GOVERNMENT OF KERALA

Kerala Development Report

INITIATIVES ACHIEVEMENTS CHALLENGES

KERALA STATE PLANNING BOARD
FEBRUARY 2021

KERALA DEVELOPMENT REPORT: INITIATIVES, ACHIEVEMENTS, AND CHALLENGES

KERALA STATE PLANNING BOARD

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Foreword

The "Kerala Development Report: Initiatives, Achievements, and Challenges" deals with the initiatives and achievements of the Government and people of Kerala, and with the challenges they face. It is a description and analysis of the major features of economic policy and development in Kerala, with an emphasis on the years from 2016 to 2020.

Kerala's accomplishment shows that the well-being of the people can be improved, and social, political, and cultural conditions transformed, when there is appropriate public action. In Kerala, the action of mass organisations and mass movements against social, political, and economic oppression and the policy actions of governments have been the most important constituents of public action. Kerala is unique in the extent of people's participation in government, particularly at local levels, and in varied forms of civic cooperation in public action.

When the present Government of Kerala came to office in 2016, it decided, against the trend at the centre and in other States, to continue the process of economic planning. The Government decided that while deepening and extending its achievements in human development, it would use these achievements as a foundation on which to create new employment opportunities for the people, particularly youth, to enhance the productive forces and increase incomes from production in agriculture, industry, and income-bearing services, and to build infrastructure.

The goal of the Thirteenth Five-Year Plan is a modern, developed Kerala, one that is marked by scientific and technological progress, by the progress of the scientific temper, and by new levels of production and decent employment, particularly for the young women and men who are entering our labour force.

The last four years and a half have been turbulent. There were extreme weather events: cyclone Ockhi in 2017, and extreme rainfall events followed by floods and mudslides in 2018 and 2019. There was an outbreak of Nipah virus disease in two districts of the State in 2018. There were new stresses on the State economy caused by demonetisation in 2016 and the introduction of GST in 2017. And in Kerala as elsewhere, the crisis associated with the Covid-19 pandemic has unsettled the economy as never before.

Nevertheless, these have been years of achievement as well.

The Economic Review 2020 shows that, despite all the setbacks, the average rate of growth from 2016-17 to 2019-20 (5.4 per cent) was higher than the average rate of growth for the previous four years, 2012-13 to 2015-16 (4.8 per cent). This rate of growth was achieved in the backdrop of a subdued international and national growth environment.

There have been the most sweeping changes in decades in public schooling, great changes in health facilities with regard to public access and quality, a transformation in major physical infrastructure, a new policy direction in industry and information technology, a deepening of participatory local government, renewed thrust to livelihoods and job creation, and an enhancement of social protection, and gender empowerment measures.

Kerala has shown resilience in the midst of all crises and always kept people at the centre of its policy decisions. The leadership of Chief Minister Pinarayi Vijayan played a crucial role in Kerala's approach to development and response to crisis.

In this Report, we present some of the policy initiatives, programmes, and schemes introduced by the Government as envisaged in the 13th Plan and the salient achievements in some sectors of the economy. The Report also describes the challenges that we face and the way ahead. The introductory chapter provides the macro achievements of the Government in brief. The detailed version is documented in relevant sections of the Report. A more comprehensive account of this government's visions, plans, schemes and programmes, and performance are available in the Approach Paper to the Thirteenth Five-Year Plan, Annual Plans from 2016-17 to 2020-21, and the Economic Review from 2017 to 2020 and other documents of the State Planning Board. These are available at https://spb.kerala.gov.in.

The Report is the outcome of the efforts of many people.

The Members of the State Planning Board (in alphabetic order: Mridul Eapen, B Ekbal, K N Harilal, T Jayaraman, R Ramakumar, K Ravi Raman, and Jayan Jose Thomas) and Chiefs of Divisions (in alphabetic order: Josephine J, N R Joy, S S Nagesh, P Shaji, Bindu P Verghese, and Santhosh Vidyadharan) are the main authors of the Report. The Members, Chiefs of Divisions, and the Economic Advisor to the Vice Chairperson drafted different sections of the Report. The Chief, Plan Coordination Division, was also involved in the initial co-ordination of the Report. The technical officers of the State Planning Board also contributed to writing different sections of the Report. Members commissioned background papers for this Report, and the authors of the background papers

have been listed elsewhere in this report. Departments and other agencies of Government sent content for the Report when requested by the Planning Board. The Senior Administrative Officer and the Plan Publicity Division helped in the selection of the printer of this Report.

V. Venu IAS, Member Secretary, Kerala State Planning Board, led the planning of the Report, reviewed chapters, participated in the editing process, and guided and coordinated its production.

Members of the editorial team in the Vice Chairperson's office included (in alphabetic order) Akhil Bharathan, Bipin Chandran, Riya Anie Cherian, T P Harshan, V Pradeep Kumar, M Reghunathan, Susmita Vinod, and C K Vijayasuryan. T P Harshan played an important role in planning and organising the Report.

Gayatri Nair IES, Economic Advisor in the office of the Vice Chairperson, led every stage in the progress of the Report: planning, receiving texts, writing and reviewing content, editing, laying out the final version, and printing. The Report would not have been possible without her efforts and her leadership of the editorial team.

I am grateful to all of them.

My colleagues in the Kerala State Planning Board and I hope that this Report serves as a document of reference with respect to the initiatives and achievements of the Government of Kerala, and as a guide when charting the future development of the State.

V K Ramachandran
Vice Chairperson
February 25, 2021

Chapter 1
Introduction and Macro Developments

Kerala has been, and remains, the most important example in independent India of the power of public action to improve the well-being of the people and to transform social, political, and cultural conditions in a State. In Kerala, the actions of mass organisations and mass movements against social, political, and economic oppression, and the policy actions of Governments have been the most important constituents of such public action.

The progress made by the State in the last five years on numerous fronts is based on the strong foundations of earlier achievements in respect of land reforms, health, school education, social justice, gender inclusiveness, and social protection.

When the present Government assumed office in 2016, it inherited an economy that was stagnant in terms of growth and one that had seen little progress in core areas in the preceding five years. The State faced serious resource constraints, mainly as a consequence of the asymmetry in India's federal system. That the structure of fiscal federalism in India is greatly biased in favour of the Centre is well known. The liberalisation regime has exacerbated the imbalance in the Indian fiscal system. This imbalance is manifested in the mechanism by which resources are shared between the Centre and the States as well as in the decreasing space for borrowing allowed to the State Governments.

Even as the Government of India abandoned Five-Year Plans and disbanded the Planning Commission, the Government of Kerala under the leadership of Chief Minister Pinarayi Vijayan reiterated its commitment to the planning process. Despite the specific form of capitalist development that now prevails, and despite the constraints that State governments must face, the Government believed that it had to present an alternative to the people. The State Government, committed to people's welfare, would address their most important economic, social, and political concerns.

The goal of the Thirteenth Five-Year Plan is a modern, developed Kerala, one that is marked by scientific and technological progress, by the progress of the scientific temper, and by new levels of production and decent employment, particularly for the young women and men who are entering our labour force.

The strategy for the 13th Plan as a whole includes the following:

1) Building a new Kerala through the four missions announced by the Government. As is now well known nationally and internationally, the leadership of Chief Minister Pinarayi Vijayan played a crucial role in the formulation of the vision for a New Kerala (*Nava Keralam*). In its first year in office, the Government of Kerala established four important missions, each of which addressed an important area of development. The missions were (i) The LIFE (Livelihood, Inclusion, and Financial Empowerment) Mission, (ii) the General Education Protection Mission, (iii) the Aardram Mission, and (iv) the Green Kerala (*Haritha Keralam*) Mission, which focuses on environmental issues.

The missions emphasise sustainable development and people's participation in the following fields:

i) high-quality school education;
ii) people-friendly health facilities;
iii) nature-friendly (including organic) agriculture;
iv) waste management, a clean environment, and a litter-free Kerala;
v) clean water bodies and enhanced water resources; and
vi) secure housing and livelihoods.

2) Increasing material production in agriculture and industry.
3) Generating employment, skill development, livelihood security, and entrepreneurship.
4) Strengthening Kerala's physical and social infrastructure.
5) Strengthening the financial infrastructure.
6) Expanding the role of modern science and technology in society and production, promoting sustainable development, and modernising governance and administration.
7) Deepening people's planning by local governments.
8) Extending social protection and the struggle against social exclusion.
9) Promoting activities centred on heritage, culture, promoting tourism, particularly responsible tourism, and building cultural and economic ties with non-resident Malayalis.

Thus, the policy of the present Government is to build on the legacy of the State, to defend the historical gains of the people, and to build a secular, democratic, inclusive alternative for social and economic development.

The 13th Five-Year Plan period has been unprecedented. There were extreme weather events: cyclone Ockhi in 2017, and extreme rainfall events

followed by floods and mudslides in 2018 and 2019. There was an outbreak of Nipah virus disease in two districts of the State in 2018. There were new stresses on the State economy caused by demonetisation in 2016 and the introduction of GST in 2017. And in Kerala as elsewhere, the crisis associated with the Covid-19 pandemic unsettled the economy as never before. The production of goods and services during the early phase of the Covid-19 pandemic came to an abrupt and almost total halt. Further, the halt to production during the Covid-19 pandemic was not locality-specific or scale-specific. Its effects were from top to bottom and across all locations. There was uncertainty about the period that it would take to resume production after the worst of the crisis was over. There is still uncertainty about how long it will take to achieve previous levels of production of goods and services, since their resumption involves national and international supply and distribution chains.

Despite the multiple challenges that the State of Kerala has had to confront – with respect to natural disaster, the pandemic, and limited financial resources and other setbacks caused by adverse Central policy – there have been short-term, medium-term, and long-term structural gains in different spheres of the economy. This chapter gives an overall introduction to these achievements; a more detailed account is in the chapters that follow.

Economic Growth

The *Economic Review* 2020 shows that, despite all the setbacks, the average rate of growth from 2016-17 to 2019-20 (5.4 per cent) was higher than the average rate of growth for the previous four years, 2012-13 to 2015-16 (4.8 per cent). This rate of growth was achieved in the backdrop of a subdued international and national growth environment.

Economic Planning

Kerala remains the only State to have made a public commitment to continue the planning process. Plans have served as instruments to structure the aspirations of the people into schemes and programmes, and divert the scarce resources of the economy to productive and socially impactful projects. The Government of Kerala formulated the 13th Five-Year Plan (2017–22), with Annual Plans to guide the development process in the State. In fact, timely interventions by the Government at times of crises were made possible by reorienting the focus of Plans to address the critical needs of the economy after the floods and landslides, and after the onset of the pandemic.

Table 1.1 *Plan outlay and expenditure, Kerala State, 2016-17 to 2019-20* in Rs crore

Year	Plan outlay	Plan expenditure	Plan expenditure as per cent of plan outlay
2016-17	24000	24470.73	101.96
2017-18	26500	29896.78	112.82
2018-19	29150	26047.32	89.36
2019-20	30610	22825.29	74.57

Source: Annual Plans.

Sustainable Development Goals

In 2018 and 2019, Kerala topped Indian States in progress in achieving UN Sustainable Development Goals in NITI Aayog's SDG India Index. The Sustainable Development Goals (SDG) India Index measures the progress made by Indian States and Union Territories towards implementing the 2030 SDG targets. Kerala ranked first in SDGs relating to health, education, and gender equality in 2018. In 2019, Kerala ranked first in SDGs relating to health, industry, innovation, and infrastructure, and second in education and gender equality.

Growth of the Productive Forces

Agriculture and allied sectors

When this government assumed office, the year-on-year rate of change in the agriculture sector was -5.1 per cent. The growth in crop production was even lower at - 7.91 per cent.

Agriculture and agricultural modernisation are key components of the 13th Plan. The main objectives set for the agricultural sector in the 13th Five-Year Plan are to enhance productivity, profitability, and sustainability in production. To enhance productivity, agriculture has to be modernised through science-based inputs and farming practices. High profitability means higher farm business incomes, and better sustainability emphasises farming practices that keep the health of the environment in focus.

The agricultural policy of the Government of Kerala has shown results. After consecutive years of decline, annual growth in the agriculture sector increased to 2.11 per cent in 2017-18, with a 1.52 per cent growth in crop production. The production of paddy increased from 5.49 lakh metric tonnes (MT) in 2015-16 to 5.87 lakh MT in 2019-20. The productivity of paddy increased from 2790 kg per hectare (ha) in 2015-16

to 3073 kg per ha in 2019-20. The production and productivity levels of paddy in 2019-20 were the highest recorded in the last ten years.

This period also saw a leap in vegetable cultivation and production. Production increased from 7.25 lakh metric tonnes from an area of 52,830 ha in 2016-17 to 14.9 lakh tonnes from an area of 96,313 ha in 2019-20.

A farmer-friendly focus has been central to agricultural policy in Kerala over the past five years. The Government of Kerala provides direct cash assistance to every rice farmer. In addition, assistance is provided by local governments to farmers. In 2020, the Government introduced royalty payments to rice farmers. Thus, close to Rs 25,000 per ha per annum is received by a rice farmer in Kerala.

Procurement of paddy increased from 5.61 lakh metric tonnes at Rs 21.5 per kg in 2015-16 to 7.01 lakh metric tonnes at Rs 26.95 per kg in 2019-20. In 2020-21, the procurement rate was further enhanced to Rs 27.48 per kg.

The State Government has positioned agriculture to be an important staging ground for recovery in the post-Covid economy. It introduced a large-scale agricultural programme called "Subhiksha Keralam" in 2020; the programme emphasises production, value addition, and marketing.

In the 13th Plan period, there was a moderate revival in milk production as a result of improved levels of intervention by the Government in milk procurement. More importantly Kerala was able to reduce its milk imports from 9 lakh litres of milk in 2016-17 to about 3.2 lakh litres per day in 2019-20. The opening of round-the-clock veterinary hospitals was an important initiative during the 13th Plan period. Currently, there are 31 such hospitals in 45 blocks across the State. In 2020-21, the coverage of such hospitals is planned to be extended to all 152 blocks in the State. An insurance scheme for cattle has been introduced by the Animal Husbandry and Dairy Departments.

Kerala's coastline is 590 km long, and the estimated number of fish workers is 10,44,000. Fisheries have been an important area of planned growth in the past four years. Fish production, which declined from 7.27 lakh metric tonnes (MT) in 2015-16 to 6.73 lakh MT in 2017-18, turned around in 2018-19, with total fish production increasing to 8.02 lakh MT. Despite the major setback caused by the floods of 2018-19, State-led efforts towards the revitalisation of waterbodies and good fisheries management have also resulted in an increase of about 15 per cent in inland fish production between 2014-15 and 2018-19. Fish seed production increased from 218 lakh fingerlings in 2016-17 to 374 lakh fingerlings in 2018-19, thus providing a major impetus for aquaculture.

Commissioning the Muvattupuzha Valley Irrigation Project is a major achievement of the 13th Plan. This was part of the efforts of the Government to complete the ongoing major and medium irrigation projects in the State, mainly the four projects at Muvattupuzha, Idamalayar, Karapuzha, and Banasurasagar. Increased focus on minor irrigation resulted in the expansion of net irrigated area over the period from 3.92 lakh ha in 2017-18 to 4.09 lakh ha in 2019-20.

Industry

A turnaround in the performance of the manufacturing sector has been central to the revival of Kerala's economy from 2016 onwards. There has been a steady increase in the size of Kerala's manufacturing sector, in value terms, especially so over the last four years. The share of manufacturing in Kerala's GSVA increased from 9.8 per cent in 2014-15 to 12.5 per cent in 2019-20. According to data from the Annual Survey of Industries, Kerala's share in gross value added by India's factory sector increased from 1.2 per cent in 2014-15 to 1.6 per cent in 2016-17. Despite the economic recession, the manufacturing sector of Kerala grew at 1.5 per cent at constant prices (2011-12) in 2019-20.

Major highlights of the improved performance of Kerala's manufacturing sector from 2016-17 onwards include a revival in the performance of State PSUs (mainly in the chemicals and electrical machinery sectors) and a continuing vigour in the growth of micro, small, and medium enterprises (MSMEs).

One of the notable achievements for Kerala in the sphere of industry has been a favourable change in perception among potential entrepreneurs over the last few years. Important events such as Ascend in 2019 and 2020 were held to attract industrial investments to the State. Kerala also implemented policy measures to improve the ease of doing business in the State. The Kerala Micro Small Medium Enterprises Facilitation Act 2019 is one of the key initiatives under the Ease of Doing Business Reforms of the Industries Department.

Kerala has taken steps to implement the high-tech industrial corridor project connecting Kochi and Palakkad. The corridor is expected to stimulate large investments in the areas of high technology manufacturing, agro-processing, information technology, biotechnology, and life sciences and will be one of the key centres for Kerala's industrial growth.

Service Sectors

Information technology

The Government of Kerala has taken major strides ahead in the Information Technology (IT) sector in the last four years. The sector saw the entry of world-renowned companies into the State.

The Kerala Fibre Optic Network (KFON) and Skill Delivery Platform Kerala are major initiatives in the 13th Plan. KFON, which is a project initiated by the Government of Kerala to provide seamless internet connectivity to Government offices and free internet connectivity to 20 lakh economically backward households, is nearing completion.

The State Government's 2017 IT policy aimed to transform Kerala into a knowledge-based society and leading IT destination. It also sought to build the necessary technological infrastructure for the creation of an environment favourable to ICT development, and to enhance the necessary human capital required to both produce and use innovative technologies through education and skill building.

The State received various awards for development in the Information Technology sector over the recent period. These include the SKOCH Award 2019 for its e-procurement project; the Digital India Award 2019 for initiatives providing comprehensive web and mobile-based services to its citizens; the Tech Sabha Award 2019 for co-ordinating flood damage assessment survey process in Kerala; and the Governance Now Digital Transformation Award 2019 for projects such as K-Fi-Digital Infra, Kerala State Portal and m-Keralam mobile app.

Innovations and startups

In 2019, the Department for Promotion of Industry and Internal Trade, Government of India, ranked Kerala as the top performer among States in respect of creation of a startup ecosystem. Under the Kerala Startup Mission, an Integrated Startup Complex was created at Kochi, which is one of India's largest innovation hubs. The Complex covered a space of 1.8 lakh square feet.

There are presently 2,900 registered startups in Kerala. These cover more than four lakh square feet of incubation space, and account for Rs 1,500 crore external investment, value creation of Rs 1,00,000 crore, and an employee base of 25,000. In 2020, 399 startups were registered in Kerala, a growth of 18 per cent over the previous year. To promote innovations in the State, the Kerala Development and Innovation Strategic Council has been formed.

Tourism

In 2017, the Government of Kerala announced a new tourism policy, outlining a new framework and significant new areas of attention in tourism. In the last four years, while the Government continues to pay attention to destination development, new emphasis and an increased share of investment has gone to promotion and marketing in the tourism sector.

After the floods of 2018 and 2019, the Government and tourism industry worked together to rebrand the State's tourism sector. The tourism sector rebounded strongly in 2019. There was a 17.2 per cent year-on-year increase in total tourist arrivals in 2019. This growth in tourist arrivals was the highest after 1995. The percentage growth in the inflow of foreign and domestic tourist arrivals in 2019 over 2018 was 8.5 per cent (foreign tourist arrivals) and 17.8 per cent (domestic tourist arrivals). Total foreign exchange earnings from tourism crossed Rs 10,000 crores for the first time in 2019, reaching Rs 10,271 crore. The total revenue generated from the tourism sector in 2019 registered a 24.1 per cent rise over 2018 to reach Rs 45,011 crore.

The public recognition of Kerala's achievements in the tourism sector can be gauged by the national and international awards that the State has received. Prominent among these are the United Nations World Tourism Organisation (UNWTO) Award for Emerging Global Destinations – Accessible Destination Award 2019 for Barrier-free Tourism Project implementation, the Pacific Asia Travel Association (PATA) Grand Award for Kerala Tourism's "Human By Nature" Campaign, the Das Goldene Stadttor 2020 for Kerala Tourism's "Human By Nature" Campaign, the PATA Gold Award for the Kerala Tourism Campaign titled "Come Out and Play," the PATA Gold Award for the Kerala Tourism website, and the PATA Gold Award for women's empowerment. The State also received the Lonely Planet Travel Award for Best Destination for Families 2018, the PATA Gold Award 2018 for the Best Honeymoon Destination in India, and the World Travel Mart Gold Award 2018 for (i) Responsible Tourism and (ii) Managing Success in Tourism. Kerala Tourism also won national-level awards such as the National Tourism Award (2018) for Wayanad Responsible Tourism Project under the Category Best Responsible Tourism Project, and Outstanding Achievement Award for Responsible Tourism Mission at the Indian Responsible Tourism Awards (IRTA 2018).

In 2020, the Covid-19 pandemic brought tourism

to a standstill, affecting the livelihood of entrepreneurs and people employed in the sector. Tourism will play a crucial part in the post-pandemic revival of the economy, and the Government of Kerala is gearing up for the next stage of advance of the industry.

Infrastructure: A Big Push

Infrastructure development received a push with the revamping of Kerala Infrastructure Investment Fund Board (KIIFB). The revamping of the Board in 2016 significantly altered its scope, power and structure. The Board is an innovative mechanism to build infrastructure by raising funds through extra-budgetary sources, and has shown that it has the potential to bring about a major transformation in the State by ushering in medium and large infrastructure projects.

Some of the major projects financed by KIIFB include the Kerala Fibre Optic Network, Petrochemical and Pharma Park in Kochi, Coastal and Hill Highway, Transgrid 2.0, Life Science Park in Thiruvananthapuram, and the Hi-Tech School Programme. The KIIFB has approved 895 projects of more than Rs 60,000 crore, an investment that will play a major role in the future economic growth of the State.

Certain major infrastructure projects were completed over the current Plan period. The Kochi Metro started operations. The Kannur International Airport was inaugurated on December 9, 2018. The highway bypasses at Kollam and Alappuzha have become operational. The construction of the Hill Highway and Coastal Highway are progressing. The Government of Kerala launched the "Oorja Kerala Mission" in 2018, aimed at the integrated development of the electricity sector in the State. Transgrid-2, one of the components of the Mission, is a major initiative aimed at strengthening the transmission network to meet the future energy requirements of the State.

Housing

LIFE is a remarkable and unique system of providing modern decent housing to homeless people. It envisages higher investment than all previous housing schemes in the State, and provides individual houses and apartment housing. More than 2.5 lakh houses have been constructed under LIFE Mission. LIFE has been a very popular scheme of the Government.

Food Security for All

The Government took steps for the successful implementation of the National Food Security Act, 2013 and ensured food security at all times, including crisis periods. As part of relief measures during the floods of 2018, the Government provided 15 kg of rice to the affected people and people living near the coastal areas free of cost. In the wake of the Covid-19 pandemic, the Civil Supplies Department of Kerala is in the forefront in ensuring that no one is deprived of essential commodities in this pandemic. Essential items are distributed free of cost to all ration card holders. There are 88 lakh ration card holders in the State. In April 2020, the Government provided a 17-item *Athijeevana* kit to 84 lakh ration holders in the State. (Details of public rationing in this sphere are given elsewhere in this volume.)

Scheduled Tribes and Scheduled Castes

The emphasis of Government policy has been to strengthen welfare programmes, strengthen educational provisioning through scholarships and facilities for home study, skilling, and new initiatives in agriculture for persons belonging to the Scheduled Tribes. Similar programmes in the sphere of welfare programmes, education, and skilling were implemented for persons belonging to the Scheduled Castes. The Government also implemented the Ambedkar Village Development Scheme, a scheme for development of amenities in settlements where there is a concentration of homes of people belonging to the Scheduled Castes.

Local Governments: Unleashing People's Potential

In 1996, the LDF Government initiated the first phase of the People's Campaign to make Kerala a model in devolved governance. In 2016, the second phase of the People's Campaign was launched to further strengthen local governments. In the past four years, local governments have streamlined the planning process and improved the implementation of Plans, recording high levels of plan expenditure. A notable feature of this period has been the formulation of District Plans.

At present, there are 1200 local governments in Kerala, including 941 Gram Panchayats, 152 Block Panchayats, 14 District Panchayats, 87 Municipalities, and 6 Municipal Corporations. The recently held election to local bodies in the State in December 2020 has brought in new governments at the helm of affairs in all the tiers of government.

Local Governments have played a crucial role in times of crises, like during the floods and other disasters of 2018-2019, and in the management and containment of the Covid-19 pandemic.

The frontline role played by local bodies and their elected representatives during the Covid-19 pandemic has been widely acclaimed. Some of the noteworthy activities of local bodies in this period include: the establishment and management of community

kitchens during lockdown; cleaning and disinfection activities; organising and running "break the chain" and social distance campaigns and awareness programmes; providing accommodation, food and other essential support to migrant ("guest") workers; coordinating home quarantines, counselling and isolation; establishing institutional quarantine for persons returning to Kerala from other parts of India and abroad; establishing and managing Covid First Line Treatment Centres; engaging personnel in health institutions managed by Local Governments; purchasing medicines and other equipment for hospitals run by Local Governments; distributing free medicines; implementing local economic plans to help people who lost jobs; increasing food production and self-sufficiency in the field of agriculture under the Subhiksha Keralam programme; and making arrangements for local dissemination of internet connectivity for school children.

Science and Technology

The establishment of the Institute of Advanced Virology in 2019 is a significant milestone in the 13th Plan Period. The institute, which is envisioned as an institute of global standards, will focus on research, diagnosis and management of emerging and re-emerging infectious viral diseases. Scaling up the activities of the Kerala School of Mathematics by starting an integrated MSc and PhD programmes and strengthening the programme to recruit post-doctoral scholars are other significant achievements. Women empowerment programmes were undertaken to support women who underwent career breaks and to attract women and girl students to the study of the natural sciences.

Cooperatives and the Kerala Bank

Cooperation and primary cooperatives are Kerala's strength, a rich legacy of our freedom movement. People's confidence in these institutions is part of Kerala's historical heritage. Today, these institutions form the backbone of much rural economic activity in the State. One of the major achievements of the present Government has been to strengthen the cooperative system by forming the Kerala Bank, which will be one of the largest banking networks in the State, in 2019. The new Bank has been formed by merging all the District Cooperative Banks with the Kerala State Co-operative Bank. A Co-operative Policy was formulated for the first time in the State in 2019-20. The policy envisages a focused development for the co-operative sector with the view to ensure sustainable development of the State.

Human Development

Education

The visible outcome of the State Government's "Public Education Rejuvenation Mission" that started in 2016, and aimed to raise the quality of infrastructure, teaching, and learning in State schools, can be seen in the massive shift of students from unaided to government and aided schools between 2016-17 and 2020-21. In this period 6.8 lakh additional children enrolled in government and aided schools. Over four years and a half, the Government invested heavily in new-generation public schools throughout Kerala, with the objective of making the best possible school education available to every child in the State.

As part of the hi-tech school project, Kerala Infrastructure and Technology for Education (KITE) has converted 44,705 classrooms (standards 8 to 12) to hi-tech classrooms in 4,752 government and aided schools in the State. Smart classrooms and computer laboratories for primary classes are nearing completion. The Government has upgraded school infrastructure in 184 schools with funds from KIIFB.

In many parts of India and the world, school children, particularly underprivileged children, were left stranded by the pandemic. The Government of Kerala reached out to school children and, with the support and efforts of local governments and communities throughout the State, was able to ensure academic continuity to them.

Despite the pandemic, this year's academic session began, as in previous years, on June 1. Online classes were conducted through a scheme titled "First Bell" run by KITE.

Health

Another salient feature of Kerala's progress in human development is its public health system, and the access that all its citizens have to preventive and curative health at all times. This aspect of its development path has won Kerala national and international appreciation. The health sector has also been a model for other States of India in dealing with public health exigencies, as its experience in dealing with the Nipah virus outbreak in 2018 and the Covid-19 pandemic has shown.

The Aardram Mission of the Government has helped improve the functioning of government hospitals, from Primary Health Centres to government Medical Colleges. Primary Health Centres (PHCs) are being converted to Family Health Centres (FHCs). Every Family Health Centre has at least three doctors and four nurses available through the day. A list of 53

common ailments has been prepared; all of those are treated at the FHC. In the first phase in 2017-18, the Government identified 170 PHCs for conversion to FHCs. In the second phase in 2018-19, 504 PHCs were selected for development into FHCs. Under the third phase of the Aardram Mission, 212 PHCs are being converted into FHCs. In addition, 76 Community Health Centres (CHCs) will be converted into Block Family Health Centres. Infrastructure in hospitals at the taluk and district was upgraded and outpatient facilities in large hospitals were made more people-friendly as part of the Aardram Mission. Because of the improved implementation of the health insurance scheme, more income-poor patients are getting free treatment.

Kerala's Covid-19 containment strategies were varied, and its popular messaging effective. The "Break the Chain" campaign was initiated by the Government to reduce the spread of the virus, through physical distancing, regular hand washing, and use of sanitisers. Mass sanitisation campaigns were conducted, and sanitisers and handwashing facilities were installed in public spaces. The Government also mobilised its resources to produce hand sanitisers and masks. Special care was accorded to migrant workers. (A more detailed account of health policy during the pandemic can be found elsewhere in this volume.)

Labour

Key interventions in the field of labour were in respect of the protection of labour rights, strengthening labour legislation, increased wages, protecting livelihoods in each phase of crisis, protecting migrant workers, and expanding programmes of widespread and inclusive skilling.

The Government took special care of migrant workers during the Covid-19 pandemic. There were approximately five lakh migrant workers at the time of lockdown in Kerala. They were sheltered in 21,556 camps all over the State. Food, water, and recreational facilities were provided to them in the camps.

Social Schemes

Pensions

Welfare pensions have increased from Rs 600 per beneficiary in 2016 to Rs 1600 per beneficiary in 2021. The number of social security pensioners, which was 34 lakh in 2015-16, has increased to 48.6 lakh in 2021. Among social security pensioners, 30 per cent received pensions for the first time during the period of this Government. The Government paid pensions two months in advance when the pandemic struck. Measures were taken to ensure that the money reached the homes of beneficiaries without delay.

Gender

Though Gender Budgeting has been central to Kerala's plans process since the 11th Plan, it was only in 2017-18 that the first Gender Budget document for the State Plan, which aggregated resources earmarked for girls/women across departments, was released. More than 10 per cent of Plan funds are allocated for gender development. As a proportion of the Plan, the gender budget has increased from 11.5 per cent in 2017-18 to 14.6 per cent in 2018-19, and 16.8 per cent in 2019-20. The gender budget constituted 18.4 per cent of the Plan for 2020-21. In 2021-22, it is almost one-fifth (19.5 per cent) of the State Plan.

In 2017, the Government started a new department for the welfare of women and children in the State by bifurcating the Social Justice Department. The Department of Women and Child Development was formed to give more focus to activities aimed at social assistance and the empowerment of women and children. Within less than three years of its formation the Department initiated a range of programmes focussed on the prevention of gender-based violence and child abuse, for the rehabilitation of survivors, gender awareness creation, good parenting, care and assistance to vulnerable women such as street dwellers, widows, assistance to female-headed families to meet unexpected financial crises (Athijeevika), and for the vocational training of women living in welfare institutions.

The Government of Kerala took up measures to ensure the freedom and safety of women through mechanisms such as the 181 Women Helpline, a 24/7 emergency response service for women in need; the "Ente Koodu" project, which provides shelter for women and children from 5 pm to 7 am; "She Lodges," a service to ensure accommodation facilities for women travellers; and district-level woman police patrols and police control rooms for women in all districts. The Government enacted a law to ensure that women workers are entitled to safe seating facilities in workspaces.

It has been the policy of the State Government to ensure equal opportunities for women in all spheres of public employment, and to facilitate their equal access to public spaces in the State. The Government of Kerala appointed women sub-inspectors in police stations, and increased the representation of women in the police to 25 per cent. Women police battalions and commando platoons were also established. For the first time in history, women have been inducted into the Kerala Fireforce Service; 100 posts have been created in

this regard. Of the total number of persons elected to local bodies in the elections of 2020, 54 per cent were women.

Specific budgetary allocations were made under an umbrella scheme called Mazhavillu in the 13th Plan period to ensure transgenders a life of dignity and basic rights to education, health care, and employment.

Persons with disabilities

In 2019, the Ministry of Social Justice and Empowerment, Government of India, judged Kerala to be first among the States of India in promoting empowerment among persons with disabilities. The award is in recognition of the innovative projects implemented by the Government for welfare, protection of rights, and empowerment of persons with disabilities. In 2018-19, the Kerala State Handicapped Persons Welfare Corporation received the award for Best Channelising Agency of National Handicapped Finance and Development Corporation.

Kerala has adopted a rights-based comprehensive life cycle approach for the welfare of persons with disabilities. The focus of the approach has been undertaking prevention initiatives, early screening, early intervention through District Early Intervention Centres (DEICs) and other health and social sector institutions, education support through special anganwadis, Buds Schools, Model Child Rehabilitation Centres, Special Schools, inclusive education and vocational training, community based rehabilitation and assisted living projects among others.

Engagement with Kerala Diaspora

The Government took important measures to increase its engagement with the Kerala diaspora by forming the Loka Kerala Sabha. The Loka Kerala Sabha aims to promote the unique culture and heritage of Kerala among Malayali expatriates. It comprises all members of the State Legislature, Members of Parliament representing Kerala, and persons elected from non-resident Keralites (NRKs) living within and outside India. Two Loka Kerala Sabhas have been held in 2018 and 2020. Measures have been already taken to implement the suggestions that emerged in the first Loka Kerala Sabha. The suggestions of the second event are being reviewed.

Resilient Kerala

The State of Kerala has demonstrated an exceptional capacity to deal with crisis. The floods of 2018 saw public action reach new heights. The Government responded to the crisis swiftly, undertaking immediate rescue and relief work. The speedy, meticulous, and people-oriented handling of the crisis by the State won admiration from all over the State – and from other parts of India and the world.

After the floods of 2018, the Government laid out a vision for a more climate-resilient State. The crisis was seen as an opportunity to rebuild, ensuring better standards of living to all sections of society. As part of this effort, the Rebuild Kerala Initiative was started. The Government formulated a Livelihood Development Package to revive the livelihoods lost in the floods.

Managing the Pandemic

The Government of Kerala took early action with respect to the pandemic. The State was the first to announce a substantial programme, much ahead of other States and the Central Government, to address the anticipated economic impact of the Covid-19 pandemic in the form of a Rs 20,000 crore package.

The many-sided response of the State is discussed in detail in another part of this report. Among the highlights is that as an immediate measure the Government set aside Rs 1320 crore to disburse welfare pensions in advance for two months in March 2020. Another Rs 100 crore was allocated to provide Rs 1000 each for families that were not eligible for welfare pensions. In the subsequent two months, Rs 2000 crore was disbursed as loans through the Kudumbashree scheme, with the State Government bearing the interest component. In addition, Rs 2000 crore was set aside to provide jobs under the employment guarantee scheme.

The State Government created a five-tier structure outside the health infrastructure comprising home quarantine, Domiciliary Care Centres, Covid First-Line Treatment Centres, Covid Second Line Treatment Centres and designated Covid Hospitals. These provided care and support to Covid patients. The Government of Kerala also appointed an Expert Committee with Dr B Ekbal, Member, State Planning Board, as Chair to advise the Government on Covid-19 control. The committee met every day from March 20, 2020 to March 20, 2021 (and has met once a week thereafter) and submits its findings and suggestions to the Government of Kerala.

Covid-19 treatment was made free in Government hospitals, including testing. At all times, food was also provided free of cost to all patients. In addition, psychological support was also provided to all Covid positive patients and other persons in quarantine through dedicated psychological support team.

To sum up, the hallmarks of Kerala's response to Covid-19 included a strong public health infrastructure

built under Aardram Mission, information dissemination at the highest level spearheaded by the press conferences of the Chief Minister, at which he provided up-to-date information on the status of the pandemic and government action. It included provisioning of food and shelter to the needy in the most difficult times.

The Health Department also launched e-Sanjeevani telemedicine services in Kerala on June 10, 2020. They provide services in a centralised manner. DISHA is the State hub managing the telemedicine activities for the State.

In every one of the crises it has had to face, the Government of Kerala has put people's welfare at the centre of its policy response. With respect to the State's response to the pandemic, as early as May 2020, one of India's most senior journalists wrote thus of Kerala's policy approach:

> The government gave four assurances to the people and implemented them in letter and spirit. It also did so with complete transparency. First, no one would go hungry and without a safety net of essential commodities and services. Every agency and arm of the government, backed by armies of volunteer citizens, worked hard to deliver on this promise. Secondly, nobody would go without shelter. The way the State looked after large numbers of highly vulnerable migrant workers was certainly a model for other States and also for the central government. Thirdly, everyone would have access to the health system, with its three tiers, as needed. The government's policy approach was unwaveringly to follow the science . . . . Free testing was part of the Kerala safety net. There is some evidence to show that proactive testing in the early days of the Covid-19 outbreak helped to flatten the curve and keep the number of cases at a low or manageable level . . . Fourthly, there would be a free and continuous flow of information, as befits a State that takes the rights of its citizens seriously. Chief Minister Pinarayi Vijayan's daily press conferences and the constant communication the government maintained with the people at large built and sustained trust at a high level. (Ram 2020)

The Kerala of the future will continue to build on its strengths in social spending, social welfare, and social justice. It will continue to use these as a foundation for further and accelerated growth in the productive forces and production in the economy. We look forward to sustained efforts to apply science, technology, modern skills, and the skills available to a "knowledge economy" to enhance growth in agriculture, allied activities, modern industry, infrastructure-building, and income-bearing services. Economic policy will be designed to modernise and enhance the system of higher education, and to provide Kerala's youth with the best forms of skilled employment available in a modern economy.

This Report deals with the initiatives and achievements of the Government and people of Kerala, and with the challenges they face in certain salient sectors of the economy. It is a description and analysis of economic policy and development in Kerala, with an emphasis on the years from 2016 to 2020 (and the first four years of the Thirteenth Five-Year Plan). It is presented to the public as a document of reference and a guide for future efforts in the field of economic planning in the State of Kerala.

References

Ram, N. (2020), "Kerala's Exemplary Response to the Pandemic Crisis," *Kerala Calling,* May.

Chapter 2
Agriculture and Allied Activities

Agriculture in Kerala: An Assessment of Progress and a Road Map for the Future

Introduction

Over the last 50 years, agriculture has had a special and unique place in Kerala's economy. To begin with, agriculture served as a driver of economic growth by expanding the size of the rural home market. It was the presence of high-value, commercial crops in the cropping cycle – spices, plantation crops and rubber – that helped raise Kerala's rural incomes substantially. In 2018-19, spices and plantation crops accounted for 23 per cent of the total Value of Output (VOO) from crops.[1] As a consequence, VOO per hectare (ha) of net sown area in Kerala was Rs 1745, comparable to Punjab's corresponding figure of Rs 1813.

Agriculture was also a successful contributor to structural change in Kerala's economy. In 2018-19, agriculture and allied sectors contributed only nine per cent to the Gross State Value Added (GSVA). Unlike India as a whole, this fall in agriculture's contribution to GSVA in Kerala was accompanied by a sharp fall in the number of workers employed in the primary sector; in 2018-19, only 19.3 per cent of the workers were employed in the primary sector in Kerala.[2]

The important question that arises, then, concerns the future of Kerala's agriculture. Will it mirror the experience of the advanced capitalist world, where the agricultural sector's share has shrunk to less than three per cent of the economy, and where production is organised on corporate, industrial lines? Or will the sector be able to modernise itself to organise agricultural production on a larger scale, but based on non-corporate, more collective forms of production organisation and the adoption of advanced technology? Alternatively, will agriculture continue to retain the features of a small peasant economy, tied to a low-yield low-income cycle, striving to protect the livelihoods of landholders?

This paper attempts to provide an assessment of the agricultural sector in the State over the last decade and point to possibilities and challenges over the next decade. The objective is to ensure the consolidation of past gains, and to view a future based on those gains. This chapter is a broad statement of prospects and pathways, and not a specific programme of action. It is submitted for broad-based discussion among farmers, scholars, and activists, in order to facilitate the formulation of policies in the future.

Major Features of Kerala's Crop Economy

Kerala's agricultural sector is marked by a set of features that sets it apart from other Indian States.

First, the share of non-agricultural area in the total geographical area of Kerala rose from about 7 per cent in the mid-1970s to about 12 per cent in 2018-19. Concurrently, the share of net sown area in the total geographical area fell from about 57 per cent to about 53 per cent. In addition, the share of fallow land (as a sum of current fallow, fallow other than current fallow and cultivable waste) in the total geographical area rose from about 1.7 per cent to 3.6 per cent.

This feature of Kerala's agriculture is significant. Because of the inflow of remittances and the sharp growth of the services sector, land is a highly valued commodity. Land prices in Kerala are among the highest among Indian States. The demand for land for non-agricultural purposes – construction of houses and non-farm establishments – is high. As a result, there is enormous pressure on agricultural land, and the conversion of agricultural land into non-agricultural land has been taking place legally and illegally. Unless returns from agriculture rise faster than the returns from non-agricultural land, these trends are likely to continue and intensify over the next decade.

Secondly, within the land used for agricultural purposes, there was a shift from food grain towards non-food-grain crops. From about 9.5 lakh ha in 1970-71, the area cultivated with food grain fell to 2.9 lakh ha in 2004-05 and 2 lakh ha in 2018-19. The precipitous decline in the area cultivated with paddy was the major reason for the shift. While a part of the area cultivated with food grain was diverted to non-agricultural uses, another part was used to cultivate non-food-grain crops. Thus, the area cultivated with rubber rose from 1.8 lakh ha in 1970-71 to 4.7 lakh ha in 1999-00 and 5.5 lakh ha in 2018-19. The area cultivated with coconut rose from 7.2 lakh ha in 1970-71 to 9.2 lakh ha in 1999-00, though it fell to 7.6 lakh ha by 2018-19.

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[1] All figures on VOO are from the Central Statistics Office (CSO).

[2] The employment figures are from the NSSO's Periodic Labour Force Survey (PLFS) for 2018-19 as per the current weekly status.

The shifts in the cropping pattern after the 1970s also implied that Kerala's fortunes in agriculture were determined largely outside Kerala. The free trade policies of the Central Government after 1994 had a strong adverse impact on Kerala's agricultural sector. The prices of most commercial crops became increasingly integrated with global agricultural prices. Further, many of the promotional schemes with respect to these crops were designed and implemented by Commodity Boards under the Ministry of Commerce. Under the policies of neoliberalism, budget allocations for these Boards declined, and the production and marketing institutions supported by them were weakened. Such withdrawal did not just affect the sector adversely, but also burdened the State Government with new responsibilities at a time when its own fiscal space was shrinking.

Thirdly, the workforce involved in Kerala's agriculture has specific features. Data from the Situation Assessment Survey (SAS), conducted by the NSSO in 2012-13, showed that only 27 per cent of agricultural households in Kerala reported agriculture as a major source of income. The corresponding share for India as a whole was 61 per cent. To put it sharp, Kerala has a substantially smaller share of "full-time" farmers than India as a whole; most are "part-time" farmers. This feature has a major influence on the extent of time, the amount of effort, and the intensity of care given to farms. Most farms are maintained unscientifically, leading to low levels of investment, productivity, and income. This is also one reason why the extent of fallow land has risen over the years.

Fourthly, Kerala has a predominance of small and marginal farms; the average holding size, as per the Agricultural Census, is 0.18 ha or 0.45 acre. The smallness of farms is a major obstacle to farmers reaping the benefits of economies of scale as well as adopting modern technologies, particularly machines. Farm size is also a constraint in the aggregation of produce at the local-level, thus weakening the bargaining power of farmers in output markets. As a result, the producer's share of the consumer's rupee in Kerala's agricultural value chains is low. While farmer's collectives, such as cooperatives or farmer producer companies (FPC), can provide alternatives, their presence in the sphere of production is not a dominant feature of the State.

Fifthly, given the rise in the share of non-agricultural manual labourers in the work force, there are complaints related to the shortage of agricultural workers in Kerala's farms. Agricultural activities are adversely affected due to this constraint across crops, but particularly in the cultivation of labour-intensive food grain. This phenomenon demands rapid mechanisation of agricultural tasks. However, the small size of most farms and the absence of machines suitable for purchase or use in these small farms have meant that the density of use of implements in Kerala is lower than in other States.

Sixthly, though Kerala has 41 west-flowing and three east-flowing rivers, and has an annual rainfall of about 3000 mm, the extent to which it is able to retain, store, and use these waters for agricultural purposes is still inadequate. The absence of adequate irrigation is one reason for the low productivity of crops. In addition, official data show a fall in the index of multiple cropping in the State. If the index of multiple cropping was 1.36 in 2001, it fell to 1.30 in 2011 and 1.26 in 2016.

In part, blame could be placed on the lop-sided emphasis on paddy cultivation in the design of irrigation projects; this led to disregard for the water requirements of other crops. But the historically inadequate emphasis in policy on small and medium irrigation projects, as well as minor-irrigation structures like check dams and lift irrigation projects, is also to be blamed. Further, the need for larger reservoir-like storage structures to store monsoon waters in the rivers in conjunction with smaller rainwater harvesting structures was never considered a priority item in previous plans in the State.

Seventhly, productivity-levels are low in Kerala also because of unscientific and imbalanced farming practices.

1) Kerala is one of the lowest fertilizer-consuming States in India. In 2018-19, Kerala's consumption of N, P, and K fertilizers was 36.4 kg per ha, which was the lowest among all Indian States. The corresponding figure was 186.4 kg per ha in Tamil Nadu, 126 kg per ha in Maharashtra, 224.5 kg per ha in Punjab, 173.3 kg per ha in Andhra Pradesh and 161.1 kg per ha in West Bengal.
2) Kerala's consumption of N, P, and K fertilizers has declined alarmingly over the last decade, from 106.2 kg per ha in 2010-11 to 43.8 kg per ha in 2015-16 and 36.4 kg per ha in 2018-19. The implications of this decline for the sustenance of soil health have not been adequately studied.
3) Wide gaps exist between the requirement and sales of major fertilizers in Kerala. In September 2019, 3500 metric tonnes of di-ammonium phosphate were required, while only 1831 metric tonnes were sold. Similarly, 11,000 metric tonnes of muriatic of potash were required, but only 8339 metric tonnes were sold. On the other hand, 9000 metric tonnes of urea

were required, but 11,578 metric tonnes were sold. Such imbalances, at wide variance from the official Package of Practices, have been a major constraint on the scientific practice of agriculture in the State.

Finally, while agriculture in Kerala is practiced in homesteads, marked by inter-cropping and multiple-cropping, most plan schemes of the Government are crop-centred. More recently, the focus of the Department of Agriculture has turned to planning for agroecological units, which is commendable. However, the design and implementation of schemes continue to be crop-centred. In addition, while livestock and fisheries are an integral part of the homestead systems of farming, these components are the domain of different departments, which presents challenges in the convergence of activities at the ground-level.

Performance of Agriculture during the 12th Five-Year Plan and 13th Five-Year Plan

Trends in Gross State Domestic Product (GSDP), Gross State Value Added (GSVA) and Value of Output (VOO)

For the data on Gross State Domestic Product (GSDP) and Gross State Value Added (GSVA) from agriculture in Kerala, two series are constructed: the first of real GSDP between 1980-81 and 2013-14 based on the base year of 2004-05 and the second of real GSVA between 2011-12 and 2018-19 based on the base year of 2011-12 (Figure 2.1). The GDP from agriculture began to rise from 1987-88 till 1997-98, and stagnated thereafter till 2013-14. The GSVA from agriculture fell sharply between 2011-12 and 2015-16. Between 2011-12 and 2015-16, the GSVA from agriculture fell by Rs 6258 crore in real terms. Thereafter, it stagnated and then fell again in 2018-19 and 2019-20 because of the adverse impact of the two major floods. In sum, there were no major stretches of growth in Kerala's agriculture after 1997-98.

After 2015-16, as part of the conscious policy interventions under the 13th Plan, the downward slide in agriculture was halted. If floods had not hit Kerala in 2018 and 2019, the agricultural growth rate in 2018-19 and 2019-20 would have been positive and high. Estimates show that damages to the crops sector due to the floods in 2018 alone were to the tune of Rs 2,722.5 crore. These included the destruction of irrigation systems and structures, destruction of crops, agriculture buildings and assets and soil degradation. Estimated production losses in the crop subsector were estimated at Rs 3,558.2 crore. About 89,610 ha of crops suffered. About 30,945 ha of perennial crops were destroyed; pepper, arecanuts, banana and coconut were the most affected. Over 109 million trees and plants were completely damaged (Government of Kerala 2018).

In addition to GSDP and GSVA, we also use data on value of output (VOO) in agriculture put together by the Central Statistics Office (CSO) (Figure 2.2). Here too, we see that the VOO fell between 2011-12 and 2015-16 by about Rs 5741 crore. There was no sign of revival at least till 2017-18.

Another interesting feature has been the declining share of the crop sector within the fortunes of the larger rubric of agriculture and allied sectors. If we consider GSVA figures, the crop sector had a share of 60 per cent in the overall GSVA in 2011-12 (Table 2.1). This declined to 53.2 per cent 2019-20. On the other hand, the share of the livestock component rose from 23.3 per cent to 26.7 per cent. The share of fisheries component also rose from 7.8 per cent to 10.2 per cent.

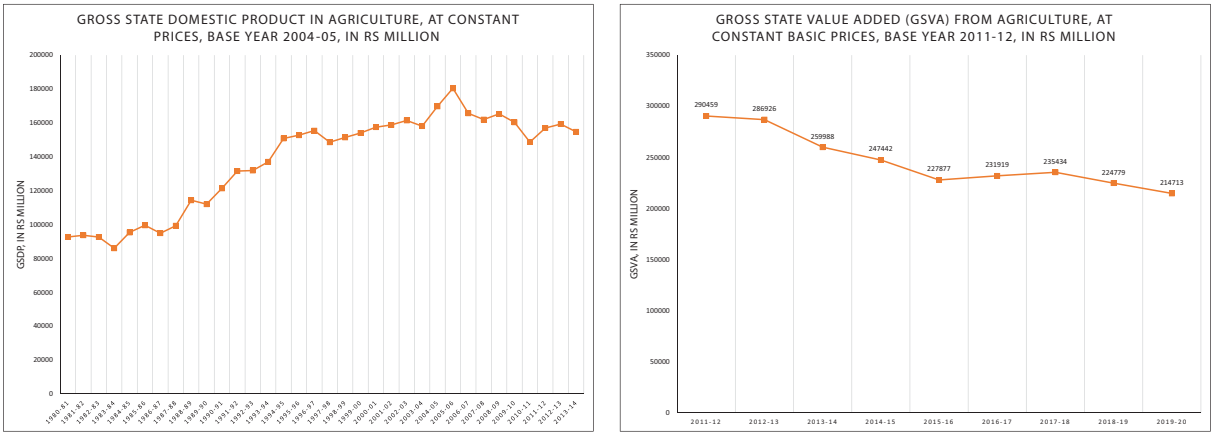


Figure 2.1 *Trends in GDP and GSVA from agriculture, Kerala, 1980-81 to 2019-20, at constant prices,* in Rs million

Source: Central Statistics Office

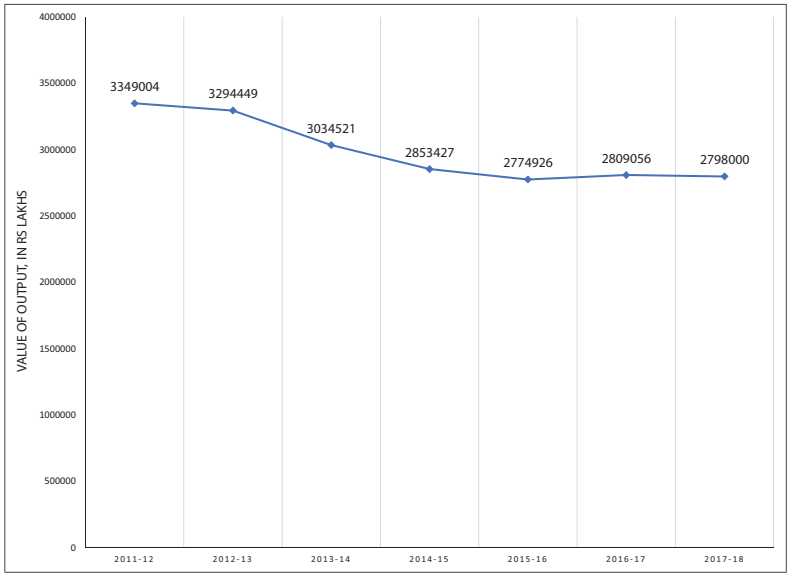


Figure 2.2 *Value of output from all crops, Kerala, in 2011-12 prices*, 2011-12 to 2017-18 in Rs lakh
Source: Central Statistics Office

Table 2.1 *Share of GSVA from each component within the total GSVA from agriculture, forestry and fishing, Kerala, 2011-12 to 2019-20* in per cent

Year	Share of GSVA from each sector (%)				
	Crops	Livestock	Forestry and logging	Fishing and aquaculture	Total
2011-12	60.0	23.3	8.9	7.8	100.0
2012-13	58.5	25.1	8.8	7.7	100.0
2013-14	56.6	26.9	7.9	8.7	100.0
2014-15	53.8	27.8	9.0	9.4	100.0
2015-16	52.2	29.1	9.5	9.1	100.0
2016-17	53.5	27.1	10.1	9.3	100.0
2017-18	53.2	27.0	9.6	10.2	100.0
2018-19	52.0	27.0	9.9	11.1	100.0
2019-20	53.2	26.7	9.9	10.2	100.0

Source: Central Statistics Office

If we go by data on crop-wise VOO, most crops grown in Kerala were affected adversely by the downturn of agricultural growth after 2011-12 (Figure 2.3). The only exception appears to be spices and condiments, where a moderate growth was recorded due to a better performance in cardamom production.

Most crops other than cardamom suffered a decline in production after 2011-12 (Figure 2.4). There was a stemming of the decline, and even a marginal revival, in the production of some crops during the 13th Plan period. Examples are paddy, pulses, banana and rubber. The floods in 2018 and 2019 were major setbacks to the efforts to revive production in agriculture during the 13th Plan period. Production in many crops drastically fell in both the years.

There was a significant rise in Plan and other allocations to the department over the 12th and 13th Plan periods (Table 2.2). The allocation to agriculture from the Plan schemes, including State and Central sector schemes, the Rural Infrastructure Development Fund (RIDF) and the Rebuild Kerala Initiative (RKI) as well as under the Kerala Infrastructure Investment Fund Board (KIIFB; outside the plan), rose by 221 per cent between 2011-12 and 2020-21. The same was true for the allocation to the Department of Soil and Water Conservation and the Kerala Agricultural University. At the same time, expenditures have lagged behind allocations, and the crisis of State finances in Kerala

Table 2.2 *Allocation and expenditure under the plan schemes and through KIIFB in agriculture, nominal figures, Kerala* in Rs crore

Year	Department of Agriculture and Farmer's Welfare					Department of Soil and Water Conservation				Kerala Agricultural University		
	Plan#	RIDF	RKI	KIIFB	Total	Plan#	RIDF	RKI	Total	Plan#	RKI	Total
Allocation												
2011-12	494.9	5.0	-	-	499.9	4.1	13.0	-	17.1	45.0	-	45.0
2012-13	704.4	5.0	-	-	709.4	4.8	16.0	-	20.8	55.0	-	55.0
2013-14	803.3	5.0	-	-	808.3	5.6	20.0	-	25.6	60.0	-	60.0
2014-15	938.3	0.0	-	-	938.3	8.6	30.0	-	38.6	63.0	-	63.0
2015-16	626.9	5.0	-	-	631.9	8.4	35.0	-	43.4	63.0	-	63.0
2016-17	758.5	7.0	-	-	765.5	10.3	38.0	-	48.3	65.5	-	65.5
2017-18	894.6	7.0	-	-	901.6	11.6	40.0	-	51.6	75.0	-	75.0
2018-19	1016.9	10.0	-	14.3	1041.2	12.7	44.0	-	56.7	82.5	-	82.5
2019-20	1021.9	10.0	81.9	7.2	1120.9	13.8	44.0	60.9	118.7	82.5	8.0	90.5
2020-21	750.1	7.5	350.3	-	1107.9	12.1	33.0	-	45.1	71.1	-	71.1
Expenditure												
2011-12	470.6	0.4	-	-	470.9	2.5	11.8	-	14.3	44.0	-	44.0
2012-13	673.9	5.0	-	-	678.9	4.0	16.1	-	20.1	54.0	-	54.0
2013-14	647.0	4.9	-	-	652.0	3.1	20.0	-	23.1	57.1	-	57.1
2014-15	731.4	4.2	-	-	735.6	8.6	29.0	-	37.5	33.5	-	33.5
2015-16	722.3	4.5	-	-	726.7	6.0	32.4	-	38.3	27.4	-	27.4
2016-17	732.1	20.1	-	-	752.3	5.9	40.7	-	46.6	42.2	-	42.2
2017-18	695.4	7.0	-	-	702.4	5.0	40.0	-	45.0	32.9	-	32.9
2018-19	764.8	6.4	-	-	771.2	3.0	17.0	-	20.1	21.3	-	21.3
2019-20	423.9	12.0	-	-	435.9	2.2	7.6	-	9.8	28.2	-	28.2
2020-21*	487.2	6.7	-	-	493.9	3.9	10.3	-	14.2	0.0	-	0.0

Note: KIIFB allocations are not part of plan allocations; #: Plan includes Plan schemes, Central schemes and State share for Central schemes;
* As on October 21, 2020
Source: Kerala State Planning Board

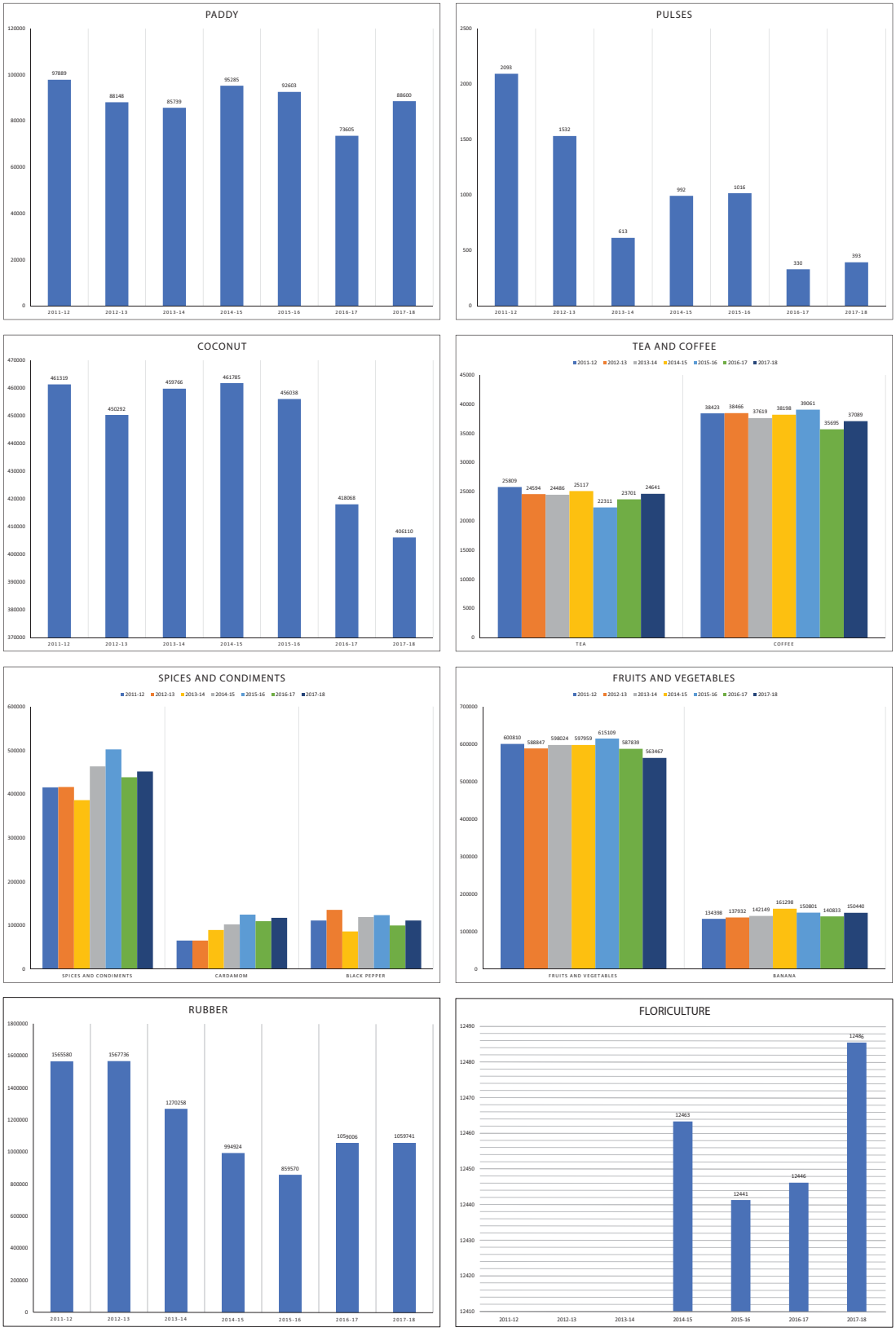
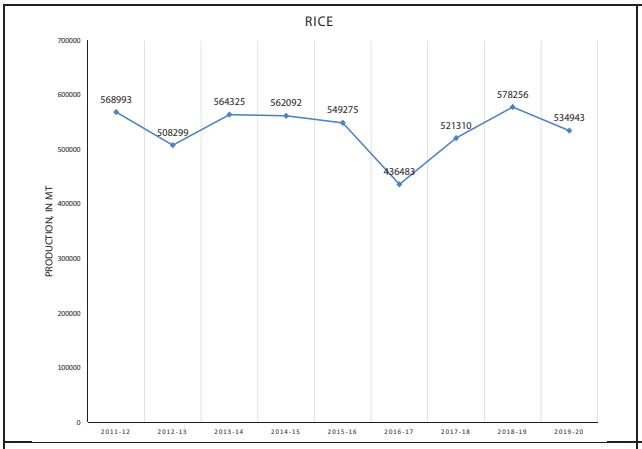
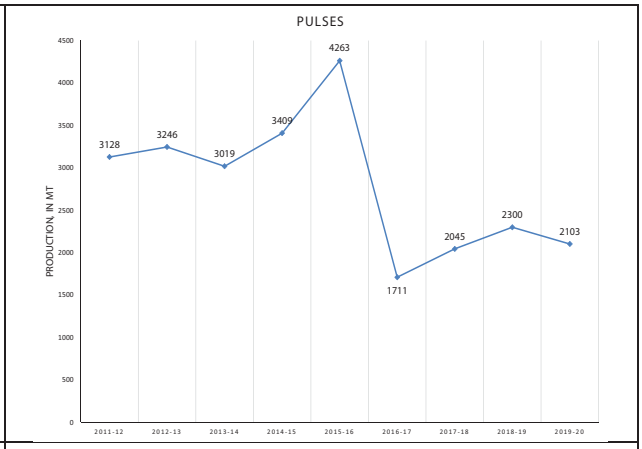
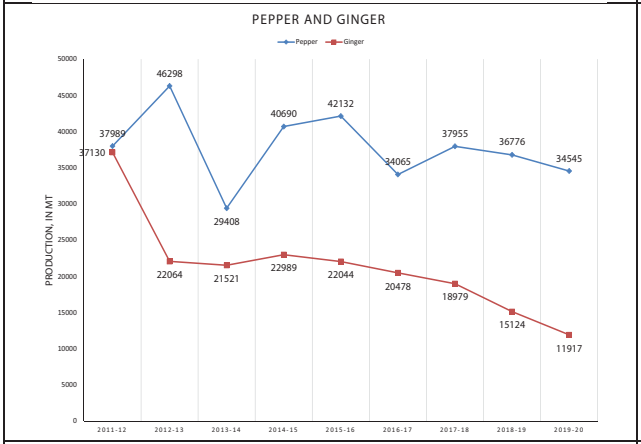
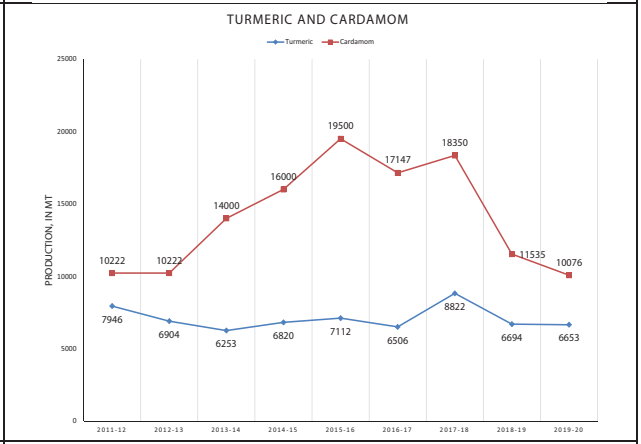


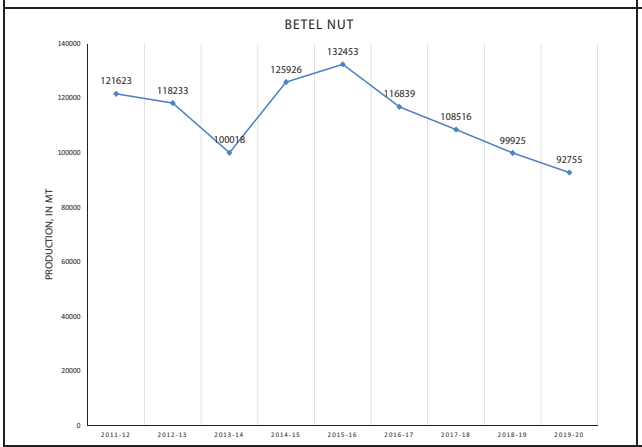
Figure 2.3 *Trends in the value of output (VOO) in selected crops, Kerala, in 2011-12 prices, 2011-12 to 2017-18*, in Rs lakh
Source: Central Statistics Office

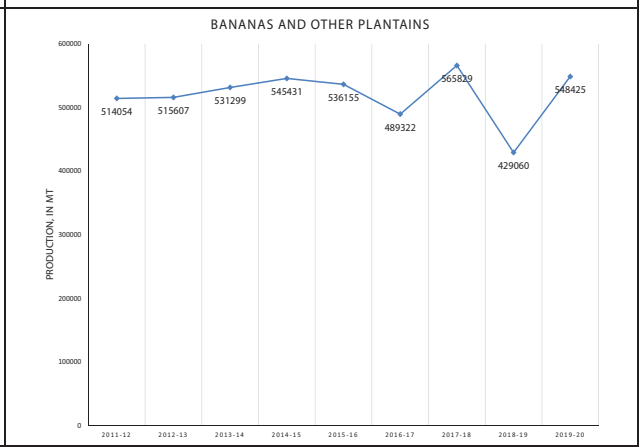

RICE
PRODUCTION, IN MT
568993
508299
564325
562092
549275
436483
521310
578256
534943
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20

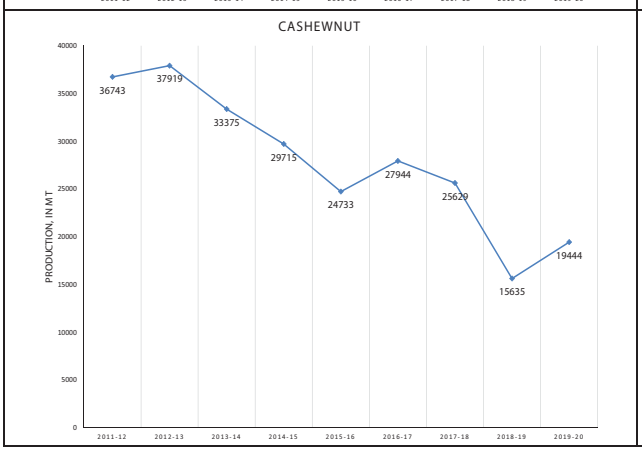

PULSES
PRODUCTION, IN MT
3128
3246
3019
3409
4263
1711
2045
2300
2103
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20

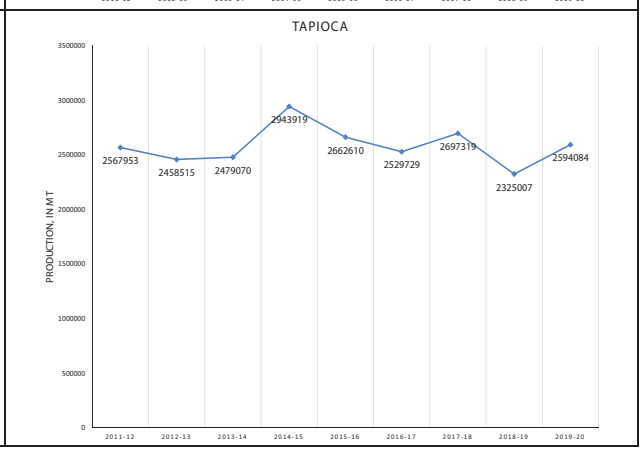

PEPPER AND GINGER
Pepper
Ginger
PRODUCTION, IN MT
37989
46298
29408
40690
42132
34065
37955
36776
34545
37130
22064
21521
22989
22044
20478
18979
15124
11917
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20


TURMERIC AND CARDAMOM
Turmeric
Cardamom
PRODUCTION, IN MT
10222
10222
14000
16000
19500
17147
18350
11535
10076
7946
6904
6253
6820
7112
6506
8822
6694
6653
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20


BETEL NUT
PRODUCTION, IN MT
121623
118233
100018
125926
132453
116839
108516
99925
92755
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20


BANANAS AND OTHER PLANTAINS
PRODUCTION, IN MT
514054
515607
531299
545431
536155
489322
565829
429060
548425
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20


CASHEWNUT
PRODUCTION, IN MT
36743
37919
33375
29715
24733
27944
25629
15635
19444
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20


TAPIOCA
PRODUCTION, IN MT
2567953
2458515
2479070
2943919
2662610
2529729
2697319
2325007
2594084
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20

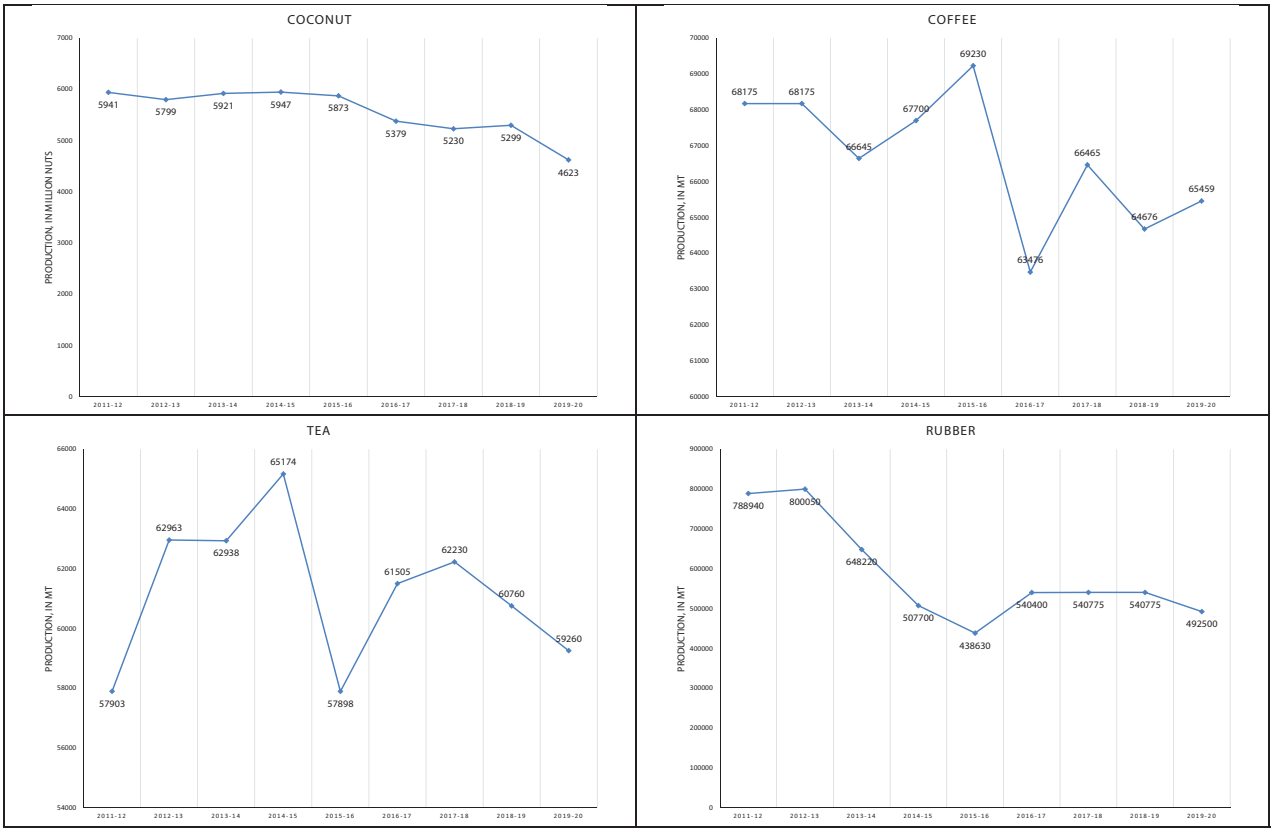


Figure 2.4 *Trends in the production of selected crops, Kerala, 2011-12 to 2018-19* in metric tonnes (MT) and million nuts

Sources: i) Department of Economics and Statistics; ii) Coffee Board; iii) Tea Board; iv) Rubber Board

after the floods of 2018 adversely affected expenditures in 2019-20. An improvement is expected in 2020-21.

In addition, spending in agriculture is also undertaken by local government institutions. The actual expenditure by panchayats in agriculture rose from Rs 67 crore in 2012-13 to Rs 285 crore in 2018-19 and Rs 180 crore in 2019-20 (Table 2.3). If we add expenditures by the Department and the panchayats, actual expenditures (not allocations) rose from Rs 775.4 crore in 2012-13 to Rs 1066.4 crore in 2018-19, which is 137.5 per cent rise.

However, there appears to be a disconnect between the extent of Plan allocations and the growth performance of the sector. A study should be initiated to assess the efficacy of plan expenditures in the agricultural sector to improve the efficiency of plan spending. This should be undertaken without any reduction in the extent of overall plan assistance to agriculture.

There were two bright spots in the field of agriculture during the period of the 13th Plan. First, the downward slide in the area cultivated with paddy was arrested. In 2015-16, 1.97 lakh ha were cultivated with paddy in the State. In 2018-19, 1.98 lakh ha were cultivated with paddy. This was in contrast to earlier plan periods, where the area cultivated with paddy consistently fell.

Secondly, the success story of the 13th Plan was in vegetable production. Between 2015-16 and 2018-19, Kerala could nearly double the area cultivated with vegetables as well as production of vegetables (Table 2.4). The area rose from 46,500 ha to 82,166 ha and production rose from 6.3 lakh metric tonnes (MT) to 12.1 lakh MT. This growth shift is corroborated by data from the Central Statistics Office (CSO) on crop-wise VOO of vegetables in Kerala.

Major Achievements in the 13th Plan Period

Some of the interventions in agriculture introduced as part of the 13th Five-Year Plan can be considered as models for other Indian States. These interventions involve assistance to farmers for production and for marketing. The Government of Kerala provides direct cash assistance of Rs 5500 per ha to every paddy farmer. In addition, Kerala's local governments give another Rs 15,000 to Rs 17,000 per ha from their Plan funds as additional assistance to rice farmers. Further, from 2020-21 onwards, as part of a programme to discourage keeping rice land fallow, the Government

Table 2.3 *Expenditure in agriculture by local government institutions, Kerala, nominal figures, 2012-13 to 2019-20* in Rs crore

Year	Expenditure in (in crore)			Shares (%) of expenditure		
	Agriculture (A)	Production sector (P)	Total expenditure (TE)	Share of agriculture expenditure in production sector expenditure	Share of agriculture expenditure in total expenditure	Share of production sector expenditure in total expenditure
2012-13	67	154	1250	43.2	5.3	12.3
2013-14	104	226	1942	46.2	5.4	11.6
2014-15	110	240	2153	45.7	5.1	11.2
2015-16	125	242	2401	51.6	5.2	10.1
2016-17	178	373	2041	47.7	8.7	18.3
2017-18	301	660	2750	45.6	10.9	24.0
2018-19	285	674	3330	42.2	8.5	20.2
2019-20	180	455	2445	39.6	7.4	18.6

Source: Kerala State Planning Board

Table 2.4 *Area and production of vegetables, Kerala, 2015-16 to 2018-19* in ha and lakh MT

Year	Area (ha)	Production (lakh MT)
2015-16	46,500	6.3
2016-17	52,830	7.3
2017-18	69,047	10.0
2018-19	82,166	12.1
2019-20	96,313	14.9

Source: Department of Agriculture and Farmer's Welfare, Government of Kerala

has provided an additional Rs 2000 per ha as a royalty payment. This payment is provided to farmers who do not keep rice land fallow. Thus, Rs 23,000 to Rs 25,000 per ha per year per crop is received by a rice farmer in Kerala. After harvest, the State Government pays the highest Minimum Support Price (MSP) for paddy in India. The Central Government's MSP for paddy is about Rs 1868 per quintal. The State Government adds a bonus of Rs 800 per quintal and procures paddy from the farmers at Rs 2700 per quintal. About 80 to 90 per cent of rice produced in Kerala is procured by the State Government directly.

The Government of Kerala offers among the highest rates of cash subsidy for vegetable farmers in India. The annual subsidy for vegetable farmers is Rs 25,000 per ha; for cool season vegetables, the subsidy is Rs 30,000 per ha. Banana farmers received an annual subsidy of Rs 30,000 per ha. These subsidies cover all farming expenses, including the costs of seeds, planting material, fertilizer, pesticide and labour costs. After harvest, Kerala's vegetable farmers receive base prices (similar to an MSP) for 16 different vegetables. No other State in India has thus far announced a base price for vegetables. The State Government has promised that if the price falls below the base price, through Government outlets will buy the produce.

In addition, Kerala pays an incentive price for rubber at Rs 170 per kg, and an MSP of Rs 32 per kg for coconut.

In brief, Kerala's agricultural policy has focussed on creating incentives for farmers by ensuring remunerative crop incomes.

During the period of the 13th Five-Year Plan, the downward slide in the area cultivated with paddy could be arrested. The area under harvested paddy, has been maintained in a steady manner despite the severe and unfavourable weather conditions, which lead to substantial crop loss across the State. The area under paddy which was 1.97 lakh ha in 2015-16 could be maintained 1.98 lakh ha in 2019-20 despite the unforeseen adversities of two consecutive floods, Ockhi, and Covid-19 pandemic outbreak. A steady increase in production and productivity of paddy is noticed from 2017-18 onwards. The highest production and productivity for paddy over the last ten years, of 5.87 lakh tonnes and 3073 kg per ha respectively was recorded in 2019-20 which is an

increase of 12.3 per cent and 25.3 per cent compared to 2010-11-levels. Specific policy interventions of the State Government, under which cultivation of paddy was encouraged with increased subsidies, a bonus over the MSP and higher procurement, were instrumental in preventing a further decline in the area cultivated with paddy. Considering the pivotal role of paddy land conservation in environment protection, royalty to the owners of cultivable wetland at the rate of Rs 2000 per ha was introduced in 2020, for conserving the cultivable wetland including the paddy lands.

Procurement of paddy increased from 5.61 lakh metric tonnes at the rate of Rs 21.5 per kg in 2015-16 to 7.01 lakh tonnes at the rate of Rs 26.95 per kg in 2019-20. In 2020-21, the procurement rate has been enhanced to Rs 27.48 per kg.

Vegetable production in the State has gained momentum over the past years. Production, which was 7.25 lakh metric tonnes from an area of 52830 ha (ha) in 2016-17, increased to 14.9 lakh tonnes from an area of 96,313 ha in 2019-20. Government policy gave support to vegetable cultivation in homesteads, institutions, and by means of rain shelter cultivation. Support was also extended to vegetable clusters including urban, staggered, and graded clusters and for micro-irrigation and fertigation.

With the Covid-19 pandemic threatening the availability of food supplies, the Subhiksha Keralam project was launched by Government of Kerala with the objective of attaining food self-reliance by enhancing the area, production and productivity of food grain, millets, vegetables, fruits, tubers and pulses in the State, enhancing incomes of farmers, employment generation, attracting youth and repatriates to agriculture, strengthening animal husbandry and fisheries sector, and promoting organic farming. Fallow land cultivation of paddy, vegetables, fruits, tubers, pulses and millets has been completed in 19711.89 ha and "rain shelters," established in a total area of 119,752 square metre. Integrated Farming System was established in 14,000 unit and employment provided for 3684 Non-Resident Indians (NRIs) and 7658 youth.

Coconut Development Council was constituted in 2018 with a 10-year development vision for reviving coconut farming in the State through replanting and under planting with high yielding varieties and local varieties, enhancing productivity and ensuring forward linkages with agro industry. It is targeted to expand coconut cultivation in an additional area of 1.44 lakh ha and replant in 3 lakh ha. As part of this effort, 11,47,151 West Coast Tall, Dwarf, and Hybrid seedlings have been distributed at the rate of 75 per ward in a 60:20:20 ratio. The procurement of seed nuts and production of seedlings as targeted are scheduled and ongoing. The "Keragramam" programme for increasing production and productivity of coconut through integrated management on cluster basis was implemented in 206 Keragramams of 250 ha each in selected gram panchayats during the period 2016-17 to 2019-20. Integrated crop management practices were implemented on 40,457 ha. Irrigation facility has been increased to 3512.67 ha.

With the objective of popularising cultivation of fruit crops in the State, comprehensive Fruit Development Programme was popularised in 2020 promotion of exotic fruits like litchi, rambutan, avocado, and mangostein in addition to indigenous fruits. So far under this programme 1.31 crore fruit seedlings have been distributed.

In order to facilitate quality control of organic inputs, especially organic manures within the State, Biofertilizer and Organic manure Quality Control Laboratory (BOQCL), the first of its kind in the State, was established at Pattambi in 2020 in line with the organic agricultural policy of the Government.

Considering the importance of crop choice and crop management prescriptions on a regional basis to ensure economic, and ecological sustainability and farmer welfare, the Department of Agriculture Development and Farmers' Welfare decided to shift to planning and implementation of schemes based on the concept of 5 agroecological zones and 23 agroecological units.

The Kerala Farmers Welfare Fund Act 2018 came into effect for the constitution of a Welfare Fund Board for the welfare of farmers. The Farmer Welfare Fund Board has been established in 2020 to implement the pension schemes and welfare programmes of the Agriculture Development and Farmers' Welfare Department. Farmer pension was enhanced from Rs 500 to Rs 1400 per farmer.

Considering the importance of soil health in augmenting crop production and significance of soil test based nutrient application, 28,40,389 lakh soil health cards depicting the fertility status and recommendations were distributed to farmers in the State based on soil testing during the period 2015-16 to 2019-20 as part of the Central Soil health Card programme under National Mission for Sustainable Agriculture.

For providing direct market opportunity to farmers for selling their produce, 30 urban markets and 440 weekly markets were established in gram panchayats for fruits, vegetables, millets.

With the twin objectives of promoting the cultivation of vegetables and flowers in the State and to support increased adoption of better practices by creating value chains of vegetables and flowers fetching higher income to the farmers, Centres of Excellence for vegetables and flowers were established in Wayanad in collaboration with Government of Netherlands.

The project establishment of banana and honey based agro park, Thrissur, has been approved by KIIFB at the Model Horticultural Farm, Kannara (Department of Agriculture), Thrissur.

Kerala Agricultural University released 35 crop varieties in various crops (rice – 8 varieties, vegetables – 9 varieties, tuber crops – 1 variety, plantation crops- 2 varieties, spices – 12 varieties, medicinal plants – 2 variety, Forage crops – 1 variety.

Intellectual Property Rights Cell (IPR Cell) of Kerala Agricultural University (KAU) facilitated obtaining Geographical Indication (GI) registration to local agricultural products of Kerala such as Nilambur teak, Chengalikodan Nendran banana, Marayoor jaggery, and Tirur betel leaf. To promote agristartups and agri business ventures, agribusiness incubators are established. Farm facilitation centres are established in all Krishi Vigyan Kendras of KAU for training in value addition and processing.

Web-based land resources information system for 14 districts of Kerala along with watershed information system for entire State was developed and deployed by Kerala State Land use Board.

As stated earlier, vegetable production increased in the 13th plan period. The level of demand for vegetables in Kerala was estimated at 27.1 lakh MT in 2009-10 according to a report prepared by the National Council of Applied Economic Research (NCAER). In 2030, the demand for vegetables is expected to rise to 35.5 lakh MT. In other words, Kerala could aim at one more doubling of production of vegetables over the 14th Plan period. Of course, this would require a sharp rise in productivity as additional area available for vegetable cultivation is limited.

The Task in Agriculture

It is clear that Kerala has to focus on a rapid increase in production of its major crops over the next decade. Given that new area that can be brought under cultivation is very limited, the focus has to be on raising productivity. Rise in productivity requires a serious reliance on modern agricultural science, and a firm rejection of traditionalist methods that keep productivity-levels low with no concomitant benefits to the environment.

One of the important weaknesses of agriculture in Kerala is the low productivity of most of its major crops. Productivity levels are low both in comparison with other States as well as with the maximum attainable productivity under scientific practises. The difference between the actual productivity and the maximum attainable productivity is termed the "yield gap."

There is a scarcity of systematically collected data with regard to yield gaps in Kerala. This paper puts together two sets of data, both from the Kerala Agricultural University (KAU) for the mid-2010s. The first was made available by the Directorate of Research at the KAU, and the second was made available by the Cropping System Research Centre (CSRC) of the KAU in Karamana (Table 2.5 and Table 2.6). In both tables, yield gaps are presented in percentages as the extent of improvement possible from the actual yield to reach the best realised (or potential) yield. That is,

Yield gap (%) = {[(Potential yield – average yield)/ average yield] * 100}

Both the tables bring out the need to improve productivity of crops in Kerala. Broad averages compiled in Table 2.5 show that while rubber recorded the lowest

Table 2.5 *Average and potential yields of major crops, Kerala in mid-2010s* in kg per ha, nuts per palm, kg per year

Crop	Potential yield	Average yield	Yield gap (%)
Rice (kg/ha)	4500	2300	95.6
Coconut (nuts/palm/year)	150	40	275.0
Arecanut (kg nuts/palm/year)	25	7	257.0
Rubber (kg/year)	2000	1400	42.9
Pepper (kg/ha)	1500	295	408.5
Coffee (kg/ha)	2000	578	246.1
Tea (kg/ha)	5000	1706	193.1

Note: Data were compiled from internal sources and hence may not match with DES data. Potential yield corresponds to average best realised yield

Source: Directorate of Research, Kerala Agricultural University

Table 2.6 *Average, potential and best yields of major crops, by selected agro-ecological zones, Kerala, mid-2010s*
in tonnes per ha, kg per ha, nuts per palm

Name of the agro-ecological zone	Crop and units	Yield in the zone	Yield in the district	Highest yield in a farmer's field	Yield gap (%)
Onattukara Sandy Plain	Paddy (tonnes/ha)	2.7	3	6.5	145.3
Onattukara Sandy Plain	Coconut (nuts/palm/year)	52	40	160	207.6
Kuttanad	Paddy (tonnes/ha)	4.3	2.6	7.5	76.1
Kuttanad	Coconut (nuts/palm/year)	41.2	29	300	628.9
Kole lands	Paddy (tonnes/ha)	4.5	2.5	9.5	112.5
Pokkali lands	Coconut (nuts/palm/year)	35	31	100	185.7
Northern laterite	Pepper (kg/ha)	567.6	98	2750	385
Northern laterite	Paddy (tonnes/ha)	2.3	1.5	5	117.4
Northern laterite	Banana (tonnes/ha)	20.2	7.8	60	197.1
Northern hills	Pepper (kg/ha)	199	217	888	346
Northern hills	Coffee (kg/ha)	1031	705	1500	45.5
Central plateau	Pepper (kg/ha)	583	217	3500	500
Central plateau	Coffee (kg/ha)	1200	750	3000	150
Northern coastal	Cashew (kg/ha)	1100	1071	1800	63.6
Northern coastal	Arecanut (kg/palm)	1.3	0.9	3.6	176.9
Kaipad lands	Paddy (tonnes/ha)	2.9	1.7	6	106.9
Southern high hills	Rubber (kg/ha)	1600	1499	2000	25
Southern high hills	Cardamom (kg/ha)	387.5	137	650	67.7
Southern Central laterites	Tapioca (tonnes/ha)	23	29	100	334.8

Source: Cropping System Research Centre (CSRC), Karamana, KAU

yield gap, the yield gaps for the rest of the crops were in the range of 95 per cent to 409 per cent. Zone-wise data presented in Table 2.6 reiterate this conclusion in a disaggregated form. Compared to the highest yield in a farmer's plot in the same zone, the yield gaps for paddy ranged from 76 per cent to 146 per cent. In coconut, the yield gaps ranged from 186 per cent to 629 per cent. In pepper, the yield gaps ranged from 346 per cent to 500 per cent.

Studies have also shown that productivity-levels of most crops in Kerala are significantly lower than in other Indian States (Government of Kerala, 2016).

Further, although productivity-levels for many crops in Kerala declined between 2011-12 and 2019-20 (Figure 2.5), the sharp fall in productivity of certain crops in 2018-19 and 2019-20 must be discounted as these were years of major floods in the State. Overall, there were moderate improvements in the productivity

of paddy, cardamom, and tapioca. But for the rest of the crops, the productivity declined in varying degrees. The declines in pepper, cashew nut, coffee and rubber appear particularly worrisome.

In sum, the primary task of agricultural policy over the next decade has to be a focussed programme to raise productivity in the State.

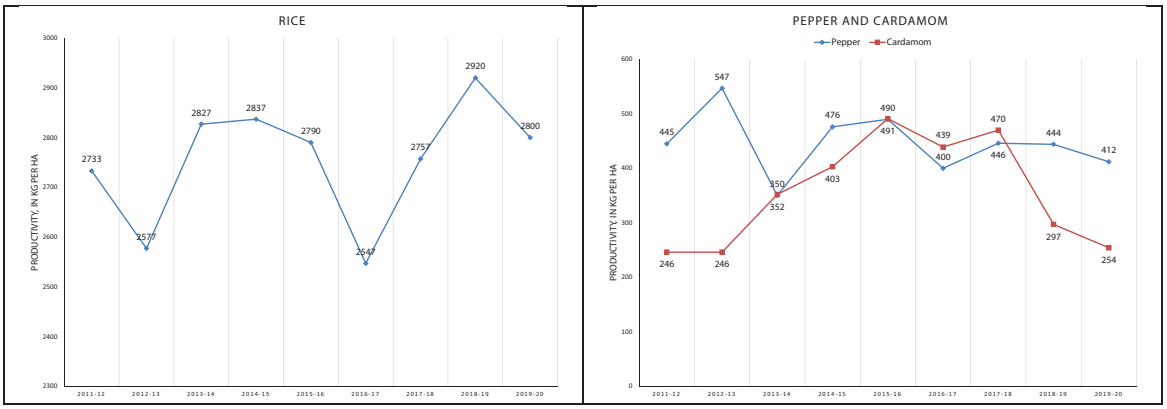
The focus of agricultural policy in the 13th Plan was to concentrate on productivity, profitability and sustainability. Only if productivity improves can incomes be raised. Studies show that in the rainfed regions of the State, yield gaps can be closed with the existing technologies. Policy, and in particular the extension machinery, has to focus on better management of soil and water, wider adoption of improved varieties, availability of good quality certified seeds and balanced fertilisation and nutrient management. These studies also show that higher yield gaps are broadly correlated with poor adoption of technologies. For instance, the absence of or poor application of lime, chemical fertilizers, insecticides and fungicides was found to be common in regions and crops with higher yield gaps. The more recent introduction of planning for agroecological zones by the Department is a welcome step which would ultimately lead to improved and scientific formulation, design and implementation of departmental schemes.

It is only through the application of more and better science that agriculture can become sustainable. In Kerala, often, a common understanding propagated through sections of the media and unverified sources is that zero application of fertilizers and pesticides is the singular way to attain sustainability. Nothing can be more wrong and irrational. The consumption of fertilizers on a per ha basis was the lowest in Kerala compared to other States and that it declined drastically over the last decade. In the case of pesticides, Kerala's consumption of pesticides is likely to be higher given the large areas under spices and plantation crops. Still, Kerala's pesticide consumption per 1000 ha in 2017-18 was 0.41 MT, which was the same as the national average. The corresponding figures were 0.82 MT in Punjab, 0.62 MT in Haryana and 0.66 MT in Maharashtra.

There are certain misconceptions on pesticide content in food in Kerala. A common refrain is that food items in Kerala, especially vegetables, are increasingly "poisonous" (*visham* in Malayalam) and unfit for consumption. "Poison" in food has also been linked to the rising incidence of cancer in the State. A statement of facts may be in order.

In India, the Food Safety and Standard Authority of India (FSSAI) under the Ministry of Health and Family Welfare fixes Maximum Residue Limit (MRL) of pesticides in food keeping in view the dietary exposure and risk assessment. In science, there are globally accepted practices to arrive at the MRL.

- At one end, there is the No Observed Adverse Effect Level (NOAEL), which is defined as the *highest* level of exposure to a chemical, determined in stringent animal toxicity tests, at which there was no observed toxic or adverse effect when one is exposed to the chemical in the long run. Numbers for animals are extrapolated to arrive at estimates for humans.
- At the other end, there is the Lowest Observed Adverse Effect Level (LOAEL), which is defined as the *lowest*-level of exposure to a chemical at which there is an adverse effect.
- A third concept used is the (Acceptable Daily Intake (ADI), which is defined as the maximum amount of a chemical that can be ingested daily over a lifetime with no appreciable health risk. The ADI is calculated by applying a safety or uncertainty factor, which is commonly 100, to the NOAEL.[3] That is, the long-term NOAEL (which is less than the LOAEL) is further divided by 100.



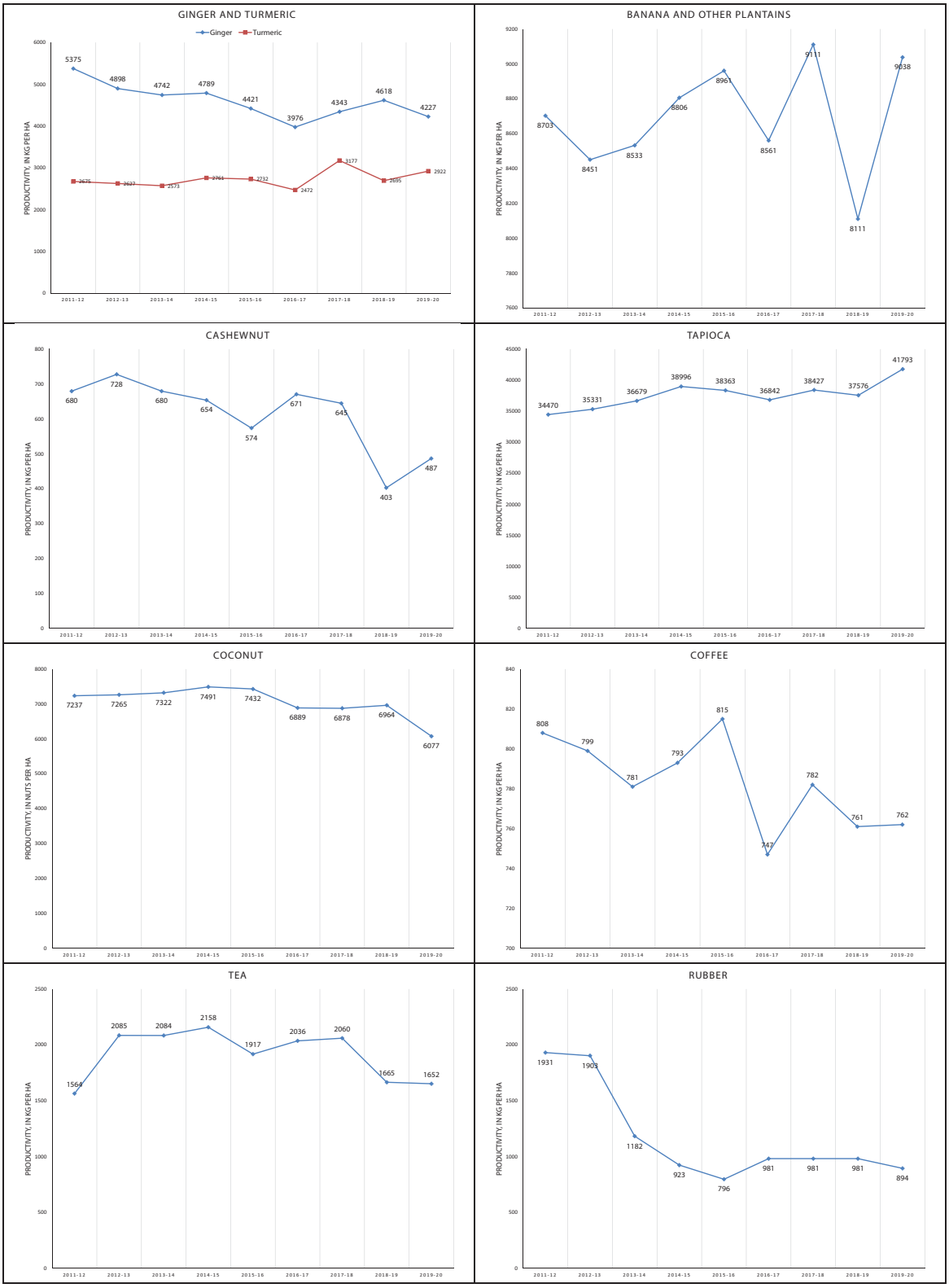


Figure 2.5 *Trends in the productivity of selected crops, Kerala, 2011-12 to 2019-20* in kg per ha and million nuts per ha

Note: Rubber productivity in 2011-12 and 2012-13 was based on tapped area, and are not comparable with other years.

Sources: i) Department of Economics and Statistics; ii) Coffee Board; iii) Tea Board; iv) Rubber Board

- Finally, we estimate the Maximum Residue Limit (MRL), which is defined as the maximum concentration of pesticide residue likely to remain as a result of the use of pesticides according to good agricultural practices (GAP) and product label recommendations. The MRL is estimated such that the total of the residue-level accounts for less than 80 per cent of the ADI for that agricultural chemical. In other words, the ADI is reduced further by 20 per cent to arrive at the MRL.

There is a Central sector scheme titled "Monitoring of Pesticide Residues at National Level" under which 27 accredited laboratories (labs) analyse samples of food items collected from retail outlets, APMC markets, mother dairy, organic outlets and farm gate for the possible presence of pesticide residues. The products covered are vegetables, fruits, spices, curry leaves, red chilli powder, rice, wheat, pulses, milk, fish and marine, tea, meat, egg and water. There are two laboratories in Kerala that undertakes this analysis: one at the College of Agriculture, Vellayani and the other at Marine Products Export Development Authority (MPEDA), Kochi.

In 2017-18, the Vellayani lab tested 1318 samples, of which 969 samples (73 per cent) had no detected residues and only 80 samples (6.1 per cent) contained residues above MRL. The Kochi lab tested 660 samples, out of which not even one sample contained residues above MRL. Let us consider vegetables. The Vellayani lab tested 549 samples of vegetables, out of which 413 (75.2 per cent) had no detected residues and only 16 samples (2.9 per cent) contained residues above MRL. Data for Kochi lab were not available. At the same time, a certain number of samples in the Vellayani lab (21.3 per cent for all food items and 18.3 per cent for vegetables) contained residues of pesticides not approved for use on the respective crop.[4] The proportion of these samples had residues higher than MRL which could not be assessed, as no MRL has been fixed by FSSAI for them. Indeed, the use of non-approved pesticides in agriculture has to be eliminated through better extension activities and awareness campaigns. At the same time, there is no evidence that any large proportion of food items available in Kerala's markets, particularly for vegetables, have residues of approved pesticides higher than MRL.

Further, even for the small proportion of food items with residues above MRL, the FSSAI has recommended a number of methods to reduce the residue-levels.[5] These include scrubbing, washing with water (about 75 per cent of pesticide residues can be removed with washing), washing with 2 per cent salt water or 1 per cent tamarind solution, vinegar soak, blanching and peeling. In addition, steaming and cooking of vegetables eliminate most of the residues that are not removed by washing or peeling.

In sum, any drastic steps are not necessary to reduce pesticide consumption in Kerala's agriculture. At the same time, no effort should be spared to discourage and prevent the use of non-approved pesticides.

While the practice of organic farming can be popularised in niche spheres where premium export prices are available, this cannot be a generalised policy for the State. It might lock the State's agriculture into a low yield-low income cycle, leading to more unscientific and irrational uses of land in the long-term. Balanced fertilizer use and improved nutrient management based on soil-testing should be aimed at for better soil health. Integrated pest management practices, which include the judicious use of pesticides and fungicides, are what should be aimed at for better plant protection.

Globally, experience shows that reduced application of chemicals in agriculture can be achieved only through better research in the breeding of crop varieties resistant to pests and diseases. Advanced research in plant breeding should help us to develop varieties and hybrids that systemically require less application of chemicals. New applications in cutting-edge areas of research, such as biotechnology, gene editing (CRISPR) and nanotechnology, promise not just to reduce the use of chemicals, but also make available high yielding crop varieties resistant to viral diseases, acidity, alkalinity, salinity, flooding and high temperature. The State's agricultural research system needs to be geared up to meet this challenge.

The Pathways to Growth

The future of Kerala's agriculture, as we underlined in the last section, has to be focussed on an increase in

[3] The 100-fold safety factor is used to account for the differences in species and differences in toxicokinetics and toxicodynamics.

[4] These non-approved pesticides are not illegal pesticides. They are approved by the Central Insecticide Board and Registration Committee (CIBRC). No chemical can be manufactured, transported and sold in India without the approval of CIBRC. Non-approved, here, implies the absence of label claims on the use of the specific pesticide on the specific crops referred to in testing.

[5] See https://fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Pesticides_04_02_2020.pdf.

productivity, profitability and sustainability. Achieving this aim requires a major reconceptualisation of agriculture in the policy sphere. This would not require additional funding from the Government. At the same time, we do foresee the need for a significant convergence of activities of the different players in the following fields:

a) encouragement of cutting-edge research to develop high quality certified seeds

b) improvement of soil health

c) integrated water resources management to expand irrigation

d) effective public agricultural extension to popularise balanced fertilisation and IPM practices

e) adoption of mechanisation in agricultural operations

f) modernisation of supply chains and marketing systems

g) large-scale investments in processing and value-addition.

In our attempts to ensure convergence in these aims, Kerala should utilise two features of institutional strength in its history: decentralised governance and the cooperative movement.

Role of Panchayats

Kerala initiated the People's Planning Campaign in 1996 after the passage of the 73rd and 74th amendments to the Constitution in 1994. A number of local activities and responsibilities related to agriculture were transferred to the local bodies. It was also specified that 40 per cent of the Plan expenditure of panchayat should be in the productive sector, within which agriculture constituted an important part (this was later revised to 30 per cent).

There were high expectations about the impact of decentralised planning on agricultural growth in the State. However, the introduction of decentralised planning coincided with a collapse of agricultural prices causing an unprecedented agrarian crisis in Kerala. Therefore, there can be no realistic assessment of the independent impact of decentralisation in agriculture at least over its first decade. The stagnation of agricultural growth, as we have seen in the last section, continued even after the acuteness of the agrarian crisis was contained after 2007.

A detailed official study in 2009 revealed that the target of 40 per cent of funds for productive sectors was not achieved in most local bodies for most years (Government of Kerala, 2009). This adversely affected investment in agriculture. This study also noted a number of other problems with planning for agriculture in panchayats. Agricultural programmes continued to be crop-specific, did not pay sufficient attention to land and water management, did not bring about innovations in agricultural practises and did not create new agrarian institutions. The other issues noted by the study included the lack of convergence and coordination across departments at the local-level, poor quality of extension services through *krishi bhavans*, dual control of agricultural departments, insufficient integration of the needs of farmers and discussions in grama sabhas and the poor performance of block panchayats in agriculture (as in helping develop a regional agricultural development policy). Many of these problems can be argued to be relevant in 2020 also.

A further problem is highlighted by data in Table 2.3. The share of production sector expenditure in total expenditure has consistently remained below 30 per cent. In fact, in most years after 2012, the share was below 20 per cent, and even just 10 per cent in one year. The share of agricultural sector in total expenditure was between 5 and 10 per cent. This is a major drawback of the decentralisation experience in Kerala. Even if 10 per cent more of the expenditure by local bodies enters agriculture, the total spending in agriculture could be raised by about Rs 200 crore a year.

In sum, though decentralisation was introduced to empower local communities and local institutions to plan the use of land-based assets, it by and large failed to achieve these objectives. This is not to devalue the role of panchayats in agricultural development, but a call to reform their activities and improve the content of their interventions in the sector. Decentralisation is too valuable a tool of public policy in Kerala to be squandered away.

The 14th Plan period should be an appropriate occasion to reinvent the role of panchayats in agriculture. The panchayats should play a leading role in planning for agriculture at the local-level, even as the block and district panchayats are given larger responsibilities to ensure that regional policies in agriculture are aligned to the needs of specific agro-ecological zones.

Role of Cooperatives and Other Collectives

A key challenge in Kerala's agricultural development has been to create institutions at the local-level that allow for the benefits of economies of scale in production and post-production activities. The small size of farms in Kerala means that farmers suffer from weak bargaining power in the input and output markets. Their produce is not aggregated at the local-level; this not only leads to poor price realisation vis-à-vis traders but also to

the absence of value-addition avenues, which in turn further dampens farm gate prices.

The group farming programme introduced in the late 1980s was an important attempt to introduce collective undertaking of selected agricultural operations, including the purchase of inputs and marketing of products. It proved to be effective in reducing costs in paddy cultivation. Later, the group approach was taken forward and consciously linked to more scientific cultural practices and adoption of technology in experiments like Group Approach for Locally Adapted and Sustainable Agriculture (GALASA). There were also interesting attempts to extend the concept of group farming into non-paddy crops like coconut and vegetables. However, none of these experiments could be taken forward and institutionalised.

Given Kerala's rich history with the cooperative movement, creating multiple forms of farmer producer organisations (FPO) is the most appropriate way of going ahead. An FPO is a legal entity formed by primary producers in agriculture. An FPO can be registered under any of the following legal provisions: (a) Cooperative Societies Act or Autonomous or Mutually Aided Cooperative Societies Act; (b) Multi-State Cooperative Society Act, 2002; (c) under Section 581(C) of Indian Companies Act, 1956, as amended in 2013; (d) a Section 25 Company of Indian Companies Act, 1956, as amended in 2013; (e) as Societies registered under Society Registration Act, 1860; and (f) Public Trusts registered under Indian Trusts Act, 1882. As is evident, in addition to the older form of cooperative societies, the Farmer Producer Company (FPC) is a new collective institution promoted from the early-2000s. Kerala has a number of FPCs in coconut cultivation – in Kannur, Palakkad, Malappuram, Kozhikode, Alappuzha, Thrissur, and Kollam – that have been performing commendably over the last decade. These experiences have to be documented and demonstrated as success stories in other parts of the State.

There has also been a mushrooming of self-help groups (SHGs) and joint liability groups (JLG) that collectively undertake paddy and vegetable cultivation on lands leased in on lease. This new form of leasing should also be encouraged and the necessary legal changes should be introduced.

Similarly, to address the shortage of labourers, there were early experiments in the State with co-operative institutions for labour supply and management, such as the Labour Bank and the Labour Army. These too have not succeeded for various reasons. More recently, the State has tried to popularise *karshika karma senas*. The record of *karshika karma senas* is mixed. A careful evaluation of these *senas* is needed that would provide us insights into how they can be popularised. The processes must be designed such that *karshika karma senas* would work in better alignment and cooperation with agricultural offices at the local-level. Their activities must be integrated with Custom Hiring Centres (CHC) for renting agricultural implements.

A Plan for Integrated Action

1) The State Government has already initiated a programme for cultivating all fallow lands in the State. In the next stage, this policy needs to be more scientifically designed. Land is a scare and valuable commodity in Kerala and it has competing uses in agricultural and non-agricultural sectors. This underlines the need for a land use plan in every panchayat. Such a land use plan should aim at the most efficient and sustainable use of every plot of land in the panchayat. The areas suitable and reserved for agricultural use, industrial purposes, public services, tourism and the no-construction zones should be delineated. While reserving areas for agricultural uses, care should be taken to consider soil health and potential for reclamation as important criteria.
2) Alongside land use plans, Kerala also needs river basin plans for all its 44 rivers. The Dutch expert team that studied Kerala's water situation after the floods of 2018 had recommended that Kerala should transform its water policy in line with the concept of Integrated Water Resources Management (IWRM), as part of which Integrated River Basin Management (IRBM) should be considered (Government of Kerala, 2018). IWRM emphasises a cross-disciplinary coordination of water, land and related resources in a river basin, watershed or catchment to achieve long-term sustainability. The aim is to focus on achieving healthy river ecosystems with wide-ranging benefits for all communities, economies and biological processes within it. The key components of the IWRM policy are identified as follows:
    a) Cross-sectoral coordination in policy development, planning, and implementation of water related infrastructure.
    b) Soil conservation and erosion protection in upper catchments.
    c) River channel management in view of uncoordinated construction of permanent and temporary check dams and bunds for irrigation and domestic water supply.

d) Continuous repair of canal embankments (bunds), silted-up and polluted drainage canals, weirs, barrages, and spillways.
e) Formulation of, and adherence to, optimal protocols for dam operations with balanced consideration for downstream water demand, environmental flow, flood protection, and power generation.
f) Better management of coastal river outlets.
g) Improved polder management in regions like Kuttanad.

It should be as sub-sets of these river basin plans that panchayats should attempt development of integrated watershed management interventions. Each panchayat needs to develop an appropriate watershed plan aligned to the larger river basin plan applicable to that panchayat. Such plans have to be prepared for every micro-watershed. In 2000, every micro-watershed in Kerala was mapped, and brief reports on each of them presented before the grama sabhas, which elected the watershed committees. These watershed committees have become defunct since then. They have to be revived and strengthened with necessary expertise and information support to prepare micro-watershed plans. The watershed plans so drawn up should be approved by the District Planning Committee and also the Kerala State Planning Board, as in most cases river basins cut across district boundaries. The annual choice of projects in the local bodies should be justifiable based on these river basin plans and watershed plans.

3) Once the watershed plans are developed, each panchayat needs to prepare a crop plan based on detailed soil tests in each region. The Government already has a scheme to distribute soil health cards to each farmer. However, the progress under the scheme is tardy. The distribution of soil health cards to all farmers of the State must be completed within a specified timeframe. More soil testing centres should be established for this purpose. Every agricultural research centre in Kerala should have a soil-testing lab attached to it. Based on the results of these soil tests, and the prevailing agroecological conditions, suitable crops in each region have to be specified along with a plan for balanced fertilisation and sustainable plant protection. The KAU is already entrusted with the responsibility of developing package of practices for each of the 23 agroecological zones of the State. These documents can serve as a base document for the development of crop plans.
4) To assist in the larger programme for agricultural development, Kerala needs to upgrade its agricultural research infrastructure. Scientists at the KAU have played an important role in the growth of the agricultural sector in the past. This role needs to be elevated to the next-level over the next decade. First, the KAU should make use of developments in the frontier sectors of biotechnology and nanotechnology to develop new seeds that are both higher yielding and with improved resistance to pests and diseases. In biotechnology, we should be able to use the emerging technologies in gene-editing and genetic engineering. In nanotechnology, we should be able to utilise new innovations in nano-agri inputs, biosensors and nano-food systems, even as we ensure biosafety of nano-materials. These would allow Kerala's agriculture to meet the challenges in climate variability and natural disasters, as we may need more short-duration seeds resistant to salinity and flooding. The KAU should also develop better protocols for precision farming and polyhouse farming, which are expected to be more popular in the near future.
5) Similar is the case with agricultural extension. Kerala has a dense network of institutions for agricultural research under the Central and State Governments. However, our framework of extension has a number of weaknesses. Many developments in research remain in the "lab" and have not reached the "land." An example is the case of integrated multi-crop models of homestead cultivation. The *krishi bhavans* have been reduced to subsidy disbursing institutions, and most of the working time of agricultural officers is spent on administrative activities. Kerala should modernise its *krishi bhavan* system utilising the possibilities of e-governance, allowing officers to spend more time in the farms. The activities of *krishi bhavans* should be focussed on productivity-enhancing interventions. A study group to reform *krishi bhavans* may be a useful first step.
6) Kerala needs to formulate a plan to improve the storage and utilisation of water in its 41 west-flowing rivers. This is extremely important to increase the irrigated area and cropping intensity. A part of the river waters could be stored in a combination of small and large reservoirs. Such a policy should be aligned with the respective river basin plans and the needs of minor irrigation schemes. Kerala also needs to undertake a programme to dredge and remove sand and other materials from the reservoir beds so as to expand their capacities of storage.

Given the necessary focus on precision farming techniques, Kerala also needs to expand the adoption of drip irrigation or fertigation, particularly in the cultivation of fruits, vegetables and coconut. The Department of Water Resources has already initiated a pilot scheme in precision farming, which should be encouraged and expanded.

7) Agricultural marketing is an important sphere, where the State needs urgent emphasis. Procurement is available only for paddy. In other crops, such as coconut or fruits or vegetables, the absence of adequate marketing facilities deprives the farmer of a remunerative price. Here, a structural feature of the State's agricultural sector is the key constraint. As Kerala's farmers are predominantly small and marginal, there is (a) a fragmentation of marketed surplus, leading to absence of economies of scale in sale; and (b) high-levels of heterogeneity in the cropping pattern in these farms, leading to unviable quantities of marketed surplus in a number of crops. Due to these features of production, and the absence of efficient supply chains, the potential for aggregation of produce at the farmer-level remains acutely underexploited. This drawback has implications for not just the farmer's price but also the growth of enterprises in value-addition, where the availability of lump sum quantities of raw materials is an important cost factor.

Let us first consider the question of agricultural markets.

Kerala has never passed an Agricultural Produce and Marketing Committee (APMC) Act. The extent of marketed surplus of crops like paddy or fruits or vegetables was never significant enough to require large and regulated wholesale markets like the APMC *mandis*. As such, the recent Farm Acts of the centre can be argued to have no direct impact on Kerala. In fact, no statutory regulations or restrictions exist as to the opening of private markets. Kerala, as a result, has been classified by the Central Government as "not requiring reforms." Nevertheless, no major private agricultural market has been established yet in Kerala.[6]

The absence of an APMC Act does not imply that there are no agricultural markets with rules or regulations. There are a large number of such markets – wholesale and retail – governed by market rules notified by the State Government from time to time. The Department of Agriculture owns and operates six wholesale markets. Local self-government institutions (LSGI) operate hundreds of agricultural markets. The Vegetable and Fruit Promotion Council Kerala (VFPCK) operates 288 markets. None of these markets are covered by any State-level legislation.

The existing network of markets is inadequate for more than one reason. One, agricultural markets do not exist in many regions where farmers are forced to rely on unregulated village traders. Two, given that agricultural production can be expected to rise in the future, more markets at the local-level would become necessary. Given Kerala's historical strength in collective action, it would be appropriate if these new markets are established in the cooperative sector. Local government institutions should play a major role in investment and regulation of these markets. Kerala should also involve National Bank for Agriculture and Rural Development (NABARD), the commercial banks, the Kerala Bank and Primary Cooperative Agriculture and Rural Development Banks (PCARDB) to extend more credit to the creation and expansion of

[6] There is no exact data on the number of private agricultural markets in Kerala. From 2004, there was a scheme of the central Government called Scheme for Development and Strengthening of Agricultural Marketing Infrastructure, Grading and Standardisation (AMIGS). Under AMIGS' sub-head "Establishment of private markets/purchase centres/collection centres/market yards", Rs 28 crore was invested in Kerala between 2005-06 and 2010-11. The nature of investments made included development of market yards, creation of agricultural marketing infrastructure, construction of modern trade centres and agri-business centres, fish processing units, milk marketing societies, collection and grading centres for rubber and grading and packing units in areca nut. Many of these were initiatives in the cooperative sector, such as the *sahakarana* (cooperative) agricultural markets.

In 2013, AMIGS was merged with the Grameen Bhandaran Yojana (Rural Godown Scheme) as a new sub-scheme called Agricultural Marketing Infrastructure (AMI), and made part of the Integrated Scheme for Agricultural Marketing (ISAM). As on September 30, 2020, there were 435 projects sanctioned under AMI in Kerala, with a total financial outlay of Rs 281.09 crore and subsidy assistance of Rs 64.26 crore. The total bank loan/own contribution was Rs 279.86 crore. Of these, 331 projects are completed and 78 projects are in the pipeline. These projects were in the spheres of market yards, agricultural processing, fishing boats, rubber processing, vehicles for transport of fish and fish products, copra processing, and rubber processing.

agricultural marketing infrastructure. Funds under NABARD's Rural Infrastructure Development Fund (RIDF) can be made use of more effectively. Finally, given Kerala's agrarian specificities, the State should begin discussions on an overall State-level regulatory regime for agricultural markets, covering public, private and cooperative markets. The existing marketing network is too fragmented, and an overarching State-level legislation will help to streamline their activities.

This brings us to the second issue, that is, the aggregation of output. Creation of facilities for aggregation should be organised parallel to the creation of new markets. Here, Kerala should facilitate the establishment of a large number of FPOs, in the form of both cooperatives and FPCs at the panchayat-level. Alongside, a plan to develop a modern supply chain for fruits and vegetables should be developed.

8) Storage and warehousing in an important area that needs focussed attention. Kerala's agricultural production will rise in the next five years. Paddy, vegetables and fruits will be the focus areas. Development of storage and market yards (including cold storages and cold chains), scientific post-harvest management and handling systems and scientific transportation will have to receive urgent policy attention. The plan to develop a modern supply chain in agriculture should include a bottom-up development of mobile cold storages at the panchayat-level, larger storage structures at the block-level and even larger warehouses at the district-level. These structures should also be efficiently aligned and linked with the agro-parks and food parks being developed at various locations.

At present, the Kerala State Warehousing Corporation (KSWC) has 56 warehouses with a total capacity of 2.76 lakh MT (of which 0.72 lakh MT is hired capacity). Other agencies with presence in Kerala are the Central Warehousing Corporation (1.3 lakh MT) and the Food Corporation of India (5.36 lakh MT). However, these facilities largely operate in the field of paddy and not in other crops. With the National Food Security Act (NFSA) coming into operation, it is estimated that an additional 7 lakh MT of storage capacity is required in Kerala.

Under the Grameen Bhandaran Yojana, storage facilities with a total capacity of about 55,806 MT were created. Further, 211 more schemes have been sanctioned for creating 90,842 MT. According to NABARD, while the credit flow to the warehousing sector in Kerala has improved over the past five years, it has not been commensurate with the potential. The status of construction of new warehouses under the KSWC financed by NABARD's Warehouse Infrastructure Fund (WIF) is given in Appendix Table 2.1. Construction of these structures should be completed with priority.

At present, the lack of adequate land has been identified as a major constraint in the development of storage and warehousing capacities. Among farmers too, the availability of farm-level storage infrastructure is poor, particularly for crops like rubber, coconut, areca nut, and spices. The concept of negotiable warehouse receipts has also not caught up in the State for multiple reasons.

There must be proper attention given to the following areas in the field of agricultural storage and warehousing.

- The State Government should increase its investments in the storage and warehousing sector to expand capacities. Plan funds and the funds of KIIFB can be used for this purpose. The utilisation of Central sector schemes to improve investments in the sector have to be given priority.
- Kerala should examine if a more liberal land acquisition policy for the creation of storage infrastructure can be introduced, including the use of common pool land available with panchayats. The current system of licensing should also be liberalised.
- The land and godowns available with the primary agricultural cooperative societies should also be used to increase storage capacities in the State. In fact, investment by cooperatives can meet a good part of the required investments.
- The existing warehouses need modernisation and renovation to reduce spoilage and increase efficiency.
- Kerala Bank should be entrusted with the task of increasing credit flow into the storage and warehousing sector.

9) Promotion of value addition and processing should be a part of efforts to expand marketing and storage. One of Kerala's historic failures in the agricultural sector has been its inability to develop medium and large industries and enterprises that purchase farmer's products in some scale and transform them commercially into value added products. Such possibilities exist in crops like coconut, vegetables, fruits, spices and condiments and medicinal plants. Unless value addition is ensured, prices received by farmers cannot be improved.

The Future of the Plantation Sector

In this section, we discuss the future of Kerala's plantation sector. The discussion is structured separately from other crops, as the plantation sector cannot be called a purely agricultural sector and shares many characteristics of production organisation with the industrial sector. Also, these commodities are managed under the different commodity boards of the Ministry of Commerce, Government of India. They are considerably export-oriented and their prices are largely determined outside the borders of the State and the country. Some discussion on spices is also included here, even though they are not plantation crops.

The culture of plantations is an integral part of the culture and geography of Kerala. The ecologically unique, though fragile, highlands of Kerala form a distinct component of the State's agrarian history and the contemporary canvas. Kerala contributes about 45 per cent to the total plantation production in India, and accounts for about 37 per cent of the total area cultivated with plantations in India. In rubber, Kerala accounts for about 77 per cent of the national production. In cardamom, the State accounts for about 89 per cent of the national production. In coffee and tea, these shares are 22 per cent and 5 per cent respectively. Taking these four crops together, cultivation takes place in 7.1 lakh ha of land, constituting 27 per cent of Kerala's cropped area. Further, it is estimated that about 20 per cent of Kerala's population depends on plantations for their livelihood. In absolute terms, more than 3 lakh workers depend on plantations for their employment.

Like in other parts of India, Kerala's plantations have a history that can be traced back to the colonial period. If Kerala was India's foremost globalised State in the twentieth century, it was largely due to the dominant presence of spices and plantations in its cropping pattern and the export revenues they brought in. After independence, plantations were exempted from the land reform legislation in Kerala owing to their industrial structure of production and the presence of a large number of daily wage workers. This policy allowed plantations to retain their economies of scale. Long leases of land were allowed to remain valid even after independence, which allowed for a stable tenurial framework.

In 1950, the Plantation Labour Act formalised labour relations in plantations and reaffirmed its status as an industrial enterprise. The Act provided a number of social security covers for plantation workers.

Beginning from the 1940s, plantation crops were brought under the special control of commodity boards, and thus separated from the Ministry of Agriculture. The Coffee Board was formed in 1942, the Rubber Board was formed in 1947, the Tea Board was formed in 1954 and the Spices Board was formed in 1987. These Boards were entrusted with the tasks of promotion of area and production, and received special funds from the Central Government. Funds were also set aside for export promotion schemes, and protection was offered from cheaper imports. In short, the plantation sector in Kerala grew between the 1940s and the 1980s in the shadow of a protectionist economic policy framework.

The situation changed by the 1990s. The World Trade Organisation (WTO) agreement came into operation from 1995. The WTO agreement led to the removal of quotas and tariffs that were the hallmark of India's protectionist trade policy. This was the first stage of the contemporary crisis in Kerala's plantation economy. Prices of plantation crops began to crash and many districts of Kerala experienced an acute agrarian crisis between 1997 and 2004.

In 2010, India signed the Association of Southeast Asian Nations (ASEAN) agreement, which inaugurated a new stage in the crisis. Many ASEAN countries shared India's tropical climate and were competitors in the production of spices and plantation crops. The State Government did not have any freedom to influence the national trade policy; these agreements were also signed by the executive without consulting either the States or the legislature. Later, the ASEAN agreement was sought to be carried forward with the zero-duty Regional Comprehensive Economic Partnership (RCEP) agreement, but progressive political movements in India were able to contain that move, *albeit* temporarily. These talks may restart anytime, and the danger continues to looms large.

Free trade agreements were only a part of the reason for the contemporary crisis in Kerala plantations. Inability to innovate and integrate, continuing poor productivity and climate variabilities have all made a bad situation worse. The productivity gap is particularly striking: in tea, Kerala's productivity is 1619 kg per ha, while national productivity is 2183 kg per ha. In *robusta* coffee, it is 842 kg per ha in Kerala and 1047 kg per ha in India. In rubber, Kerala's productivity is 1400 kg per ha whereas it is 1500 kg per ha in India. Also, productivity-levels in Kerala appear to have fallen over the recent years.

One important reason for the crisis of production of plantation crops in Kerala is the drastic reduction of Central Government finding for the four commodity boards for tea, coffee, rubber and spices. In Table 2.7,

we provide data on the real expenditures (revenue and capital) under the four boards. The figures are striking. Between 2011-12 and 2018-19, the expenditures fell drastically by 54.8 per cent in the Tea Board, 33.9 per cent in the Coffee Board, 34.3 per cent in the Rubber Board and 40 per cent in the Spices Board.

Such a decline in expenditure seriously affected the operations of the boards in production and marketing, and had a direct and visible impact on the growth performance of the plantation sector. The contribution of the plantation sector to Kerala's GSDP fell from Rs 21,000 crore in 2011-12 to Rs 9950 crore in 2018-19. More than 13 plantations in the State are closed. About 6000 persons lost jobs directly and indirectly. No new investments are forthcoming in the plantation sector. No plantation invests in replanting, as Government subsidies have been slashed with the fall in outlays. Some estimates show that even the area used for cultivation within the plantations has declined over the last decade.

The State Government should initiate a set of discussions with the Ministry of Commerce to ensure that the Budgets outlays for commodity boards are urgently raised. This needs to be a demand of a mass movement in Kerala, joined by the Government, all political parties, growers and workers.

Discussions with managements of plantations in Kerala usually bring out a set of demands: (a) labour and labour welfare costs in Kerala are higher than in other States, accounting for about 65 per cent of the cost of production; (b) plantations should be allowed inter-cropping and diversification into new high-value crops; (c) plantations should be allowed to begin ecotourism activities; and (d) Kerala should have a policy of "once a plantation, always a plantation".

It was in the context of these demands that the Justice Krishnan Nair Commission was appointed in 2015, which submitted its report to the Government in August 2016. This report recommended 14 specific policy changes in the plantation sector. The present State Government appointed a committee of secretaries to implement the major recommendations of this report. In June 2018, a major set of decisions were taken by the Council of Ministers, Government of Kerala.

1) The State decided to completely abolish plantation taxes.
2) The collection of agricultural income tax from plantations was to be frozen.
3) Charges of seigniorage in the cutting of rubber trees were abolished.
4) All *layams* (labour lines) in the plantations were to be exempted from the building taxes charged by the local bodies.
5) The reconstruction of *layams* would be included as part of the LIFE Mission of the Kerala Government and 50 per cent of the reconstruction costs would be met by the State Government. The estate owners may pay the rest 50 per cent over seven annual instalments. In a survey, it was found that 32,454 plantation workers are homeless. In addition, about 5348 retired plantation workers were homeless. They will be included under the ambit of LIFE mission.
6) The procedure of renewing leases of plantations would be eased.

Table 2.7 *Expenditures for the four commodity boards under the Ministry of Commerce, India, revenue plus capital, deflated by GVSA deflator with base year 2011-12=100, 2011-12 to 2019-20* in Rs crore

Year	Real expenditure (in Rs crore)			
	Tea Board	Coffee Board	Rubber Board	Spices Board
2011-12	265.0	202.4	195.8	109.4
2012-13	183.6	141.0	171.8	101.2
2013-14	150.3	132.8	170.2	90.9
2014-15	149.1	135.5	176.0	92.9
2015-16	149.8	118.7	168.3	87.9
2016-17	122.0	114.1	120.7	65.2
2017-18	147.1	138.0	144.0	75.5
2018-19	119.7	133.7	128.6	65.7
2019-20	143.3	179.8	175.5	81.9
% fall, 2011-12 to 2018-19	-54.8	-33.9	-34.3	-40.0
% fall, 2011-12 to 2019-20	-45.9	-11.2	-10.4	-25.1

Source: Expenditure budgets, Ministry of Finance, Government of India, various years

7) Plantation lands will be exempted from the Kerala Forest (Vesting and Management of Ecologically Fragile Land) Act (EFL).
8) A plantation policy would be formulated for the State.

These eight decisions were long-standing demands of the plantation owners in Kerala. In February 2020, the Government also released a draft of a plantation policy. Here too, many demands of the plantation sector found a place. Below, we summarise the major points in the draft plantation policy.

1) Plantations would be retained and protected as plantations. The policy of renewing leases of plantations would be further eased and hastened. This would ensure that the existing barriers to services like bank credit would be removed.
2) The measurement and demarcation of EFL would be hastened, so that more land can be brought under cultivation at the earliest.
3) The Government would favourably visit the theme of maximising income from one unit of plantation land. This would be attempted without disturbing the basic features of production in a plantation. The Government will explore the possibilities for allowing more inter-cropping, particularly vegetables, in the plantations. The Government will also explore if the Land Utilisation Order of 1967 needs amendment in this regard.
4) A major initiative for improving the processing and value-addition of plantation crops will be introduced. The cluster schemes of the Industries department will be extended to plantation crops also.
5) Plantations currently closed will be reopened with the help cooperatives or other means. This will help protect the employment of plantation workers.
6) Schemes of local bodies will include schemes for plantation workers and plantations also.
7) A special scheme for improving the skills of plantation workers will be introduced.
8) The Plantation Relief Fund and its activities will be streamlined and improved.
9) Given the impacts of climate variations, plantation regions will also require better watershed-based planning, construction of small water storage structures, renovation of wells and ponds and drinking water schemes. Using funds from the Disaster Management Authority, such works will be undertaken in consultation with the plantation managements and local bodies.
10) Production of renewable energy – solar, wind and biogas – will be promoted in the plantation sectors.
11) Possibilities of tourism in the plantations may be visited, but it will be implemented with the condition that the basic structure of plantations will remain unchanged.
12) A Plantation Directorate will be formed by the Government, which will allow the convergence of activities of the departments of revenue, forest, labour, industry, local bodies, finance, power and agriculture. This Directorate will be a one-stop contact point for all activities related to plantations and the State Government.
13) All incentives and exemptions available to new industrial units will also be available for plantation-related initiatives.

With regard to the major recommendations contained in the Krishnan Nair Committee and the draft plantation policy, the Government and plantation managements will continue discussions and reach a resolution on the outstanding issues.

There are two points of concern on plantation sector. These represent expectations from the sector.

1) Kerala needs to raise investments in plantations to expand replanting and improve productivity. This is an urgent need for the long-term survival of Kerala' plantations. Kerala also needs more investments in the value-addition sector of plantations. The plantation managements should publish an investment plan in these two spheres. In fact, we would argue that a part of the State Government's promised support to plantations may be made conditional on the achievement of specific outcomes in replanting and value addition.
2) Kerala is a labour-friendly State. As such, demands to weaken welfare measures where the plantation industry may have social obligations will not be received favourably by the Government. Kerala's higher wage rates are a given, and we need forward-looking policies where employers and workers join hands for the overall progress of the sector.

Fisheries in Kerala: Prospects for Growth of Production and Income

Introduction

The total population of fish workers in Kerala is 10.44 lakh, including 2.4 lakh inland fish workers. The fishing fleet of Kerala comprises 5997 mechanised vessels, 30,920 motorised vessels, and 2674 non-motorised traditional vessels. The fishing industry makes a valuable contribution to our exports. In 2019-20, the export of

marine products from Kerala was 148,227 tonne and valued at Rs 5020.3 crore.

Kerala's fisheries sector is marked by the predominance of marine production over inland production; the reverse is true for India as a whole. There is some consensus that while there is potential for deep sea fishing, Kerala needs to move towards sustainable fish management measures, responsible fishing, and stock enhancement.

Achievements in the 13th Plan period

In the 13th Plan period, the Government's effort in the marine fisheries sector was to improve livelihood security among the fish worker population; provide better amenities – sanitation, health care, drinking water, electricity, and library facilities – in the coastal regions; and reduce mortality at sea. There were major achievements in this regard. We shall begin with a brief description of these gains before moving to issues and strategies.

Infrastructure

A signal achievement was the completion of the construction of long-pending infrastructure projects, such as fishing harbours. Under marine infrastructure development schemes, at a total cost of Rs 403.5 crore, eight fishing harbours at Muthalapozhi, Chellanam, Chetuva, Tanur, Thalai, Vellayil, Koyilandy, and Manjeswaram were completed and commissioned. Outside the Plan, utilising KIIFB funds, the construction of Parappanangadi and Chethi harbours were completed at a cost of Rs 209.04 crore. The Plan has also supported the development of Thankassery, Puthiyappa, Beypore and Arthunkal fishing harbours. Harbour Management Societies for the operation of fishing harbours were constituted. For the first time in India, Fisheries Management Councils were formed with the participation of managements, fisheries representatives, people's representatives, and fisheries experts.

In addition, a total of 1600 coastal roads were constructed between 2017 and 2021, spending Rs 704.1 crore. More than 65 fish markets were constructed at a cost of Rs 193.5 crore. For coastal protection, an offshore breakwater project was initiated in Poonthura with KIIFB funding of Rs 19.7 crore. About 200 fibre-reinforced plastic (FRP) vessels were provided to fish workers as part of the Blue Revolution scheme. On a pilot basis, 10 deep sea fishing boats were distributed to fish workers. The *Sagara* mobile app was introduced to record the departure and return of fishing vessels at sea. The Kerala Marine Fisheries Control Act and Rules (KMFR Acts and Rules) of 1980 were comprehensively revised in 2017.

As a result of all these measures, marine fish production in the State increased from 4.84 lakh metric tonne (MT) in 2015 to 6.09 lakh MT in 2019.

Sustainability

A major menace in the sea is plastic pollution. Under an ambitious project titled "*Suchitwa Sagaram*" (Clean Sea), a sanitation campaign was launched to reduce plastic waste build up in the sea by prohibiting plastic waste dumping and removing all forms of plastic from the sea. *Suchitwa Sagaram* was implemented in Neendakara in Kollam in collaboration with the Society for Assistance to Fisherwomen (SAF), Local Self Government Institutions (LSGIs) and the Suchitwa Mission. This project was noted by the United Nations. About 38.4 tonnes of discarded nets, plastic ropes, and other plastic items have so far been removed by fish workers from the sea.

Livelihood and social security

In order to reduce mortality at sea, the Government commissioned marine ambulances for three zones: Vizhinjam in Thiruvananthapuram, Vypin in Ernakulam, and Beypore in Kozhikode. The marine ambulances were equipped with all modern facilities required for emergency medical aid for 10 persons at a time. Further, 19 coastal hospitals were constructed in the health sector.

To promote alternative livelihood activities, more than 2500 micro-enterprises were established along the coast; these provide livelihoods for 7000 fisherwomen. An Apparel Park Consortium was established at Kundara, Kollam, where 12 microenterprise units covering 48 fisherwomen beneficiaries were established. Employment was created for 230 fisherwomen in 9 coastal districts by establishing 46 "Coastal Friendship" seafood restaurants.

Housing was a major initiative. The Department provided safe houses to 5457 homeless fish worker families. The rehabilitation of another 4500 houses for fish workers is in progress. Through the LIFE Mission, 1619 homeless fisher families received new houses. A building complex with 192 flats has been constructed at a cost of Rs 18 crore at Muttathara, Thiruvananthapuram, to rehabilitate fishermen who lost their land and houses. Each flat has a floor area of 542 sq. feet.

Growth Trends

The value of output (VOO) from fisheries in Kerala as a whole rose by 13 per cent between 2011-12 and 2017-18 (Figure 2.6). The contribution of the inland sector is less than 20 per cent of the total VOO from fisheries

and aquaculture. In 2018-19, fish production in Kerala was estimated at 1.92 lakh tonnes from the inland sector and 6.1 lakh tonnes from the marine sector. The growth in the VOO from the marine fisheries sector was moderate (a rise of 6.3 per cent), while there was substantial growth in the VOO from inland fisheries sector (a rise of 58 per cent).

Kerala is deemed to have already attained an optimum-level of production in marine fish resources. It is the growth in inland fisheries that bodes well for the future of Kerala's fisheries sector. This chapter largely focusses on Kerala's potential in developing the inland fisheries sector.

As in the case of food grains and vegetables, Kerala is deficient in fish production. It is estimated that the total domestic fish consumption in the State is approximately 9.12 lakh tonnes per annum, or about 2000-2500 tonnes per day. Of the annual consumption, about 3 to 4 lakh tonnes (or about 60 per cent) is imported from other States or countries, especially for consumption in urban areas. A large share of Kerala fish production is marine. The total marine capture fish production in 2018-19 was more than 600,000 tonnes while inland aquaculture contributed only about 25,000 tonnes.

According to a study conducted by the Central Marine Fisheries Research Institute (CMFRI), the demand-supply gap for fish will widen in Kerala. At the same time, Kerala, with its vast aquatic resources in brackish water, sea water, and freshwater, has immense potential for developing inland aquaculture. It is time that the State concentrates on this food production system. Aquaculture has become a lucrative business activity more recently, with elaborate cage facilities in inland and brackish waters supported by multi-species seed-production hatcheries. In many regions of India, traditional fish farming areas are slowly being transformed into intensive fish or shell-fish farms. Kerala should use this potential to expand inland aquaculture in the next ten years.

Kerala's Inland Fisheries Sector

Kerala has a total coastal length of 590 km. The State is endowed with a vast area of inland waterbodies: 5295.93 ha of freshwater ponds and tanks, 1620 ha of freshwater lakes, 65213 ha of brackish water areas and 46128 ha of backwater stretches suitable for aquaculture. Kerala is also endowed with 41 west flowing and 3 east flowing rivers with a total length of 3092 km with significantly long stretches suitable for pen and cage culture.

A major constraint, however, is fish seed availability. Kerala has 32 hatcheries for the seed production of freshwater and brackish water fish and shrimps. Fish seed production, which was estimated at 353.55 lakh in 2019-20, met only 25 per cent of the seed requirement of the State. The highest production came from the hatcheries at Malampuzha and Peechi dams. About 648 lakh shrimp seeds – *Penaeus monodon*, *P. indicus* and *Macrobrachium rosenbergii* (scampi) -- were produced in 2019-20. These numbers indicate Kerala's potential resources and throw light on future possibilities.

Shrimp farming has a history of many centuries in the State. In the early twentieth century, dry shrimp (*chemmeen parippu*, or peeled, deveined cooked and dried shrimp) was exported from Kerala to Europe. In the post-Independence period, mechanisation and motorisation intensified. The landings of "*karikkadi*" shrimp (*Parapenaeopsis stylifera*) improved significantly and forms of processing like freezing and canning became popular. Scientific shrimp farming trials started in the 1950s. Shrimp farming in moderate density mode (i.e., a stocking rate of 5 to 8 shrimp per sq.m)

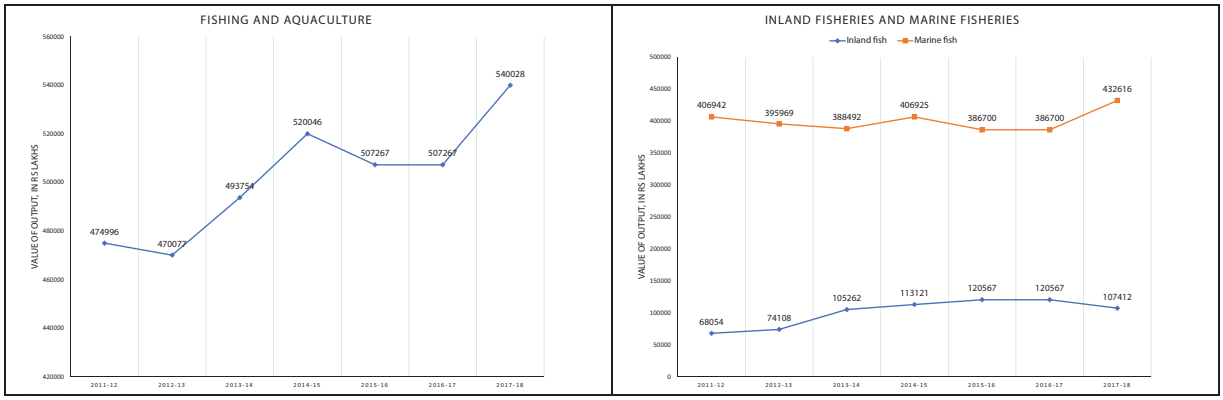


Figure 2.6 *Deflated value of output (VOO) from fisheries and aquaculture in Kerala from 2011-12 to 2017-18* in Rs lakh

Source: Department of Economics and Statistics, Government of Kerala

began only in the 1980s. In the mid-1990s, white spot disease, a severe blow to shrimp farmers, broke out in Kerala.

Fresh water aquaculture

In the freshwater sector, culture trials of fish like Indian Major Carp (IMC: rohu, catla, and mrigal) were initiated by the Fisheries Department in the 1970s and 1980s. The Indo-German project in Malampuzha during this period played a significant role in promoting reservoir fisheries through the production of carp fingerlings. The comparatively low annual fish production from aquaculture in Kerala (25,000 tonnes) clearly indicates the low productivity of the existing system. Most importantly, these fish do not fetch the due market demand and price among consumers who prefer marine fish. In the near future, carp may remain only in reservoir fisheries and may be slowly replaced in small scale systems by tilapia, basa, anabas, murrel, and pearl spot.

Seed Production Sector

The seed demand in Kerala for the implementation of the aquaculture programme (*janakeeya matsya krishi*) of the Fisheries Department is estimated to be 12 crore fresh water fish seed. A rough estimate shows that the indigenous production of freshwater fish seeds in Kerala is as low as 3.5 crore, produced mainly by the Government or its subsidiary hatcheries. This leaves a deficit of 8.5 crore seeds, which is imported from other States.

Apart from Government projects, there are thousands of farmers engaged in fresh water aquaculture projects. They use advanced technologies like Biofloc, Recirculating Aquaculture System (RAS) and Aquaponics. In 2019-20, farmers of the northern districts of Kerala are reported to have bought about two crore fresh water fish seeds (mainly for RAS, aquaponics, and intensive pond culture) even after we exclude the seeds used for Government projects. Cargo flights are chartered exclusively for bringing seeds to Kerala and these are sold at airports. Seeds supplied by middlemen are of inferior quality and suppliers loot farmers by supplying disease-affected seeds at exorbitant prices. As a result, the production is low. To control the unauthorised seed suppliers, a Fish Seed Act has been enacted by the Government. The establishment of multi-species hatcheries that can be operated on a season or species basis for meeting seed requirement is the only way to overcome the problem of middlemen. The species that have high potential in the Kerala context include tilapia, murrel, basa, anabas, carp, giant freshwater prawn, *penaeus vannamei, penaeus monodon,* asian sea bass, pompano, cobia, mullets, crab, and mussel.

Among the above species, murrel, Asian sea bass, mullet, basa, *P. vannamei*, and mussel seeds are in particularly short supply. Establishing hatcheries for these species is an important step forward.

Farming of Potential Species and Diversification

Tilapia. Tilapia have a high growth rate, are adaptable to a wide range of environmental conditions, and are able to grow and reproduce in captivity and to feed voraciously. Tilapia can withstand high water temperature and low-levels of dissolved oxygen. The optimum temperature range is between 20-30°C; they can tolerate temperature as low as 12°C. Tilapia tolerates brackish water conditions also (salinity up to 20 ppt). They can be stocked at higher densities (10,000-20,000 per ha in ponds and up to 4 to 5 lakh in intensive systems such as biofloc and RAS) than other fish. This is why this fish has become an excellent candidate species for aquaculture in tropical and semi-tropical conditions.

Tilapia culture is currently practiced in more than 100 countries. Nile tilapia is generally the most important cultured species on account of its fast growth rate, adaptability to a wide range of culture conditions, and high consumer acceptability. Nile, Red, Deep black, Deep red and Chitralada are considered to be superior to ordinary tilapia (*Tilapia mossambica*). This species breeds prolifically in the culture fields from very young age and culture often fails on account of stunted growth.

Murrel. The potential of murrel as a candidate species for freshwater aquaculture has not adequately been utilised in India other than in a few States, such as Andhra Pradesh and Tamil Nadu.

Vannamei shrimp (Penaeus vannamei) culture. The American shrimp vannamei was legally imported into India in 2009. Shrimp being one of the most expensive and sought-after sea foods in the world, its culture and seed production have been receiving new attention in many countries, including India.

The Kerala University of Fisheries and Ocean Studies (KUFOS) attempted to popularise vannamei farming through a plan scheme from 2011 to 2017. The University trained hundreds of farmers during that period. Scientific cultivation on the lines prescribed by the university's protocol yields 10 tonnes per ha with a net profit of Rs 10 lakh in 120 days.

Mullet. Grey mullet (*Mugil cephalus*) is a candidate species for brackish water aquaculture both in estuarine fields and homestead ponds, preferably integrated with other species. Various combinations of striped grey mullet and milkfish are considered successful models for brackish water farming in India. Mullet is an integrated component of traditional brackish water aquaculture along the Indian coast and the mangrove forests provide an excellent ecosystem for its larval, juvenile and sub-adult phases. Its scientific farming is yet to be popularised.

Crab Culture. Crab culture is practised in brackish water (where the salinity of the water will be between 5-25 ppt). There are two types of crab rearing.

Batch culture. Uniform sized crablets are stocked in "grow-out" ponds. Culture duration is 6-8 months and the production rates vary from 1 to 2.5 tonne per ha with 50 per cent to 80 per cent survival.

Crab fattening. Water crabs are collected from the wild and stocked in ponds, where, after a period of 20 days, shells harden and the marketability of the crabs increases.

Ornamental Fish Sector

Aquarium keeping is said to be the most popular hobby around the world after photography. The global trade of ornamental fish is as high as 10 billion USD per annum. Singapore, which has a total geographical area of 719 sq. km, is the leading nation in aquarium industry, with about 60 per cent of the total stake. Although India has more than 2500 species of potential ornamental fish, the trade volume remains negligible. Kerala, though endowed with rich aquatic resources and species diversity, lags behind in ornamental fish production.

The industry in Kerala can focus both on domestic marketing and exports. In the domestic market, fish like gold, guppy, molly, fighter, angle, gouramy, oscar, and cichlids are traded while high-value species are preferred in the export market. There is great potential for the production and export of koi carp, particularly to Japan.

Future Development of Aquaculture in Kerala

Advanced technologies in aquaculture

Biofloc. Biofloc Technology (BFT) is a technique for improving the quality of water in aquaculture by balancing carbon and nitrogen in the livestock system. BFT not only treats waste but also helps nutrition to aquatic animals. The Government of Kerala is promoting BFT wherever possible. Since it is a viable technology practised in many countries, it is a technology to be emphasised in the future.

Recirculating aquaculture system (RAS). Cultivable species need to be fed with quality feed on a regular basis. In order to maintain water quality, efficient filtration systems need to be installed to ensure the optimum growth of fish. A Recirculating Aquaculture System ensures that water flows back to the culture system after filtration (mechanical, biological or chemical filtration) in order that water quality is maintained throughout the culture. Although this is an energy intensive and expensive mode of aquaculture, it is used in urban conditions where the water area available for aquaculture is limited.

Aquaponics. Aquaponics is a synergic system between fish and plants in which both grow together in one integrated system. In an aquaponics system, water flows from a fish tank into a biofilter where bacteria break down the fish waste into an organic nutrient solution in which to grow plants. The plants then absorb the nutrients from the water before it is re-circulated to the fish tank. This is also a dynamic and energy-intensive system and needs the utmost care in implementation.

Intensive aquaculture. Aquaculture can be practiced intensively by modes such as the flow throw system, cage culture, and pen culture. Cage culture in reservoirs, backwaters and marine environments has much potential for sustainable development.

Reservoir based scampi production. The giant freshwater prawn, *Macrobrachium rosenbergii*, commercially known as "scampi," is a major delicacy and has been exported for many decades from Kerala (*M. rosenbergii* may well be the only species that goes to the export market from the freshwater sector of the country). Its commercial seed production was standardised in the 1990s by a team led by C. Mohanakumaran Nair. In 2005-06, the total national production of the species reached a peak of 35,000 metric tonnes. The prevalence of cultivation of the species declined on account of a viral disease. Most scampi hatcheries were converted to *Penaeus vannamei* hatcheries over this period. The shortage of seed is a major problem faced by this sector at present.

There is an urgent need to revitalise freshwater prawn farming in Kerala. The deep and undisturbed reservoir environment can be well used to develop scampi culture. It may well be possible also to obtain Geographical Indication (GI) certification for scampi reared in Kerala reservoirs.

Homestead ponds. Kerala should maximise the utilisation of water bodies for productive purposes. Domestic pond aquaculture is an excellent mode of aquaculture to meet the fish requirement of families. Tilapia, murrel and anabas are excellent candidate species for homestead farming.

Organic shrimp farming. Of late, Government regulatory agencies have introduced better management practices (BMPs) to address the need for sustainability in aquaculture development. Possible regulations of aquaculture in different parts of the world include restrictions, land use classification and zoning, environmental impact assessment, mitigation plans, permits, user fees and monitoring protocols.

There is immense potential for organic shrimp farming in Kerala. Kerala has a long history of organic shrimp farming. Traditionally, paddy-cum-fish culture used the "trapping cum holding system" in which shrimp seeds along with other assorted fish were allowed to enter the fields through the water inlets (sluice gate) with the tidal flow. The shrimps which remained in the fields for a particular period achieved marketable size and were harvested using sluice bag nets during the tidal ebb. This system was popularly known as "shrimp filtration".

At present, wherever Vannamei shrimp culture is not possible for ecological reasons, Kerala could popularise organic tiger shrimp farming (species: *Penaeus monodon*). This is Kerala's native shrimp. Unused or underused brackish water fields, including mangrove areas, can be used for organic shrimp farming. Local groups including Kudumbashree can be entrusted to look into the day-to-day operations of the area including fishing, pre-processing, processing and marketing.

Value addition. Most aquaculture products in Kerala are sold raw, without any value addition. Importing countries make an array of expensive products and realise huge margins from, for example, Indian shrimp. Value addition is an area with much potential for income-enhancement in Kerala.

Summary

The expected outcomes of policy in inland aquaculture should be:

- to create additional employment, particularly skilled employment
- to enhance the production of fish and shrimp
- to address food and protein security
- to improve farmers' incomes
- to produce high value aquarium fish for global markets
- to produce organic vegetables, meat, eggs, and fish from aquaponics and other integrated systems with premium value
- to improve the production of specific products such as mussel and oysters
- to add value to aquaculture products
- to improve farm management and water quality management
- to improve diagnostics and health management of cultivable fish
- to promote the cooperative movement in aquaculture
- to improve capacity building and professionalism in the aquaculture sector
- to maintaining food safety
- mangrove conservation and afforestation
- to ensure gender equality in the fisheries development
- to improve research and development in association with the Kerala University of Fisheries and Ocean Studies

Animal Resources in Kerala: An Assessment of Progress and a Roadmap for the Future

Introduction

The animal resources sector in Kerala contributed about 27 per cent to the Gross State Value Added (GSVA) from agriculture and allied sectors in 2018-19. It is estimated that about 7.1 lakh households are directly engaged in animal resources in Kerala. A large number of women are also involved in the workforce in this sector.

As per the results of the Situation Assessment Survey (SAS), only 51.6 per cent of all agricultural households in Kerala were engaged in animal farming in 2012-13, while the corresponding national average was 71.9 per cent. Further, while the average monthly income of an agricultural household was Rs 11,888 in Kerala, only Rs 575 (4.8 per cent) came from animal farming. In other words, animal farming, at present, is at best a minor supplementary source of income for Kerala's rural households.

Performance of the Animal Resources Sector

Livestock population

Data on the population of livestock and poultry are available from the Indian Livestock Census, organised at periodic intervals. The data released for 2019 are broadly encouraging for Kerala (Table 2.8). The total livestock population in Kerala, after falling between 2007 and 2012, rose from 27.3 lakh to 29 lakh between 2012 and 2019. Within livestock, while cattle

Table 2.8 *Population of livestock and poultry in Kerala, 2007 to 2019* in lakh

Item	2007	2012	2019
Total livestock population	35.8	27.3	29.0
Cattle population	17.4	13.3	13.4
Buffalo population	0.6	1.0	1.0
Goat population	17.3	12.5	13.6
Pig population	0.6	0.6	1.0
Poultry population	156.8	242.8	299.7

Source: Indian Livestock Census, various years

population rose moderately, the population of goats and pigs rose substantially. Within poultry, population grew consistently between 2007 and 2019. Between 2012 and 2019, the poultry population in Kerala increased by about 57 lakh.

Between 2007 and 2012, cattle population in Kerala had sharply fallen by about 4 lakh animals. One reason for this fall in cattle population was the high rate of slaughtering in the State, given the high domestic demand for meat. It was in this context that the Government introduced the herd induction scheme to reverse the fall in cattle population. Between 2006-07 and 2019-20, a total of more than 80,000 milch animals and about 18,000 heifers were distributed to growers (Table 2.9). The rise, though moderate, of cattle population between 2012 and 2019 is a sign of the success of the herd induction programme.

Trends in GSVA and VOO

If we consider data on the GSVA in the livestock sector, the overall growth pattern in the last decade shows that there was period of growth between 2011-12 and 2014-15, and then a decline (Figure 2.7). In real terms, there was an absolute decline in the GSVA by Rs 20,388 crore between 2014-15 and 2018-19. There was a moderate pickup of growth in the first year of the 13th Plan, but the heavy floods of 2018 and 2019 resulted in a sharp fall of GSVA in 2018-19 and 2019-20.

If we consider the data on value of output (VOO) released by the Central Statistics Office (CSO), the findings on GSVA are corroborated (Figure 2.8).[7] There was a period of growth till 2015-16, followed by a sharp fall in 2016-17 (the last year of the 12th Plan). There was a pickup in 2017-18, but lack of VOO data for more recent years constrains us from a further analysis of the 13th Plan period.

Thus, overall, while the livestock sector grew point-to-point between 2011-12 and 2018-19, the slowdown after 2014-15 is a matter of concern and needs urgent attention. We shall now consider trends in VOO for each sub-sector (Figure 2.8).

Over the 12th Plan period, there was a sharp fall in the VOO for milk and milk products. One reason for this fall was the incidence of the foot-and-mouth disease among cattle in Kerala in 2013-14, whose impacts continued through the 12th Plan period. About one lakh animals were affected and more than 6000 animals died. Within bovines, more than 33,000 animals were affected and about 2800 animals died. Further, in 2016-17, there was a severe drought that adversely affected the production of milk. The procurement of milk recorded a fall by about 1 lakh tonne in 2016-17. In January 2016, Milma imported about 1.6 lakh tonne of milk per day from outside the State. Post-drought, in January 2017, Milma was importing about 4 lakh tonne of milk per day.

In the single year of the 13th Plan, there was a rise in VOO in milk but it needs to be seen if the revival is maintained. The record in the 13th Plan would surely be marred by the severe floods in the State in 2018 and 2019. The 2018 floods resulted in loss of income through animal products and damage to infrastructure and livestock assets. More than 5,000 cows, 11 lakh chickens, and 4.8 lakh ducks died totalling about 16.5

Table 2.9 *Number of cattle inducted as part of herd induction utilisation plan fund, Kerala, 2006-07 to 2019-20* in number

Year	Number of animals inducted	
	Milch animals	Heifers
2006-07	5884	-
2007-08	10,440	-
2008-09	7000	480
2009-10	4079	750
2010-11	4270	1260
2011-12	2550	980
2012-13	3507	1000
2013-14	4717	1175
2014-15	6339	1770
2015-16	7215	2145
2016-17	6540	2320
2017-18	7063	3055
2018-19	5606	1780
2019-20	5590	1267
Cumulative total	80,800	17,982

Source: Department of Dairy, Government of Kerala

[7] Gross Value Added is defined as the value of output (VOO) minus the value of intermediate consumption and is a measure of the contribution to GDP made by an individual producer, industry or sector.

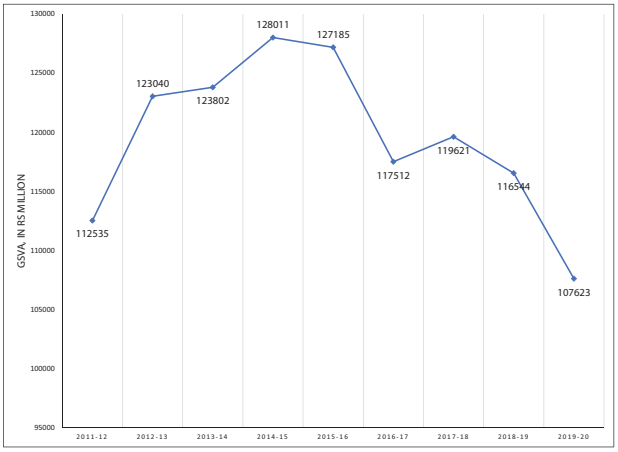


Figure 2.7 *Gross State Value Added (GSVA) at constant basic prices, livestock sector, Kerala, 2011-12 to 2019-20 base year 2011-12* in Rs million
Source: CSO

lakh livestock death. The total damage and loss for the livestock sector was calculated at Rs 687.5 crore. Estimated income loss to the livestock subsector was Rs 519.73 crore, including production losses and decline in egg and milk production.

After 2011-12, there was also a sharp fall in the VOO in dung. At the same time, there was a growth in the VOO in egg and meat between 2011-12 and 2017-18. There was a sharp growth in VOO from "increment in livestock," the estimates of increment in livestock population are estimated by extrapolating the population figures available from the successive rounds of Indian Livestock Census. In other words, this is simply a reflection of a rise in livestock and poultry population over the years. Thus, the VOO data also raise a number of issues of concern in Kerala's animal resources sector that requires urgent policy attention.

Production Estimates

Let us now come to direct estimates of production in the animal resources sector. To begin with, data on milk production in Kerala between 1992-93 and 2018-19 are given in Figure 2.9. Milk production grew from 18.9 lakh tonne in 1992-93 to 27.2 lakh tonne in 2001-02, which was a commendable stretch of growth. There was a sharp fall by about 7 lakh tonne in milk production between 2001-02 to 2004-05. Thereafter, there was another period of growth between 2005-06 and 2012-13, when milk production rose again to 27.9 lakh tonne. Between 2012-13 and 2016-17 (the 12th plan period), milk production fell again by about 2.7 lakh tonne. In the 13th Plan period, the decline in milk production was arrested and there was a moderate rise in milk production. The milk production in 2019-20 stood at 25.4 lakh tonne, which was slightly higher than the production figure of 25.2 lakh tonne for 2015-16. Clearly, if there were no floods in 2018 and 2019, there would have been a visible revival of production. Data on per capita milk production in Figure 2.9 also reaffirm these findings.

There have been significant achievements during the 13th Plan period in dairy sector. Certain achievements directly caused an enhancement in production and productivity in the sector while some others were of policy importance.

In Kerala, the livestock sector is prominent and one of the fastest growing sectors of rural economy. A positive trend is noticed in livestock population in the State. Compared to last two Censuses (showing a trend of declining population), 20th Livestock Census shows one per cent increase in livestock population, 9 per cent increase in goat population and 25 per cent increase in poultry population. Emergency veterinary service during night hours extended to all the 152 blocks from 45 blocks. A new multi-speciality veterinary hospital was made functional at Kudappanakkunnu in Thiruvananthapuram. Wild life study centre and oncology wing established at State Institute for Animal Diseases, Palode. National Accreditation Board for Testing and Calibration Laboratories (NABL) accreditation obtained for four Laboratories (Labs) under the Department namely, State Institute for Animal Diseases (SIAD) Palode, Avian Disease Diagnostic Laboratory (ADDL) Thiruvalla, Rinder Pest Eradication (RPE) laboratory Palakkad, and State Laboratory for Livestock, Marine and Agri Product (SLMAP) Ernakulam. The new institutions namely, layer farm at Ayur, Thottathara in Kollam, hi-tech dairy farm at Kuriottumala, Livestock Management Training Centre at Athavanad in Malappuram and at Sulthanbathery in Wayanad District were established.

A new scheme Comprehensive Livestock Insurance Scheme "Gosamrudhi" has the lowest premium rate available in the State, under the scheme 1,86,650 cows were insured. Through the scheme on animal resource development for improving the livestock resources in the State, various projects such as support for commercial goatery, male calf fattening schemes, interest subvention for loans taken for animal resources sector were implemented.

Animal Husbandry Department has developed Geographic Information System (GIS) based mapping of farmers "Bhoomika" to build a geospatial data base of farmers engaged in animal resources activities for effective management and monitoring of health,

breeding, production, risk and disaster management, and human resource management. The institutions coming under the purview of the department has been brought under the geo mapping system. Kerala Livestock Development Board is developing a new software application for herd book registration electronically in association with IIITMK, so that the data could be synched with similar applications of Animal Husbandry Department and Dairy Development Department.

As part of Rebuild Kerala Initiative (RKI), an amount of Rs 2.2 crore sanctioned to establish two Mobile Tele-veterinary units at Ernakulam and Kannur districts and each comprises of advanced diagnostic aids such as portable X ray unit, portable ultrasound scanner, surgical equipments and animal lifting device. Centre for Development of Advanced Computing (C-DAC) is the implementing agency for the project and the project will be completed within 8 months period. Under the "Subhiksha Keralam" project, an amount of Rs 382.24 crore (State Plan, Rs 51.44 crore, RKI – livelihood support package, Rs 77.00 crore and LSGI schemes, Rs 254.80 crore) is included for implementation of Animal Husbandry Department schemes including the projects, namely, *Govardhini*, a rural backyard goat development scheme under National Livestock Mission (CSS), commercial goatery, goat satellite unit and male calf fattening.

"Kerala chicken" is a Rebuild Kerala Initiative (RKI) of the State at a project cost of Rs 63.10 crore intended to supply safe broiler chicken at reasonable price to the consumers and to develop a viable livelihood vocation to the farmers. The project envisages to establish 2600 broiler rearing farms and 240 Kerala chicken sales outlets across the State and also to establish breeder farms, rendering plants for waste management, processing plants, reefer vans, testing facility for meat quality analysis under various stakeholders, namely, Animal Husbandry Department, Kudumbashree, Kerala State Poultry Development Corporation (KSPDC), Meat products of India (MPI), Brahmagiri Development Society (BDS), Kerala Veterinary and Animal Sciences University (KVASU) and Local Self Government Department (LSGD).

The dairy sector plays a pivotal role is ensuring the socio-economic stability of the population in the State. In Kerala, around 8 lakh families are involved in dairying activities. The dairy co-operative societies are the backbone of dairy sector of Kerala, of which 3.94 lakh farmers registered under the co-operative sector. There are 3643 registered dairy co-operatives in the State which ensures steady price and market to the producers and play a vital role in the rural economy. During the period, 134 dairy cooperatives have been newly registered and 133 dormant societies revived and made functional. Annual milk production of the State is 26 lakh Metric Tonne (MT) and the milk collection through dairy co-operatives has reached a record figure of 21.37 lakh litre per day in December, 2021. There was around 30 per cent hike in milk procurement during the period from 2015-16 to 2020-21. Around 9.5 lakh person days of employment generated every year in the Kerala dairy co-operative sector. As a measure of transparency in the activities of dairy co-operatives "unified accounting software" covering dairy co-operatives and other stake holders established. For stabilising the dairy sector, Kerala Co-operative Milk Marketing Federation (KCMMF) has initiated the preliminary works of establishment of a milk powder factory of 10 MT per day at an estimated cost of Rs 54 crore at Moorkanad in Malappuram District.

As far as the productivity of cattle is concerned, Kerala stands second in the country (10.22 litre per day) next to Punjab. Average productivity of Indian breed of cattle is 3.85 litre/day and crossbred cattle is 7.85 litre per day. The Dairy Department being the nodal agency for fodder development activities could produce 15.88 Lakh Metric Tonne (LMT) of additional fodder and 96,087 farmers benefitted from this programme. By utilising an amount of Rs 10.05 crore, a new scheme namely, massive fodder cultivation implemented in barren lands (344 ha) and distribution of green fodder and dried fodder through dairy co-operatives. A Cattle Feed Act is intended to ensure the quality of cattle feed produced and marketed is under preparation. Permanent quality assurance facilities established at permanent check posts namely, Meenakshipuram, Aryankavu, and Parassala. The Integrated Dairy Development Programme and Dairy Zone Programme in selected districts or blocks provided a great impetus to the dairy development activities. Establishment of Heifer parks and Calf adoption programme also helped to stabilise the dairy sector of the economy. As the part of herd induction programme financial assistance were extended for inducting 28,414 milch animals and 9,058 heifers. The Comprehensive Dairy Insurance Scheme "Ksheera Sandvanam" covering the cattle (18,278) and cattle owner (60,792) is for ensuring the socio-economic stability of farmers.

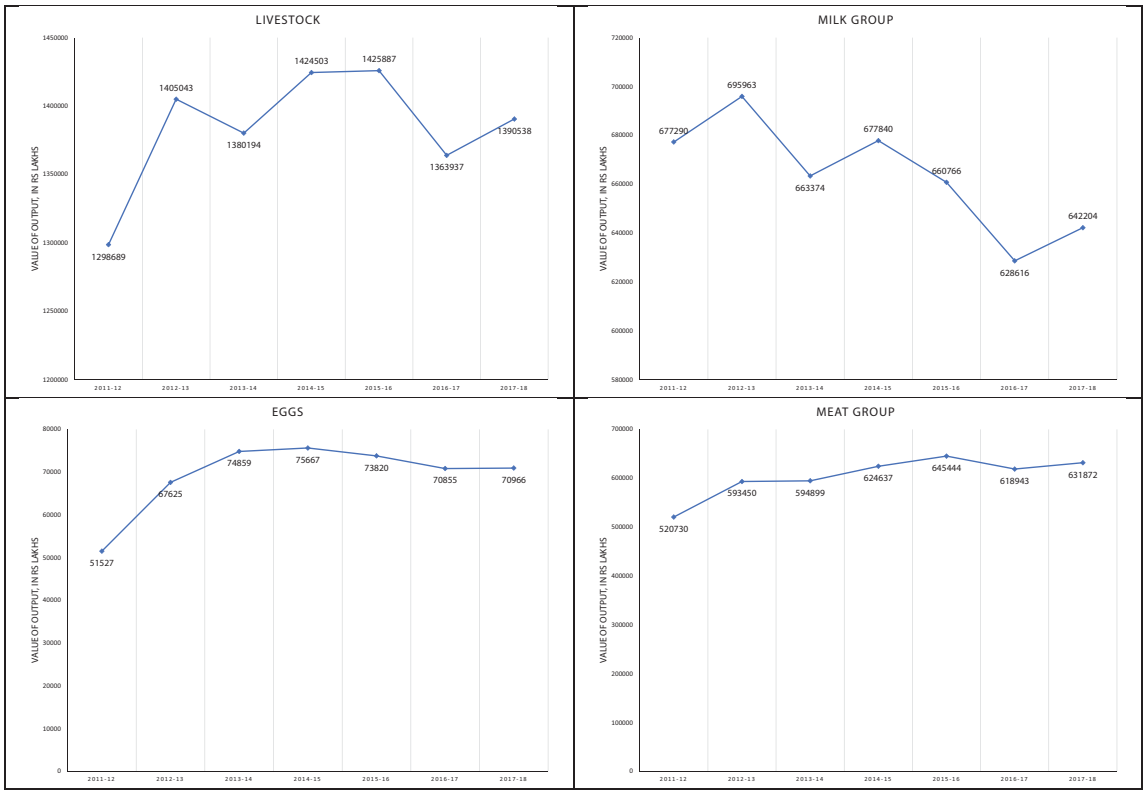
To manage the flood in Kuttanad region and its effects on cattle population, preliminary activities were initiated for the establishment of two elevated and Community Cattle sheds at Alappuzha. Being the

nodal agency for distribution of Kisan Credit Card (KCC), financial assistance was availed for an amount of Rs 270.8 crore to 46,547 farmers. The monthly pension of eligible pensioners enrolled to Kerala Dairy Farmers Welfare Fund Board was hiked from Rs 500 per month to Rs1600 per month per pensioner. Under the "Subhiksha Keralam" project, an amount of Rs 88.08 crore with a Plan assistance of Rs 51.07 crore was allocated for implementation of Dairy Department schemes including induction of milch animals and heifers, fodder cultivation, milk incentive, subsidised cattle feed bags, cattle shed construction/renovation, farm mechanisation, insurance and revolving fund.

Under the Flood Rehabilitation Programme, an amount of Rs 44 crore during the period 2018-2020 had been utilised by the Department. Around 19,930 farmers were assisted in 2018-19 and 28,170 farmers in 2019-20. Rs 11.83 crore was utilised to distribute cattle feed at subsidised rates to farmers who were otherwise suffering due to the Covid-19 pandemic crisis. Around 2 lakh farmers benefited out of this programme. In addition to the same, Rs 35.24 crore was extended as Cattle Feed Subsidy to dairy farmers of the State.

Data with the Dairy Department show that Kerala's dependence on imported milk is declining. In 2016-17, about 9 lakh litre of milk were imported into the State every day.[8] By 2019-20, Kerala was able to reduce the dependence on milk imports to about 3.2 lakh litre per day. Other indirect indicators of milk production also show promising outcomes for the 13th Plan period. For instance, in 2015-16, Milma used to import at least 6 to 7 lakh litre of milk per day from outside Kerala. In 2020, Milma was importing only about 88,000 litre of milk per day. Further, Milma exports about 58,000 litre per day to powder factories outside the State. If we deduct exports from the imports, Milma's deficit declines to just 30,000 litre per day. The fall in Milma's reliance on imported milk indicates a possible rise in domestic milk production which is not captured adequately in official data. More clarity will be obtained when milk production data for 2020-21 become available.

The moderate revival of milk production during the 13th Plan period was a reflection of improved-levels of intervention by the Government of Kerala in milk procurement (see Table 2.10). In 2016-17, the procurement of milk through dairy cooperatives was 5.9 lakh tonne. From 2017-18, this could be raised up to 6.8 lakh tonne by 2019-20. On a per day basis, this represented a rise of procurement from 16.3 lakh litre per day to 18.6 lakh litre per day.



[8] The total deficit in milk production, when estimated on the basis of a requirement of 250 gram per person for 365 days for the projected population, is placed at a slightly higher level of 4.6 lakh tonne.

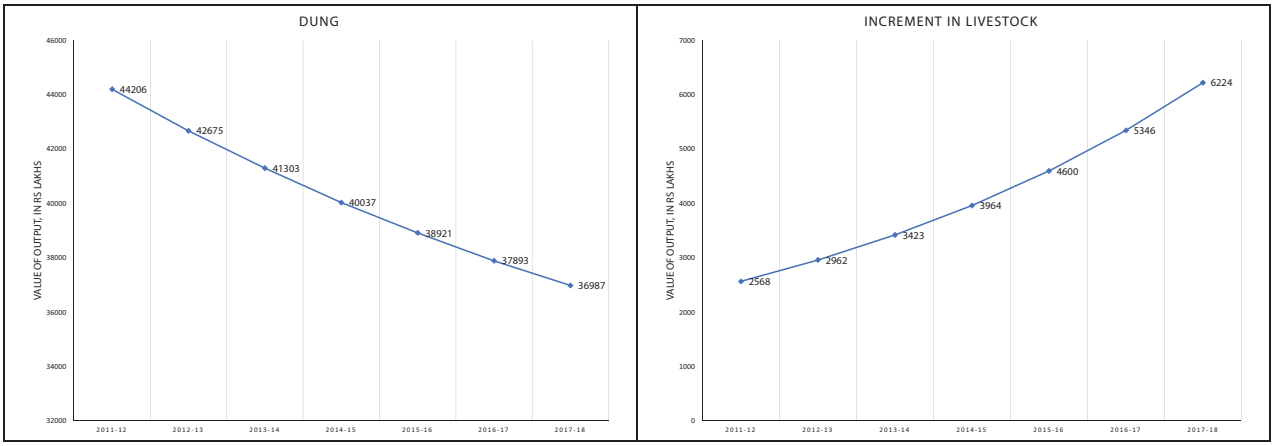


Figure 2.8 *Value of output (VOO) from livestock and selected sub-sectors, Kerala, in 2011-12 prices, 2011-12 to 2017-18* in Rs lakh
Source: CSO

In the case of egg production, there was a clear phase of rise in production between 1992-93 and 2001-02 by about 23 crore eggs (Figure 2.10). However, there was a sharp fall in egg production between 2001-02 and 2006-07 by about 80 crore eggs. Thereafter, egg production rose sharply between 2006-07 and 2014-15 by about 130 crore eggs, which was a commendable growth performance. However, egg production fell again after 2014-15, and there was a decline in production by about 32 crore eggs between 2014-15 and 2019-20. The total import of eggs into Kerala in 2019-20 was 254.8 crore eggs, while the domestic production stood at 218.1 crore eggs.

In the case of meat production, there was a moderate rise in meat production by about 55,000 tonne between 2011-12 and 2019-20 (see Figure 2.10). The decline in 2018-1 9 and 2019-20 appears to be a result of the floods of 2018 and 2019. In 2019-20, the total production stood at 4.55 lakh tonne, while the total import of processed meat (i.e., excluding live animals transported for slaughter) was at 28,000 tonne.

Domestic demand for meat has been growing at a faster rate. An indication of this is available from the data on import of different types of livestock and poultry animals into Kerala from 2012-13 (Figure 2.11). While there was a moderate decline in the import of cattle after 2014-15, the import of buffaloes rose over the same period. While the import of goats was largely unchanged, the import of pigs sharply rose from 11,311 in 2012-13 to 77,670 in 2019-20. So did the import of adult poultry birds into the State, which rose from about 3.6 crore in 2012-13 to about 10 crore by 2019-20. The question to ask is if Kerala can increase its dependence on domestically grown animals for slaughter.

Major Gains in the 13th Plan Period

The total allocation for the animal husbandry and dairy departments has risen consistently over the past decade

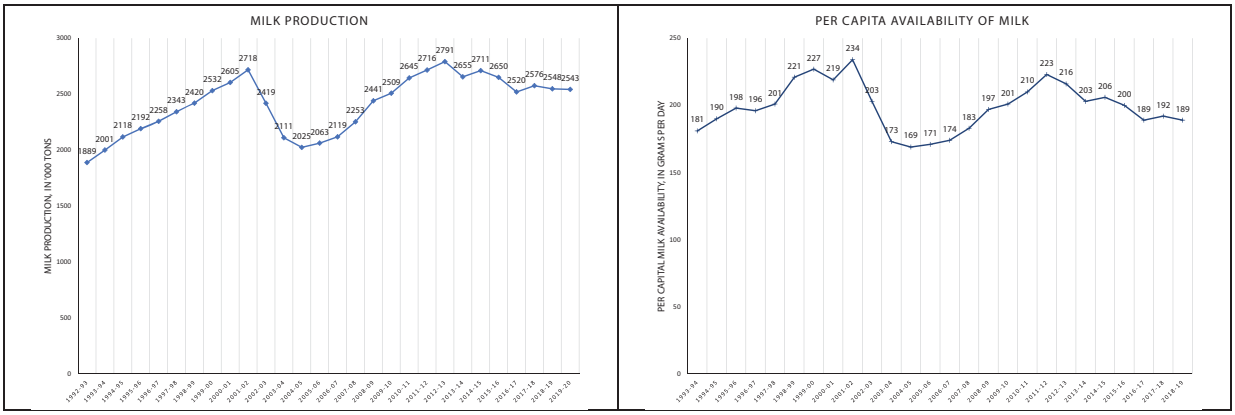


Figure 2.9 *Milk production and per capita availability, Kerala, 1992-93 to 2019-20* in thousand tonne and gram per day
Source: Department of Dairy, Government of Kerala

Table 2.10 *Procurement milk through dairy cooperatives, Kerala, 2007-08 to 2019-20* in lakh MT per annum and lakh litre per day

Year	Procurement of milk through dairy cooperatives	
	In lakh MT per annum	In lakh litre per day
2007-08	4.1	11.2
2008-09	4.0	11.1
2009-10	4.3	11.7
2010-11	4.1	11.2
2011-12	4.5	12.4
2012-13	4.9	13.4
2013-14	5.3	14.4
2014-15	5.6	15.3
2015-16	6.0	16.4
2016-17	5.9	16.3
2017-18	6.6	18.1
2018-19	6.8	18.6
2019-20	6.8	18.6

Source: Department of Dairy, Government of Kerala

(Table 2.11). The total Plan allocation rose from Rs 175 crore in 2011-12 to Rs 436 crore in 2019-20, which was a 149 per cent rise. However, expenditures have lagged behind allocations and the total spending in 2019-20 was only Rs 232 crore out of the allocation of Rs 436 crore. Two notable deductions from Table 2.11 are that the utilisation of funds from the Central sector schemes and Rural Infrastructure Development Fund (RIDF) in National Bank for Agriculture and Rural Development (NABARD) has declined for the animal husbandry and dairy departments after 2016-17.

In addition to Plan funds listed in Table 2.11, the departments also make use of the funds allocated through the Plan to the local self-Governments (LSGs). Table 2.12 provides the data on expenditures through LSGs. The total expenditure in the sector through LSGs rose from Rs 44 crore in 2012-13 to Rs 182 crore in 2019-20. The share of animal resources sector in the total production expenditures of LSGs also rose from 28.3 per cent in 2012-13 to 40 per cent in 2019-20. As the share of the total expenditure of LSGs, expenditure on animal resources also rose from 3.5 per cent in 2021-13 to 7.4 per cent in 2019-20.

There were important institutional interventions made in the animal resources sector during the 13th Plan period. We shall list a few important points below.

1) Higher procurement of milk through the dairy cooperatives and the continuation of the herd induction programme have already been alluded to. The member ship in dairy cooperatives has risen by 25,000 during the 13th Plan period.
2) The opening of 24*7 veterinary hospitals was an important initiative during the 13th Plan period. Currently, there are 31 such hospitals across the State that cover 45 blocks. In 2020-21, the presence of 24*7 hospitals is planned to be expanded from 45 blocks to all the 152 blocks of the State.
3) An insurance scheme for cattle has been introduced by the Animal Husbandry and Dairy Departments. Their schemes together currently cover more than 85,000 animals.
4) Four regional laboratories under the Animal Resources have received accreditation status over the 13th Plan period.
5) Two tele-veterinary units have been established.
6) About 500 artificial insemination centres for goat have been opened, which was instrumental in the rise in goat population seen during the livestock census of 2019.

Strategies for Growth

It is important to understand some of the basic features of the animal resources sector in Kerala before we formulate strategies for the future.

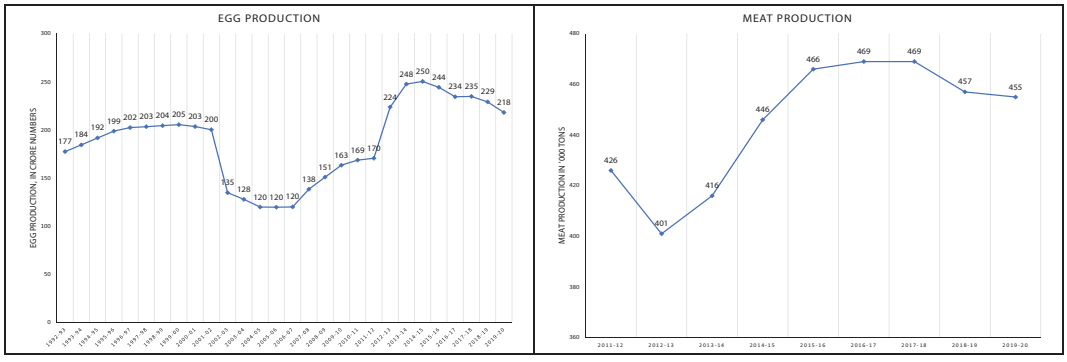


Figure 2.10 *Production of egg and meat, Kerala, 1992-93 to 2019-20* in thousand and thousand tonne

Source: Department of Animal Husbandry, Government of Kerala

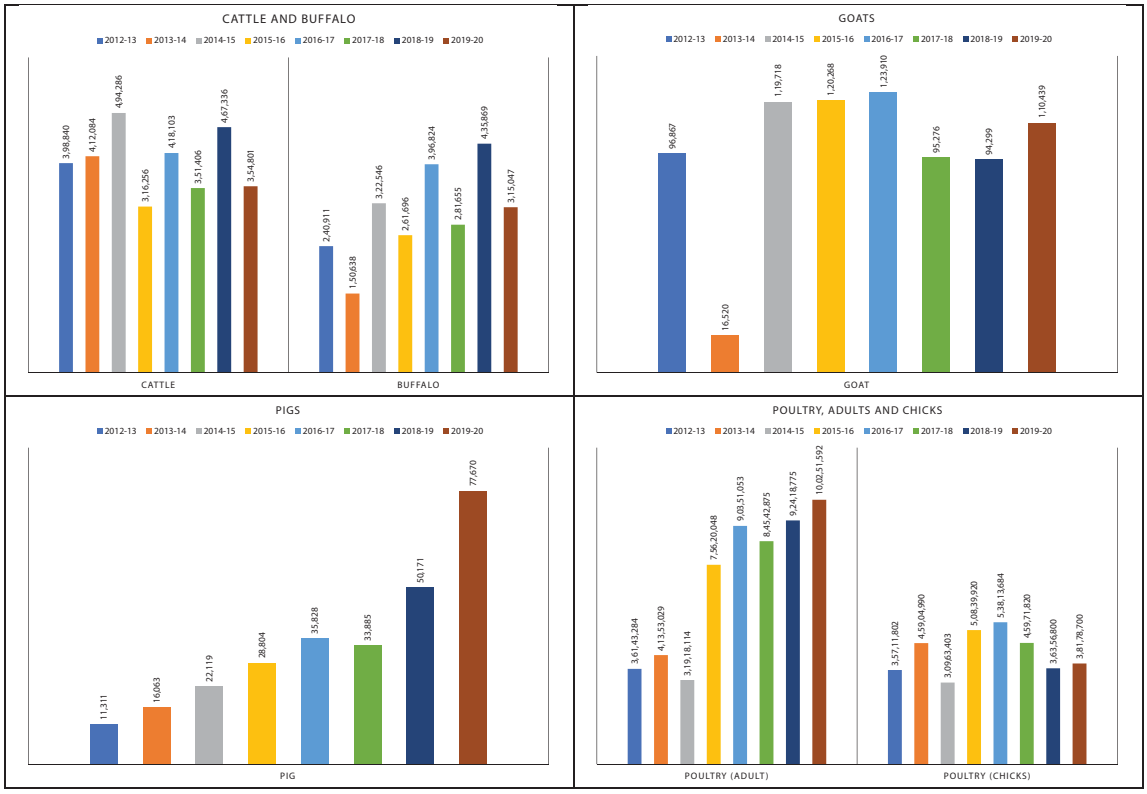


Figure 2.11 *Import of animals into Kerala, by type, 2012-13 to 2019-20* in number
Source: Department of Animal Husbandry, Government of Kerala

First, Kerala's dairy sector may be characterised as a low input-low output system. Most of the farming of animals in Kerala takes place in small homesteads integrated with crop cultivation and fisheries. The average herd size in small homesteads does not normally exceed three, while in medium sized homesteads the herd size goes up to nine. More than 55 per cent of cattle farmers maintain herd sizes of two or three, while 32 per cent maintain single-cow units.

The number of commercially operating dairy farms with larger herd sizes is less in Kerala. Data from the Dairy Department show that there were only 41 commercial farms (0.2 per cent) that had herd size more than 100 (Table 2.13). About 92 per cent of the farms had herd size less than 20, out of which about 70 per cent had herd size 5 to 10. In other words, Kerala has enormous potential in expanding the average herd size and benefit from economies of scale in production and marketing.

Secondly, even though herd sizes are low, productivity of cattle in Kerala is higher than the national average. The average milk yield per animal in India for exotic or crossbred animals is 7.9 kg and for indigenous or non-descript animals is 3 kg per day. The corresponding figures for Kerala are 10.2 kg per day and 3 kg per day respectively. The productivity of 10.2 kg per day in Kerala for exotic/crossbred animals was the second highest among Indian States after Punjab (13.4 kg per day). This advantage for Kerala was due to the high percentage of exotic/crossbred animals in the population compared to other States. Data from the Livestock Census of 2019 show that about 94 per cent of cattle in Kerala are either exotic or crossbred and only 6 per cent are indigenous or non-descript breeds. In India, on the other hand, only 26 per cent of the cattle are exotic or crossbred and the remaining 74 per cent are indigenous or non-descript breeds.

The question in Kerala is how it could build on the progress in artificial insemination and genetic improvement made over the years into concrete gains in milk production. The high genetic quality of Kerala's cattle population is a most appropriate launchpad for a rapid rise in milk production in the recent future. At the same time, Kerala should also aim at improving the genetic basis of its livestock and raise productivity to at least 13 to 14 litre per day.

Thirdly, demand for milk is expected to rise over the next decade. A study by the National Council of Applied Economic Research (NCAER) in 2014 argued that the total demand for milk was 27.9 lakh tonne in

Table 2.11 *Plan allocations and expenditures, Department of Animal Husbandry and Dairy, Kerala, 2011-12 to 2020-21* in Rs crore

Year	Free Plan + SS	CSS	RIDF	Total
		Allocation		
2011-12	156	7	12	175
2012-13	223	18	23	264
2013-14	285	17	23	325
2014-15	332	17	33	382
2015-16	335	27	43	405
2016-17	333	22	50	404
2017-18	356	19	50	425
2018-19	388	16	50	453
2019-20	394	12	30	436
2020-21*	345	12	22	379
		Expenditure		
2011-12	200	15	0	215
2012-13	219	23	0	242
2013-14	263	11	12	286
2014-15	277	41	17	335
2015-16	274	6	21	301
2016-17	309	13	0	323
2017-18	365	9	0	374
2018-19	327	2	0	329
2019-20	228	4	0	232
2020-21*	150	2	1	153

Note: Plan includes Plan schemes, Central schemes and State share for Central schemes
* As on October 21, 2020
Source: Kerala State Planning Board

Table 2.12 *Expenditure in animal resources and dairy by local government institutions, Kerala, nominal figures, 2012-13 to 2019-20* in Rs crore

Year	Expenditure on AH and Dairy (AH)	Production expenditure (P)	Total expenditure (T)	AH/P (%)	AH/T (%)
2012-13	44	154	1250	28.3	3.5
2013-14	69	226	1942	30.3	3.5
2014-15	71	240	2153	29.6	3.3
2015-16	72	242	2401	29.6	3.0
2016-17	137	373	2041	36.6	6.7
2017-18	232	660	2750	35.1	8.4
2018-19	234	674	3330	34.7	7.0
2019-20	182	455	2445	40.0	7.4

Note: AH-Animal Husbandry
Source: Kerala State Planning Board

Table 2.13 *Classification of dairy farms by herd size, Kerala, 2019-20* in number and per cent

Size of herd in dairy farms	Number of dairy farms	Share in total (%)
5 to 10	9878	69.5
11 to 20	3166	22.3
21 to 50	984	6.9
51 to 100	152	1.1
More than 100	41	0.2
Total	14221	100.0

Source: Department of Dairy, Government of Kerala

2009-10, which would rise to 32.9 lakh tonne in 2020, 34.2 lakh tonne in 2025 and 35.2 lakh tonne in 2030. Based on an interventionist scenario, the supply of milk was projected to be 31.5 lakh tonne in 2020, 35.1 lakh tonne in 2025 and 39.2 lakh tonne in 2030. Clearly, the supply projections went awry as the production of milk declined after 2012. Thus, Kerala is lagging at least by 4 lakh tonne with regard to the supply projections in 2020. Given an expected rise in milk demand, Kerala has to focus on raising its milk production by at least 50 per cent in 2030. The State should use the advantage of its higher productivity to achieve this objective through improved organisation of production.

Fourthly, in its efforts to raise milk production, Kerala would face a key constraint in the form of fodder production. Studies show that the ideal roughage to concentrate ratio for livestock is 60:40. In Kerala, the share of concentrate is currently above 60 per cent. This imbalance in feeding is known to create a number of stresses to the animals. Productivity can be increased more rapidly with an ideal 60:40 feed ratio; diets with more grain are more digestible and ferment faster, which provides nutrients to animals at a faster rate. Fibre-deficient feed can lead to the disruption of physiological mechanisms in animals; they lead to the accumulation and lack of absorption of fermentation acids in the rumen. The immunity to different diseases is also likely to be lower in animals with a higher concentrate feed ratio.

Data on the area cultivated with hybrid Napier are given in Table 2.14. As is clear, there was a decline in the area cultivated with fodder over the past few years. Kerala cultivates just over 2000 ha of fodder, which produces only 46 per cent of the fodder requirements based on a 60:40 ratio. It is estimated that fodder cultivation would be required in at least 13,000 ha if Kerala is to meet the roughage production target based on a 60:40 ratio. Subsidy to the tune of Rs 2000 per ha is provided currently for fodder cultivation, but it has not helped.

Fifthly, in the case of meat, Kerala produces only about 10 per cent of its domestic requirement. But this is with regard to animals of the State slaughtered in the State. At the same time, if we consider animals transported from outside the State and slaughtered in the State, Kerala produces about 73 to 75 per cent of its domestic requirement. NCAER's 2014 projections show that the demand for meat in Kerala was 4.8 lakh tonne in 2010, which was to rise to 6.5 lakh tonne in 2020, 7 lakh tonne in 2025 and 7.4 lakh tonne in 2030. But Kerala produced only 4.5 lakh tonne of meat in 2018-19. Production has to grow at least 4 per cent per annum over the next decade for Kerala to reach closer to self-sufficiency in meat production.

Sixthly, in the case of egg, the demand was estimated at 229 crore eggs in 2009-10, which was to rise to 300 crore eggs in 2020, 322 crore eggs in 2025 and 338 crore eggs in 2030. But Kerala actually produced only 229 crore eggs in 2018-19. This is close to what NCAER had projected as production under an optimistic scenario in 2020. But production has to grow by about 120 crore additional eggs over the next decade.

Table 2.14 *Area under fodder farms, Kerala, 2006-07 to 2018-19* in ha

Year	Area under Hybrid Napier (ha)
2006-07	2280
2007-08	-
2008-09	1770
2009-10	2235
2010-11	2650
2011-12	3109
2012-13	2594
2013-14	2816
2014-15	3727
2015-16	2665
2016-17	2645
2017-18	2050
2018-19	2285

Source: Department of Dairy, Government of Kerala

There are some important problems that arise when Kerala plans to expand the size of its poultry industry. They are listed below:

- **Lack of sufficient land for starting poultry farms**. Kerala is a thickly populated State and poultry farms can be started only at sufficient distances from human dwellings.
- **High cost of labour**. The labour cost is very high in Kerala compared to other States.
- **High feed cost**. Chicken is simple-stomached and most of the poultry feed ingredients are also human food. At present, the cost of poultry feed is determined by a private consortium, as the market share of public sector poultry feed production is not significant. This increases the feed costs.
- **Reducing numbers of backyard poultry units.** The backyard poultry units were the strength of poultry production in Kerala. But their number is reducing at a fast pace along with the fragmentation of landholdings.
- **Lack of proper extension activities.** Farmers are not sufficiently aware about the modern methods to rear small numbers of chicken in partial confinement without causing serious damage to the vegetation. Such technologies are not easily accessible at low cost.
- **Reduced availability of quality cross bred chicks**. Cross bred chicks suitable for profitable backyard rearing are not easily available from reliable sources.

Finally, there is also enormous potential for the production of egg, meat and milk in ducks, goats and pigs. Both goat and pig population has grown between 2012 and 2019. Pigs are efficient converters of feed into meat and can fit into diverse systems of management. Cost and availability of feed and the price of pigs make piggery a very profitable vocation in rural Kerala. Goat is a multi-functional animal and can efficiently survive on available shrubs and trees even in low fertility lands. Ducks are grown in the Kuttanad region and survive on a variety of food sources like grasses, aquatic plants, fish, insects, worms and small molluscs.

Specific Policy Pathways

Promotion of larger dairy farms

We have already alluded to the relatively small size of dairy units in Kerala. Kerala should tap the potential of rural entrepreneurship and popularise the establishment of larger commercially run dairy farms in Kerala. Here, it is necessary that policy helps to converge three factors: high yielding cows, fodder or feed availability and marketing facilities.

Many of the existing regulations under the Kerala Municipal Building Rules 1999 to set up big dairy units (i.e., with 6 animals or more) discourage dairy entrepreneurs from taking up such ventures. For instance, the presence of more than five cattle (or for that matter, more than five pigs and more than 20 goats) implies that the unit would be considered "hazardous" under the 2012 rules of the Kerala Panchayati Raj Act. More recently, many allegations of harassment have arisen with regard to implementing the regulations of pollution control in dairy farms, especially those equipped with Bulk Milk Chilling Centres (BMCC).

Necessary steps may be taken to deregulate the sector so as to encourage commercial dairy farming on a larger scale. More recently, the National Green Tribunal (NGT) has issued a new set of guidelines for dairy farms and *gaushalas* where dairy farms have been moved from red category to orange category. Here, rules for dairy farms in Kerala have to be simplified and unified. Low cost Effluent Treatment Plants (ETP) have to be encouraged, financially assisted and popularised. The Government will also have to explore higher subsidies for feed and electricity as well as offer tax exemptions to new plants. Presently, wet market sales attract no tax but packaged meat is taxed.

In sum, Kerala will have to improve the "Ease of Doing Dairy Business" through consciously designed policy.

Modernisation of dairy farming

Currently, the classical cooperative model dominates the organisational structure of the dairy cooperative sector. But many developing countries (even Anand Co-operatives) are moving beyond the classical co-operative models to introduce commercial and competitive elements. India's cooperative sector now faces stiff competition and is starting to lose ground to other competitors who are more professionally managed. The cooperative sector is responding by adapting its business models to the new generation models. For instance, cooperative dairy enterprises can now be registered as producer companies under the Companies Act. There is need to promote producer companies in the livestock sector in Kerala also. Graduation from subsistence, small holder milk producers to small, commercial dairy farmers will be fundamental to put the strategy into action.

The Government should undertake a study of the marketing and supply chains in the dairy sectors of the State, and initiate measures to remove bottlenecks from the producer to the consumer. The use of modern Information Technology (IT) infrastructure, to develop the marketing network of milk, meat and eggs in the

State should be encouraged. This includes the linking up of all dairy cooperatives in the State under single inter-connected software.

New advances in breeding

The following strategies are recommended for the cattle breeding.

1) A demand exists in the field for germplasm of high yielding dairy breeds. Such germplasm needs careful introduction in the field as the progeny may not be viable under less favourable farm conditions prevalent in the State. A two-tier system may be advocated with the first tier consisting of regular pedigree bull semen (average to moderately high yielders) for common livestock farmers and a second tier with semen from high pedigree bulls for elite cows of farmers having a conducive farm environment for animals with such genetic and phenotypic make up.
2) Field-level application of allied Assisted Reproductive Technologies like induced breeding and timely artificial insemination and the use of sexed sorted semen should be explored.
3) Infertility among crossbred cattle is a major long-standing concern. The State average for age at first calving should be brought down to 24-30 months from around 4 years. Inter-calving period should be brought down to 12-14 months from the present 22 months. While the problem has been known for some time, the exact reasons, which may be multiple, needs to be analysed and identified for strategic interventions to be made. Hence, an integrated assessment of infertility prevalent in the crossbred dairy cattle of the State should be attempted, with the involvement of Kerala Veterinary and Animal Sciences University (KVASU), Animal Husbandry Department (AHD) and the Kerala Livestock Development Board (KLDB). Focus should be on zone-wise management of bovine infertility by establishing facilities/centres for effective surveillance, evaluation and intervention.
4) A plan for the conservation of indigenous breeds to preserve genetic variability (of breeds indigenous to Kerala), including recognising of local breeds and use of assisted reproductive technologies, should be rolled out. Steps to be taken to register Kasaragod Dwarf and other native cattle as breeds for effective utilisation of Central scheme in this sphere.

Introduction of animals

Local availability of cows is a concern for farmers cows are purchased from outside the State under various Government schemes. The concept of purchasing animals from outside the State to increase the State's animal population needs a review. This is not to belittle the gains to the State's animal wealth from the import of animals. But it has also been argued that animals brought from outside the State have contributed to an increase in disease incidence in Kerala (including of haemoparasites and viral diseases).

Kerala may have to gradually phase out its dependence on cows from other States over the next five years. A technical committee of experts may be constituted to analyse the strengths and weakness of the importing animals. It has also been suggested that a quarantine period of 28 days should be insisted up on when cattle are imported from other States. Also, heifer nursery units based on rural entrepreneurship may also be promoted as a source of future milch cow herd. On similar lines, male calf or buffalo rearing units may also to be promoted as a source of good quality meat.

Identification and registration of all animals

The identification of animals is a major constraint in the collection of accurate demographic data of animals in the State. Lack of accurate data adversely affects the implementation of developmental projects as well as traceability of animal units.

Feed and fodder

Kerala needs an appropriate fodder plan to raise fodder production. Currently, there are 5741 fodder plots in the State, as per the database maintained for Dairy Department schemes. Of these 5741 plots, 4362 plots (or 76 per cent) are between 1 acre and 2.5 acre in area. There are 952 plots (or 17 per cent) of area between 2.5 acre and 5 acre. There are only 427 plots (or 7 per cent) of area more than 5 acre. Kerala may need to promote commercial cultivation of fodder on large scale if it needs to meet its demand in the next decade. Suitable contract farming models should be explored to promote fodder cultivation.

1) Promotion of commercial fodder production with an assured market through co-operative societies and linking fodder cultivation with Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) should be attempted. The incentives should include an assured market price to the producers.
2) Promotion of fodder cultivation in waste lands should be encouraged through Kudumbashree units or Self- help Groups (SHGs) or entrepreneurs, and quality of fodder produced should be ensured through proper soil management.

3) Hydroponics and Azolla cultivation schemes implemented through departments should be reviewed by a technical committee of experts.
4) Malabar Rural Dairy Foundation (MRDF) may be entrusted with the collection, bailing, transport and distribution of straw from intensive paddy cultivation areas to needy farmers.
5) Since the price of milk cannot be increased, subsidy should be given in the form of feed as an incentive to the farmers.

Surplus of milk and product diversification

One major lesson learned from the Covid-19 pandemic in the animal resources sector in Kerala is the need to attain a greater degree of self-sufficiency in handling animal produce. The pandemic has also reminded Kerala that the State it is close to attaining self-sufficiency in milk production. In the coming years, the State needs to prepare itself for a handling a situation of surplus milk. Thus, Kerala needs a modern milk powder plant as well as an evaporator plant to convert and store surplus milk as milk powder and condensed milk. Prior to the erection of such a facility, feasibility studies should be carried out to ascertain the availability of excess milk throughout the year.

We also need to aim at developing the production of value added commodities from milk, such as cheese and yogurt. This implies setting up of advanced product diversification facilities in the existing dairy plants.

The quality of raw milk at farm-level is of great concern. This area needs attention. The cold chain maintenance from farm to fork has to be ensured. The milk procured at the farm-level has to be cooled in a short span of time to reduce the bacterial load. This needs more financial support to ensure cold chain maintenance. At present, there are only 442 Bulk Milk Chilling Centres (BMCC) in the State, with a capacity of 17.7 lakh litre per day. This needs to be increased to suit the milk procurement capacity of the dairy cooperatives. Where necessary, or cluster BMCCs with linkages to a maximum of 5 to 6 dairy cooperatives have to be promoted. Assistance is needed for the installation of around 150 BMCCs throughout the State with an average installed capacity of 2000 Litre Per Day (LPD).

Promoting meat production and value addition

In order to develop the base of meat production in the State, a Meat Sector Strategic Plan (MSSP) should be developed. The objective of MSSP should be to frame an overall strategic plan for the meat sector in Kerala, comprising production, processing and marketing of meat and meat products. This should include separate plans for cattle and buffalo meat, chevon, pork and chicken. Some of the challenges such a plan would face are as follows:

1) Backward integration for rearing of animals ensuring veterinary health coverage and concentrated feed, individual identification and traceability, would be a requirement. Better forward integration of the products with markets to be built through the establishment of supply contracts with domestic retail chains, restaurants and hotels, as well as market facilitation measures.
2) Kerala will have to build new infrastructure for meat processing plants to cater to the northern, Central and southern districts. It may be best to set up such plants in border districts to reduce costs of transport of live animals across the State.
3) In piggery, where some extent of geographical separation of production from residential areas is deemed necessary, Kerala could think of using vacant areas in plantation land. Buildings and a small area could be rented out, and the farms could also provide organic manure for the plantation crops.
4) Information and training will have to be imparted to all the stakeholders in the value chain to support informed and business-oriented decision making, especially in the production and processing sectors. Further, capacity building would be necessary to expand skilled and technical manpower in slaughtering, processing and packaging of meat.
5) Alongside, the State will also have to create an integrated cold supply chain for retailing meat and meat products.
6) Value addition in meat and meat products through developing entrepreneurs for ready-to-eat and semi-processed meat products in the domestic market is important. At present, only a small percentage of the meat produced is converted into value added products. Most meat is purchased by consumers in the fresh or frozen form for conversion into products at homes or restaurants. The need for satellite processing units – centrally located slaughter houses and a number of associated centres or processing units – has to be planned for.
7) Kerala will also have to explore options for converting inedible offal and animal wastes from the meat plants into economically useful products. There is huge potential for processing animal tissues to produce valuable proteins/materials, which have a global and domestic market.

8) Farmers and entrepreneurs in meat production have to be ensured adequate amount of credit at subsidised rates of interest. Kerala Bank and other primary cooperative societies should be requested to develop specific credit packages for meat production.

Quality issues in meat production

The real potential of the meat sector in Kerala has not been fully tapped. The requirement of meat, especially beef, in Kerala is met from animals brought for slaughter from outside Kerala, i.e., Andhra Pradesh, Karnataka and Tamil Nadu. With only a handful of formal slaughter houses in operation and a large percentage of informal slaughter being carried out illegally (around 60 per cent of the informal units are estimated to be unregistered), and without any veterinary inspection, the meat sold to the public is largely unclean. It has also resulted in large-scale pollution in the surrounding areas. Animals are slaughtered in unclean surroundings, by butchers with little expertise in hygienic meat production and many times on roadsides. Meat stalls are also open stalls where carcasses are hung in full view of the public in unhygienic settings. Waste and effluent management is practically non-existent. Biogas plants have been installed in a few units for waste management, but they are dysfunctional due to lack of skilled supervision.

The entire chain of operations leads to breach of public health, with serious consequences for animal welfare, food safety, occupational health, and environmental hygiene.

For processed meat, the drivers of demand are hygiene, quality and food safety. However, significant investment is required to achieve high standards. Rising per capita consumption in domestic market and increase in global demand opened up new opportunities to meat and poultry industry to adopt modern technologies in production, preservation, processing, value addition and consumer packaging. Currently, value addition in meat sector is almost non-existent. For the meat sector to be more vibrant, profitable and provider of safe meat, it is necessary that a perceptible shift from unorganised to organised sector takes place. This calls for a strategic plan to modernise the meat production sector towards the production of clean and wholesome meat based on a Clean, Green and Ethical (CGE) farming and production system.

Promotion of poultry farming

In the 1970s, Kerala was exporting eggs to other parts of the country. Chengannur and Kottarakkara railway stations were famous as centres of rail transport of eggs to other States. That is, Kerala was producing more eggs than what was demanded within the State. However, today, the State imports approximately 2 crore eggs per day from other States. It is estimated that about Rs 800 to Rs 1000 crore is the amount of revenues flowing to other States due to these imports. This situation has to be reversed. It is also estimated that an average of one million broiler birds per day are being slaughtered in Kerala to meet the domestic chicken demand. But the broiler industry continues to be under the clutches of large-scale producers headquartered in the neighbouring States. At present, only 0.1 per cent of the broiler poultry market share is handled by the Government and public sector undertakings including cooperative sector. This also needs redressal.

A key role in this regard will be played by the Kerala Chicken Project, introduced during the 13th Plan. In 2018-19, the Animal Husbandry department, along with Kudumbashree, Kerala State Poultry Development Corporation (KSPDC), Meat Products of India (MPI), KVASU and the Brahmagiri Development Society (BDS), proposed to implement the Kerala Chicken Project. This project is envisaged to cater to the present and future needs of production, quality assurance, processing and marketing of chicken following an efficient supply chain model. According to the mission statement of the project, it aims to "meet the domestic demand of poultry meat, by producing safe chicken meat inside the State through healthy and hygienic practices and selling at affordable price, and thereby providing enterprise opportunities to farmers, especially the women, and the consumers." It envisages the establishment of broiler breeder farms in Kerala to produce required broiler commercial chicks for farming at reasonable price, to give assistance to budding broiler farmers, to create a fair and stable market price through a distress relief fund and to achieve 100 per cent market share in the broiler industry in a phased manner.

In the 14th Plan period, the following issues will have to be addressed.

- A special purpose vehicle will have to be created in the first year to enable resource mobilisation for project.
- Two big broiler breeder farms in every district will have to be set up with the collaboration of private entrepreneurship, local self Government (LSG) support and Kudumbashree to produce quality day-old chicks under strict quality control for supply reasonable price.
- About 150 hi-tech commercial broiler farms operated by farmers will be required throughout

Kerala, again with the support of private entrepreneurs, Kudumbashree, the Animal Husbandry Department, Kerala State Poultry Development Corporation (KSPDC) and other stakeholders.

- Infrastructure facility will be required in every district namely, processing plants, cold chain facilities for transportation, cold storages, marketing outlets and sales channels such as supermarkets and own outlets by name "Kerala Chicken Shoppe".
- Kerala Chicken Food Processing Parks will have to be established in at least 4 districts with common facilities and mother facilities.
- Chicken rendering plants will have to be established in every district for scientific waste management and safeguard the environment. This will also cater to converting the waste to by-products like organic manure, pet, fish foods, and feed ingredients.
- About 1000 Kerala Chicken outlets with cold chain facility will have to be established in the State for selling safe to eat chicken.
- A cold chain facility with about Rs 200 crore capital infusion will be required with packhouses, reefer vans and cold storages in the sales outlets. This will require responsible investment from major cooperatives and private players under strict Government supervision.
- Quality assurance of meat for food safety will have to be maintained through NABL or similar accredited private labs established within the radius of 2 km of major production centres.

Promotion of duck farming

Some amount of planning has to go into how to intensify duck farming in Kuttanad. The Kuttanad ducks are the indigenous *desi* ducks of Kerala, which include the *Chara*, *Chemballi*, *Pulli* and *Black* varieties. Among these four varieties, *Chara* and *Chemballi* are the two familiar varieties. They are hardy water fowls, acclimatised to the geographical area and resistant to many diseases. Even though Kuttanad ducks are dual purpose in nature (i.e., reared for egg and meat), they are reared in Kuttanad mainly for egg production. This is because even though consumers prefer Kuttanad duck meat for its tasty and nutritious meat, farmers do not prefer to rear them exclusively for meat purpose due to their low body weight, meat is to bone ratio and feed efficiency. Presently, exotic meat type duck breeds like *Vigova Super-M* and *White Pekin* are reared for meat purposes, but their major drawbacks are low egg production, high costs of day-old ducklings and less consumer preference for white feathered birds.

One major issue faced by duck farmers is the high-level of mortality due to the outbreak of duck pasteurellosis, duck plague and new duck diseases. Around 90 per cent of the ducks are reared without any systematic or scientific feeding practices or disease control measures. Ducks largely rely on spilled grains, grass hoppers, slugs, snails, small crabs, insects, mosquitoes and other larvae and small fishes from the harvested paddy fields, ponds, water ways and rivers. The geographical peculiarities of Kuttanad invite a large number of migratory birds, which in turn leads to infections like Bird Flu or Avian Influenza among the local duck population.

Lack of knowledge about vaccination against these diseases and scarcity of vaccination experts are some of the other factors leading to high-levels of duck mortality. Kuttanad urgently needs a large project that would vaccinate most of the ducks within a strict time frame. It also needs proper disease surveillance programmes and vaccination of nomadic ducks to prevent mass deaths. A cadre of field workers has to be created for this purpose. We suggest that a major project be allotted to the KVASU, Pookkode towards this purpose for exclusive operation in the Kuttanad region. This project site should have infrastructural facilities to provide and distribute 5 lakh day-old ducklings per year. In addition, the project should create facilities for providing services like disease diagnosis, feed analysis, training to duck farmers, custom hatching facilities for duck farmers (aiming at about 15,000 eggs per week) and field veterinary services. It is estimated that for producing 5 lakh ducklings, 4000 parent stocks have to be reared, which needs around 12000 sq. feet shed area. Additionally, area will be required for a hatchery, an experimental shed, a disease diagnosis and feed analysis laboratory, a waste treatment plant and a training centre. The Kerala State Planning Board has already provided an initial allocation to the KVASU to begin work on this project. We recommend that Kerala Government should provide 10 acre of land to the KVASU in Kuttanad to establish the project site.

Providing insurance cover to the duck population is essential to minimise financial losses to the duck farmers in the aftermath of disease outbreaks. Generally, insurance companies are not willing to take up duck and poultry insurance. Government intervention should be ensured in this regard so that insurance cover is ensured for both ducks and poultry.

Promotion of veterinary entrepreneurship

Comprehensive entrepreneurship development programmes are required to tackle the critical

production and skill gaps in Kerala's livestock sector. Entrepreneurship, innovation, skill development and capacity building have to emerge as potential areas of focus in veterinary extension. Promotion of livestock, dairy and poultry entrepreneurship programmes to help returnee Non Resident Keralites (NRKs), unemployed youth and women established commercial livestock ventures is extremely critical in a post-Covid era.

Precision farming, farming based on agro-ecological zones and production of safe to eat products need more attention. During the 13th Plan period, there were plans to establish "start-up villages" in livestock production based on agro-ecological zones. This project envisaged integrating agriculture, livestock and fisheries to produce safe to eat products with less than permissible-level of pesticide and antibiotic residues. There was also a proposal to establish "agri-smart villages" practising high-value dairy, poultry, goat production and piggery, involving the promotion of commercial ventures, high-tech farming, processing and value addition, e-marketing and export-oriented production. Both these ideas could not take off during the 13th Plan period. Such innovative ideas have to be consciously promoted during the 14th Plan period.

Finally, a round-the-clock common resolution centre, which works to solve problems faced by entrepreneurs, should be set up to cater to the requirement of the primary sector. This should deal with questions of production, production support, and marketing as part of the *Subhiksha Keralam* project. This can be a central nodal point, called, for example, *SK Suvidha*, and operated by well-trained professionals.

Forest Governance: Initiatives and Priorities

Introduction

Proximity to the tropics, copious rainfall, relatively high humidity, and fertile soil are among the factors responsible for the evolution of highly diverse forest ecological systems in Kerala. The total extent of forests in Kerala is 11,524.4 sq. km (29.9 per cent of the geographical area), of which an extent of 9,339.2 square km is Reserved Forests, 284.2 sq. km is proposed reserve and 1,900.9 sq. km is vested forests and ecologically fragile lands. These include tropical evergreen, semi-evergreen, moist-deciduous, dry-deciduous, *shola* grasslands, and mangrove forests. Of the total forest area under the control of the Kerala Forest Department, natural forests form 78.4 per cent and plantations form 13.5 per cent; the remaining 8.2 per cent is under lease and forest land under the Forest (Conservation) Act, 1980.

Each of the 44 rivers in the State has its source in a forest. There are around 1000 human settlements (tribal and non-tribal) and private estates in remote locations within forests. There are 484,839 tribal persons belonging to 36 tribal communities living in 725 settlements; they constitute 1.5 per cent of the total population of the State.

The Administrative Context

The duties and responsibilities of Forest Department include the protection of forests and wildlife, extraction of timber and other forest produce, management of Protected Areas (PAs), survey and demarcation of forest boundaries, soil and moisture conservation, implementation of participatory forest management programmes, management of human-wildlife conflict, implementation of programmes for nature and wildlife education, extension and interpretation, conservation of biodiversity, research on biodiversity conservation and natural resource management, production of genetically superior planting materials, tribal welfare activities, development of forest management information system, conducting cases in the Courts and legal support, managing issues related to captive elephants, licensing of sawmills and wood-based industrial units, and improved intelligence gathering and investigations of cases with inter-State and international ramifications.

The wildlife wing of the Forest Department manages 3,213.2 sq. km of forests under the Protected Area network, which includes five National Parks (NPs), 17 Wildlife Sanctuaries (WLS), two Tiger Reserves (TRs), and one Community Reserve (Kadalundi-Vallikkunnu). There are several High-Value Biodiversity Areas (HVBAs), such as New Amarambalam, Kulathupuzha, Siruvani-Muthikulam, Goodrickal, Malayattor, Camel's Hump Mountains, Chembra, Elambileri, Aranamala, Kattimattam, Vellarimala, Vavulmala, and Thirunelli. The list of Protected Area (PA) networks and territorial forest divisions in Kerala are given in Table 2.15 and Table 2.16 respectively.

Challenges to forest management in Kerala

Over the past decades, forests in Kerala have been subjected to large-scale human intervention. Extensive areas of forests have been converted to commercial tree plantations (such as teak and eucalyptus plantations), cash crops (such as cardamom, coffee, tea, rubber, and pepper), and areas for cattle-ranching. Interventions such as road construction, river-valley projects, urbanisation, and mass tourism have also reduced the forest cover. Poverty and economic backwardness among forest-dependent communities continue to exert pressure

on forest resources. Besides, encroachment, wildfire, proliferation of invasive species, poaching, mining, excessive firewood collection, non-compatible land-use, changes in cropping pattern, "honey-combing" because of human habitations inside forest enclosures, and climate-induced ecosystem malfunctions have further led to the degeneration, fragmentation, and loss of vital habitats. More recently, Kerala has also witnessed extreme and erratic weather events, destructive cycles of drought and flood, human-wildlife conflict, and diminishing livelihoods from forests.

The devastating floods that wreaked havoc in Kerala in August 2018 and August 2019 caused major damage to the social, economic, human, and ecological infrastructure of forests. It impacted the forests through loss of vegetative cover, widespread landslides, washing away of humus and topsoil, formation of gullies and ravines, and reduction of overall water retention capacity. The poor and the disadvantaged, particularly the tribal people living in forest enclosures, suffered maximum losses during these floods. The Post-Disaster Needs Assessment (PDNA) report prepared by the Government identifies "heightened vulnerability" of forest enclosures and calls for integrated and innovative approaches for forested landscapes. The ability of forests to absorb the intense and incessant rains was significantly reduced in forest enclosures and degraded forests due to the absence of stable multi-canopied vegetation that contributed to flash floods and landslides. Remote and far-flung settlements also suffer from the poor reach and penetration of rural development schemes, poor access to education and healthcare and markets, which creates precarity in their existence and recovery. To compound these, the forest enclosures also bear the

Table 2.15 *List of Protected Areas in Kerala* area in square km

Name of WLS/NPs	Year of formation	Total Area (in sq.km)
Periyar WLS (Tiger Reserve)	1950	925.0
Neyyar WLS	1958	128.0
Peechi-Vazhani WLS	1958	125.0
Parambikulam WLS (Tiger Reserve)	1973	643.7
Wayanad WLS	1973	344.4
Idukki WLS	1976	70.0
Eravikulam NP	1978	97.0
Peppara WLS	1983	53.0
Thattekkad BS	1983	25.0
Silent Valley NP*	1984	237.5
Shendurney WLS	1984	171.0
Chinnar WLS	1984	90.4
Chimmony WLS	1984	85.0
Aralam WLS	1984	55.0
Anamudi Shola NP	2003	7.5
Mathikettan Shola NP	2003	12.8
Pambadum Shola NP	2003	1.3
Mangalavanam BS	2004	0.02
Kurinjimala Sanctuary	2006	32.0
Choolannur Pea Fowl Sanctuary	2007	3.4
Kadalundi-Vallikunnu CR	2007	1.5
Malabar WLS	2009	74.2
Kottiyoor WLS	2011	30.4
Total		3213.2

Note: BS-Bird Sanctuary; CR-Community Reserve; NP-National Park; WLS-Wildlife Sanctuary
Source: Department of Forests, Government of Kerala

brunt of human-wildlife conflict causing considerable hardships and unrest among people.

Forests and Water Security of Kerala

The repeated floods of 2018 and 2019 were critical for forests in Kerala. A closer analysis of the trail of events helps understand the problem of hydrological security. Four factors affected the water situation of Kerala in this context.

Built-up area

Of the total geographical spread of 38,863 sq.km, the total built-up area (houses, buildings, roads, and pavements) in Kerala comes to around 6,000 sq.km. These are surfaces made permanently impermeable for water infiltration. It is only reasonable to presume that Kerala may end up having one-fourth of its total area permanently under tar, mortar, concrete, and tiles in the not-so-distant future.

Reservoirs

Most of the 90 odd reservoirs in the State face acute problems of siltation. The conventionally assumed role of reservoirs as water impounding structures during times of excess rains and providers of sustained water during drought has significantly reduced over the years.

Wetlands

The swamps, wetlands, and paddy fields of Kerala used to be major storage areas of water. However, these have dwindled and have almost irretrievably been lost over the last four decades.

Forest ecosystems

All river systems in Kerala have their sources in forests. Forests perform two vital functions: they intercept high intensity rainfall and facilitate deep percolation and retention of water. This has an important bearing on the cycle of flood and drought. It is estimated that the current ability of forests to perform their hydrological function is only about 30-40 per cent of what may have been possible if forests were green, healthy and intact. Fragmentation and degradation are the reasons for this. Factors that cause degradation and fragmentation of Kerala's forests, *inter alia*, include uncontrolled forest fires, grazing, encroachment, monoculture plantations and linear intrusions like roads and canals.

Among these four factors, major interventions and course-corrections may not be possible in the case of the first three. However, the fourth factor – forests – offer the best possible option for improving water security. The objective should be to improve the hydrological functionality of the forests from the current 30-40 per cent to 60-70 per cent.

Achievements during the 13th Five-Year Plan

The last five years have witnessed important changes made by the Government in existing practices of forest and wildlife management. Policies of participatory forest management have been implemented over the last five years. Innovative ideas for afforestation and wildlife conservation were implemented during this period. Along with forest conservation activities, the economic and financial development of forest-dependent communities was a major objective of the Government. Forest conservation and afforestation campaigns in the State have shown results. The forest cover of the State has increased during the second consecutive assessment period as well, thereby enabling the State to occupy third position among States in terms of increase in forest cover, as per India State of Forest Report 2019. As per the report, the total area under forests, including plantations is 21,144 sq. km which is 54.42 per cent of the geographical area of the State. There has been an increase in forest cover in Kerala by 823 sq. km, an increase of 2.12 per cent, as compared to the previous assessment in 2017.

Natural forests are essential for maintaining the balance of the ecosystem. A policy decision was taken to convert the existing plantations into natural forests, except where necessary. As part of this, 7211.41 ha eucalyptus, 7342.862 ha acacia, 2842.945 ha manchiyam are to be converted to natural forests in a phased manner. The Government also envisages the conversion of low productivity teak plantations into natural forests. As part of natural forest management, major activities taken up were survey of forest boundaries, forest protection, and regeneration of denuded forests. Boundary demarcation was done by construction of cairns and *kayyala* along the boundary of the forests. During the past four years, 53,635 cairns (*junda*) were constructed as part of boundary consolidation.

Kerala Forest Department has launched "Project Green Grass" in the State in a move to keep our forests clean. The project aims to clear the solid waste from forest areas (by involving Vana Samrakshana Samiti, Eco Development Committee, and voluntary organisations), create awareness among the tourists, impose spot fining and other legal measures, adopt technology to monitor waste dumping and so on. 125 waste dumping spots were identified and cleaned. Since Munnar Forest Division faces a major issue of waste dumping, a separate plan was developed for the region, thereby removing 1808 tonnes of waste from that area alone. Water sources and rivers inside the

Table 2.16 *List of territorial Forest Divisions in Kerala with extent* area in sq.km

Sl.No	Forest Division (FD)	Reserve Forests (RF)	Proposed Reserve	Vested Forest (VF)+EFL	Total
Southern Circle, Kollam					
1	Thiruvananthapuram	359.124	5.8253	3.651	368.6003
2	Thenmala	123.432	-	7.735	131.167
3	Achencoil	284.3298	-	0.2082	284.538
4	Ranni	1050.336	7.16	1.568	1,059.06
5	Punalur	280.051	-	0.169	280.22
6	Konni	320.643	11.021	-	331.664
Total		2417.9158	24.0063	13.3312	2455.253
High Range Circle, Kottayam					
7	Kothamangalam	316.8451	-	0.1576	317.0027
8	Munnar	440.49	175.275	2.45	618.215
9	Marayoor	13.972	47.26	0.076	61.308
10	Mankulam	90.06	-	-	90.06
11	Kottayam	627.287	-	31.967	659.254
Total		1488.6541	222.535	34.6506	1745.84
Central Circle, Thrissur					
12	Vazhachal	413.944	-	-	413.944
13	Chalakudy	279.7098	-	-	279.7098
14	Malayattoor	617.2411	0.5248	-	617.7659
15	Thrissur	293.743	-	4.3137	298.0567
Total		1,604.64	0.5248	4.3137	1609.476
Eastern Circle, Palakkad					
16	Mannarkkad	150.7322	-	271.7213	422.4535
17	Nilambur North	57.9196	0.0171	340.7032	398.6399
18	Nilambur South	267.3894	-	57.8888	325.2782
19	Palakkad	73.41	-	162.0847	235.4947
20	Nenmara	205.517	-	150.2104	355.7274
	Total	754.9682	0.0171	982.6084	1737.594
Northern Circle, Kannur					
21	Kozhikode	24.3998	22.966	243.0856	290.4514
22	Wayanad North	134.024	15.064	65.8527	214.9407
23	Wayanad South	66.1381	6.8449	274.681	347.664
24	Kannur	121.3702	0	65.2014	186.5716
25	Kasaragod	86.0221	0	33.7083	119.7304
	Total	431.9542	44.9643	682.529	1159.358
	Grand Total	6698.1302	292.0475	1717.4329	8707.521

Source: Department of Forests, Government of Kerala

forests were decontaminated as part of the Haritha Keralam Mission. Around 169 ponds were cleaned and hundreds of water sources were revived. Three hundred and fifty check dams were newly constructed inside the forests during the period, thereby ensuring drinking water availability to wild animals inside forests.

Kerala's Thiruvananthapuram landscape is one among the three areas in India identified for

implementing the project "Forest Plus 2.0" by the Ministry of Environment, Forest, and Climate Change. This project, started in 2018 with the technical support of United States Agency for International Development (USAID), aims at developing tools and techniques to strengthen ecosystem-based management by including ecosystem services in forest landscape management, and to bring in a larger area under improved management and improve the livelihood of forest dependent communities. As part of this project, the supply chain analysis of major non-timber forest produce and ecotourism activities in the forest fringe villages of Thiruvananthapuram Forest Division is in progress.

Among the measures taken to mitigate the increasing problem of human-animal conflict along the forest fringes are the construction of physical barriers like solar fencing, digging of elephant-proof trenches, construction of elephant-proof walls, and crash guard rope-fencing along the forest boundary. The following measures have also been undertaken: construction of check dams, maintenance of *vayal* and ponds in forest area to ensure the availability of sufficient water, planting fodder species inside forests to ensure food for wild animals, voluntary relocation of tribes from settlements, and awareness creation among the farmers to abstain from cultivating palatable crop along the forest fringes. Over the past four years, 204 Jana Jagratha Samithis have been formed in the State. For better coordination mechanism, SMS alert systems were implemented in 65 forest fringe areas with control rooms in five locations. To send back the wild animals coming outside the forest. 12 bore pump action gun was made available to the Department. "Crash Guard Steel Rope Fencing," the first of its kind in the country, was adopted by the Department to reduce human-wildlife conflict. In this innovative model, flexible steel ropes are used. The ends of the rope are anchored on heavy concrete block so that the whole component will act as a single unit and the animals will find it difficult to push down. As a pilot project, "Crash Guard Steel Rope Fencing" was installed for a length of 1.3 km in Mankulam Forest Division. Various activities initiated under KIIFB to combat human-animal conflict are in final stages. The activities under Phase I include solar power fencing (101.5 km), elephant-proof wall (0.41km), and rail fencing (16 km) and those under Phase 2 are solar power fencing (136.7 km), elephant proof wall (0.3 km), and crash guard steel rope fencing (48 km). Apart from this, voluntary relocation of 483 families are also undertaken under KIIFB, the first of its kind in the country, wherein such a relocation is being funded by a State Government for relocating the people from the non-protected forest areas. Compensation amount given to the victims of human animal conflict was hiked and online facilities were implemented for speedy disposal of compensation.

During the Covid-19 pandemic induced lockdown, Kerala Forest Department had an online initiative to support tribal livelihood. Thiruvananthapuram Wildlife Division took the lead to develop an online platform to ensure market access of non-wood forest produces (kasthoorimanjal, honey, handicrafts/bamboo products) and agricultural produces (tapioca, long beans, yam, plantain) from tribal hamlets in all the three forest ranges namely, Agasthyavanam Biological Park (A. B. P), Neyyar, and Peppara under the division. The forest produce procured directly from tribal hamlets at market rates were delivered at the doorstep of prospective consumers on first come first serve basis from different parts of the city through the WhatsApp group VANIKA. The greatest advantage of such a timely intervention by Kerala Forest Department is that the people living inside forest areas who would have otherwise lost their products (all of them being perishable) could find a market and the tribal people who were getting their regular income earlier through these products were not deprived of these during the lock down period.

New initiatives by the Department include (1) the work of setting up a world class Elephant Rehabilitation Centre at Kottoor using KIIFB assistance of Rs 105 crore, which is in progress. Having completed the first phase, the Chief Minister of Kerala did the inauguration on February 16, 2021 (2) The existing Thrissur zoo is to be shifted to another site where sufficient space is available for rehabilitating the animals. Works amounting to Rs 309.75 crore is in progress. By 2021, the new zoo will be made operational after completing the relocation. Inauguration of first phase was done on February 13, 2021 by the Chief Minister (3) "Budha Mayoori" is proclaimed as the official butterfly of Kerala State, thereby being the fourth State in the country to have a State Butterfly (4) Karimpuzha Sanctuary, in Malappuram, with an area of 227.97 sq.km, has been declared as the new wildlife sanctuary in Kerala (5) Assistance received under Rebuild Kerala Development Programme for Rs 800 crore for voluntary relocation of private settlements from forests, acquisition of private estates within forests, and consolidation of mangroves.

Looking to the future

Scientific evidence and knowledge show that the long-term ecological security of Kerala lies in securing and

safeguarding its forests and other natural resources. The legitimate livelihood and development aspirations of the people need concurrently to be addressed. In other words, Kerala requires a governance approach in forest-dominated landscapes that does not compromise the ecological functions of forest resources while addressing the developmental and livelihood requirements of people. In furtherance of this, the following approaches are proposed:

1) Relocation of private settlements located inside the forests
2) Acquisition of private estates located inside the forests
3) Securing identified elephant corridors
4) Consolidation of forest boundaries through survey and demarcation
5) Resumption of unused forests areas given on lease
6) Swapping the habitations of forest-dwelling communities as a strategy to address human-wildlife conflict, disaster-risk reduction and improving access to livelihoods and welfare measures
7) Rationalisation of boundaries of Protected Areas (PAs)
8) Consolidation of mangrove forests
9) Restoration of industrial plantations to natural forests
10) Rationalising teak plantations
11) Unlocking the potential of NTFP-based forest livelihoods
12) Effective implementation of the Forest Rights Act, 2006
13) Addressing human-wildlife conflict
14) Moving towards the landscape management

Relocation of private settlements. This concerns relocating private settlements (non-tribal) located inside the forests by paying suitable compensation. Prior informed consent and written willingness shall be the basis for this voluntary relocation. It is estimated that around 2000 ha of forest enclosures can be converted to natural forests through this process.

Acquisition of private estates. Private estates inside the forests were established by clearing dense natural forests, mostly located on steep slopes of forested mountains. Restoring them back to natural forests shall significantly reduce the likelihood of calamities like landslides apart from improving the hydrological functions of the forests. Restoration of these estates is also expected to reduce the incidences of human-wildlife conflict. It is estimated that around 3000 ha can be restored to natural forests through this process.

Securing identified elephant corridors. The Ministry of Environment, Forests, and Climate Change with support from the Wildlife Trust of India, New Delhi has identified seven critical elephant corridors in Kerala. Of these seven, one corridor (Thirunelli–Kudrakote corridor) has already been completely secured. Two other corridors (Nilambur Kovilakam-New Amarambalam and Mudumala–Nilambur via O' Valley or Ouchterlony Valley) do not need any land acquisition. The acquisition of Kottiyur-Periya corridor – i.e., 66.3 ha – is in progress. This leaves us with three remaining corridors that need to be consolidated: (a) Begur–Brahmagiri, 247.8 ha; (b) Nilambur–Appankappu, 23.3 ha; and (c) Periyla at Pakranthalam, 13.46 ha. Apart from significantly reducing the issues of human-wildlife conflict, this approach shall also consolidate some of the most disaster-prone areas of the State (in Wayanad and Nilambur) under forest cover.

Consolidation of forest boundaries through survey and demarcation. Considering the importance of consolidating the remaining forests tracts, intensive efforts need to be made to get the forest lands surveyed and demarcated. Apart from the ecological and enforcement-related reasons, demarcation of forest boundaries is highly essential for settling the legal disputes relating to forest boundaries. It is estimated that the total length of boundary of forests in Kerala is 16,845.8 km of which 5,291.1 km is natural boundary. That is, the total length of forests that require demarcation is 11,554.7 km of which 9,541.8 km has already been demarcated. The remaining 2,012.7 km boundary of forests of Kerala needs consolidation and permanent demarcation.

Resumption of unused forests areas given on lease. Around 55,711.1 ha of forest lands have been given on lease to public sector units in the past for various purposes including cultivation. Plantations of cash crops such as rubber, cardamom, coffee, and tea as well as agricultural crops exist in such leased out areas. There are extensive areas within these leased out tracts that are unused and still maintain the characteristics of original forest formations. Such unused forest areas can be resumed by the Forest Department for conservation and management.

Swapping the habitations of forest-dwelling communities as a strategy for mitigating human-wildlife conflict, disaster-risk reduction, and improving access to livelihood and welfare measures. Around 1.5 per cent of the State's population comprise people of the Scheduled Tribes who live in

and around the forests in 725 settlements. In most of these settlements, people want improved infrastructure. The demand for bringing development to such far-flung and remote areas means further disturbance to forests and escalating cost. However, the legitimate livelihood and development aspirations of the people also need to be addressed. Human-wildlife conflict and vulnerability to natural disasters induced by climate variability have also become serious problems in many tribal settlements located inside forests. In some places, tribal communities themselves have started demanding rehabilitation from interior forests to more suitable areas inside the forests that are more accessible and less prone to human-wildlife conflict and natural disasters.

Hence, as a strategy, it may be prudent to swap the location of such far-flung tribal settlements from the interior forests to other suitable areas (in the same eco-cultural settings) within the forests that shall be more permanent, ecologically benign, and imply a value-for-money proposition. However, swapping of tribal settlements from interior to other suitable forest areas must be planned with extreme sensitivity and must be based on the informed consent of the communities. Rehabilitation processes that include swapping forest areas may also require the prior approval of the Central Government under the provisions of the Forest (Conservation) Act, 1980, the Wildlife (Protection) Act, 1972, and the Forest Rights Act, 2006.

Rationalisation of boundaries of Protected Areas (PAs). Though many Protected Areas in the State have performed impressively in preserving species diversity at the individual-level, their management effectiveness remains critically sub-optimal at the landscape-level because of (a) the relatively small size of most PAs; (b) incomplete representation of flora and fauna; (c) connectivity issues (as in the Idukki Wildlife Sanctuary); and (d) prevailing and emerging threats (including climate variability). In the current situation, the existing PAs, already small and under considerable stress from various factors, will lose their functional effectiveness with disastrous consequences for the ecological and hydrological integrity of the State .

Hence, through a technically robust and socially conscious process, the boundaries of the existing PAs must be rationalised with an aim to cover more high-value biodiversity areas in the PA network. Public discussions are important in this regard.

Consolidation of mangroves. Mangrove forests are vital coastal ecosystems dotting the seascape-landscape interface, and they form a first barrier against rising storm surges and coastal erosion. They are also the major breeding grounds of marine fishery stock and hence play a key role in many regional economies. In the beginning of the twentieth century, Kerala had extensive areas under mangroves (100 sq.km), now reduced to just 21.1 sq.km across 10 districts. So far, the Government has accorded legal protection for only 4.4 sq. km of mangroves. The ownership of the remaining mangroves is with the Revenue and other departments, panchayats and private individuals. These areas need to be protected. That is, there is a need to accord legal protection to the remaining 16.7 sq.km of mangroves. While mangrove forests with the Revenue Department, panchayats and other Government agencies can be notified under the Kerala (Forest) Act, 1961, mangroves with private individuals will need to be acquired and notified as Reserve Forests. Further, mangrove-based rural livelihoods and income generating activities must be initiated.

Restoration of industrial plantations to natural forests. In the second half of the nineteenth century, with the formation of the colonial forest bureaucracy, the forests of Kerala were brought under organised management. Extraction of timber and accommodating the aspirations of expanding agriculture were the priorities of forest management till independence. Supplying raw materials to forest-based industries became the central tenet of forest management in the post-independent era with the enactment of the second National Forest Policy, 1952 and the formation of the Kerala State in 1956. Reeds and bamboos became main raw materials sourced from the forests for pulp, rayon and mat-weaving industries. Later, acacia, eucalyptus, alnus and tropical pines were introduced as fast-growing species to supplement the raw material requirements of industry. *Acacia mearnsii* (black wattle) was also added to the list as a raw material for the tanning industry.

These were times of early nation building and industrial development. It was no wonder then that considerations of industrial growth took precedence over ecological security. In retrospect, however, these monoculture industrial plantations adversely affected forests and forest resources. Some of these plantations were established in highly ecologically sensitive areas such as high-altitude grasslands. Species like black wattle had also become invasive in high-altitude ecosystems.

The Forest Policy of 1988 shifted the priorities from the promotion of industrial plantations to biodiversity conservation as the dominant theme of forest management. More recently, the fury of climate

variability-induced natural disasters, particularly recurring floods, have put additional responsibilities on forest management including in improving the hydrological services apart from conserving biological diversity.

Currently, Kerala has around 27,000 ha under industrial plantations (acacia, eucalyptus, tropical pines and alnus). In view of diminishing requirement from the industries and considering the need for managing the forests as a bulwark against climate variabilities and for improving the water security, the Government of Kerala has taken a policy decision that the remaining industrial plantations (eucalyptus, acacia, wattle and pine) be phased out by 2024 and restored to natural forests. Most of these areas are already abandoned, in a highly degraded condition and overgrown with exotic invasive species. Considering that such a move would substantially improve the water retention capacity of forests, these degraded and abandoned industrial plantations are proposed to be restored back to natural forests. An estimated 27,000 ha of industrial plantations can be restored to natural forests through this process.

Rationalisation of teak plantations. Since the 1840s, large tracts of natural forests of Kerala were converted to pure teak plantations. Thus teak, the "jewel of oriental forests," became the premier species of plantation forestry in Kerala. As of now, Kerala has 90,978.1 ha of forest land under teak plantations. This accounts for about 59 per cent of the total area under plantations with the Forest Department and 8 per cent of total forest area in the State.

For some time, there have been certain concerns regarding the performance and long-term prospects of the teak plantations. Declining productivity (particularly in second- and third-generation plantations), poor management of younger plantations and issues related to delayed silvicultural practices were some of them. The propriety of retaining the poorly managed teak plantations in the context of climate variabilities, invasive species and flood and drought incidences are also being pointed out. It is further noted that most of the teak timber reaching the markets are now sourced from private holdings and the share of forest plantations are marginal.

In this context, it has now been decided that teak plantations in poor or degraded sites and without any potential for development into successful plantations shall be restored to natural forests. Similarly, areas falling in disaster-prone areas (above 30 degree slope), wildlife corridors, riverine areas and high-value biodiversity areas also need to be restored to natural forests. It is estimated that around 50,000 ha of existing teak plantations will need to be reverted to natural forests based on the above decision and require eco-restoration.

Through the above approaches that pivot largely around the eco-restoration of disturbed/degraded forests, it is presumed that the hydrological functionality of forests can be improved manifold at a minimum cost.

Unlocking the potential of NTFP-based forest livelihoods. One of the main objectives of forest governance is to provide people with means of livelihood based on sustainable resource use. This shall prevent overexploitation of forests that would have otherwise been subjected to over-dependence, degradation and eventual biodiversity loss. Forests provide a large quantity of non-timber forest products (NTFPs) and approximately 27 per cent of India's population, particularly tribal communities, is dependent on NTFPs for their sustenance and livelihoods. Non-timber forest products are estimated to contribute up to 60 per cent of household income in some of the poorest rural villages. Non-timber forest products generate employment, substantial income and enable rural communities to offset multiple vulnerabilities.

Developing an efficient and operative NTFP management strategy is now an imperative of forest governance, as NTFPs form the core of activities under the Forest Rights Act, 2006. There is also a need for synchronising the Forest Rights Act and the Participatory Forest Management programmes. Notwithstanding the enormous economic, social and ecological significance, there are several critical issues affecting the NTFP sector in Kerala. The distribution, quantum and scale of NTFPs available in our forests and the pattern of resource use are inadequately known. Further, the markets for NTFPs are poorly studied and remain largely opaque. The rights of collectors are tenuous and access regulations are unclear in the absence of incomplete declaration of Community Forest Rights (CFRs). Often, the collection practices are not sustainable and value addition is weak. Moreover, primary collectors get only a small portion of the overall value of the produce.

Overall, there are many gaps in our current understanding of the range of NTFPs collected from the forests, their classification, socio-economic values, technical packages, trade, market mechanisms and policy and legal contexts for their sustainable use. This calls for a game-changing strategy. An increase in the share of the value of NTFPs accruing to the

marginalised communities will have a strong impact on poverty as well as the stability of democratic governance in some of the backward areas of the State. Interventions aimed at greater transparency in the commercial value of NTFPs and more equitable sharing of revenue shall incentivise the forest-dependent communities as well as the Forest Department to conserve biological diversity. In sum, there is need for a structured approach for NTFP management from the forests of Kerala.

Effective implementation of the Forest Rights Act, 2006. The Forest Rights Act provides for recognition and vesting of forest related rights to the Scheduled Tribes and other traditional forest-dwelling communities. The various rights that can be provided/ claimed are individual, developmental and community forest rights.

The Kerala Forest Department's Participatory Forest Management (PFM) guidelines lay down ways to create spaces for conservation through people's participation. Through PFM, the tribal communities have been empowered to implement certain activities in forest areas, which aids in better management and conservation of forests. This also helps create a rapport between Forest Department and tribal communities and helps in providing appropriate livelihood opportunities for the tribal population.

The Forest Rights Act enacted in 2006 goes one step ahead and confers formal rights to tribes and other forest-dwelling communities over forest land and its resources. It recognises the tribal communities' rights over the forests they use/protect and enables them to use their own traditional knowledge and practices for managing the same. However, rights under the Forest Rights Act also come with duties and responsibilities. This provides a space for converging the PFM and FRA in a win-win situation.

Dealing with human-wildlife conflict. There are increasing reports of human-wildlife conflict from many parts of the State. Elephant, tiger, leopards and wild boar are the main animals involved in the conflict situations. Incidences of lives lost, crops and property damaged and retaliatory killings are on the rise. Loss of habitats, increasing population of wildlife, climate change and changing cropping patters immediately surrounding the forests are the reasons attributed for this. Notwithstanding the efforts to address the situation through various means, it remains a major issue in the State. More cost-effective measures must be developed for addressing human-wildlife conflict with the involvement of local people.

Moving towards landscape management. The forests perform multiple roles in Kerala that are reflected in the land-use in the forested landscape. Considerations of production forestry (timber, pulpwood), protection of wildlife (Protected Areas), catchment protection of river-valley projects, biodiversity conservation, NTFP management, tribal livelihoods, housing human enclosures and tourism, locations of agriculture and plantations and infrastructure and sources of river systems are major land-uses in the forested landscapes. This framework of forest governance is a product of the policies and priorities of the forestry sector as demanded by society and the economy from time to time.

For instance, colonial considerations were the original driving force behind the establishment of the Forest Department. Its present organisational arrangement as Circles, Divisions and Ranges were made when timber extraction and establishment of teak plantations were the major objectives of management. Large-scale clearing of natural forests for agricultural expansion took place during this period (i.e., the second half of the nineteenth century and the first half of the twentieth century). In the post-independent era, in tune with the provisions of the second National Forest Policy of 1952, extensive monoculture plantations of acacia and eucalyptus were raised by clearing natural forests for producing raw materials for industries. Large tracts of forestland were also leased out for commercial horticulture and tree plantations or diverted for various infrastructure development projects. Formulation of Project Tiger and enactment of the Wildlife (Protection) Act, 1972 saw the genesis of wildlife conservation (Protected Areas) in areas rich in wildlife.

The social forestry programme, an externally aided project to promote tree planting outside forest areas, was started in the early 1980s. Participatory forest management was initiated in 1990s to enlist the support of forest-fringe communities in forest conservation by addressing their livelihood requirements. Concerns of climate change and rights of tribal communities were other considerations that became important in the first decade of the twenty first century. Of late, hydrological functions have become the cornerstone of forest management. Paradoxically, even though forests are currently viewed as having multiple purposes, they are administered based on a highly compartmentalised framework.

A hydrological framework for forest governance calls for a "ridge-to-valley" approach where watersheds of major rivers become the focus of management

planning and action. All the interventions in a landscape (comprising several watersheds) from the source of a river till it joins the sea must be synchronised with respect to planning and implementation. For instance, protecting a key water-source from all sorts of disturbances (production felling, tourism or fire) is an imperative irrespective of whether it falls in forest or non-forest areas. This calls for an integrated governance approach based on landscape-level considerations. In other words, all the land-uses within a landscape need to be synchronised and there must be concerted efforts to incorporate conservation-friendly practices in all land-uses operating in the landscape. The integrated management of all inter-connected land-uses in a landscape is going to be an important strategy (with impetus on urban forestry, climate change mitigation and hydrology) of forest governance in the future.

Appendix Table 2.1 *Progress of construction of new warehouses under the Kerala State Warehousing Corporation (KSWC) as on October 13, 2020* in Rs crore

Name of Project	Sanctioned amount (crore)	Expenditure incurred (crore)	Progress of Work
Construction of warehouse at State Warehouse, North Paravur, Ernakulam funded by NABARD	1	0.67	Work completed and warehouse is ready for inauguration
Construction of warehouse at the State Warehouse, Muthalamada, Palakkad	7.5	0.027	Soil testing conducted; total station survey conducted; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; structural design to be obtained and to be finalised; e-tender to be invited on getting technical sanction.
Construction of warehouse at State Warehouse, Punalur, Kollam	3.25	0.048	Soil test conducted; total survey station conducted; building permit obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; exchange of 3.11 cents of land with the adjacent plot to avoid demolishing of existing godown yet to be obtained from the Government.
Construction of new warehouse at the State Warehouse, Mavelikkara, Alappuzha	1.8	0.007	Building permit obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; in progress
Construction of new warehouse at State Warehouse, Haripad, Alappuzha	3.63	0.025	Soil test conducted; total station survey conducted; Fire NOC obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; in progress; work tendered.
Construction of new warehouse at Sasthamkotta, Kollam	2.4	0.006	Soil test conducted; total station survey conducted; Fire NOC obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; in progress

Construction of new warehouse at State Warehouse, Thalassery, Kannur	1.67	0.014	Soil test conducted; total station survey conducted; Fire NOC obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; sanction also obtained from Coastal Regulation Authority; work e-tendered; in progress.
Construction of warehouse-cum-agri complex at State Warehouse, Kozhinjampara, Palakkad	3.8 (from NABARD) 0.3 (from Plan funds)	0.024	Soil test conducted; total station survey conducted; Fire NOC obtained; MoU signed between KSWC and Kerala State Nirmithi Kendra for consultancy; sanction also obtained from Coastal Regulation Authority; work will begin soon.

Note: NOC stands for no objection certificate; KSWC stands for Kerala State Warehousing Corporation; MoU stands for memorandum of understanding.
Source: Kerala State Warehousing Corporation

Chapter 3
Food Security and Public Distribution in Kerala

Kerala has one of the most effective and best-run public distribution systems in India. Prior to the 1997 introduction of the targeted system, Kerala was the only State in India that had an almost total coverage of the population by the Public Distribution System (PDS). There are 87.9 lakh ration cardholders in the State. A summary of PDS in Kerala is given in Table 3.1.

Major Policy Transformation

The present Government has taken major steps towards policy transformation. The following are the key policy transformations implemented in the past four years.

Implementation of National Food Security Act (NFSA), 2013

The National Food Security Act 2013 was introduced by the Government of India to ensure food security for the vast majority of the population belonging to the middle and lower classes of the society. The objective of the Act is "to provide food and nutritional security in human life cycle approach by ensuring access to adequate quantity of quality food at affordable prices to people." Under the NFSA, the State Government is responsible for implementation and monitoring the schemes of various ministries and departments of the Central Government in accordance with the guidelines issued by the latter for ensuring food security to targeted beneficiaries in the State. In pursuance of the National Food Security Act 2013, Government of Kerala has decided to implement NFSA in the State with effect from November 1, 2016.

NFSA covers up to 75 per cent of the rural population and 50 per cent of the urban population under Antyodaya Anna Yojana (AAY) and priority households (PHH). While AAY households, which constitute the poorest of the poor, are entitled to 35 kg of food grains per family per month, priority households are entitled to five kg per person per month. Corresponding to the all-India coverage of 75 per cent and 50 per cent in the rural and urban areas, State-wise coverage under NFSA was determined by the erstwhile Planning Commission (now NITI Aayog) by using the National Sample Survey (NSS) Household Consumption Survey data for 2011-12. Kerala has got coverage of 52.63 per cent in rural area and 39.50 in urban area.

Beneficiary identification

The Government of Kerala took measures to identify eligible households. In Kerala, the process of renewal of existing ration cards coincided with the statutory provisions of the NFSA. As mandated in the NFSA, "priority" and "non-priority" ration cards have replaced the Below Poverty Line (BPL) and Above Poverty Line (APL) cards, respectively. A State-wise ranking of the beneficiaries was also conducted. Kerala has successfully implemented NFSA 2013 as per the norms suggested by Government of India.

Supply chain management

Supply chain management and doorstep delivery of food grains (from intermediary State-owned godowns up to the doorstep of authorised ration dealer (ARD)) has now been entrusted to Supplyco, which has been appointed by the Government to be the authorised agency and system integrator for this purpose. Supplyco has established taluk-level intermediary storage godowns and an e-tender has been floated for the selection of transporting contractors for lifting and doorstep delivery of food grains. GPS tracking of the transportation vehicles is still under way. As the first phase, all these were implemented in Kollam district, after which a rollout throughout the State followed.

Automation of fair price shops

Fair Price Shops (FPS) have been automated through the implementation of electronic point of sale (ePoS) devices. Ration distribution happens through a

Table 3.1 *Public Distribution System in Kerala at a glance*

Number of districts	14
Number of taluks	81
Number of interim godowns	107
Number of authorised ration dealers	14,297
Number of ration cards	87.9 lakh
Number of Anthyodaya Anna Yojana (AAY) cards	5.57 lakh
Number of Priority Household (PHH) cards	31.64 lakh
Total National Food Security Act (NFSA) cards	37.21 lakh
Tide-over cards	50.69 lakh

beneficiary's Aadhaar authentication, and food grain accounting happens on a real time basis on a central system with transaction details available in the public domain. Aadhaar authentication ensures that genuine beneficiaries are availing food grains from FPS. Kerala has good internet connectivity in both urban and rural areas. This also helped to achieve a higher percentage of successful Aadhaar authenticated transactions than elsewhere. Table 3.2 shows the percentage of Aadhaar authentication.

Table 3.2 *Details of electronic point of sale transactions and Aadhaar authentication, by month and year* in number and per cent

Month and year	Total no. of cards in the State	Aadhaar authentication (per cent)
March 2018	7,002,895	81.55
March 2019	8,412,615	97.63
March 2020	8,714,294	38.17
July 2020	8,792,169	95.25

Grievances redressal system

The Department has developed an online grievance redressal mechanism to register and track grievances. A call centre and toll free helpline numbers (1967 and 1800-425-1550) for Targeted Public Distribution System (TPDS) have already been working with Kerala State IT Mission (KSITM). Grievances can be registered through the email-id: dir.sch@kerala.gov.in. The National Informatics Centre (NIC) has customised a grievance redressal (GR) application newly prepared for Local Self Government Department (LSGD), for the use of the Department internally, as specified in NFSA 2013.

Transparency portal

The existing website of the Department (www.supplycokerala.gov.in) has been developed into a transparency portal by NIC through which public can access information including allocation details.

Appointment of State Food Commission

The Chairman and members of the State Food Commission have been appointed for the purpose of monitoring and reviewing the implementation of the National Food Security Act.

Revision of FPS commission structure

The Government constituted a committee with the Director of Civil Supplies as chair and including ration dealers to propose a package. The Committee has recommended a model structure. The Government of Kerala has agreed to a final package based on the Committee's recommendations subject to the condition that the ePoS will be implemented before a new commission structure is implemented. A revised commission structure will boost the morale of FPS licensees to improve service delivery to the beneficiaries.

Standardisation of FPS

FPS has been standardised by putting the same colour code and it is also mandated to put the stock and price list of commodities outside the FPS. Directions have been also given to FPS licensees to update the stock and price accordingly.

The following are the major milestones achieved during the process of PDS transformation.

Doorstep delivery operations

Supplyco has been entrusted with the implementation of the doorstep delivery of rationed articles under the PDS in Kerala. The food grain allocated to the State, either through Food Corporation of India (FCI) or from Compact Multi-Roller (CMR) mills have to be lifted from the respective godowns and delivered at the doorstep of the Fair Price Shops (FPS) after storage at interim godowns. At present the Corporation has started NFSA intermediary godowns in all 75 taluks in the State for storage of food grain lifted from FCI depots/CMR Mills. The Corporation has also hired 223 godowns with 15 lakh sq. feet area, which can store about 2.5 lakh MT of food grains. Because of switching over to NFSA operations, the operations in the existing 11 sub-depots have been converted to NFSA godowns.

Successful implementation of ePoS across Kerala

Electronic point of sale (ePoS) has been implemented across Kerala in a time-bound manner. Training has also been imparted to FPS licensee and department officials on the operations of ePoS devices. User manuals have been prepared and distributed to all FPS licensees. The Government has taken FPS licensees into confidence by increasing their commission structure after implementation of ePoS devices.

Implementation of inter-State portability

The Government has implemented State portability to provide facilities to beneficiaries to avail of food grains from any shop within the State . A large number of beneficiaries availed of the portability option for their convenience and experienced good service delivery. FPS licensees can also improve service delivery in order to attract more beneficiaries.

"One Nation One Ration Card" is a major project of the Department of Food and Public Distribution,

Government of India. It is intended to facilitate the purchase of food grain in any State in which a ration cardholder resides. Kerala began national portability transactions from January 2020. States/UT that are participating in the national portability cluster can obtain food grain from within the cluster States through Aadhaar-authenticated ePoS transactions. At present, 20 States and UTs have joined the One Nation One Ration Card scheme.

Social audit

The Government has introduced the practice of a social audit to bring in transparency and prevent pilferage in the public distribution system. The awareness-levels of beneficiaries have increased. Social auditing is a process though which we understand the gaps in the service delivery mechanism and can take measures to address the gap. Government plans to conduct social auditing by covering more areas to ensure that continuous improvement in the service delivery is achieved.

Humanitarian Crisis and Response

Over the last four years, Kerala witnessed a series of crisis situations, including the Ockhi cyclone, the Nipah virus outbreak, floods and, with the rest of the world, the Covid-19 pandemic. During such crises the Government was able to decisively and very quickly take various steps to get food grain to affected populations.

Ockhi response

Government of India allotted a quantity of 3555 MT of rice at the MSP-derived rate to the State for distribution to families affected by Ockhi cyclone.

Nine districts were affected by the cyclone, namely, Thiruvananthapuram, Kollam, Alappuzha, Ernakulum, Thrissur, Malappuram, Kozhikode, Kannur and Kasaragod. Beneficiaries were issued 15 kg of rice per family free of cost. For this, 2918 MT of rice was utilised. The total expense incurred in connection with the distribution was Rs 9.24 crore. The amount was reimbursed from the Chief Minister's Disaster Relief Fund.

Expenses incurred in connection with distribution of Ockhi free ration were as follows.

- Cost of rice including weighment charge: Rs 83,125,903
- ARD Dealer Commission: Rs 3,555,000
- Transportation Charge: Rs 5,688,000
- Total: Rs 9.24 crore

Flood relief initiatives

The State experienced two consecutive floods and landslides in 2018 and 2019. Civil Supplies Department has taken various flood relief measures to ensure all vulnerable beneficiaries are provided with ration food grains. As part of flood 2018 relief measures, Government has provided 15 kg of ration articles to the affected people and people living near the coastal areas free of cost. The Department of Civil Supplies had directed the ration dealers to supply rice free of cost. As part of the move, necessary arrangements were made in ePoS machines also. A total of 48 lakh families in 1259 flood-hit villages in the State were eligible for the free ration supply.

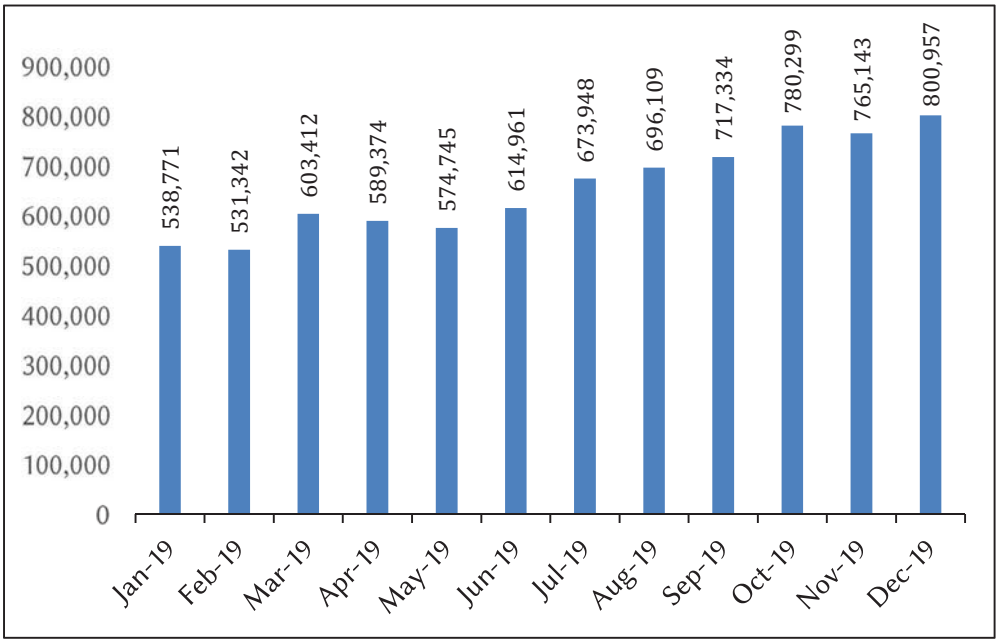


Figure 3.1 *Implementation of national portability transactions in Kerala, January to December 2019*

PDS and Covid-19 response

The Government of Kerala was able to use the infrastructure and the deep-rooted network of the PDS in the State to deal with the crisis generated by the outbreak of Covid-19 and the subsequent lockdown. Fully automated FPSs with e-POS machines, online allocation systems, effective supply chain management, well-categorised beneficiary data and smart grievance redressal systems helped the State successfully implement activities in response to Covid-19 related emergencies. During the lockdown, for the first time in the history of State's public distribution system, more than 97 per cent of the beneficiaries availed their ration allotments.

Being a consumer State, Kerala depends for its essentials and other materials on other States. In the wake of the Covid-19 pandemic, the Civil Supplies Department of Kerala was in the forefront of implementing various measures to provide relief to society and in ensuring that no one was deprived of essential commodities in the pandemic period.

In April 2020, all families under Non Priority Subsidy (NPS) and Non Priority Non Subsidy (NPNS) were given 15 kg rice free of cost. Subsequently, to ensure essential food items during the lockdown period, the State Government provided an essential articles kit costing Rs 972 per kit to 87.9 lakh families in the State at free of cost. The essential articles kit, named the *Athijeevana* kit, had 17 items, including cooking oil, sugar, pulses, spices, cereals, and soap. The kits were distributed by the Kerala State Civil Supplies Corporation. In addition to this, free rations of the value of Rs 300 crore were distributed to all categories of families such as AAY, PHH, NPS, and NPNS.

Even in the midst of the Covid-19 pandemic, the State took extraordinary steps to provide Onam food kits to ration-card holders. It included 11 grocery items. 83,711,76 families benefited from this distribution. The kits were distributed through ration shops. In addition, 10 kg of rice per card were given in August, at the rate of Rs 15 per kg to non-priority sections. Along with this, rice and other essential items were supplied at subsidised prices by Supplyco, Consumerfed, and Horticrop. To tide over the difficulties caused by the pandemic, Government decided to extend the supply of the essential-articles free kit, which included eight essential items, to all ration card holders.

A quantity of 5 kg rice or 4 kg atta per person was distributed to migrant or "guest" workers free of cost. Workers who were not covered under the National Food Security Act and State Public Distribution System (PDS) were only eligible for this benefit. As part of the Centre's "Atmanirbhar Bharat" and "PM Cares" funds, food kits containing 5 kg of white rice and 1 kg of black chickpeas were given to registered migrant workers for two months.

In addition to these measures, students up to primary-level who are covered by the mid-day meal scheme were given provisions and rice kits. Around 2,626,110 students in government and aided schools across the State benefited from the scheme. Fish workers affected by the trawling ban were provided with food kits during the pandemic.

Table 3.3 *Advantages to stakeholders in the value chain*

Stakeholders	Advantages
Executives	Executives can take informed policy-level decisions based on customised Management Information System reports and can also understand effectiveness of scheme implementation.
Administrators	Administrators can monitor State-level lifting and distribution status of food grains on real time basis.
Department officers	Department officials can monitor monthly lifting and distribution status and corrective measures could be taken proactively.
Supplyco	Supplyco can plan doorstep delivery operations well in advance, and can also ensure time-bound delivery of food grains at fair price.
FPS Licensee	FPS Licensee can get real-time stock details, and transaction details with food grains accounting. Each month food grain is delivered at FPS so that FPS management becomes smooth.
Beneficiaries	Beneficiaries are informed each month of their entitlement and billing details on the given mobile number. Portability also supports the beneficiary to choose their FPS based on convenience and service quality.

PDS Transformation: Impact on Stakeholders

The changes in the PDS projects in Kerala helped to achieve numerous advantages to all stakeholders included in the value chain (Table 3.3).

Road Map for the Future of the PDS

There are various projects in the pipeline that are likely to fructify in the next five to 10 years that will add to the benefit of stakeholders. These projects include the development of scientific storage, implementation of the Hunger-Free Kerala project across the State, the diversification of the food basket in the public distribution system, building greater awareness among beneficiaries, and optimisation of the supply chain.

Storage loss occurs mainly because of loss of moisture, prolonged storage, varying climatic conditions, the bleeding/spillage of grains from gunny bags, bird/rodent infestation in storage complexes, sliding down/deterioration of stocks, and fungus/insect infestation of stocks. To address storage losses, options for the construction or hiring of scientific storage units must be explored. The Food Corporation of India has mentioned the advantages of steel silos with bulk handling facilities as a highly mechanised and scientific way of bulk storage of food grain that brings in efficiency, flexibility of operations and prevents losses during storage and transportation. If food grain is stored in silos and transported in bulk, losses due to theft, pilferage and transportation would be negligible, in contrast to food grain storage in bags in conventional warehouses. The requirement of land for silos is approximately one-third of the space required for conventional storage warehouses of similar capacity, an added advantage. Moreover, silos can be operated round the clock. This would bring in flexibility and would improve overall efficiency. It would also contribute to improving the efficiency of the railways and also in creating an efficient food supply chain management system.

The Hunger-Free Kerala Project is a State Government initiative under the 13th Five-Year Plan. In keeping with the UN Sustainable Development Goals for 2030, different districts in Kerala followed different methods of implementing the project. Some districts, such as Thrissur, provided meals at subsidised rates and delivered meals to the elderly, while others, like Alappuzha, operated on a largely charity-based model, with customers allowed to pay whatever they could, or nothing at all, for a meal a day, in addition to delivering meals to certain identified beneficiaries. Government plans to implement the project across all the districts in Kerala.

More awareness must be created among beneficiaries on their entitlements. The Department has been publicising various channels of grievance-redressal that beneficiaries can seek for the resolution of their problems. Radio, television, print media, and social media are being used to create more awareness among beneficiaries. Measures are also being taken to create awareness among migrants to avail of their entitlements in their own languages. The State also gives importance to diversifying the basket of food items for public distribution schemes. It is important that the number of beneficiaries and outreach of the public distribution system be utilised to increase nutrition. It is desirable to add food grain such as millets to consumption baskets.

The Government of Kerala introduced a programme called "Subhiksha Keralam" to increase production in agriculture and related sectors during the pandemic. The programme aims at increasing the production of rice, fruit, vegetables, tubers, other food grains and legumes. Various Government departments are working with farmers, youth, repatriated NRIs, Kudumbashree units and NGOs to implement the programme. The objective of the programme is to make agriculture a major livelihood source in the State, and to resolve food security concerns.

Conclusion

The Government of Kerala has taken various measures to ensure the implementation of various food-based welfare schemes, including the Public Distribution System, ICDS, and Midday Meal Scheme, and to cover all vulnerable people and eligible beneficiaries in the population. Control and monitoring mechanisms have been strengthened to oversee the implementation of the scheme. More measures are in the pipeline for the enhancement and continuous improvement of food safety-net programmes. Scientific studies need to be conducted to optimise the food grain supply chain system, increase efficiency in route-planning, and ensure the timely delivery of food grain at defined locations. The Government also seeks to address food security concerns and provide new livelihoods through its flagship Subhiksha Keralam programme.

Chapter 4

Water for Kerala's Development: Status, Challenges and the Future

The vision for water management in Kerala is to achieve water security, long-term sustainability of water resources, equitable distribution of water, citizen stewardship over water, and a human rights-based approach to water management. In order to achieve these, the State has to embark upon a series of activities, which include (i) the restoration and protection of key water ecosystems like rivers, lakes, ponds, and flood plains, (ii) augmentation of usable water, (iii) basin-wide cooperation, (iv) the integration of surface and groundwater management, (v) water abstraction compatible to hydrological and environmental sustainability and (vi) empowerment and involvement of people through an institutional mechanism of local governments.

These actions should be undertaken through stakeholders' participation, decentralisation, accountability, and improved technology to reduce water consumption for daily use in all sectors, particularly high water-consuming sectors like agriculture, manufacturing industry, and domestic use.

Significant Achievements in Irrigation Sector in the 13th Five-Year Plan Period

The main activities undertaken in the irrigation sector during the 13th Five-Year Plan concerned a shift in focus from major and medium irrigation to minor irrigation, a special focus on canal modernisation, drought management, and the completion of ongoing major and medium irrigation projects in a time bound manner.

The Kerala State Planning Board formed a five-member Technical Committee to evaluate the Muvattupuzha, Idamalayar, Karapuzha and Banasurasagar projects. The Secretary, Water Resources Department was also a member of this Committee. After studying the implementation difficulties, clearly defined targets and timelines were set by the Committee for the completion of these projects and they were funded accordingly over the period of the 13th Plan.

The commissioning of the Muvattupuzha valley irrigation project deserves special mention. The commissioning of the project on July 10, 2020, was a major achievement of the period. The completion of Ezhuthonippadam aqueduct and commissioning of Koothattukulam Lift Irrigation, as part of this project, require special reference. With a cumulative expenditure of Rs 1083.64 crore, as on date of commissioning, the project benefitted an ayacut of 33670 hectare (ha) (gross) and 17,179 ha (net). The major crops irrigated include paddy (3925 ha), coconut (6354 ha), banana (2126 ha), rubber (3868 ha), and vegetables (1765 ha). The desalination of low-level paddy fields in Kottayam, drinking water supply schemes in Idukki, Ernakulam and Kottayam districts, industrial benefits for the Hindustan Newsprint Factory and the generation of hydel power are major additional benefits of the project.

Work on the Idamalayar Irrigation Project faced several stumbling blocks, especially at the Railway crossing and MC road crossing works. The Water Resources Department cleared hindrances at the MC road crossing by adopting the push-through mechanism during this period. This turned to be a landmark in the history of the Water Resources Department. Thus, an innovative mechanism cleared the hurdle at the MC road crossing portion in the low-level canal of Idamalayar. The project was cleared by constructing a tunnel of 35 m and also through a cut and cover canal construction of 66 m.

In tune with the emphasis of the 13th Five-Year Plan, there was increased focus on minor irrigation. The result was an expansion of net irrigated area over the period from 3.92 lakh ha (2017-18) to 4.04 lakh ha (2018-19) and further to 4.09 lakh ha (2019-20). Community micro-irrigation techniques were initiated during the period by the Department of Water Resources in order to enhance irrigation efficiency. Six schemes for micro-irrigation amounting to Rs 11.86 crore have been identified in Ernakulam, Kozhikode, Kasaragod, Thrissur, Idukki, and Wayanad districts.

The mandate of the Department of Water Resources under the Haritha Keralam Mission Programme was water conservation. The objective was to renovate and clean existing water resources, thereby making them available for irrigation and drinking purposes. Approximately 165 ha of ayacut was developed by renovating 375 ponds between 2017 and 2020. A Watershed Master Plan of 914 gram panchayats was prepared. Under Haritha Keralam, with the support of public participation, first-phase renovation works at the Varattayar, Kolarayar, Meenachilar, Kodurar, and Meenatharayar schemes were completed. Renovation work on 380 tanks and ponds were completed under minor irrigation Class I schemes in 2017-2020.

Two hundred and seven lift irrigation (LI) schemes were affected by the floods of 2018. Rs 1400 lakh were sanctioned for their repair.

The Minor Irrigation Census helps in building a comprehensive data base of irrigation potential created and utilised, water distribution practices, and sources used for energising the schemes. The Sixth Census, with reference year 2017-18, is in progress. The first Water Body Census is also being conducted along with the Sixth Minor Irrigation Census.

Groundwater conservation and recharge aims at the sustainable development of groundwater resources. These recharge schemes include rooftop rainwater harvesting for groundwater recharge through dug wells, recharge pits, bore wells, subsurface dykes, and small check dams. Groundwater recharge through rooftop rainwater harvesting was done in public buildings and Government schools. During the 13th Five-Year Plan period, The Ground Water Department successfully implemented rooftop rain water harvesting through recharge pits to enhance groundwater-levels of dug wells for Jala Samrudhi project in Kattakada constituency in Thiruvananthapuram District. Kattakkada constituency was declared the first assembly constituency in Kerala to implement artificial groundwater-recharging structures in all Government schools and offices. There were significant achievements in flood control activities. This includes the achievement of Government of India-approved schemes such as KEL II, KEL III and KEL IV and State Schemes. The latter includes construction of the outer boundaries of *Padasekharams* in Kuttanad taluk, and the modernisation of the Thanneermukkom barrage.

The third stage of Thanneermukkom regulator cum bridge (RCB) was completed and opened to the public on July 31, 2018. The bridge has 28 stainless steel shutters and allied lifting mechanisms. As a flood control measure, mineral sand was removed from the Thottappally spillway. The actual design capacity of Thottappally spillway is 1800 cubic metre per second. It was reduced to 600 cubic metre per second because of reduction of the width of the estuary from 380m to 150m. This narrowing was a crucial factor in the floods of 2018. In order to widen the estuary, 2,42,831.25 cubic metre of sand and obstructions were completely removed before July 23, 2020.

Kuttanad Package II. A Package for the Comprehensive Development of Kuttanad, based on a report prepared by the Kerala State Planning Board was released by the Chief Minister. The Rs 2400 crore package envisages inter-departmental coordination and funding through the Plan and KIIFB.

Increasing Demand and Its Potential Impact

The development of water resources in Kerala is largely driven by expanding population, urbanisation, growth of irrigation/agriculture, food production, energy demand, macroeconomic process, and changing consumption pattern. Between 1951 and 2011, Kerala's total population grew by 148 per cent, but the urban population grew by 783 per cent. Per capita annual availability of freshwater declined from 14443 cubic metre in 1951 to 5301 cubic metre in 2021.

Although Kerala's population is expected to stabilise in near future, the demand for water may not decline. The high growth of urbanisation, rising living standards of the population, growth of per capita income and high levels of consumption and energy use will lead to an increase in water use. Urbanisation impacts the hydrological cycle in several ways. It extracts a significant amount of water from surface and groundwater sources and extends impervious surfaces. It prevents recharge of groundwater, exacerbates flood risk, and pollutes water bodies through the discharge of untreated wastewater. Water quality is affected due to non-point source pollution, and lack of proper wastewater management and adequate sewage treatment facilities.

As the quality and quantity of surface water come under stress, society turns more and more towards groundwater to meet water demand. There is increasing dependence on groundwater for irrigation. The majority of human settlements, particularly in rural areas and urban fringes, depend on groundwater for meeting their daily needs. Several parts of the State have reported depletion of groundwater resources. Most of these impacts are manifested locally. The upstream-downstream conflict might exacerbate with increasing water demand. Besides, there are competing uses of water. The present institutional mechanism follows narrow sector-specific mandates. Thus, there is a fundamental disconnect that results in poor performance and negative impacts.

Risk-sensitive Areas

Kerala has several risk-sensitive areas.

1. Low-lying coastal stretches particularly the Kuttanad area, and low-lying lands surrounding the Vembanad lake and other coastal water bodies. These densely populated coastal stretches are vulnerable to flooding, storm surges, and stronger winds. Availability of freshwater is a major challenge due to the brackish water environment.
2. Islands within the backwaters, and barrier bars along the coastline that suffer from inadequate fresh water supply.

3. Drought-prone areas that suffer from water shortage in certain periods during summer months. The areas that are often drought-affected are distributed in the districts of Palakkad, Wayanad, Kannur, and Kasaragod. There are places almost in all districts facing occasional water stress due to low rainfall or climatically draught years.
4. The mountainous areas mostly inhabited by the scheduled tribe population. The rain shadow areas along the Western Ghats, particularly, the Attappadi valley in Palakkad and the Marayur area in Idukki receive very low rainfall and experience drought conditions.

Besides these areas, the slums within the cities are also risk-sensitive areas. There are several stretches in the coast adjoining major urban centres, where tank water supply is found necessary to meet the demand for drinking water during summer months.

Emerging Scenario in the Context of Climate Change

Climate change and variability will compound the situation and problems might aggravate particularly in the risk-sensitive areas. Climate change will affect water and other associated ecosystems in various measures. The frequency and magnitude of weather extremes will increase. Some of the impacts of climate change will be manifested through sea-level rise, change in rainfall pattern, and rise in water and ambient temperature. With the sea-level rise, saltwater will move further upstream along the estuaries, lagoons and rivers and, consequently, the freshwater environment downstream will be affected.

Kochi city is one of the urban areas in Kerala, which is highly vulnerable to the sea-level rise. The water supply and sanitation infrastructures will also be under stress due to the sea-level rise. The islands and barrier bars will be exposed to the vagaries of rising sea-levels. The temperature increase in water bodies will affect water quality and reduce their self-purifying capacity. The available reports indicate that several parts of the western ghats experience a rise in temperature of 1 to 2^{o}C. This causes depletion of soil moisture and will affect agriculture. Crops with shallow root systems face water stress and productivity is falling. It will have serious repercussions on the livelihoods of the farmers. There is also the issue of urban heat islands.

Constraints on Water Resources Management

Water resource management in Kerala faces several constraints:

1. The water ecosystems in the State are under severe stress due to gross alteration of catchments, land use change, deforestation, overexploitation of river bed deposits, human intervention, flood plain occupancy, and prolonged negligence to maintain traditional water structures. All these actions take place at a local level. However, there is a synergistic impact through aggregation. Repairing these altered ecosystems may not be an easy task.
2. The data on surface water used are based on the computations that were attempted in 1974. There have been several changes in water availability, use, and demand afterwards. The rainfall pattern is also changing. Surface water data need updating. The method used for groundwater assessment is a generalised version. Geologically, the State is composed of several structural blocks. As a result, the aquifers are disjointed and localised. These realities are hardly factored in while assessing groundwater conditions.
3. There is inequality in access to drinking water and sanitation services. Infrastructure for water supply is not adequate. The marginalised sections of the society face several problems of access. Wide variations in inter- and intra-urban and rural areas are another set of challenges in water management.
4. In spite of multiple rules and regulations, the systems for industrial and urban effluent management are not at the desired-level causing serious water quality problems.
5. Non-point source pollution is another major issue due to dispersed nature of settlements and intensive agricultural practices. Existing rules and regulations are not adequate to manage non-point source pollution.
6. The existing water management follows a centralised system principally governed by the Kerala Water Authority (KWA). There are also several other organisations like KSEB, Water Resource Department, State Groundwater Board, and Central Ground Water Board, handling water resources. Lack of effective coordination at the resource management level and also at the use level poses problems to evolve proper water management practices.

State of Water Resources: The Supply Side

Kerala is blessed with an abundance of rainfall (Figure 4.1). Considering an annual rainfall of 305 cm during the water year of 2018-19, the average gross yield from rainfall in Kerala has been estimated at 118,523 cubic mm. However, due to undulating and asymmetric

topographic, geomorphic settings and intrastate variations of rainfall pattern, rainwater availability in Kerala differs both from the coast to the Western Ghats crest in the west to east direction, and also between north and south Kerala. The rainfall varies temporally too. A little over 65 per cent of the total rainfall precipitates during the monsoon months. While south Kerala receives rainfall both during the southwest monsoon and the northeast monsoon, north Kerala receives rainfall only during the southwest monsoon. While Thiruvananthapuram district receives 33 per cent of the total rainfall during the northeast monsoon, Kasaragod district receives only 9 per cent of the total rainfall during the northeast monsoon. The orography modifies rainfall patterns and the foothill zone across the State receives the maximum rainfall. As a coastal State, Kerala is also blessed with ocean water and brackish coastal water bodies. However, here, we shall limit our discussion mainly to freshwater resources.

Surface water availability

Forty four rivers drain Kerala and 41 of them are west flowing and discharge into the Arabian Sea. The remaining three rivers flow eastwards to the Cauvery river basin. The total average annual yield of all the 44 rivers in Kerala is estimated as 70,323 cubic mm. This is about 30 per cent less than that of a single river like the Godavari. The utilisable yield in Kerala stands at 42,772 cubic mm.

Another estimate indicates that total surface water availability in Kerala, after accounting for losses due to evapotranspiration and interception, is about 54,410 cubic mm, of which 41,000 cubic mm flows as surface runoff, 7900 cubic mm infiltrates to recharge ground water and the rest 5510 mm is stored in reservoirs. Besides, there is water diversion as part of the interstate agreement with Tamil Nadu. It is not possible to plan to use the entire quantity of 41,000 mm of water. Some amount of freshwater is required as environmental flow to maintain the functioning of the hydro-ecosystem of all water bodies, like rivers, lakes, and backwaters. A certain amount is required to prevent salt water ingress from the sea and some flow should be maintained to flush out wastes that are regularly discharged into the rivers from human settlements. About 40 per cent of flow should be allowed for all these functions and the rest 60 per cent may be considered as annual utilisable water. However, even this may not be feasible because rivers are rain-fed in nature and hence experience wide variations in flow between non-monsoon and monsoon seasons. As a result, drawing 60 per cent of the water during non-monsoon months may not be practical; rainfall is the main source of all available water and it is mostly concentrated during the monsoon months. While annual water availability indicates a surplus, there is a deficit of 7142 cubic mm during the summer months (Table 4.1).

The availability of water also widely varies across space. All the 44 basins are not equally productive. Water yield depends on rainfall, catchment character, drainage pattern, and land use. The catchment character of drainage basins in north Kerala, central Kerala, and south Kerala are different. The rainfall distribution trend is also different. All these are reflected in the total water yield and also utilisable yield as evident from the

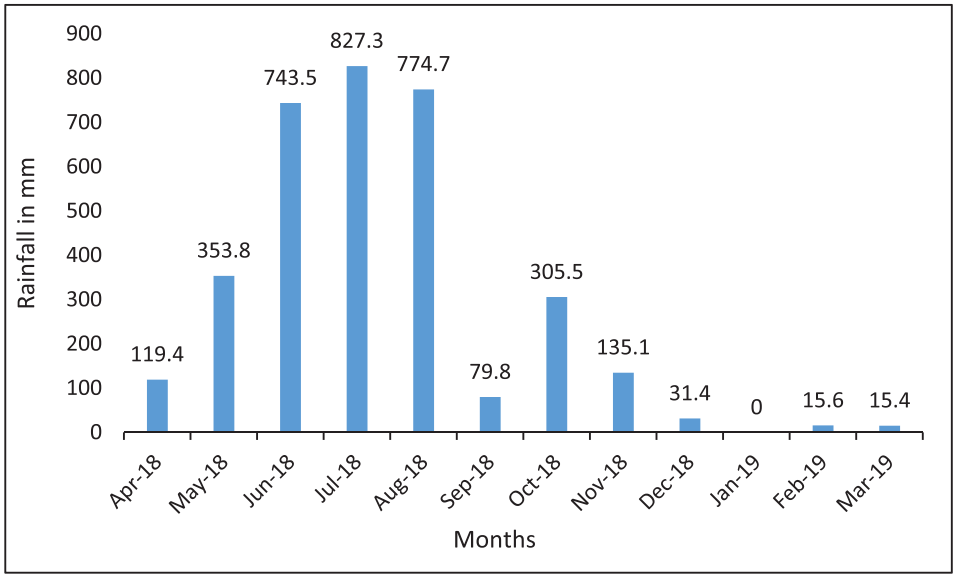


Figure 4.1 *Monthly distribution of rainfall in Kerala, April 2018 to March 2019* in mm

Table 4.1 *Availability and demand of water in Kerala, 2001* in cubic mm

Items	Annual		Summer months	
	Availability	Demand	Availability	Demand
Surface water	24,600		3690	
Ground water	5,135		5135	
Stored surface water	5,500		5500	
Domestic demand		1,226		809
Birds and animals		438		293
Industrial demand		6,400		3,200
Conservation of Kari land		5,000		3,500
Irrigation		13,665		13,665
Total	35,235	26,729	14,325	21,467
Surplus/Deficit	(+) 8506		(-) 7142	

Source: KRWSA; Kerala Development Report, Planning Commission.

data worked out for sample basins chosen from all three segments of the State (Table 4.2).

Ground water availability

The total annual groundwater recharge in Kerala is 5769.23 cubic mm and the net availability or extractable recharge is 5211.75 cubic mm. The net groundwater availability at the district-level varies from 186.14 cubic mm in Idukki to 591.44 cubic mm in Palakkad. Thrissur has a net groundwater availability of 590.48 cubic mm. Average net availability was in the order of 0.13 cubic mm per square km.

By 2017, the annual groundwater extraction for all uses was 2672.09 cubic mm or 51.27 per cent of the total extractable recharge. Around 46 per cent of extracted ground water was used for irrigation and the rest 54 per cent were used for domestic and industrial supply. There are wide variations among districts in the matter of ground water use. In districts like Kasaragod, more than 72 per cent of ground water draft is used for irrigation, whereas there are several districts that use more than 60 per cent of their ground water draft for domestic and industrial purposes.

Traditionally, people in Kerala depend on open wells for meeting their domestic needs and also for irrigating homestead gardens. There are about 4.5 million open wells in Kerala. The density of open wells is very high (around 150 per square km), perhaps the highest in the country. On an average, more than 90 per cent of wells are used for domestic purposes.

The stage of development of groundwater varies from 24.51 per cent in Wayanad to 79.64 per cent in Kasaragod. Based on the stages of ground water development it emerges that Chittur block in Palakkad is overexploited; Kasaragod block in Kasaragod and Malampuzha block in Palakkad are in critical condition. There were 30 blocks distributed across nine districts in the semi-critical category in 2017. In 2013, there were only 18 CD blocks under the semi-critical category. Also, extractable groundwater recharge declined by 6.93 per cent and net groundwater availability for future use declined by 3.94 per cent between 2013

Table 4.2 *Annual yield of selected river basins in Kerala* in cubic mm per square km

River basins	Area* (km^2)	Average discharge, 1998-99 to 2008-09 (%) $		Yield (mm^3/km^2) $	
		Monsoon	Non-monsoon	Annual	Utilisable
Valapattanam (North Kerala)	1867	94	6	2.19	1.57
Bharatapuzha (Central Kerala)	6186	87	13	1.21	0.67
Chalakkudi (Central Kerala)	1704	86	14	1.83	1.19
Pamba (South Kerala)	2235	79	21	2.08	1.42
Vamanapuram (South Kerala)	867	70	30	1.53	1.03

Source: *Government of Kerala; $ Central Water Commission.

and 2017. Extraction of groundwater increased from 46.63 per cent in 2013 to 51.27 per cent in 2017. If this trend continues, the groundwater scenario will be under stress in near future.

Freshwater lakes

While most of the natural wetlands are brackish, there are few freshwater bodies too. The important ones are Vellayani, Sasthamcotta, Pukot, Enamakkal, Manakkodi, Muriyad, Eravikulam, Devikulam, and Elephant Lake. The total area of these nine lakes is around 16 square km. Among these nine freshwater lakes, three lakes – Sasthamcotta Lake in Kollam, Vellayani Lake in Thiruvananthapuram and Pukkot Lake in Wayanad – are important. Water from the Pukkot Lake is used for pisciculture and irrigation. Vellayani lake and Sasthamcotta lake supply drinking water for large urban areas. Kollam municipality and a couple of surrounding panchayats depend upon the Sasthamcotta lake for their drinking water needs.

Ponds, tanks, and springs

Ponds and tanks are traditional rainwater harvesting structures used widely in tropical countries. The ponds in Kerala may be grouped under three types: (a) natural depressions (locally known as *chiras*); (b) excavated and man-made ponds or tanks; and (c) valley-head ponds or *talakkulams*. While the first two types are located in low-lying areas, the third type is found in the valley head. Many of the valley-head ponds in Kerala are associated with springs. Spring-fed ponds are perennial; however, all springs do not yield large quantities of water. CWRDM has identified 236 perennial springs in the State, of which about 20 per cent are being utilised.

The State has 995 large ponds with a minimum water storage capacity of 1500 m^3 each. They are found throughout the State, but a sizable number of these ponds are located in Palakkad, which is drought-prone. Rainfall in this area is lower than in other parts of the State. Even in Thiruvananthapuram urban corporation, there are 80 ponds, some of this are still in use. The Department of Water Resources has carried out a census of the ponds and has tabulated 45,000 ponds by giving a unique identification number. Most ponds and tanks in Kerala are small structures conforming to the region's more variegated topography. Nevertheless, they have helped the State to augment its water resources since the early days.

Water storage

Many of the rivers have been impounded in their upstream sections for irrigation and hydroelectric projects. There are 54 dams in Kerala, which includes 14 dams and six barrages maintained by Irrigation Department, 42 dams by the Kerala State Electricity Board and two dams maintained by the KWA. Total stored surface water in Kerala is estimated at 5500 cubic mm or 7.75 per cent of available water. Water is diverted through canals for irrigation during the dry season. It also helps to recharge wells in certain areas. But the reservoirs are of mixed blessings. On the one hand, they facilitate the generation of hydroelectricity, provide irrigation water for agriculture, facilitate pisciculture, and therefore contribute to development. On the other hand, they restrict the silt movement and regular river flow due to which the coastal areas are deprived of sediment supply. This in many cases leads to imbalance in coastal sediment distribution. With restricted sediment flow, nutrient movement is also reduced. This affects the productivity of coastal waters. Most of the reservoirs in Kerala are silted up. Impounding of new reservoirs is subject to various constraints.

Sectoral Demand for Water and The Present State

Water is necessary for all human activities. There is a competing demand and also multiple uses. However, water is managed or provisioned through various sectors. We intend to discuss the sectoral demand for water, accomplishments, and development challenges to meet these demands.

Drinking water, sanitation and human health

The Water, Sanitation, and Hygiene (WASH) is fundamentally important to lives, livelihoods, and sustainable development. Everyone needs access to adequate safe water for drinking, household use, personal hygiene, and sanitation. Kerala has progressed significantly in this matter. Nevertheless, there are areas and group of households that lack access to drinking water and sanitation. Efforts of 50 years of public intervention in creating drinking water facilities have not brought the desired results in many places. In some panchayats, drying up of wells during summer months is a common phenomenon that affects sizable number of households depending on well water. The worst sufferers are poor and landless households, small landholders, scheduled castes, and scheduled tribes. It is women who bear the brunt of the ordeal of fetching water from faraway places. Caste and gender-based inequities and economic inequalities are also dominant in several panchayats.

In March 2017, the total number of water supply schemes in operation under Kerala Water Authority (KWA) was 1073 with a total installed capacity of

3367.13 million litre per day (MLD). It covered 1.81 crore people or 54 per cent of the total population in the State. The average per capita availability of piped water is 104.20 litres per day. Out of the 1073 schemes, 989 schemes catered to rural areas, and 84 schemes catered to urban water supply schemes. Given the present rate of consumption in the State as indicated by the KWA, the annual water requirement for piped water supply will be 2310 cubic mm by 2021 considering the projected population of the State at 34 million.

Household-level data from Census 2011 indicated that of 7.72 million households in the State, only over 29 per cent households were covered by tap water supply. Treated tap water was available for 23.35 per cent of households. Well water was the main source of drinking water for 62 per cent of households and the bulk of these wells (47.4 per cent) were uncovered. Around 8.5 per cent of households depended on hand pumps, tube wells, bore wells, springs, rivers, and canals as the main source for drinking water. Also, 77.7 per cent of households had drinking water sources within their premises, 14.1 per cent have near the premises and the rest 8.2 per cent have to travel some distance to fetch water. Groundwater was the mainstay for meeting the domestic needs of more than 80 per cent of the rural and 50 per cent of the urban population.

Kerala Rural Water Supply and Sanitation Agency (KRWSA) or Jalanidhi scheme

The KRWSA, popularly known as Jalanidhi, was entrusted in 2000 with the responsibility to facilitate the implementation of rural water supply systems as part of a World Bank-supported project. The first phase of this project was launched between 2000 and 2008. This phase covered 1.13 million people building 3663 village-level water supply schemes in 112 gram panchayats or 11 per cent of all gram panchayats. The second phase of the Jalanidhi project started in March 2017. 5072 Jalanidhi schemes were in operation under Phases I and II covering 1.49 million people. The highest number of schemes (929) was in Malappuram covering 3.16 lakh people.

Coverage alone does not fully reflect inequalities. Disparities are evident in the level of services related to safety, accessibility, and reliability of water services. There has also been the problem of slipping back. During 2016-17, the total number of habitations covered was 21,551 of which 152 habitations slipped back. An evaluation report by the independent evaluation group in 2013 had noted that according to the independent household survey commissioned by the World Bank in 2008, 44 per cent of the community schemes reported periodic water shortages and actual water supply was 45 litre per capita per day (lpcd) against the designed average supply of 60 lpcd. The water supply fell to only 29 lpcd during the summer season. Some project schemes resorted to three days of rotational water supplies in the summer to serve all consumers.

Another survey in 2012 indicated that a majority of the beneficiaries drew water from traditional sources to supplement water supply projects. Although the project was rated satisfactory based on relevance, efficacy, and efficiency, it was pointed out that "its performance towards the end of the project was less than its demonstrated potential." The project performance assessment report highlighted a few points that merit close scrutiny. These were: (i) poor quality of water; (ii) lack of technical and executive hands for maintenance; (iii) dearth of experienced ngos; (iv) dependence on donor agency for maintenance cost; and (v) institutional problems related to repair of major damages to community schemes. The issues identified in the evaluation report are significant from the user's perspective, affordability and policy planning. Investment deficit for aging infrastructure is also another area of concern.

Urbanisation

There are no appreciable differences between rural and urban areas in Kerala in the matter of drinking water supply, although, spatial disparities are well evident in the district-level disaggregated data. The KWA has reported that only 54 per cent of the urban population receive piped water supply. The coverage varies from 10 per cent in Kasaragod district to 87 per cent in Ernakulam district. Census 2011 showed that around 59 per cent of households in urban areas depended on well water against an all-India average of 6.2 per cent. Ernakulam, Palakkad and Thiruvananthapuram were only three districts, where more than 50 per cent of urban households had access to tap water supply.

Energy

Kerala's energy sector is dominated by hydropower, which accounted for 71 per cent of the total installed capacity of 2961 mega watt (MW) in 2017. This was in sharp contrast to India's dependence on hydel power for 14 per cent of its energy demand. There were 24 hydel power projects with a total installed capacity of 1921 MW in 2009, which increased to 2108 MW in 2017. Besides, there are 21 hydropower schemes at various stages of implementation. On completion, they are expected to add nearly 380 MW in installed capacity under hydel power. KSEB continues to invest in hydel

power and tries to maintain the ratio of 80:20 between hydel power and thermal power.

High rainfall, an abrupt rise in slope along the western ghats scarp, and high-altitude plateau formation have provided the State certain unique opportunities to impound reservoirs and set up hydel power projects. However, the power sector in Kerala is vulnerable to rainfall variations on account of over-dependence on hydel power. Any fluctuation in rainfall directly impacts power generation. The drought in the year 1982-83 witnessed unprecedented power shortages in the State. Till that year, Kerala was considered as a surplus State. Dependence on hydel power makes Kerala's energy scenario green. However, there are geographic limitations to continue with the installation of hydel power projects, particularly large projects. In this context, small and micro hydel projects are gaining importance. There are successful models like Meenvallam micro-hydel project being developed in the Palakkad district.

Agriculture and food security

The utilisation of surface water for irrigation is not directly assessable. However, an indirect assessment can be made. As with any region, the major user of water in Kerala is the irrigation sector. The irrigation efficiency in the studies carried by CWRDM has been found to be as low as 40 per cent. By 2016, the net irrigation water utilisation was estimated as 3532 cubic mm and the gross irrigation water utilisation was estimated as 8830 cubic mm. This is supplied from both the surface and groundwater sources. The groundwater usage for agriculture is estimated as 1221 cubic mm; the rest is met from surface water sources, which include major, medium, and minor irrigation structures.

Predicting the future demand in irrigation sector is a challenging task, especially in the context of climate change. Irrigation demand may rise if rainfall declines. At present, the area under irrigation is a little over 19 per cent. The water demand will increase with the expansion of irrigated areas. However, there are several constraints to expanding the irrigated area in Kerala due to the undulated nature of the topography, which also causes considerable loss of water. Irrigation water is required during summer months when the State faces a deficit. Hence, emphasis should be given to adopting modern techniques and scientific water management practices to improve efficiency.

Industry

Large-scale manufacturing industries are not prominent in Kerala. Industrial demand for water is relatively less compared to other neighbouring States except in Ernakulum district. Data on total water utilisation for the industry is not available. However, Centre Groundwater Board (CGWB) estimate indicated that groundwater extraction for industrial use in Kerala was 14.39 cubic mm by 2017. Number of water connections given by the KWA for industrial use was only 1623 in 2017.

According to FICCI, the current water utilisation for the industries in the country is 8.5 per cent of the total water abstraction, and out of which almost 45 per cent is from surface sources, 35 per cent from groundwater and 25 per cent from municipal sources. This ratio can be assumed for Kerala also even though it may be slightly on the higher side. Thus, the industrial water demand for the State was estimated to be 1015 cubic mm in 2016.

Tourism and water recreation

Tourism and water recreation are an important economic activity in Kerala. It generates substantial revenue for the Government. Water-based tourism, both in the sprawling backwaters and rivers in Kerala, invariably finds an important place in any discourse on tourism potential. Provisioning of potable water in the tourist centres is a priority activity. Any new idea on new accommodation, transport or entertainment should first necessarily consider the present status of water availability and facilities enjoyed by the residents of the area. Maintenance of water quality of the water bodies is an important issue in developing water-based tourism.

Environmental flow

Water is also required for maintaining aquatic habitat, wild lives and preserving environment. Though there no estimate of the water requirement to maintain ecosystem functions, it has been suggested that 40 per cent of river discharge may be left for all ecosystem services. One estimate indicated that 439 cubic mm of water is required annually for the birds and animals. Acute shortage of water within the forest areas is often reported during summer months, which results in human-animal conflicts in the villages along the forest fringe. It is important to work out the environmental flow for all the rivers in Kerala.

Challenges to Water Management

Kerala faces several challenges in the matter of water management ranging from meeting sectoral demands to maintain ecosystem services of water. There are also challenges related to manage water-related extremes like flood and drought, source sustainability, and to improve the quantity of usable water availability.

Demand management

Demand for water is increasing in all sectors, particularly for domestic use, agriculture, industry, urban development, flushing out wastes from water bodies, energy, and ecosystem services. However, there are uncertainties about the precise amount of water required to meet all the demands. Meeting drinking water need is always a priority. The challenges in this sector are: (i) reaching out to the uncovered section of the population; (ii) improving the quality of the existing services; and (iii) ensuring bulk water availability to meet the unmet demand. There is a need to evolve special management strategies for increasing the availability of water during the summer season.

Quantity management

Improving the quantity of available usable water is a big challenge. The amount of rainfall is more or less the same over the years. What is important is to devise intervention measures to increase the residence time of water on the land surface. Water harvesting through the four-water concept is gaining momentum for increasing water availability in many drought-affected areas. The four-water concept stresses using rain water, surface water, groundwater, and maintaining the availability of soil moisture in the upper part of the soil column. The overall water availability can be enhanced through conservation, proper maintenance and improvement of storage facilities, creating additional storage, renovation of derelict traditional water structures, and watershed management. Multi-usability of water resources will also to the gross availability.

The existing storage capacities of the dams are only 7.75 per cent of the available water. The National Water Policy of 1987 and the State Water Policy of 1992 had clearly stated that all existing and future reservoirs – both irrigation and hydel – should have a drinking water supply component. In addition to the Aruvikkara and Peppara reservoirs, which were built for water supply alone, only Malampuzha and Peechi have drinking water components (i.e., only four out of 30 reservoirs in the State). The best long-term solution for meeting most of the domestic and industrial water needs in the future is to draw water from all existing and future reservoirs. The irrigation projects which are under different stages of completion may be reviewed to plan for their timely completion.

Quality management

Deterioration of water quality, both surface water, and ground water is a major issue. Analysis of available data indicates that water quality is deteriorating over the years and more and more water bodies are recording higher Biochemical oxygen demand (BOD) values. Water in most of the river segments is rendered unfit for consumption without treatment. The nutrient loading of water bodies is also increasing and in some cases is alarming. Several stretches of the rivers flowing through the cities show "Urban River Syndrome". Bacteriological contamination of groundwater is widely reported. Considering the fact that 62 per cent of households depend on wells for meeting drinking water needs, deteriorating quality of groundwater is a matter of serious concern.

Management of deteriorated groundwater is more complex than surface water as the sub-surface geochemical reaction between contaminants and earth materials is not always well understood and the subsurface movements of pollutants are slow and difficult to detect. Further, the retention time of pollutants in ground water is much longer than that in surface water. Improving water quality of both surface and ground water is a huge task as it is also linked with solid and liquid waste management. Unsafe water, lack of sanitation, and hygiene are the leading causes of mortality and morbidity in several countries.

Water-related extremes and risk management

Kerala confronts water-related extreme events like flood. While some parts of the State like Kuttanad experience incidence of floods almost every year, the State as a whole suffers from flood problems from time to time. Landslides also occur in the western ghat areas during monsoon months. Besides, the coastal surge is another issue affecting sizable parts of the coastline. All these incidences cause the loss of human lives and the economy.

The State witnessed devastating floods in the consecutive two years of 2018 and 2019. The flood of 2018 was an unprecedented event claiming 488 lives and affecting 56 lakh people across the State. Ten out of 14 districts experienced flood fury. More than 60,000 houses were devastated. Exposure of people to hydrometeorological hazards has been growing over the years. On one hand, the water holding capacity of river provenance is declining to cause high instantaneous flow and on the other hand there is a high reduction of flood cushioning area downstream. People are living in the flood plains and there is also a heavy economic investment in the vulnerable areas. Climate change is likely to increase flood incidence. The flood in 2018 was followed by low rainfall and a drought-like situation prevailed. One of the challenges is how to make Kerala water-related disaster risk resilient.

Restoration of ecosystem services, flood plain zonation, vulnerability assessment, and adaptation of nature-based flood management practices are necessary steps to address flood-related disasters. In recent years, there is stress on implementing nature-based flood protection measures or a hybrid of nature-based and structural measures for flood management across the world as purely structural measures are found to be inadequate. The nature-based measures stress system scale perspectives, including spatial scale, time scale, integration with ecosystem conservation and restoration, adaptive management, and people's participation. Room for rivers and increasing water holding capacity of the catchments are some of the new initiatives.

Increasing sectoral water use efficiency

There are two options to increase water use efficiency in agriculture: reduction of water losses and increase of productivity per unit of water use. Reduction of water loss can be attained through agronomic practices, changing crop calendar and irrigation management, such as the use of precision irrigation and participatory irrigation. The second option refers to increasing crop productivity i.e., producing more crops or value per volume of water used. Irrigation of high-value crops is important in this context. Besides, there are several other measures including use of technology to increase water use efficiency. It is important to understand the real potential of reducing water losses to avoid devising costly and ineffective demand management strategies.

A large proportion of the water abstracted in irrigation systems will return to the system. The quality and the timing of the return flow is important regarding the usefulness of the water for the downstream users. Irrigation systems, and more notoriously industrial users, often return polluted water to the system, effectively meaning that the water is not available for further use. In this case, an improvement in irrigation efficiency, whereby a smaller volume of water is abstracted and an even smaller volume returned, will mean a better quality of water is available for the next downstream user. If these systems are adopted, the pesticide pollution in the downstream water bodies can be controlled.

Future Development Framework, Strategy and Action Plan

The future vision of water management in Kerala should be to develop the State as a water secure State. The framework proposed here is expected to lay the foundation to accomplish such a task. Water management is a complex and interdisciplinary issue encompassing the domains of science, technology, and society. The future water management and development strategy should address this complexity.

Developing an integrated water management framework

Almost all developed countries either have prepared or are in the process of preparing a water management framework for the country as a whole, and also for river basins. The best-known document is the European Union Water Development Framework. The Union's Water Framework Directive (WFD) which was adopted in 2000 is a major driving force influencing water management at the national, regional, and local-levels in all the EU countries. The directive covers river basin management, requirements to coordinate water use within river basins and river basin planning. The WFD is the principal driver of recent changes in the scalar organisation of water governance and advocacy in Europe. Several other countries have also prepared similar documents.

In India, the Mihir Shah committee proposed a paradigm shift in water management in India by amalgamating two main organisations, namely central water commission (CWC) and central ground water board (CGWB), and devise water governance both at the national and State-level. It proposed integrated water management interventions suiting the contour of demand management and sustainability as the central focus, and emphasised equity in access to water, transparency, and a national water framework law. Each State was expected to redesign their water management and water governance initiatives following this national guideline.

Resource augmentation: strengthening the supply side

There are five broad areas that warrant attention to improve the water resource base and strengthen the supply side. Strategies for achieving each of these activities and proposed action plans are spelt out here:

Suitable and equitable water allocation for all water use sectors and fulfilment of basic water requirements

Strategies. Assessment of water resources of the State (updating the 1974 PWD report on water resources); Prioritisation of water use for various sectors, i.e., agriculture, domestic, industry and conservation of ecosystem; and setting up of water-use criteria/ proportions for the various sectors from the

panchayath through watersheds/ river basin to State-level and promotion of conjunctive use of surface and groundwater (especially shallow groundwater).

Activities and action plan. Preparation of inventory of water resources (both surface water and groundwater) in all the river basins; updating and strengthening the information on water requirements of various sectors and forecasting of future needs and trends; development of water resource potential and management plan for block panchayats and setting up guidelines for water allocation to various sectors; allocation of water for the various sectors under the framework of river basin management plan, including ecosystem services; and supplementation of groundwater-based irrigation in surface water irrigated areas during the lean season.

Improving the water use/management efficiency

Strategies. Renovation of existing water resources infrastructures; protection of water recharging ecosystems and natural resources; replication of success stories of supply and water management to other feasible areas; and precision water management.

Activities and action plan. Survey and preparation of plan for rehabilitation of water sources and waterways, including development and conservation plans; repair and improvement of distribution systems and control structures in order to reduce water losses and ensure desired water delivery; periodic de-silting of reservoirs for increasing the water storage capacity; renovation of the dilapidated irrigation ponds/tanks, check dams, Thurangam and other water storage/ diversion/distribution structures; empowerment of community organisations in taking care (planning, implementation and monitoring) of common property resources; prevention of encroachments and protection of riverbanks by eco-friendly measures; protection of water recharging ecosystems like forests, wetlands, paddy fields, mangroves, and sacred groves; prevention of uncontrolled mining of sand, granite, clay and soil; and replication of successful models to gear up the water conservation programs in the State.

Linkage of master plans of departments with river basin plan for holistic IWRM

Strategies. Preparation of the integrated river basin management plan for all the 44 river basins

Activities and action plan. Formation of required institutions; and Integration of the individual plans available in the line departments with river basin plans by ensuring stakeholders' participation.

Creation of new water conservation and storage structures

Strategies. Exploration of the possibility for new structures on a priority basis in the river basins; and Promotion of water conservation.

Activities and action plan. Investigation in the river basins to locate suitable sites and feasibility studies (may be taken up in the Chalakkudi river basin to begin with); exploration of paleo channels, ox-bow lakes and abandoned channels to promote as water storage structures; taking of rainwater harvesting and recharge pits and percolation tanks in suitable areas on a watershed basis; implementation of open well recharge treatments in all households; adoption of suitable erosion control measures like contour bunds, terracing, etc. for soil and water conservation; Promotion of rooftop rainwater harvesting at household and institutional-levels; construction of check dams, barrages, dykes, and VCBs in rivers and streams, wherever it is feasible; and construction of ponds and tanks in ideal locations; and development of abandoned quarries as water harvesting and storage structures.

Management of water quality problems for improving the water supply

Strategies. Improvement and sustenance of water quality.

Activities and action plan. Monitoring of water quality problems with special reference to each basin and preparation of a protection plan to arrest water pollution; development of cost-effective materials for water purification, especially using nanotechnology; surveillance and monitoring of water quality through public participation using sensor-based devices for water quality testing; development of proper sanitation plans and sewage treatment plants; and control of non-point source pollution.

Demand management in water

Water use sectors in Kerala are broadly grouped into five categories: (a) Domestic, including drinking water, (b) Irrigation, (c) Industry, (d) Hydropower, and (e) Ecosystem services, including wildlife needs. Strategies and proposed action plans are indicated below.

Domestic including drinking water: Providing 100 per cent safe drinking water to all

Strategies. Identification and prioritisation of problematic areas; reduction of water losses in distribution; and development of water resources for augmenting the distribution of potable water

Activities and action Plan. Preparation of plan and implementation of domestic water supply schemes in problematic areas on a priority basis; setting up of more community and village water supply systems by using both surface and groundwater; setting up of more water treatment plants for ensuring safe drinking water; and development of GIS-based distribution network along with sensors for improving the efficiency.

Increasing the gross irrigated area

The objective should be to increase the gross irrigated area in the State from the current-level of 17.9 per cent of the gross cultivated area to 31 per cent.

Strategies. Preparation of block-level and panchayat-level irrigation plan by considering all the existing schemes and possible new schemes; Improvement of the water use efficiency for maximising the water productivity; and Reorientation of irrigation management through decentralisation.

Activities and action plan. Preparation of framework for district-level strategies for increasing the irrigated area; assessment of the irrigation water availability and demand based on the cropping pattern of the panchayat, considering crop water requirements and irrigation recommendation for the crops in different agroecological units of the State; completion of all pending major/medium/minor irrigation structures; promotion of minor irrigation projects/schemes; creation of new storage structures such as ponds, VCBs, barrages and check dams where feasible; recharging of ground water in the existing overexploited and critical areas; creation of more water diversion structures and development of springs in highland and midland areas, and more lift irrigation schemes in lowland areas; irrigation of high value horticultural crops such as pepper, cardamom, vegetables, banana, etc. to attain maximum productivity; increased involvement of Water User Associations (WUAs) through Participatory Irrigation Management (PIM) for enhancing the physical access of each individual plot to water by which more cultivable area may be brought under assured irrigation; promotion of extension activities relating to water harvesting, water management and crop alignment for farmers and grassroots-level field functionaries; improvement of drainage facilities in farm area; enhancement of water utilisation capacity of irrigation projects; enhancement of the adoption of advanced micro irrigation and water saving technologies, precision farming, polyhouse farming and hydroponics to achieve more crop per drop; reduction of irrigation water demand by proper planning viz., early sowing of variety, uniform way of planting in group approach, laser land levelling and mulching on a watershed basis.

Industry

The goal is to meet the industrial demand of 1200 cubic mm by 2022 by achieving an increase of around 18 per cent over the current requirement.

Strategies. Defining the rights and responsibilities of the industries on water usage; adoption of the principle of 3 R's (Reduce, Recycle and Reuse) in water use; prevention of the pollutant load in the effluents for environmental protection; locational analysis for new industries with respect to water resources.

Activities and action plan. Preparation of guidelines defining water rights and responsibilities of various industrial sectors; appropriate pricing of water for industrial use to improve the efficiency; recycling of used water for industrial purposes; installation of advanced effluent treatment plants (ETP) in all the industries and their periodic monitoring of the same by Pollution Control Board; and evaluation of water availability before starting new industries and concurrent monitoring of water use, water availability and water quality.

Hydropower: meeting the energy demand of the State

Strategies. Creation of new micro hydel schemes; storage of enough water for generation of power considering the increasing energy demand under changing climate scenario.

Activities and action plan. Investigation and construction of new micro hydel schemes in all possible locations; Periodic de-silting for enhancement of the storage since siltation is a major problem in the reservoirs; and improvement in the use efficiency of existing hydropower systems with advanced technologies.

Ecosystem services

The objective is to ensure maintenance of ecosystem functions, provisioning of water for wildlife, biodiversity conservation and sustainability of water resources.

Strategies. Protection and conservation of ecosystem services, such as forests, wetlands and mangroves; improvement of water availability in wild habitats; sustenance of environmental flow in rivers; and limitation of overexploitation of groundwater.

Activities and action Plan. Protection and forestation of various forest ecosystems; identification of water sources within wild habitats and creation of necessary

storage structures within forest areas for meeting the water needs of wildlife; inclusion of more wetlands under the purview of Ramsar sites and implementation of Management Action Plan (MAP) of wetlands and Ramsar sites; promotion of livelihood support system for wetland conservation, including inventorying and evaluation of the ecosystem services; determination of required environmental flow in the rivers of Kerala; and enforcement of legislative measures to check overexploitation of groundwater.

Water Related Disaster Management

Flood, sea surge, drought and landslides are common water-related disasters affecting Kerala. Landslides occur during every monsoon period in the hilly tracts. The post-flood Kuttanad package of Kerala State Planning Board proposed a new approach to water management and other related activities including livelihoods. The interventions proposed under this package provides important lesson to develop Kerala, and particularly to make Kuttanad flood-resilient. The prime objective of water-related disaster management programme is to ensure effective preparedness as well as mitigation from water related disasters.

Strategies. To introduce an efficient flood, drought and land slide protection system in the context of changing climate scenarios.

Activities and action Plan. Formulation of the flood, drought, landslide protection, and rehabilitation master plans employing both structural and non-structural measures; real-time forecast for disasters by preparing drought and flood frequency forecasting risk maps; development of a preparatory process for protection and rehabilitation operations prior, during and after disasters; vulnerability mapping at different scales ranging from panchayat to river basin; and organisation of training programmes to all the stakeholders for protection and rehabilitation.

Technology

Technology has an important role in sustainable water management. At present, most of the technologies are used for treatments and distribution of water, disposal of wastewater, sewage treatment and treatment of industrial effluents. In most cases, these technologies are energy-consuming and adversely impact our environment. Green technologies are being promoted in various countries to ensure human well-being as well as to preserve the environment. According to the United Nations Environment Programme,

> Green technology covers a broad area of production and consumption technologies. The adoption and use of green technologies involve the use of environmental technologies for monitoring and assessment, pollution prevention and control, resource and energy recovery, mitigation of climate change and remediation and restoration.

To mitigate water pollution, green technologies are used in a broad range of scales from households to the industry-level. Green technology covers treatment of rainwater, storm water treatment, artificial groundwater recharge, wastewater reuse, industrial waste water treatment, construction of wetlands for wastewater treatment, biological treatment and nutrient removal, technology for nitrogen removal and water recycling and pollutant removal by biomass-based adsorbents.

Green technology can be used in Kerala for the treatment of wastewater, industrial effluents, and sewage. Application of technology is also required for increasing efficiency of water use in irrigation, water-saving technology at the household-level, and sewage management.

Application of Geomatics is necessary to record water distribution systems especially in the urban areas, where underground sewage drainage lines and drinking water pipes are placed side by side. To combat loss of water during transmission and to control contamination, regular monitoring using GIS software will be useful. Digitisation of all drainage system will also be useful for storm water management and urban flood control.

Learning lessons from Unique Initiatives on Watershed Management

Kerala has the distinction to have various inventiveness in different fields. New ideas are appreciated and people are enterprising enough to adopt them. Water management is one such sector, where a number of initiatives undertaken by the Government, science and technology institutes, and local self-Governments have produced significant results, particularly in the sphere of watershed management. Many of these programmes provide important lessons, which through proper scientific analysis may be replicated, upscaled, and dovetailed into the larger planning process of the State.

The first successful and complete watershed master plan was prepared by Perambra block panchayat in Kozhikode in 2000. In 2004, a model watershed master plan for Thirurangadi Block Panchayat in Malappuram was prepared by the Centre for Earth Science Studies. There were successful water harvesting mechanisms developed in the Film Video Park, KINFRA at Kazhakuttam, Chadayamangalm Block under

Hariyali projects, and similar initiatives in Palakkad. With assistance from CWRDM, Perumanna Gram Panchayat in Kozhikode took the lead becoming the first panchayat to declare a water policy on the lines of the State Government's water policy declared in 2008. Kerala State Land Use Board also initiated watershed management/water conservation projects in different parts of the State.

Recent initiatives undertaken by the Nedumangad Block Panchayat and the Kattakkada and Taliparamba assembly constituencies to prepare watershed management plan are noteworthy attempts. It addresses several challenging issues and provides a model programme at the block panchayat-level. Kerala Institute of Local Administration (KILA) and Haritha Keralam Mission are instrumental in executing several watershed management projects at the panchayat-level. Attempts are taken to document some of the best practices. There are also initiatives in Kannur and Wayanad districts.

Detailed scientific evaluation of all these projects is necessary to learn the lessons. All these projects are successful from the participation point of view. However, some questions like the quantum of water additionally harvested, the status of soil moisture, accrued benefit due to enhanced water resources and the process and method of equitable distribution of additional water warrant more discussion.

Lessons from the Alappuzha Canal Cleaning Project

The Alappuzha town received international acclaim due to its success in decentralised waste management. The Clean Home Clean City campaign introduced in 2012 was a successful intervention to tackle the solid waste crisis involving students and local people. This was followed by a programme of cleaning canals in the Alappuzha town concentrating on the Vadai canal and the Commercial Canal. The Indian Institute of Technology (IIT) Mumbai, College of Engineering, Kuttanad, and KILA extended support.

The programme began with a detailed inventory of the canals, the status of waste generated at households, water quality analysis, waste management in commercial and industrial establishments, and pilot interventions. Recommendations following this analysis covered technical solutions for canal network, solid waste management, liquid waste management, water quality and public health, environmental regulation of industries and commercial establishments, and utility of canals and institution building. The pilot intervention project had encouraging results. The CDD (CDD Society is a not-for-profit organisation, registered in 2005, that innovates, demonstrates and disseminates decentralised nature-based solutions for the conservation, collection, treatment and reuse of water resources and management of sanitation facilities) has proposed an integrated approach to the rejuvenation of the Municipal Colony Canal and a plan has been drawn up. Several lessons can be learnt from this initiative. The scaling up of the programme and its sustainability is a question for the future. The urban water bodies infested with 'urban river syndrome' can consider initiating such programmes and set up appropriate community institutions.

River Rejuvenation

Kerala has accorded high priority on river restoration as part of Haritha Kerala Mission programme. The campaign titled "Now, Let Me Flow" covered both urban and rural areas. Around 2035 km length of rivers was covered under 739 segments. Around 62 per cent of all segments were less than 2 km in length. This programme covered all the 14 district and 1034 LSGIs. Over 1.62 lakh volunteers participated in this campaign. Restoration plans and field-level activities were developed in collaboration with LSGIs. As a campaign to generate awareness and people's participation, this programme was successful.

However, it is now important to scientifically investigate the river stretches including hydrological and geomorphological characteristics to devise lasting solutions. Proper documentation in cadastral scale map and digitisation of those maps are necessary for planning purposes. It is important to link such initiatives with river bank mapping and sand auditing programmes.

River Bank Mapping and Sand Auditing

At the instance of the Government of Kerala, the programme on river bank mapping and sand auditing began in 2012. The objective of this programme was to map bank characteristics of all major rivers in the State and assess river bed deposits in order to regulate sand mining from the river beds. Data have been generated at the cadastral scale. So far, 20 rivers have been covered. These data can be used for the river rejuvenation programme, which is one of the activities under river basin management.

Chapter 5
Industry: A New Way Forward

Structure and Growth of the Industrial Sector

There has been a steady increase in the size of Kerala's manufacturing sector, in value terms, especially over the last four years. More importantly, Kerala has achieved substantial progress with respect to modernising and diversifying its industrial sector.

The manufacturing sector in Kerala accounted for 12.8 per cent of Kerala's Gross State Value Added (GSVA) (at constant 2011-12 prices) and 11.8 per cent of total employment in the State in 2017-18.[9] In comparison, the manufacturing sector accounted for 18.0 per cent of India's and 29.3 per cent of China's GDP in 2017.[10] The share of manufacturing in Kerala's GSVA increased from 9.8 per cent in 2014-15 to 13.2 per cent in 2018-19. According to data from Annual Survey of Industries, Kerala's share in gross value added by India's factory sector increased from 1.2 per cent in 2014-15 to 1.5 per cent in 2017-18 (Figure 5.1).

According to the Periodic Labour Force Survey (PLFS) data, the manufacturing sector in Kerala employed 15 lakh workers (who comprised 12.8 per cent of the State's total workforce of 127 lakh) in 2017-18. They include workers in the factory sector, estimated at 3.1 lakh persons in 2017-18. The factory sector is almost identical with the organised manufacturing sector. It comprises factories that employ more than 10 workers and operate with the aid of electric power (as well as factories that employ more than 20 workers without the aid of electric power). The Annual Survey of Industries (ASI) published by the Government of India's Ministry of Statistics and Programme Implementation (MOSPI) is the main source of data on the factory sector. In 2017-18, 3.1 lakh factory workers in Kerala were employed in 7649 factories across the State (Table 5.1, 5.2 and 5.3).

Workers in traditional industries, of which coir, cashew and handloom are a major segment, form a substantial share of Kerala's manufacturing workforce. In fact, a few resources-based industries accounted for 42.3 per cent or 1.35 lakh workers out of the 3.1 lakh workers in Kerala's factory sector (in 2016-17). These industries include: food products and beverages (cashew processing is a major component of this), beedi manufacturing, and textiles (which include coir processing and handlooms).

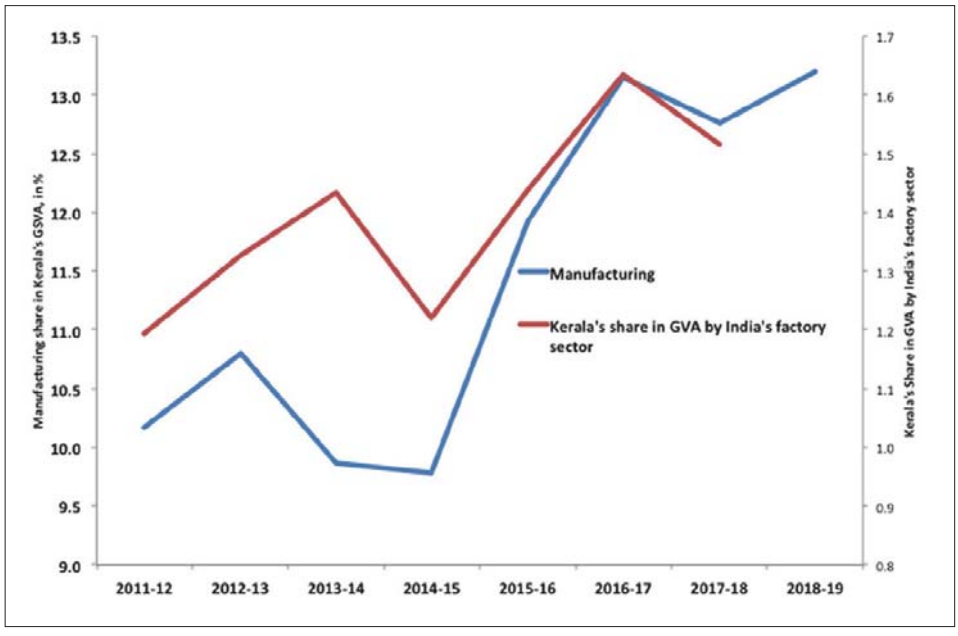


Figure 5.1 *Manufacturing's Share in Kerala's GSVA and Kerala's Share in GVA by India's factory sector*
Source: Directorate of Economics and Statistics and Annual Survey of Industries

[9]Employment data based on the Periodic Labour Force Survey (PLFS) carried out by India's Central Statistical Office in 2017-18.
[10]Manufacturing as a share of India's GVA at basic prices in 2017-18. The Chinese share is obtained from the World Bank's *World Development Indicators.* Available at: http://data.worldbank.org/indicator.

It needs to be noted that there has been a substantial reduction over the years in the size of the workforce engaged in traditional industries in Kerala. This is because of structural problems faced by some of these industries (such as cashew) as well as the withdrawal of the younger generation of educated workers from industries characterised by low wages. Tables 5.4 and 5.5 gives the structure of manufacturing sector in Kerala.

At the same time, it is worth highlighting that a new set of modern industries is growing in size in Kerala. The top industries in Kerala with respect to value added are chemicals, refined petroleum products, rubber and plastic products, electronic products, and pharmaceuticals and medicinal botanical products.

A More Modern Industrial Sector

With the above-referred structural changes, Kerala's factory sector has become more modern and technologically more advanced. With respect to the cumulative investment in fixed capital in India's factory sector, Kerala's share was only 0.79 per cent in 2011-12, but rose impressively to 1.32 per cent by 2017-18. This implies that investment in the factory sector in Kerala has grown faster than the corresponding national average in the years after 2011-12. Faster rate of investment has resulted in gains in output and value added growth for Kerala. With respect to gross value added by India's factory sector, Kerala's share which was only 1.10 per cent in 2011-12, rose to 1.44 per cent in 2015-16, and rose still further to 1.51 per cent by 2017-18 (Table 5.2).

In 2011-12, fixed capital per factory worker was Rs 3.9 lakh in Kerala while the corresponding national average was Rs 14.5 lakh (both in current prices). Thus fixed capital invested per factory worker in Kerala was only 27.1 per cent of the national average in 2011-12. However, by 2017-18, fixed capital per factory worker in Kerala improved considerably to reach 66.4 per cent of the national-level (Table 5.3).

With the infusion of industrial investments into the State, Kerala's factory sector has achieved greater competitiveness. With respect to emoluments received

Table 5.1 *Key aspects of the factory sector, Kerala and India, 2017-18*

	Kerala	India	Kerala's share in India, in %
Number of factories	7,649	2,37,684	3.22
Number of factory workers	3,10,326	1,56,14,598	1.99
Fixed capital, in Rs lakh	43,466	32,93,410	1.32
Gross Value Added, in Rs lakh	22,342	14,74,854	1.51

Source: Annual Survey of Industries, as reported in Thomas (2020)

Table 5.2 *Key aspects of the factory sector, Kerala's share in India, 2011-12 to 2017-18*

	2011-12	2015-16	2017-18
Number of factories	3.23	3.25	3.22
Number of factory workers	2.93	2.37	1.99
Fixed capital	0.79	1.37	1.32
Gross Value Added	1.10	1.44	1.51

Source: Annual Survey of Industries, as reported in Thomas (2020)

Table 5.3 *Key ratios related to the factory sector, Kerala and India, 2011-12 to 2017-18*

Fixed capital per worker in Rs lakh

	Kerala	India	Ratio for Kerala as a share of the ratio for India, in %
2011-12	3.9	14.5	27.1
2015-16	11.3	19.6	57.7
2017-18	14.0	21.1	66.4

Gross value added per employee in Rs lakh

	Kerala	India	Ratio for Kerala as a share of the ratio for India, in %
2011-12	2.7	7.3	37.7
2015-16	5.4	8.9	60.6
2017-18	7.2	9.4	76.2

Emoluments (annual) per employee in Rs lakh

	Kerala	India	Ratio for Kerala as a share of the ratio for India, in %
2011-12	1.1	1.6	66.8
2015-16	2.0	2.4	84.1
2017-18	2.3	2.7	87.6

Fixed capital per factory in Rs lakh

	Kerala	India	Ratio for Kerala as a share of the ratio for India, in %
2011-12	219.9	896.1	24.5
2015-16	507.2	1,205.3	42.1
2017-18	568.3	1,385.6	41.0

Source: Annual Survey of Industries, as reported in Thomas (2020)

Table 5.4 *Structure and relative size with respect to employment and value added, shares of industries in total factory sector of Kerala and shares of Kerala's industries in total by the respective industries in India, 2016-17*

Industries	Shares in Kerala's total factory sector		Kerala's Shares in India	
	Employment	Value added	Employment	Value added
Food Products and beverages (10, 11)	30.5	11.9	5.3	1.4
Tobacco products (12)	4.8	0.3	3.3	0.2
Textiles (13)	6.9	2.9	1.4	0.6
Garments (14)	2.6	1.5	0.7	0.7
Footwear (15)	2.7	1.6	2.2	2.0
Wood and wood products (16)	2.6	0.9	9.0	2.8
Paper and paper products (17)	1.1	0.4	1.4	0.3
Printing and reproduction of recorded media (18)	1.9	4.8	3.8	5.9
Refined petroleum products (19)	4.2	12.1	8.7	1.0
Chemical products and pharmaceuticals (20, 21)	6.6	19.2	1.4	1.2
Rubber and plastics products (22)	7.2	10.5	3.3	2.7
Other non-metallic mineral products (23)	6.0	4.7	1.8	1.0
Basic metals (24)	1.5	1.2	0.5	0.2
Fabricated metal products (25)	1.5	0.7	0.7	0.2
Electronic, computer and optical Products (26)	4.2	5.2	6.0	2.3
Electrical Equipment (27)	1.6	1.6	1.0	0.4
Machinery and equipment (28)	0.8	0.7	0.3	0.1
Motor vehicles (29)	0.1	0.1	0.0	0.0
Other transport equipment (ships and boats)(30)	1.6	3.5	1.6	1.5
Furniture, jewellery, medical and dental instruments, toys (31, 32)	2.4	10.0	1.8	5.6
All Industries	100	100	2.1	1.0

Note: Figures in brackets refer to the divisions (in two digits) to which each of these industries belong according to National Industrial Classification (NIC) – 2008.

Source: Annual Survey of Industries data on persons engaged and gross value added

per factory worker as well as labour productivity, Kerala has lagged behind the corresponding national averages. As already mentioned, this is partly because of the continuing dominance of traditional industries in total factory employment in Kerala. In 2011-12, the salary received by an average factory employee in the State was 66.8 per cent of the salary received by an average factory employee in the country as a whole. At the same time, gross value added per factory worker in Kerala was only 37.7 per cent of the corresponding national figure (in

2011-12). In other words, in 2011-12, Kerala's factory sector had lagged behind the corresponding national averages much more with respect to labour productivity than with respect to emoluments per worker (Table 5.3; also see Thomas 2020).

However, by 2017-18, there was a substantial improvement for Kerala's factory sector both with respect to labour productivity and emoluments per worker. These figures for Kerala were 76.2 per cent and 87.6 per cent respectively of the corresponding Indian averages (by 2017-18) (Table 5.3; also see Thomas 2020).

Turnaround in the Performance of Public Sector Units

The progress that Kerala's industrial sector has achieved with respect to modernisation over the last few years has been partly on account of the improved performance of public sector units, especially State public sector units, in Kerala. Bharat Petroleum Corporation Limited's (BPCL)-Kochi Refinery has been undergoing a major expansion of its refining and petrochemical production capabilities and this holds great promise for the chemical and allied industries in Kerala. Between 2011-12 and 2016-17, the value addition by refined petroleum products increased by eight times in Kerala. In fact, the growth of value added by manufacturing sector as a whole as well a number of industries including chemicals, garments, pharmaceuticals, furniture, jewellery and medical instruments has been much faster in Kerala compared to the corresponding national averages (according to ASI data).

Kerala has a number of State and Central public sector units engaged in diverse areas of manufacturing, mainly chemicals, engineering and electronics. Some of the PSUs in the State, such as Travancore Cochin Chemicals (TCC) and Keltron, have been pioneers in the country in their respective fields of production (caustic soda and electronics respectively). However, the performance of many of the PSUs in Kerala has been rather lacklustre in recent times. A major highlight of the improved performance of Kerala's manufacturing sector from 2016-17 onwards is a turnaround in the performance of some of these PSUs, engaged mainly in the production of chemicals and electrical machinery.

Kerala Minerals and Metals Limited (KMML), Travancore Titanium Products (TTP) Limited, Travancore-Cochin Chemicals Limited (TCC) and Transformers and Electricals Kerala (TELK) Limited were some of the major PSUs, which sharply improved their performance from 2016-17 onwards. All the above-referred PSUs except KMML had registered losses in 2015-16. However, in a significant turnaround, all these four State PSUs made substantial profits in 2016-17. Kerala State Drugs and Pharmaceuticals (KSDP) Limited, which turned profitable by 2017-18, has been going through a significant phase of modernisation and

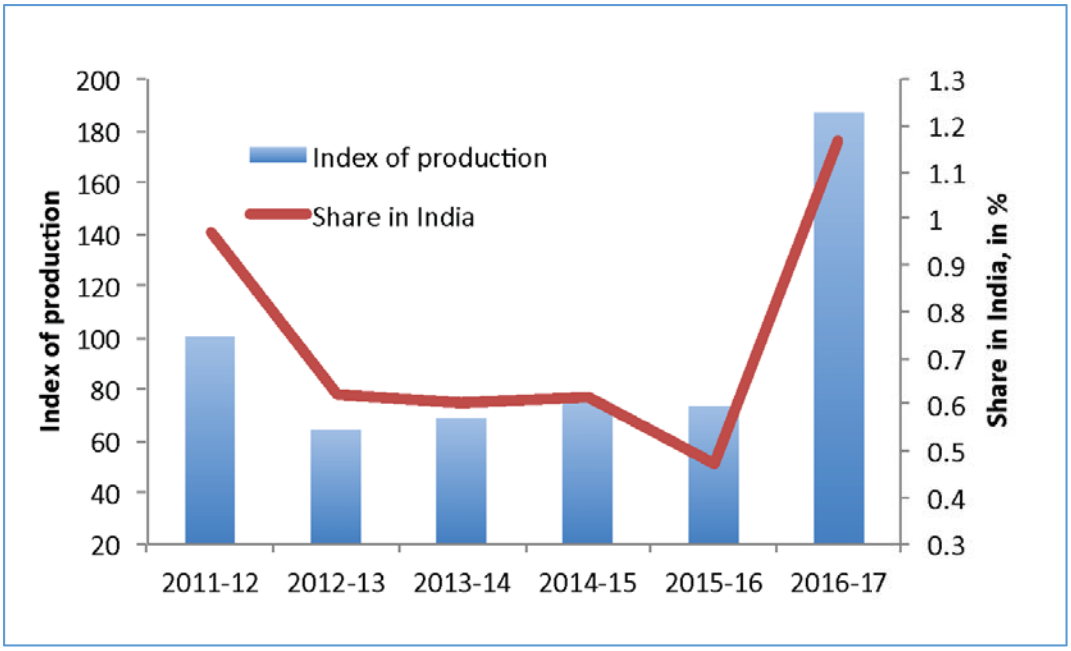


Figure 5.2 *Chemicals and Pharmaceutical industries in Kerala, Index of Production (Gross Value Added) (with index for 2011-12 = 100) and share of Kerala in value added by these industries in India*
Source: Annual Survey of Industries

capacity expansion. Figure 5.2 shows that, by 2015-16, value added in chemicals and pharmaceutical industries in Kerala had declined to 73 per cent only of the corresponding value in 2011-12, However, in 2016-17, value added by these industries improved sharply to 187 per cent of the 2011-12 level (Figure 5.2; also see Thomas 2020).

New Opportunities in Modern Industries

Another positive aspect has been the emergence of a few new modern industries in the State, especially in the private sector. The number of workers engaged in the manufacture of electronic components in Kerala rose from 2,930 only in 2012-13 to 10,263 by 2016-17 (Table 5.5). Workers engaged in the manufacture of medical and dental instruments and supplies increased from 1,023 only in 2012-13 to 3,207 in 2016-17 (Table 5.5).

A highlight of this positive transformation has been the emergence of a class of Kerala-based entrepreneurs who have been successful in setting up a number of technologically advanced enterprises. Some of these units in areas such as medical equipment, spice extraction, and food processing have achieved international recognition for the quality of the products they produce (such as bold bags or oleoresins). In recent years, Kerala has emerged as a highly favourable location for technology startups, with the Kerala Startup Mission and other institutions playing an important facilitative role.

Kerala's Strengths in Micro and Small Industries

Kerala's share in India with respect to micro, small, and medium enterprises (MSME) is bigger than Kerala's share in India's population (which was 2.76 per cent in 2011). According to the data on unincorporated non-agricultural enterprises (excluding construction) in India from the 73rd round of the National Sample Survey (NSS), there were 23.8 lakh unincorporated non-agricultural enterprises (excluding construction) in Kerala in 2015-16 employing a total of 44.9 lakh workers. This may be compared to the size of the non-agricultural workforce in Kerala, which was 105.7 lakh in 2017-18, according to the latest PLFS (the size of Kerala's workforce was 127 lakhs in that year) (Table 5.6; also see Thomas 2020).

Unincorporated non-agricultural enterprises in Kerala comprised 17.9 lakh own-account enterprises (OAEs) with a total workforce of 21.2 lakh and 5.9 lakh establishments with a total workforce of 23.7 lakh. OAEs are enterprises that run without any hired worker employed on a regular basis while establishments employ at least one hired worker on a regular basis (see Table 5.6; also see Thomas 2020).

In 2015-16, Kerala's share in India with respect to unincorporated non-agricultural enterprises was 3.8 per cent. If we consider only the establishments, Kerala's share in India was 5.9 per cent (see Table 5.6; also see Thomas 2020).

Unincorporated non-agricultural enterprises in Kerala comprised 5.5 lakh manufacturing enterprises, 7.4 lakh trading enterprises, and 10.9 lakh enterprises in other services activities (in 2015-16). Employment in unincorporated manufacturing enterprises in Kerala was 10.1 lakh, which was 2.8 per cent of the corresponding

Table 5.5 *Employment in selected major industries, Kerala and India, 2016-17* in numbers

Industries	Kerala	India	Kerala's share in India
Rubber products (221)	15,506	2,10,679	7.4
Refined petroleum products (192)	13,203	1,30,938	10.1
Chemical products (201, 202)	11,036	7,61,630	1.4
Manu of electronic components (261)	10,263	83,890	12.2
Pharmaceuticals, medicinal chemical and botanical products (210)	10,154	6,79,891	1.5
Footwear (152)	8,498	2,65,036	3.2
Garments (141)	8,384	7,78,319	1.1
Plastic products (222)	7,450	4,89,824	1.5
Printing and services related to printing (181)	6,177	1,60,407	3.9
Ships and boats (301)	4,320	17,967	24.0
Electric motors, transformers and generators (271)	3,548	2,00,804	1.8
Medical and dental instruments and supplies (325)	3,207	60,762	5.3
Furniture (310)	3,151	70,189	4.5

Source: Annual Survey of Industries data

employment at the national-level (according to PLFS data, total manufacturing employment in Kerala in 2017-18 was 15 lakh).

In 2015-16, annual gross value added (GVA) per worker in unincorporated OAEs and establishments in Kerala were Rs 1.16 lakh and Rs 7.60 lakh respectively. The corresponding national averages were Rs 0.95 lakh and Rs 6.4 lakh respectively. Average annual emoluments received hired worker was Rs 1.26 lakh in Kerala compared to the national average of Rs 0.87 lakh (see Table 5.6; also see Thomas 2020).

According to data from the Directorate of Industries and Commerce, Government of Kerala, 64,879 new MSME units started operations in Kerala during the five years from 2016-17 to 2020-21 (up to January 31, 2021). While 15,858 of these enterprises were in the services sector, more than 33,000 new enterprises were started in the manufacturing sector (between 2016-17 to 2020-21). Of these, the major investment had been into agro and food processing industries (12,699 new enterprises), followed by textiles and garments (8339 new enterprises) and light engineering industries (7104 new enterprises) (Table 5.7).

Sources of Growth

I. Agro and Food-Processing Industries

As the Approach Paper to the Thirteenth Five-Year Plan notes, there are immense opportunities in Kerala for the development of food-and agro-based industries, particularly industries that have deep linkages with

Table 5.6 *Unincorporated non-agricultural enterprises (excluding construction) and workers, Kerala and India, 2015-16,* in lakh numbers

	In lakh numbers				Kerala's share in India, in %	
	Kerala		India			
	Enterprises	Workers	Enterprises	Workers	Enterprises	Workers
OAEs	17.9	21.2	533.6	690.8	3.3	3.1
Establishments	5.9	23.7	100.3	421.9	5.9	5.6
Total	23.8	44.9	633.9	1,112.7	3.8	4.0
Enterprises by sector						
Manufacturing	5.5	10.1	196.6	360.4	2.8	2.8
Trading	7.4	14.5	230.4	387.4	3.2	3.7
Other Services	10.9	20.3	206.9	364.8	5.3	5.6
Total	23.8	44.9	633.9	1,112.7	3.8	4.0

Source: 73rd round of the National Sample Survey (NSS) on unincorporated non-agricultural enterprises (excluding construction), July 2015-June 2016

Table 5.7 *Year-wise details of new MSME units started in Kerala under each subsector* in number

Name of subsector	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Agro and food-based	2,395	2,553	2,712	2,582	2,457	12,699
Textiles and farments	1,695	1,947	1,858	1,904	935	8,339
General /mechanical/light engineering	1,606	2,001	1,533	1,334	630	7,104
Service activities	3,057	3,679	3,259	4,036	1,827	15,858
Wood products	775	871	644	5,32	322	3,144
Cement products	344	469	329	3,09	149	1,600
Printing and allied	322	392	348	2,80	132	1,474
Paper products	172	163	192	1,88	144	859
Information technology	263	316	294	2,40	125	1,238
Others	3,098	3,077	2,657	2,290	1,445	12,564
Total	13,727	15,468	13,826	13,695	8,163	64,879

Note: Data for 2020-21 is up to January 31, 2021
Source: Directorate of Industries and Commerce

Kerala's agricultural and natural resources. The potential for the growth of agro-based industries in Kerala arises on account of both supply and demand factors. On the supply side, Kerala produces a rich variety of agricultural products, including rice, coconut, rubber, pepper, cardamom, banana, and pineapple. The State has enormous forest and marine resources.

On the demand side, a relatively large market for food and agro-based products exists within Kerala. Average per capita consumption expenditure in rural Kerala is almost twice as large as the average per capita consumption expenditure in rural India (in 2011-12, according to National Sample Survey data). However, there are also important challenges for the growth of agro and food-based industries in Kerala. Some of these challenges are discussed below.

Revival of agricultural production – critical for the growth of agro-based industries

A sharp increase in the production (as well as productivity in cultivation) of agricultural products such as coconut and spices is critical for the growth of agro and food-processing industries in Kerala. In fact, the establishment of processing industries, which will help to ensure higher returns to farmers for their agricultural products, will be an essential component of any plan to revive agricultural production in Kerala.

Evolving new models for procurement of agricultural products

A distinctive feature of the agricultural sector in Kerala is the role played by small farmers who carry out cultivation in homestead or other small plots of land. At the same time, however, the smallness in size poses a challenge with respect to the collection and procurement of agricultural products, both for farmers and for the processing industries (Thomas 2020).

Given the absence of a sufficient network for the procurement of agricultural products, farmers of several agricultural products often complain that they do not get good prices for their products (especially products such as jack fruit, which do not have much commercial value within Kerala). At the same time, agro-processing industries, especially small and medium enterprises, find it difficult to deal with the large numbers of small farmers spread across the State when they have to procure agricultural products as raw material for their industries.

While Kerala is known to be a major producer of a rich variety of agricultural products, very little of the processing of these products occurs within the State. At the same time, the existing agro-processing industries in Kerala suffer due to shortage of raw material or source raw material from outside the State. Some of the jackfruit-processing and spices-extraction units in Kerala have pointed to the difficulty in collecting the raw material (jackfruit or spices) from Kerala although the State is a large producer of these products (Thomas 2020).

Kerala is a major producer of pineapple (especially Ernakulam, Kottayam and Idukki districts). Vazhakkulam in Ernakulam district has emerged as a leading centre in the country in the trading of pineapple. Despite the easy availability of pineapple within the State, there is very little activity in Kerala in pineapple processing and value addition. This is a severe loss of opportunity for the State, as value-added products from pineapple are likely to attract substantial markets within the country and outside (including in East Asian countries and countries in the Gulf region). Pineapple farmers in Kerala point out that processing pineapple within the State will help them achieve higher and more stable prices for pineapple.[11,12]

Processing of meat, milk, and egg

Kerala is a major consumer of meat, milk, and egg products. The State can do much more in generating employment opportunities in these sectors based on the large domestic demand. As of now, Kerala depends on imports to meet a large share of its requirements of meat, milk, and egg products. There is very little processing of these products within the State. Even facilities such as modern slaughterhouses are relatively scarce in the State. Setting up of industrial units and modern facilities for the processing and value addition

[11]Vazhakulam Agro And Fruit Processing Company Limited (VAFPCL), which is owned jointly by Kerala State Government (70 per cent) and farmers in the region (30 per cent of the total shares). has been set up with the objective of processing and value addition of fruits including pineapple, mangoes, and ginger. The company is located in Vazhakkulam in Ernakulam district, is well connected to Kochi International Airport and the Kochi Sea Port by road. VAFPCL has facilities for processing (including juice extraction and concentration and Aseptic filling of fruit juices such as pineapple and mango) of fruits. The factory has facilities for production of juices in Tetra Pak packages. VAFPCL also has an Integrated pack house, which has facilities for pre-cooling and packing of fresh pineapple and other fruits (which can be further exported). VAFPCL has the potential to emerge as a major player in the processing of fruits and vegetables produced in Kerala (and also Tamil Nadu), especially in the Ernakulum, Idukki and Kottayam districts.

[12]Thomas (2020).

of meat, milk, and egg will help to satisfy the demand for these (value-added) products within the State and also aid employment generation in this sector. This will also encourage more farmers in Kerala to take up animal husbandry and poultry farming, and also to adopt modern methods of production and value addition in these economic activities.

As in other parts of India, the facilities for storage and transport of fruits, vegetables and other agro-based products from the farm to the market (cold storages, for instance) are poor in Kerala too.

Benefits to health and tourism sectors

A revival of the agricultural sector and agro-processing industries in Kerala will have hugely beneficial impacts in the areas of health and tourism in the State. Easier availability of better (tastier and healthier) food products will be a big boon for the local population as well as for tourists. Kerala has much to learn from the East Asian countries including Thailand, Malaysia, and Taiwan in successfully combining agriculture, agro-processing industries, tourism, and the hotel and restaurant business. There should be a conscious campaign in the State to include bigger portions of locally grown vegetables and fruits in Malayalee cuisine.

II. Chemical and Petrochemical Industries

Expansion by BPCL-Kochi Refinery and its implications

Bharat Petroleum Corporation Limited's (BPCL)-Kochi Refinery has undertaken a major expansion (investment amounting to Rs 4,588 crores) of its refining capacity, and this holds great promise for the chemical and allied industries in Kerala. After its expansion, BPCL-Kochi Refinery's refining capacity is expected to increase from the current 9.5 million metric tons per annum (MMTPA) to 15 MMTPA. BPCL-Kochi Refinery will then have the largest refining capacity among public-sector refinery units in India. With the increase in its refining capacity, BPCL-Kochi Refinery will be producing approximately 3,00,000 MMTPA of propylene and 90,000 MMPTA of ethylene. Propylene and Ethylene are key ingredients for a wide range of downstream industries in the areas of petrochemicals and specialty chemicals.

Petrochemical complex at Kochi

The State Government has plans to set up a petrochemical complex at Kochi in land owned by Fertilizers and Chemicals Travancore Limited (FACT). After its completion, the petrochemical complex is likely to attract large private investments in the area of chemicals and petrochemicals. The upcoming complex will have some distinct advantages, given its proximity to BPCL-Kochi Refinery, Petronet LNG Limited, chemical units such as Travancore Cochin Limited (TCC), and port facilities. There is potential to begin the manufacture of plastics, polymers, fibres, and personal and home care products in the private sector.

Petrochemicals, specialty chemicals, biochemicals, and pharmaceuticals

Kerala has bright prospects in the areas of petrochemicals, specialty chemicals and pharmaceuticals. It is easier to convert the output from these industries into products that have a ready market in Kerala.

Petrochemicals are key ingredients for a wide variety of products including industrial grade paints and coatings, latex paint formulations, water proofing paints, bonding, adhesion and hardening chemicals, adhesives for plastic tapes, labels, self-adhesive envelopes, medical and construction adhesives, new generation plastics and plasticizers, all-purpose plasticizer for PVC and vinyl chloride copolymers, herbicides, plasticisers and textile finishing, super absorbent polymer used for diapers, rheological modifiers in surface coatings, personal care products, benign dyestuffs and non-phosphate detergents (Sukumaran Nair, 2020).

Specialty chemicals include adhesives, agrichemicals, cleaning materials, cosmetic additives, construction chemicals, elastomers, flavours, fragrances, food additives, industrial gases, lubricants, polymers, surfactants, and textile auxiliaries. (Source: https://en.wikipedia.org/wiki/Speciality_chemicals).

Biochemicals is another area in which there is great potential for growth in Kerala. Biochemicals include "enzymes, hormones, pheromones, which either occur naturally or are manufactured to be identical to naturally occurring substances." (Source: http://www.businessdictionary.com/definition/biochemicals.html). One of the distinguishing features of the biochemical industry is that its products are typically of low volumes but of high value. The applications of biochemical include oleoresins, natural pesticides, therapeutic products, and human insulin. A Kerala-based company Synthite is a major player in the production of oleoresins. Agricultural and natural resources of Kerala will have greater industrial applications with the emergence of a dynamic biotech and biochemical industry (for example, oleoresins are produced from spices or herbs).

Building linkages

There exist some linkages between units in the chemicals and petrochemical sector in Kerala. The notable

ones include the relationship between BPCL-Kochi Refinery and TCC (ethylene produced by BPCL-Kochi Refinery and chlorine produced by TCC are used to produce PVC). Other units that collaborate by using each other's products are TCC and Keral Minerals and Metals Limited (KMML) and Travancore Titanium Products (TTP) and Malabar Cement. There should be greater number of such collaborations (to use each other's products), particularly in the context of the increased refining capacity of BPCL-Kochi Refinery.

Prospects in bulk chemicals

Bulk chemicals form an important category of chemical products manufactured by State PSUs in Kerala (for example, caustic soda produced by TCC). Bulk chemicals are basic ingredients for several industries. At the same time, it is difficult to transport bulk chemicals over long distances. Therefore, the expansion in the production of bulk chemicals in Kerala should be guided by the demand emerging from downstream industries (that use bulk chemicals) within the State. It may not be easy to sell bulk chemicals produced in Kerala in other States.

Paint industry

The paint industry is another area in which Kerala-based firms will have good potential, given the availability of petrochemical ingredients from BPCL-Kochi Refinery. As is well known, there is a large market for paint in Kerala, especially paint used for house construction purposes. At the same time, more than 80 per cent of the paint consumed in Kerala today is manufactured outside the State.

However, it may be difficult for a new private player from Kerala to compete head on with the established players in the consumer paint industry in India. One possibility is that Kerala-based firms could find some niche areas within the paint industry, such as industrial paint or corrosion-resistant paint.

Titanium minerals

The mineral sands available along the coastal regions of Neendakara and Kayamkulam are rich in titanium and zirconium, which have applications in a range of industries, including electronics, electric vehicles, aviation, aerospace, and chemical and defence production industries. Kerala has to fully exploit the potential of its rich mineral sands by way of sustainable mining, mineral separation, and further conversion to value added products. As of now, State public sector units, KMML and TTP, are engaged in value addition, with the production of titanium dioxide (Sukumaran Nair, 2020).

The current demand for titanium dioxide is indeed huge in India. In fact, domestic production accounts for only 27 per cent of the total demand for titanium dioxide in the country. The rest (73 per cent) of the domestic demand is met by imports. KMML can make use of this large demand (for titanium dioxide) for its future growth. While KMML's main strength is its capability to produce titanium dioxide in large volumes, TTP's strength is mainly in producing versatile products based on titanium. TTP has the potential to enter into specialty chemicals and specialty paints, such as paint in prussian blue colour.

There are possibilities for the setting up of an industrial complex (in, for instance, Chavara) for the manufacture of downstream products based on titanium and zirconium. Previous studies have identified the technical feasibility and commercial viability for the manufacture of titanium mill products, zirconium carbonate, and pearlescent pigments. Various titanium mill products (following metallurgical processing out of titanium sponge) include tubes, sheets, bars, pipes, and coils, which are used in industries including aviation, aerospace, aircraft, chemical and defence industries (Sukumaran Nair 2020).

Urea manufacturing

FACT in Kochi was engaged in the production of urea. However, its urea fertilizer plant was abandoned in 2002 and the caprolactam plant has not been operating for over a decade. At the same time, India has been importing around 90 lakh MT of urea every year, mostly from China and Oman. India is, in fact, one of the largest importers of urea fertilizer worldwide.

The Central Government has announced plans to revive five fertilizer (ammonia and urea) manufacturing plants in the public sector that had been closed down during the 2000-2002 period (citing, at that time, the relatively high cost of production in these units). These are the plants of Fertilizer Corporation of India (FCIL) and Hindustan Fertilizer Corporation Ltd (HFCL) at Talcher (Odisha), Ramagundam (Andhra Pradesh), Gorakhpur (Uttar Pradesh), Sindri (Jharkhand) and Barauni (Bihar). The Government expects that the revival of urea production will reduce the country's dependence on imports from China. FACT's plant at Ambalamedu (Kochi) had a capacity of producing 3.3 lakh tonnes of urea per annum when it was closed down in 2002. FACT has approached the Government of India with a proposal for a new urea plant. If this proposal receives approval, FACT's urea plant, which will have access to natural gas as feedstock, will emerge

as a major urea producer with relatively low investment and low cost of production.[13] FACT will then be able to meet the urea requirements for agriculture in several south Indian States.

Cement manufacturing

There is a large market for cement within Kerala. However, more than 90 per cent of Kerala's current demand for cement is met by cement procured from other States. Cement produced in Tamil Nadu and Andhra Pradesh supply nearly 70 per cent and 20 per cent respectively of the Kerala market (for cement). As of now, the major Kerala-based cement manufacturer (Malabar Cements) has a share of only around 6 to 8 per cent of the market for cement within the State. Cement manufacturing units in Kerala should make use of the large market for cement from within the State.

III. Electronics

Kerala was one of the first Indian States to recognise the importance of electronics manufacturing when the State Government set up Keltron in 1973. Despite its early start, Kerala lags behind some other Indian States, notably Tamil Nadu and Karnataka, in electronic hardware manufacturing. At the same time, the growth of the electronics industry in India, at the national-level, has also been far below the country's potential in this sector. While Kerala has been more successful in the IT industry than in electronics hardware manufacturing, it is not yet a leading State in terms of IT revenues. At the same time, industry sources say that the nature of software development in the State and the skill-levels of its IT workers provide Kerala some niche advantages.

Given such a context, Kerala should think of ways to revive manufacturing of electronic and IT hardware in the State. First, the market for electronic and IT goods in Kerala is relatively large and sophisticated. The State Government itself is a large consumer of electronic and IT hardware products. Secondly, Kerala should build on the unique advantages of the IT sector in the State and also make good use of the skill sets of its IT workforce. Globally, there is now a growing integration between the IT and electronic sectors and between software and hardware production. With IT sector itself going through fundamental changes, it is important that Kerala turn its attention to diversifying into hardware manufacturing as well.

Thirdly, large numbers of engineers and professionals from Kerala work in advanced areas of electronic design and manufacturing in many parts of the world. The State can encourage some of them to return and start enterprises in Kerala. Some of these non-resident Keralites can act as mentors to technology start-ups from the State, providing technology, expertise and financial assistance to young entrepreneurs.

IV. Medical Equipment, Healthcare and Biotechnology

With respect to research and manufacturing in the area of medical devices, Kerala already possesses some expertise and key advantages, including the presence of a few leading research centres, availability of skilled workers, and favourable natural environment. Combining these advantages with the State's strengths in the IT sector, Kerala can emerge as a significant player in the medical devices sector. Kerala should devise strategies to nurture entrepreneurs capable of setting up high technology firms in the health sector across the State. Given the critical importance of the medical devices sector on the one hand, and the large dependence in the country now on imported medical devices, Kerala can contribute significantly to the national efforts to build technological and manufacturing capabilities in this sector.

In the medium to long run, Kerala could become a leading centre of research and high-end manufacturing in the areas of diagnostics, biotechnology and pharmaceuticals, as well as of medical devices. In addition to the existence of some leading research institutions and the availability of skilled labour, one of Kerala's key strengths in the above-referred areas is the State's health infrastructure itself. The wide network of hospitals, health professionals, and patients (who are educated and health conscious) across Kerala provide an enabling environment, including a rich source of data, for researchers in all fields relating to health. The State should particularly encourage startups and high technology SMEs in research and high-end manufacturing in these areas.

Biotechnology offers the potential for the development of a range of value-added products in Kerala, especially given the State's rich natural diversity. Kerala has a number of academic and research institutions in the areas of biotechnology and life sciences, which are considered as among the best in the country. These institutions have created a critical mass of human resources, which is an important asset for Kerala in the biotechnology and life sciences industries.

[13]To set up a modern Urea plant in Ambalamedu, with an annual production capacity of 12.7 lakh tonnes (2200 tonnes per day of ammonia and 3850 tonnes per day of urea), investment required will be of the order of approximately Rs 4500 crores.

V. Anchor Industries: Industrial Corridor, Ports, Shipping, Logistics, and Inland Water Transport System

Kerala has taken steps to implement the high-tech industrial corridor project connecting Kochi and Palakkad. Kochi-Palakkad Hi-Tech Industrial Corridor will be part of the Chennai-Bengaluru Industrial Corridor project. The corridor is expected to stimulate large investments in the areas of high technology manufacturing, agro-processing, IT, biotechnology, and life sciences. After its full implementation, the Corridor project will be one of the key centres for Kerala's industrial growth.

International experience suggests that there are important possibilities for industrial growth based around ports. Singapore provides a good example. The advantages offered by the Singapore port provided the momentum to that city-state's emergence in later years as an international hub for shipping, logistics and distribution, and communication and information.

With the setting up of the Vizhinjam port, the Kerala coast will have two major ports (Vallarpadam in Kochi is the other major port) and a number of minor and intermediate ports. Given such a context, there is a huge potential for the growth of various industries in Kerala, mainly around Vizhinjam and Vallarpadam ports.

Costs related to transport and logistics form a substantial chunk of the overall costs in chemicals, minerals and related industries in Kerala. In fact, in the case of cement manufacturing units in Kerala, transport-related costs account for almost 70 per cent of the overall costs.

An effective inland water transport system can go a long way in reducing costs associated with the transport of cement and heavy chemicals in Kerala.

In Kerala, an inland water transport system will be preferred over road transport with respect to the safety aspect too. Transporting over dimensional consignments (ODCs), which carry large equipment or heavy chemicals, through Kerala's crowded roads is a highly risky affair.

VI. Textile and Garments

There is a large market for cloth in Kerala. At the same time, however, employment creation in Kerala within the textiles and garment sectors is rather limited. There is large potential for an expansion of enterprises and workers in the textiles, garments, and related industries in Kerala.

There are 20 textile mills in Kerala in the public or cooperative sectors (7 of these mills are State public sector units while the remaining 13 are in the cooperative sector), which together employ approximately 5000 workers. There are also a few major private sector groups in the textile-spinning sector in Kerala. There include the mills run by the Patodia Group in Aluva (GTN) and by Pricot in Kanjikode, Palakkad.

However, the textile sector in Kerala has been going through a difficult phase, with almost all of the mills in the public and cooperative sectors registering losses.

A revival of the textile and garment sectors in Kerala has been an important item on the agenda of the State Government.

According to the 2011-12 NSSO survey, there were a total of 1.7 lakh workers in Kerala in the textile industry, which also included workers in the coir industry. At the same time, the garment industry in Kerala provided employment to 3.3 lakh workers, which also included employment in small, tailoring establishments. The textile and the garment industries together provided employment to 5 lakh workers in Kerala, which accounted for 27.6 per cent of the total manufacturing employment in the State (of 18.1 lakh) in 2011-12 (see Table 5.5; also see Thomas 2020).

The major centres of textile production in India are located in Tamil Nadu and Gujarat, and these States provided employment for 16.8 lakh and 10.5 lakh textile workers respectively in 2011-12. There were 5.7 lakh textile workers in Maharashtra. A majority of the textile workers across the country are engaged in small, unregistered firms, working with powerlooms or handlooms (Thomas 2020).

In 2016-17, there were 220 factories in Kerala engaged in the spinning, weaving and finishing of textiles, and they employed a total of 14,300 textile workers. In the same years, there were 4409 factories in Tamil Nadu in the spinning, weaving and finishing of textiles, employing 3 lakh workers (see Thomas 2020).

As already mentioned, the garment industry provided employment to 3.3 lakh workers in Kerala in 2011-12, according to NSSO data (see Table 5.5). This included employment in small, tailoring establishments. But if we look at employment only in the relatively large garment factories (employing at least 10 workers), the number is much smaller. In 2016-17, there were only 44 garment factories in Kerala employing a total of 8,384 workers. In comparison, there were 936 garment factories in Karnataka employing a total of 2.7 lakh factory workers. Tamil Nadu had 1,315 garment factories but total factory employment in the garment sector in that State was less than in Karnataka: 1.1 lakh garment workers (all for 2016-17) (see Thomas 2020).

Bangalore in Karnataka and Tiruppur in Tamil Nadu are two of the largest centres of garment production in the country.

Textile spinning sector in Kerala: major challenges

The spinning sector in Kerala faces some important challenges including: (a) relatively small size and technologically backward condition of the industry in Kerala (b) excess capacity in the spinning sector in India (c) fluctuations in raw material prices (c) competition from firms in other State and China (d) and other challenges faced by the industry.

Kerala does not produce the raw material needed for the spinning sector – cotton or synthetics. Further, the yarn produced by the spinning mills in Kerala is processed outside the State – in textile centres such as Bhiwandi in Maharashtra. In this way, the spinning sector in Kerala is geographically isolated, with limited forward or backward integration. Most of the spinning mills in Kerala, particularly those in the public and cooperative sectors, use old machinery and outdated technologies. Technological backwardness is a factor that reduces the productivity-levels of public or cooperative sector spinning mills in Kerala (Thomas 2020).

The textile industry in India began to face difficulties after 2011-12, with the general slowdown in the economy. The large capacities (in textile spinning) that were created during the boom period (2003-2008) has emerged as a major issue for the industry. One of the major challenges facing the Indian textile industry is that some of India's competitor countries, introducing Vietnam and Pakistan, face very little duties in their export markets. This is because of the Free Trade Agreements (FTAs) entered by these countries with their trading partners.

Garment industry in Kerala: major challenges and opportunities

Kerala has a large and sophisticated market for all types of garments. In addition to the large home market, garment firms in Kerala can also take advantage of the demand for Kerala-specific designs from a sizeable export market comprising non-resident Keralites.

Compared to the spinning and weaving sectors, value addition is much higher in the garment sector. Compared to the spinning and weaving sectors, capital requirements are low in the garment sector. Therefore, there is greater scope for entrepreneurship in the garment industry. At the same time, however, relatively small players in the garment sector face stiff competition from the bigger firms. For instance, in the case of the undergarment manufacturing industry, big brands such as Jockey command dominance because of their large volumes of production and their financial and marketing strengths (Thomas 2020).

Kerala's potential in the garment industry emerge partly from the changing nature of the garment industry worldwide. Globally, the trend in the market is towards "fast fashion models" in garments. This has reduced the lead-time, that is, the time between the initiation and completion of a production process. This implies that more than scale, flexibility and skill are going to become important in determining success in the garment industry. In such a context, Kerala's garment manufacturers will have an advantage because of the relatively large home and export market they can leverage (Chinju Johny 2020).

The other advantage is the large availability in Kerala of skilled workers and professionals in the garment and fashion sector. The industry should work closely with fashion and design institutes in Kerala. The garment sector should take good advantage of online marketing strategies. The State Government should play the role of a facilitator in triggering the growth of the garment sector in the private sector. Special attention should be devoted to the nurturing of woman entrepreneurs.

VII. Handloom and Powerloom Sectors in Kerala

The handloom and powerloom industry provide employment to a sizeable section of the workforce in Kerala. As already noted, there were 1.7 lakh workers in the textile industry in Kerala in 2011-12 (including workers in the coir industry). It is likely that 90 per cent of these workers are in the informal sector, which include workers engaged in handlooms and powerlooms.

The handloom and powerloom industries in Kerala are characterised by low-levels of productivity and poor conditions of work. According to persons associated with a handloom cooperative society in Kalliassery, Kannur, a worker engaged in handloom weaving is able to weave only 5 to 6 metres of cloth in a day. A worker is able to earn only around Rs 350-400 a day (although a worker's total earnings in a day, including the benefits such as PF she receives would amount to Rs 645) (Thomas 2020).

While a handloom worker is able to produce only 5 to 6 metres of cloth in a day, a worker in the newly set up high-tech weaving factory in Pinarayi (in Kannur) can oversee the production of up to 450 metres of cloth in a day.[14] Compared to handlooms, productivity-levels are much higher even in powerlooms.

Working conditions are poor for workers engaged in handlooms and powerlooms (noise-levels are particularly high in powerlooms). Cooperative societies should be able to provide toilet and other facilities, especially for women workers engaged in these industries.

It is clear that in handlooms and other traditional sectors, both technological and organisational innovations are needed to increase productivity, improve wages, and at the same time, avoid job losses. The promotion of handlooms should be done along with measures for improvement of value added per worker.

Handlooms should be encouraged to work on products/areas where it can create a niche market (such as high design furnishings or sarees). Handloom cooperatives should work with design institutions such as National Institute of Fashion Technology (NIFT) so that they can come up with innovative designs and marketing strategies. Another option would be a tie up between handloom weaving societies and the tourism sector (Thomas 2020).

The State Government has engaged handloom cooperative societies in Kerala to supply cloth for the School Uniform Scheme of the Government. Handloom workers and leaders of cooperative societies have agreed that the School Uniform Scheme has helped to revive the sector to some extent. The Government is planning to extend the School Uniform Scheme to cover a greater number of students in the State. A demand from powerloom cooperative societies has been that they should also be allowed to benefit from the scheme.

VIII. Other Traditional Industries

Cashew industry

The cashew industry in Kerala has been facing a severe crisis from 2013-14 onwards. In 2018, according to industry observers, the crisis affected more than 80 per cent of the 834 registered cashew factories in Kerala, and close to 20 per cent of all cashew factories had been burdened with stressed assets (as declared by banks from which these factories had taken loans) (Thomas 2020).

According to some estimates, the cashew industry in Kerala employs as many as 2 lakh workers, mostly women. The public sector units in the cashew industry – Kerala State Cashew Development Corporation and CAPEX – together employ approximately 16,000 workers. The rest of the cashew workers (that is, approximately 90 per cent of the cashew workers) are engaged in cashew factories in the private sector. Therefore, the crisis that has affected private-sector cashew factories has rendered several women workers jobless.

A major reason for the problems facing small and medium-scale cashew factories has been the fluctuations in the price of raw cashew nut (RCN), which affect the working capital requirements in the industry. In recent years, the price of raw cashew nut has risen to as high as 2,400 dollars per ton. The rise in international prices of raw cashew nut along with the depreciation of the Indian Rupee (against the dollar) meant that the working capital requirements in the industry have soared to very high-levels. The cashew processing industry was particularly affected by a rise in the import duties (to 9.7 per cent) on raw cashew nut imposed in 2014-15 (the import duties have now been reduced to 2.5 per cent).

A field study carried out in 2018 found that a cashew-factory owner employing 100 workers requires approximately 1.2 tons of raw cashew nut on a daily basis. When the raw cashew nut prices increased to 2,400 dollars per ton and the Rupee-dollar exchange rate depreciated to Rs 70 per dollar (as it happened in some months in 2018), such a factory required working capital of approximately Rs 2 lakh per day. Assuming that the factory operates for 200 days, the annual working capital requirement for such a factory would be approximately Rs 4 crores a year (Thomas 2020).

Banks had been providing large working capital loans to cashew factories in Kollam, especially during periods when the industry was generating profits. Typically banks have been giving loans to cashew factories with houses or land owned by the factory-owner as collateral. However, many of the cashew factories have started incurring losses as the prices of raw cashew nut began to climb upwards from 2013-14 onwards. At the same time, there has also been a general decline in the export demand for cashew, especially from developed countries (Thomas 2020).

The cashew industry in Kerala continues to employ traditional technologies for cashew processing. In fact, the industry in Kerala believes that the handcrafted (drum roasting technique) cashew processed in Kollam has a distinctive flavour and this provides them a unique marketing advantage. At the same time, the cost of processing of cashew in Kerala is higher than the costs in other Indian States and in Vietnam, partly on account of the traditional nature of production technique employed in Kerala.

[14]Based on the author's field research in Kannur, Kerala (2019).

Coir processing

One of the important challenges faced by coir industry in Kerala is the shortage of raw material, namely coconut husk, which is processed into coir fibre and coir products. There has been a general stagnation in coconut cultivation in Kerala in recent years. There have also been other constraints to the collection and processing of coconut husk in Kerala. They include the relatively small size of land holdings in which coconut is cultivated in the State and environmental issues involved in processing of husk.

At the same time, the neighbouring State of Tamil Nadu has distinct advantages compared to Kerala with respect to the availability of raw material. Pollachi in Tamil Nadu has emerged as a major centre for the coir industry. In fact, there are several units in Tamil Nadu, which make use of coir pith, which is a byproduct in the conversion of coir husk into coir fibre. Coir pith is extensively used for agriculture and poultry farming in Tamil Nadu. Tamil Nadu and China (for coir mattresses) have made major advances in coir processing.

Modernising the traditional sectors

The Government is taking steps to modernise the traditional industries in the State, including coir, cashew, and handloom. As already noted, these industries continue to employ a substantial part of the State's total workforce. Modernisation of traditional industries will include (but will not be limited to) mechanisation of production processes in these industries. Moreover, with modernisation, Kerala's traditional industries will strive to diversify into new products (such as geo-textiles in the coir sector), and evolve effective marketing and distribution strategies. Rather than displacing workers (a strategy involving mechanisation alone may result in this), modernisation will lead to overall expansion of the industry and the creation of greater value addition per worker.

The State Government has taken several steps to modernise the coir sector. The initiatives include plans for technology-enabled procurement and decentralised fibre extraction. The procurement process will be carried out by Kudumbashree units/farmer producer companies, making use of mobile based aggregated procurement platform. For the traditional spinning and weaving sector, the strategy involves the building of linkages with eco-tourism projects (which highlight the history of coir). At the same time, industrial spinning and weaving sectors will be modernised.

For achieving a brighter future, the coir industry in Kerala has to venture into new products and innovative marketing strategies. Already the State Government has encouraged diversification into industrial coir with a focus on non-woven, coir geo textiles, coir composite/ injection molded coir and coir composite board. Given coir's properties such as tensile strength, it has applications in sectors such as automobiles and aerospace. The coir sector requires entrepreneurs who can take advantage of the research in the area of coir and related material.

IX. Knowledge Economy Clusters in Thiruvananthapuram, Kochi and Kozhikode-Kannur

Thiruvananthapuram has the potential to emerge as one of the most dynamic centres of knowledge economy within the country, with a distinctive advantage in biotechnology and life sciences. The premier academic and research institutions in Thiruvananthapuram include the Rajiv Gandhi Centre for Biotechnology (RGCB), Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST) and Indian Institute of Science Education and Research (IISER).

Kerala State Industrial Development Corporation (KSIDC) has set up a Life Sciences Park in Thiruvananthapuram. Within the Life Sciences Park, the Institute of Advanced Virology has started operations in 2019. A facility for the manufacture of medical equipment is also being set up within the Life Sciences Park.

Kochi and its surrounding areas also offer exciting potential for the growth of biotechnology. Cochin University of Science and Technology (CUSAT) and Mahatma Gandhi University (in Kottayam) carry out research in this field. Kerala State Drugs and Pharmaceuticals (KSDP) Limited has pharmaceutical production facilities in Alappuzha. Kerala is planning to set up a Pharma Park in Kochi, which will be developed along with the Petrochemical Park, both of which are being set up adjacent to BPCL-KRL (Kochi Refinery Limited). Pharma Park in Kochi could provide space for firms that are engaged in research and high-end manufacturing in the areas of pharmaceuticals and biotechnology.

A third cluster of biotechnology and life sciences industries could be developed in the northern part of Kerala, which will take advantage of the academic and research institutions as well as the rich biodiversity in this region, including Kozhikode, Kannur and Wayanad. Both Kozhikode and Kannur have international airports, and they can benefit, in particular, from their relative proximity to Bangalore

(firms in high technology areas considering a shift out of an overcrowded Bangalore may consider setting up their bases in these cities).

Industrial Policy and Agencies for Transformation

I. Industrial Policy

Industrial policy and agencies for economic transformation are both important factors while charting a new path for industrial growth in Kerala. Industrial policy for Kerala should recognise the State's unique challenges and opportunities. As the Approach Paper for the Thirteenth Five-Year Plan points out, Kerala as a region is not suited for industrial units that require vast tracts of land, industries that degrade environment, or industries that are based solely on cheap and unskilled labour. At the same time, as the Approach Paper argues, Kerala should aim to set up a modern industrial sector that builds on the distinctive advantages of the State's rich natural resources and skilled workers.

Kerala's future industrial growth should be based increasingly on private enterprise. In fact, there is enormous potential for saving mobilisation and entrepreneurship within the State. Kerala's distinctive advantages include workers and entrepreneurs in the State who are educated, with many of them professionally qualified and having exposure to new technologies and the wider world. Given the nature of capital and entrepreneurship within the State and given also the unique conditions of its geography and natural environment, industrial growth in Kerala could be led by small and medium enterprises – enterprises that are innovative and high value adding.

It needs to be emphasised that Kerala's future economic growth should be led increasingly by knowledge-based, high technology, and innovative industries and sectors. Kerala should have a plan to harness the latest advances in areas such as biotechnology, life sciences, nanotechnology, and material research for the State's future economic growth. At the same time, Kerala should also try to transform its traditional industries, including handloom, coir, and cashew, making use of new technologies, especially in design and marketing. With a population of close to 35 million (in 2012), which has one of the highest-levels of per capita consumption in the country, Kerala is a large market for a range of new-technology products, including electronics, IT, and health-related products.

While Kerala's future industrial growth may be led by the private sector, public sector institutions, especially public sector units (PSUs) under the State Government, will play an important facilitating role. There are 103 State PSUs in Kerala, which include 42 PSUs under the Industries Department. State and Central PSUs in Kerala possess enormous resources, which include the expertise of their staff, access to advanced technologies including machinery and testing facilities, as well as ownership of land and buildings in prime locations across the State.

State public sector units in Kerala could become the prime movers for a range of public-private partnerships in advanced technologies across the State. State PSUs could provide incubator facilities for startups and small and medium enterprises. They can set up research centres and training facilities to nurture high technology entrepreneurship.

Consider, for instance, Keltron. Keltron has production facilities in several locations across Kerala. Keltron could set up a research centre in advanced electronics, which may encourage researchers and professionals in the area of electronics to associate with the public sector unit. It is possible that many professionals who are non-resident Keralites may be keen to work in Kerala on visiting fellowships or other arrangements. Keltron could encourage some of these researchers or a selected number of young engineers to set up startups, making use of its incubator facilities. This could set the stage for transforming Keltron into a major facilitator for entrepreneurship in advanced electronics.

One of the important means to promote innovative industries is through the building of strong linkages among three institutions: universities or academic institutions, industry, and the Government. The long-term foundations built in the State in the areas of health and education provides a launching pad for the State in knowledge-intensive industries. Universities and academic institutions in Kerala should be encouraged to work in cutting edge areas of technology and also to work closely with industry. Students and faculty members should be encouraged to set up startups and high technology enterprises. The potential for university-industry-Government linkages are the highest in sectors such as life sciences, biotechnology, and advanced electronics.

The State Government has already implemented a number of reform measures to ease the process of setting up an enterprise in Kerala. They have been aimed to reduce the delays faced by a prospective entrepreneur in getting permissions from the relevant authorities, getting land allotted to set up the factory, and obtaining permits for construction and electricity

connection. The State has also achieved much progress in making the process of finding information and obtaining permissions online.

At the same time, it is important to recognise that industrial policy for Kerala should not solely be about competing with other Indian States in Ease of Doing Business. The Ease of Doing Business ranking, which is mainly based on a methodology recommended by the World Bank, attach importance to the cheapness of land and labour. Given its relative shortage of land and semi-skilled labour, Kerala may find it difficult to compete with many other Indian States in attracting labour-intensive or resource-intensive industries. Instead, industrial policy in Kerala should focus more clearly on encouraging enterprises that are based on innovation, new technologies, and entrepreneurship.

II. Industrial Promotion Agencies

A number of Governmental or public-sector agencies are involved in the promotion of private industrial units in Kerala. They include the Department of Industries and Commerce (DIC), Government of Kerala, Small Industries Development Corporation (SIDCO), Kerala State Industrial Development Corporation (KSIDC), and Kerala Industrial Infrastructure Development Corporation (KINFRA).

Industrial promotion policies for startups and high technology enterprises are not the same as the policies needed for promoting conventional industries. The agencies should try to reinvent and adapt themselves to the changing demands of industrial promotion.

There is some degree of overlap between the promotional functions and policies of these various agencies. A number of agencies are involved in the development and allotment of land needed for industrial growth. They include DIC, SIDCO, KSIDC and KINFRA. Of these, while the DIC aims to promote and allot land for micro and small industrial units, KSIDC is mandated to aid the growth of medium and large industrial units. At the same time, there are substantial differences in the policies for land allocation of the various agencies, and the cost of renting/purchasing industrial land from them.

There is need for building greater synergies between the activities of the various promotional agencies. There are, for instance, entrepreneur development schemes overseen by DIC and KSIDC. There is much to gain by achieving greater coordination between the activities of the various agencies in each of these cases.

The revival of agriculture and agro-processing industries in Kerala will require coordinated efforts from various quarters, including the State Government Departments of agriculture, industry, and tourism, local self-Governments, research institutions, NGOs, health and nutrition professionals, and the media. In fact, the State Government could launch a major campaign for the building of a strong agro and food production sector in Kerala – similar to the earlier campaigns for mass literacy and democratic decentralisation.

III. Institutions for Technology Acquisition and Continued Innovations

There are many potential entrepreneurs in Kerala (including migrant returnees from the Gulf countries) who are seeking opportunities to set up industries, including agro-based industries, in the State. However, a major hurdle for an entrepreneur planning to set up an agro or food-based industrial unit is that he/she does not have enough information about or access to the relevant technologies (relating to products, processes, and machinery). The State Government must support entrepreneurs with acquisition and learning of technologies.

The State needs to evolve multiple strategies to access technologies in the chemicals and petrochemical sector, especially in the new and emerging areas (such as biochemicals). There should be efforts to promote interaction between industry and universities or academic and research institutions in Kerala. Industry-academia collaborations are likely to be more important in the areas of biochemical and biotechnology. In several areas of chemicals and petrochemicals, Kerala-based firms could consider entering into joint ventures with leading firms in the respective fields or purchasing technologies from them.

IV. Local Governments

Local governments have played an important role in industrial development in many parts of the world, notably China. Local governments can contribute effectively to the development of industries in rural areas, and in particular to industries such as food processing and garments.

In Kerala, local governments can be an important source of support in the State. There are two reasons for such an optimism. First, local governments in Kerala have been empowered – both politically and in terms of financial resources allocated for them – to a greater extent than in other parts of India. At the same time, however, local governments in Kerala have only had limited success in the sphere of industrial development.

Secondly, as the Approach Paper to the Thirteenth Five-Year Plan of Government of Kerala notes, there

is large scope in the State for the development of industrial units that are relatively small (with respect to the requirements of land and capital), and yet could be characterised as "smart" (making effective use of advanced technologies). Kerala is particularly suited for the development of agro and food-processing industries. Local governments can play an effective role in the development of these industries in Kerala.

There are two important ways in which local self-Governments can intervene in industrial development: first, as a regulator and, secondly, as an agency for planning and promotion of industries. Representatives of industry associations point out that entrepreneurs face several difficulties on account of LSGIs' rules related to industries. Entrepreneurs have to go through a long process – often taking several weeks – to obtain licenses from the local bodies. These licenses have to be renewed after a certain period. Panchayats can cancel the licenses and issue "stop memos" to the units. There have been many instances in which the licenses had been cancelled on account of even minor complaints received by the panchayats (Thomas 2020).

At the same time, officials from LSG Department point out that they are constrained by the rules and regulations related to industry at the local-level. As of now an entrepreneur has to obtain clearances from several departments including Town and Country Planning, Fire and Safety, and Pollution Control Board before they apply for license from the local government. It was felt that some of these rules and requirements are outdated and can be simplified or done away with. If the rules are simplified and local bodies are given greater powers in giving permissions to industries, the process of obtaining licenses will be much faster for the entrepreneur (she or he will not have to try to obtain clearances from individual departments).

According to the Panchayat Act, panchayats can issue licenses for industrial units for a period of five years. It was felt that the process of renewal of license should be made easier. The State Government has already initiated several measures to achieve greater ease of doing business in the State. As part of this, there will be changes in rules related to issue of industrial licenses by panchayats.

LSGIs role in promotion of industries

LSGIs can play an active role in planning for and promoting industrial development. As of now, LSGIs allocate only around two per cent of their total fund allocation for the industrial sector. There is also need for an attitudinal shift: LSGIs should see themselves as enablers and facilitators for industrial growth. There should be an effective plan at local-level about the appropriate nature of industrial development for each panchayats. In fact, LSGIs have started new initiatives including "Entrepreneurs Club" to promote entrepreneurship and industrial growth.

There should be healthy competition between local governments to facilitate industrial development in their respective panchayats. LSGIs could be ranked in terms of their success in promoting industrial development. Often when various ward members or councillors compete to get a share of the total budget in a panchayat, it results in investments whose size and scale are less than optimal. Therefore, it is important for panchayats to have long-term plans with respect to the nature of industrial development.

V. The Role of Industries Department

The Industries Department should play an active part in making use of the funds available with LSGIs. In fact, it should vigorously campaign to obtain a substantial share of funds for industrial development from the LSGIs. As of now, the Departments of Animal Husbandry, Dairy and Fisheries have been successful in obtaining funds from the LSGIs because of their proactive interventions. In the planning process for industrial development at the local-level, Industrial Extension Officers (IEOs) of the Industries Department can play an important role. They can work closely with the LSGs to promote industrial development.

Processing of agro and food products has great potential for growth in Kerala. LSGIs should be actively involved in identifying products and in promoting entrepreneurs in these fields. They should, in particular, try to obtain assistance from technically qualified persons in the panchayat, especially young engineers.

Kudumbashree can work with LSGIs for the promotion of agro and food based industries in particular.

VI. Public Sector Units

Among Indian States, Kerala has one of the largest numbers of public sector units set up by the State Government. Many of the public sector units in the State had been pioneers in India in their respective areas of operation. Travancore Cochin Chemicals (TCC) and other chemicals-based units in the Aluva-Kochi region had been important players in India's chemical industry at the time they had been set up (and at least until the 1960s). Kerala was one of the first Indian States to recognise the importance of electronics manufacturing when the State Government set up Keltron in 1973.

Later, Kerala was one of the first States in the country to set up an IT park when Technopark started operations in Thiruvananthapuram in 1995.

In addition to State PSUs, Kerala also has a number of Central PSUs. They include Fertilizers and Chemicals Travancore Limited (FACT) in Kochi, Kochi Refineries Limited (of Bharat Petroleum Corporation Limited (BPCL)), Cochin Shipyard Limited (CSL), and Instrumentation Limited (IL) in Palakkad.

PSUs as facilitators for private entrepreneurship

PSUs in Kerala should play the role of facilitators for the promotion of entrepreneurship, especially high-technology entrepreneurship. Chemical-based PSUs could initiate special efforts to promote downstream industries in the area of chemicals and petrochemicals. The upcoming Petrochemical Park and Pharma Park could emerge as important avenues for public-private participation. KSIDC should launch special programmes to encourage private investors to begin manufacture of downstream products in chemicals and petrochemicals. As already mentioned, there is huge potential for promoting electronics, biotechnology and other high technology sectors with assistance from State and Central public sector institutions in these fields. They need professionals with expertise in technological, financial, and other managerial experts related to each company.

VII. University – Industry Linkages for Technology Upgrading

In the medium to long-term, Kerala should take steps to enhance its human resource capabilities in the areas of biotechnology, life sciences and other advanced technologies. Universities in Kerala could take the initiative for this. Academic and research institutions in Kerala should try to build collaborations with leading technology institutions in India and abroad. Such collaborations could lead to the exchange of students and faculty members, joint research projects and publications, and to a faster growth in the formation of technology firms in Kerala.

Universities and academic institutions in Kerala should be encouraged to work in cutting edge areas of technology and also to work closely with industry. Students and faculty members should be encouraged to set up startups and high technology enterprises.

Industrial Sector in Kerala: Major Achievements in the 13th Plan

The 13th Five-Year Plan and Targets

The Thirteenth Five-Year Plan for Kerala for the period 2017-2022 laid out a strategy to achieve a significant leap in industrial production in the State through enterprises in the private, co-operative and public sectors. Kerala envisages to establish a modern industrial sector that builds on the distinctive advantages of the State. To begin with, the Approach Paper for the Thirteenth Five-Year Plan recognised that Kerala as a region is *not* suited for industrial units that require vast tracts of land, industries that degrade environment, or industries that are based solely on cheap and unskilled labour. Industrial growth in Kerala must make effective use of the skilled labour force in the State as well as the latest advances in technologies, including biotechnology, artificial intelligence, and nanotechnology. Given the specific features of the economy and spatial distribution in the State, growth in Kerala could be led by units that are relatively small (particularly with respect to the requirements of land and capital), and yet can be characterised as "smart" (given their flexibility in production and adaptability to market conditions).

Strategy for Future Industrial Growth

According to the Approach Paper for the Thirteenth Five-Year Plan, the strategy to build a strong manufacturing base in Kerala will have two important components. On the one hand, there will be an emphasis on food and agro-based industries that have strong linkages with the State's agricultural, natural and marine resources. They will include industries that add value to agricultural products in the State, including rice, coconut, rubber, pepper, cardamom, banana, and pineapple; forest and marine resources; and traditional industries such as coir and cashew processing. The second component of an industrial strategy for Kerala relates to the promotion of industries that make effective use of advanced technologies and build on Kerala's achievements in the areas of health and education. This involves the promotion of (a) specific segments of chemical and petrochemical, electronic, port-based, and engineering industries, and (b) enterprises that are based on frontier areas of computing and media technologies, biotechnology, nanotechnology and life sciences.

An Overview of Major Achievements

A turnaround in the performance of the manufacturing sector has been central to the revival of Kerala's economy from 2016 onwards. The annual rates of value-added growth in manufacturing were 18.2 per cent and 6.1 per cent respectively in 2016-17 and 2017-18, but the growth rates declined to 1.78 per cent and 1.54 per cent respectively in 2018-19 and 2019-20. The share of manufacturing in total GSVA of Kerala was only 9.8

per cent in 2014-15 but rose to 12.5 per cent by 2019-20. According to the Annual Survey of Industries, Kerala's share in total value added by India's factory sector improved from 1.2 per cent in 2014-15 to 1.6 per cent in 2016-17.

Major highlights of the improved performance of Kerala's manufacturing sector from 2016-17 onwards include a revival in the performance of State PSUs (mainly in the chemicals and electrical machinery sectors) and a continuing vigour in the growth of micro, small and medium enterprises (MSMEs) in the State. The impetus for growth has come from fresh investments in petroleum refining in Bharat Petroleum Corporation Limited's (BPCL)-Kochi Refinery, the emergence of two major ports in Kerala (in Vallarpadom in Kochi and the upcoming Vizhinjam port in Thiruvananthapuram) and also from a few big infrastructure projects, which are at various stages of completion (these include, importantly, the Kochi-Coimbatore Industrial Corridor project).

One of the notable achievements for Kerala in the sphere of industry has been a favourable change in perception among potential entrepreneurs over the last few years. The general impression had been that Kerala was not a suitable investment destination. This is no longer the case today. Part of the reason is that the nature of industrial growth itself has changed with the growing importance of knowledge and skill-based industries. Kerala has clear and specific advantages in knowledge-based industries compared to the rest of the country.

In addition to the availability of skilled labour, Kerala offers possibilities for entrepreneurs to set up knowledge-based industries across the length and breadth of the State. The relative advantages enjoyed by even rural areas of Kerala in health, education and standards of living is a major positive feature. Kerala's future economic growth stands to benefit from engagements with the large body of Malayali engineers and professionals who have worked with the latest technologies and management practices in different parts of the world. According to NITI Aayog's *India Innovation Index 2020*, Kerala has been ranked the best State in India on two indicators: enablers for innovation and business environment. Further, Kerala is ranked second among Indian States with respect to human capital for innovation in this index.

Over the last few years, the setting up of mega food parks, cluster based ventures, and cold storages across different regions of Kerala helped the promotion of agro-based and food processing industries in the State. The State is setting up industrial parks specifically for the growth of petrochemicals, pharmaceutical manufacturing, and life sciences. Leveraging on the advantages of local demand has been an important plank of the industrial strategy, including in electronics and food processing. There has been particular attention on the growth of defence electronics and light engineering. The expansion and growth of Cochin Shipyard, Kochi Refineries Limited and KSEB have provided opportunities for downstream industries. Logistics and port-based industries have been another area offering big opportunities for the State.

Achievements in Detail

Ease of doing business

The State Government has implemented a number of business friendly amendments to the relevant laws and regulations.

a) **Kerala Investment Promotion and Facilitation Act, 2018**. This Act envisages mandatory approval within a period of 30 days if applications are submitted with necessary documents. The Act seeks to avoid delays in granting various licenses, permissions, approvals and clearances required under the various enactments and make the State investor friendly.

b) **Kerala Micro Small Medium Enterprises Facilitation Act, 2019**. This legislation permits units, with an investment of less than Rs 10 crores and not falling under the "Red" category, to establish and function in the State without taking any licenses under State Rules for a period of three years, based on self-declaration. The units may obtain licences within a period of 3 years and 6 months.

c) **Kerala Micro Small Medium Enterprises Facilitation (Amendment) Ordinance, 2020**. This legislation permits enterprises other than MSMEs and not falling under the "Red" category to establish and function in the State without taking any licenses (under State Rules) for a period of one year. The Investment Facilitation Bureau constituted under the Act will issue the required clearances for the enterprises, which will have a validity of up to five years.

d) **Kerala Single Window Interface for Fast and Transparent clearance (KSWIFT) portal**. This provides an opportunity for entrepreneurs to obtain the required clearances for starting an industry from 18 different departments or agencies in the State. The State Government officially inaugurated the K-SWIFT portal on

November 2, 2019. Until December 2020, the portal has issued licenses to 511 entrepreneurs. In the past five years, clearances have been issued to 29 projects with an investment outlay of over Rs 3,600 crores.

e) **Invest Kerala Portal**. This portal acts as a single touch point for providing all the relevant information needed for an entrepreneur, including fiscal incentives, land bank details, SOPs, guidelines, and so on.

Directorate of Industries and Commerce

According to the Directorate of Industries and Commerce (DIC), the number of MSME units that started operation in Kerala during the five-year period from 2016-17 to January 2021 was 64,879. Total investment in these units is Rs 6,081.53 crore and total employment in these unts is 2,29,400.

Major achievement under various schemes

1 The Entrepreneur Support Scheme provides support to MSMEs in the form of Startup Support, Investment Support and Technology Support (15 per cent to 30 per cent subsidy with a maximum ceiling of Rs 30 Lakhs). During the last five years, 5027 units received assistance under ESS and the total amount disbursed was Rs 237.69 crore.

2 Multi-storied Industrial Estates, with captive power plants as well as material handling and other infrastructure facilities have been set up in a few locations across the State. More than 90 per cent of the construction work on the multi-storied industrial estates at Puzhakkalpadam Phase I (100,000 sq. feet), Punnapra (48,459.12 sq. feet) and Puzhakalpadam Phase II (1,34,555.55 sq. feet) is complete, and they are expected to be commissioned by March 2021.

3 The Cluster development MSE CDP scheme includes assistance for sourcing of raw material, mutual credit guarantee for sourcing loans, common brand creation, marketing, setting up of common facility centres, training centres and quality testing. Total number of clusters assisted under this scheme is 6 and total amount distributed is Rs 989.83 lakh.

4 Business Incubation Centre and Investment Facilitation Centres have been set up at 14 district industrial centres to provide guidance and mentoring to entrepreneurs (in project preparation, obtaining licenses and clearances, liaising with financial institutions and so on) and address technical issues they face.

5 Online processing of applications. Applications for licenses from and schemes of the Directorate of Industries and Commerce and the 14 district industries centres are now received and processed online.

6 Industrial promotional programmes. These include Entrepreneurship Awareness Programmes conducted at the block-level, Investors Meet at the taluk and district-levels, and Entrepreneurship Development Programme at the district-level. Entrepreneurs were provided support through Technology Clinics

Table 5.8 *Subsector-wise details of new MSME units started in Kerala, from 2016-17 to 2020-21, up to January 2021*

Name of subsector	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Agro and food-based	2,395	2,553	2,712	2,582	2,457	12,699
Textiles and garments	1,695	1,947	1,858	1,904	935	8,339
General /mechanical/light engineering	1,606	2,001	1,533	1,334	630	7,104
Service activities	3,057	3,679	3,259	4,036	1,827	15,858
Wood products	775	871	644	5,32	322	3,144
Cement products	344	469	329	3,09	149	1,600
Printing and allied	322	392	348	2,80	132	1,474
Paper products	172	163	192	1,88	144	859
Information technology	263	316	294	2,40	125	1,238
Others	3,098	3,077	2,657	2,290	1,445	12,564
Total	13,727	15,468	13,826	13,695	8,163	64,879

Note: Data for 2020-21 is up to January 31, 2021
Source: Directorate of Industries and commerce

and Technology and Management Development Programmes. The average annual numbers of persons who have been attending Entrepreneurship Development Programmes in Kerala is 30,000. It is expected that one in five or 6,000 of the 30,000 people who attend the programmes become entrepreneurs each year, and in the process, create 15,000 new jobs (every year).

7 Exhibitions and trade fairs. Exhibitions and trade fairs are organised in each district showcasing the products of MSMEs. Some of the annual events include Kerala Agro Food Pro and Machinery Expo. In the exhibitions held as part of these events in 2020, there was participation by 125 agro-processing units and 132 machinery manufacturers respectively.

8 The Government has also created the Commerce Mission to encourage and develop trade and commerce in the State and to market indigenous products in domestic and global markets. Kerala

9 e-Market web portal has been launched to provide better marketing facilities to MSMEs and PSUs.

10 Entrepreneur Development Clubs have been formed in schools and colleges to nurture the entrepreneurship spirit in the younger generation. During the period 2016-2020, 1245 ED Clubs have received a total of Rs 130 lakhs as grant.

KSIDC

KSIDC, which was established in 1961, is the premier industrial promotion agency of the Kerala State Government. Table 5.9 gives a summary of the assistance provided by KSIDC to enterprises through participation in share capital and disbursement of loans. The number of enterprises that received assistance from KSIDC increased from 27 during the two-year period 2015-17 to 47 during the two year period 2019-21 (with data up to January 2021).

a **Seed fund assistance**

Seed Funding is financial support provided to innovative ventures or other startup businesses. A maximum of Rs 25 lakhs per venture or 90 per cent of the initial cost of the project, whichever is lower, is sanctioned as soft loan for a period of one year at the prevailing RBI bank rate**.** Since 2016-17, seed fund assistance of Rs 10.6 crore was provided to 78 firms.

b **Project infrastructure**

1) **Life sciences park**. A dedicated park for the Life Sciences sector is being set up by KSIDC in 206 acres of land (Phase I: 75 acres and Phase II: 131 acres) at Thonnakkal, Thiruvananthapuram. Work on infrastructure development has been completed in Phase-1 of the Park in which the Institute of Advanced Virology project has become operational.

2) **Medical devices park**. KSIDC, as a joint initiative with the Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), has conceived a Rs 260 Crore project for setting up a Medical Devices Park (MedSpark) in 9 acres of land in the Life Sciences Park (Phase-I). The project will be completed in March 2022.

3) **Mega food park, Cherthala**. KSIDC has set up a Mega Food Park at Pallipuram, Cherthala, with a thrust on processing and export of seafood items. The Park will be linked to pre-processing centres (PPC) at Thoppumpady, Vypeen, and Munambam. Five units have already started operation and land has been allotted to another 22 units. A standard design factory building of 20,000 sq. feet, common facility centre, and a warehouse building of 9,000 sq. feet have been constructed at the Mega Food Park.

Table 5.9 *Assistance provided by KSIDC to enterprises, as share capital and loans, 2015-16 to 2020-21, Rs in Crore*

Year	Number of units provided assistance	Share capital assistance disbursed, in crores	Loan amount sanctioned, in crores	Loan amount disbursed, in crores	Loan amount recovered (P+I)
2015 –16	15	2,093.12	86.65	63.22	118.17
2016 –17	13	191.71	85.82	64.07	75.58
2017 –18	20	194.41	149.47	71.70	81.41
2018 –19	14	309.31	120.66	64.18	85.47
2019 – 20	24	334.70	304.51	85.78	90.50
2020 –21	23	422.00	156.75	213.89	41.66

Note: 1. Share Capital Assistance disbursed in 2015-16 includes investment on Kannur International Airport.
2. Data for 2020-21 is up to January 31, 2021

4) **Industrial Growth Centres.** A total 190 units are operating in the Industrial Growth Centres (IGCs) set up by KSIDC in Kannur, Kozhikode, Alappuzha and Palakkad. (Table 5.10)

c) Events: Two Editions of Ascend and Young Entrepreneur Summit

KSIDC and the Industries Department organised Ascend 2019 and Ascend 2020 at Kochi to highlight the proactive steps taken by the State Government in creating a hassle-free environment for doing business. These events were held on February 11, 2019 and January 10, 2020 respectively. Ascend 2020 showcased more than 100 projects across various sectors, and the State received expressions of interest from entrepreneurs amounting to the tune of Rs 1 lakh crores.

The third edition of Young Entrepreneurs Summit was held in 2017. The summit with the theme "Disrupt, Discover and Develop" provided an ideal platform to startup entrepreneurs and selected student innovators from across the State.

Kannur Natural Rubber Products Private Limited (KNRPPL)

KSIDC has established KNRPPL to set up a manufacturing unit at Kannur (Thaliparamba Taluk) for rubber-based products including gloves.

Development of Integrated Solid Waste Management Projects with Waste to Energy Plants

The State Government has given sanction to set up Integrated Solid waste Management Projects with Waste to Energy Plants at identified locations in Thiruvananthapuram, Kollam, Trichur, Palakkad, Malappuram, Kozhikode and Kannur districts.

Kerala Industrial Infrastructure Development Corporation (KINFRA)

KINFRA was set up in 1993 with the objective of building industry-specific infrastructure across the State and creating a land bank for future industrial growth. The industrial parks developed by KINFRA have facilities such as developed land on built up space, dedicated power and water supply, and communication facilities. KINFRA provides a readymade manufacturing environment for entrepreneurs, and help them reduce the time and cost involved in setting up a unit.

Land available with KINFRA

As on October 15, 2020, the total land acquired by KINFRA is 2,939.1 acres. Land available with KINFRA for industrial development purposes is 2,318.3 acres, of which 1,476.7 acres have already been allotted to industrial units. The remaining land (841.1 acres) is still available with KINFRA for allotment to industrial units. KINFRA has completed infrastructure development in 12 key industrial sectors with world class infrastructure in 24 industrial parks, of which 9 are catering exclusively to the small and medium sector. Land has been allotted to 728 industrial units in the various industrial parks of KINFRA with total committed investment of Rs 1,746 crore and providing direct employment to 20,000 persons. KINFRA has also successfully implemented a single window clearance system in all the parks.

Some of the upcoming projects of KINFRA include: Petrochemical Park, Kochi; Advanced Technology Park, Ramanattukara, Kozhikode; Global Ayurveda Village, Thonnakkal and Varkala, Thiruvananthapuram; Defence Park, Ottapalam, and Mega food Park, Palakkad.

PSUs

The number of public sector units (PSUs) under the Industries Department was 40 in 2016-17, which increased to 42 in 2019-20. Over the past four years, the turnover of PSUs increased from Rs 2,799.7 crore in 2015-16 to Rs 3,148.2 crore in 2019-20. State PSUs under Industries Department, as a whole, were incurring net losses in 2015-16 and 2016-17. However, these PSUs reported net profits in 2017-18 and 2018-19. Details are provided in Table 5.11 and 5.12.

- KMML achieved a high profit of 181.11 crore Rs in 2017-18. "Froth flotation", a state of the art mineral extraction system from black sand, has been implemented in this unit.
- KSDP Ltd achieved turnover and profit of Rs 100 crores and Rs 7.13 crores respectively in 2019-20.
- KELTRON achieved a turnover of Rs 459.5 crore in 2018-19.
- TCC, after four years of slump, has recovered by achieving a profit of Rs 55.87 crores in 2018-19.
- Kerala Automobiles Ltd has started manufacturing Kerala's Neem-G electric vehicles.

Table 5.10 *Number of units operating in industrial growth centres*

Specification	IGC, Kannur	IGC, Kozhikode	IGC, Alappuzha	KIZ, Palakkad
Number of units operating	59	72	53	6

Table 5.11 *Performance of State of PSUs under the Industries Department, Government of Kerala, profit and loss making units, 2015-16 to 2020-21* values in Rs crore

Particulars	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21*
Profit making units						
Number of Units	8	12	13	12	9	4
Value of Production	874.8	1,590.9	2001.7	2,252.9	1,774.6	500.1
Turnover	948.4	1,727.5	2,023.1	2,322.1	1,911.2	543.2
Profit made by the profit making units	113.5	91.8	252.9	241.2	121.6	28.7
Loss incurring units						
Number of Units	32	28	28	30	33	38
Value of Production	1,509.8	774.6	908.0	1,152.8	1,003.1	582.1
Turnover	1,851.3	993.8	898.0	1,120.7	1,237.0	674.5
Loss made by the loss making units	234.7	225.3	247.9	232.9	287.2	185.1
Total units						
Number of Units	40	40	41	42	42	42
Value of Production	2,384.6	2,365.5	2,909.8	3,405.7	2,777.7	1,082.2
Turnover	2,799.7	2,721.3	2,921.1	3,442.7	3,148.2	1,217.7
Employment	16810	1,5785	1,5242	13,838	15,719	14,021
Tax and Incentive to Government	358.5	315.1	308.0	349.0		
Net Profit/Loss(-)	-121.2	133.4	5.0	8.3	-165.7	-156.4

*Up to 30/09/2020

Table 5.12 *Performance of State of PSUs under Industries Department, Government of Kerala, by Sectors, 2015-16 to 2020-21* in Rs crore

Items	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Chemicals (7 units)						
Plan fund allocation	19.1	19.7	19.5	28.2	15.3	51.5
Turnover	1,153.6	1,266.6	1401.9	1,595.9	1,394.7	670.5
Net profit	13.0	28.2	223.3	189.1	63.4	6.1
Textile (8 units)						
Plan fund allocation	29.7	34.8	23.8	22.2	20.5	33.8
Turnover	96.3	82.3	133.9	157.3	158.7	53.8
Net profit	-72.3	-73.9	-90.9	-94.2	-115.5	-56.0
Engineering (6 units)						
Plan fund allocation	6.0	12.9	25.9	30.5	9.4	34.2
Turnover	121.4	116.6	125.8	154.2	158.8	67.0
Net profit	-33.7	-31.9	-44.8	-42.7	-42.2	-21.7
Electronics (3 units)						
Plan fund allocation	1.5	2.8	2.7	10.6	0	17.7
Turnover	484.8	452.4	480.2	542.6	521.1	143.9
Net profit	13.4	-17.51	3.8	9.6	4.4	-11.0

Electrical (4 units)						
Plan fund allocation	18.5	15.5	17.9	32.9	5.5	46.3
Turnover	398.2	424.0	393.4	565.1	498.9	166.9
Net profit	-47.3	-17.9	-34.2	-20.4	-34.8	-40.1
Traditional and wood based (7 units)						
Plan fund allocation	14.0	4.9	7.1	7.5	4.5	11.05
Turnover	146.7	139.7	128.1	136.3	121.5	29.3
Net profit	-20.9	-22.1	-30.1	-21.8	-22.2	-17.2
Ceramic (2 units)						
Plan fund allocation	2.0	4.9	4.9	16.2	3.0	
Turnover	5.5	4.7	5.3	8.2	10.99	8.93
Net profit	-10.9	-10.9	-13.7	-9.0	-8.27	-6.08
Development (3 units in 2014-2017 and 2 after 2017)						
Plan fund allocation	-	5.5	-	-	1.0	15.21
Turnover	393.2	235.2	252.4	283.1	283.6	77.8
Net profit	37.6	12.7	-8.4	-2.3	-10.5	-10.5

- PSUs under chemical and electronic sectors contributed to the better performance of State PSUs in the industrial sector in 2018-19. At the same time, PSUs in the textile sector recorded losses, pulling down the overall performance of the State PSUs. The State Government has launched efforts to revive the PSUs and help them emerge as agents of technological transformation of Kerala's industrial sector.
- The total value of production in the 42 State PSUs under the Industries department decreased from Rs 3,405.7 crore in 2018-19 to Rs 2,777.7 crore in 2019-20, registering a decline of 18 per cent. Turnover of these State PSUs also decreased by 8.6 per cent in 2019-20 compared to its previous year.

Handloom

- **Kerala handloom school uniform project.** The project envisages free supply of uniform material to schools in the Government sector. This project has been implemented by the Directorate of Handloom and Textiles in association with the Education Department, with key contributions from Hanveev, Hantex and DIC. This project has energised all direct and indirect stakeholders in the handloom sector. Workers have benefitted from higher days of employment and better wages.
- As part of *Kaithari Suraksha Scheme*, HANTEX distributed inputs to about 5000 weavers to enable continuous production of handloom.
- Value of cloth purchased by Hanveev almost doubled from Rs 8.60 crore in 2015-16 to Rs 16.68 in 2019-20. Its sales turnover increased from Rs 19.03 crore in 2015-16 to Rs 20.30 crore in 2019-20.
- Modernisation of power loom co-operatives is picking pace. After the modernisation of looms, productivity has increased. Earlier two looms were attended by one weaver. After modernisation, a weaver could attend to 8 looms. Thus productivity and wages of weavers has increased.
- The Government approved modernisation of Malappuram Co-operative Spinning Mills, Cannanore Co-operative Spinning Mills, Priyadarshini Co-operative Spinning Mill and the Quilon Co-operative spinning Mill. The first phase of modernisation of Malappuram Co-operative Spinning Mill and Kannur Co-operative Spinning Mill has been completed. The second phase of modernisation of the mill has started.

Coir

- Government of Kerala is implementing the "Second Reorganisation of Coir Industry" – a comprehensive revival package to modernise the coir sector while protecting the incomes of its workers. The total outlay of the package is around Rs 1,444.44 crore which includes State funds and NCDC fund to the tune of Rs 200 crore. Export of coir PSUs and

agencies in Kerala has increased from Rs 1,072.55 lakh in 2016-17 to Rs 1,425.86 lakh in 2019-20.

- Implemented Price Stabilisation scheme – ensuring remunerative prices to producers.
- Around 157 defibering units (DF) have been newly set up across the State as part of the modernisation scheme with the production capacity (per eight hour shift) ranging from 8,000 husks to 40,000 husks. These include 50 units in the private sector.
- As part of the modernisation efforts, 15,000 electronic ratts and 250 Automatic Spinning Mills (ASMs) have been installed in the State. Coir yarn production in the State increased from 7,800 MT in 2015-16 to 20,000 MT in 2019-20.
- The State Government has taken steps to sign a MoU with the University of Wageningen for developing coir composite boards on a commercial basis at a project cost of Rs 100 crore. Commercial production of coir composite boards has commenced.
- The Coir Department, Government of Kerala signed a MoU with 850 panchayats in 2019 to supply coir geo textiles to the latter. Coir geo textiles have applications in soil and water conservation.

Kochi Bangalore Industrial Corridor (KBIC) project

State Government has approved the proposal for the development of the Kochi Bangalore Industrial Corridor (KBIC) Project in Kerala. The State Government has appointed KINFRA as the Nodal agency for the acquisition of the land for this project. Government has accorded approval to KINFRA for the acquisition of 1351 acres of land in Palakkad for developing Palakkad Node as part of the KBIC Project. Government also proposes to develop GIFT city in Kochi as a part of KBIC. Accordingly District Collector Ernakulam has identified 543 acres of land in Ayyambuzha, Aluva for the proposed GIFT city project. The total expected cost for acquiring the land parcels in Palakkad and Kochi comes to Rs1,578 crore, which is proposed to be met with the financial aid of KIIFB.

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Chapter 6
Information Technology: The Highway to Growth

The Information Technology (IT) sector in Kerala occupies today a significant space in the State's economy and its importance has been recognised particularly in terms of its potential and significance in the future of the State. This chapter examines some issues related to the sector.

Introduction and Overview

IT is an integral element of the technology of the twenty-first century. To describe it as the cutting edge of technology, as was common in the last century, is to underestimate the extent to which it has become the equivalent of the machine in the Industrial Revolution. Just as the production of machinery was at the foundation of economic growth in general, and the growth of industry in particular, and just as the advance of mechanisation in the twentieth century transformed production, the IT revolution has outperformed its original expectations. This is especially borne out by the manner in which the new technology is increasingly becoming the foundation of the organisation of all aspects of production, circulation, and distribution of goods, especially in the advanced economies.

IT, in contrast to mechanisation, is characterised by a dual structure, commonly referred to as software and hardware. It is arguable which aspect is more dominant and likely to be so for the future, and at the current pace of development it is perhaps prudent to not draw any definitive or rigid conclusions. While both aspects have their own trajectories of development, it is also evident that they constantly interact and influence each other.

Two recent announcements, one on the use of the latest machine learning methods in the control of stratospheric balloons for internet connectivity, and the other on the use of deep neural network methods to make a breakthrough in understanding how proteins fold, demonstrate the tenuous nature of the hardware/software distinction. This dual structure is reflected in the nature of the IT industry, where the global leaders among IT firms and corporations have increasingly a stake in both aspects, even if in their origins they focused on only one of them.

For developing economies, the IT revolution has posed a peculiar challenge. The relatively slow pace of mechanisation, and indeed industrialisation, in many developing economies appeared to imply that the new technology would have limited scope in these economies. However, in varying ways, especially in South East and East Asia, and in India, the significance of IT in developing economies has been brought home clearly. India, in particular, has had a fairly unique trajectory of development of IT, where the emphasis was much more on software than hardware. But more importantly, the development of IT in developing economies like India was driven in the first instance by an IT sector that was very much export-oriented. However, subsequently, both domestic demand in some sectors and the realisation of the importance of e-governance have given a significant boost to IT in the country. Nevertheless, the mainstay of the IT industry in India is its export orientation, with exports continuing to lead domestic revenue by at least 3 to 1. External dependence on hardware is also significant and not diminishing in absolute terms, amounting in recent years to between a third and a half of the gross export revenue.

The IT sector in Kerala presents some particular issues that are important to recognise, even if there are many that are in line with the all-India picture. The latter is true in the export-oriented and foreign market-directed nature of the industry in Kerala. The software side of the IT sector is even more heavily dominant in the State than in the rest of the country, with only a limited presence in electronics manufacturing.

Kerala possesses some very significant advantages. The State has a remarkable-level of mobile/telephone penetration, with 32 million households being connected. Internet penetration through broadband and mobile is also very high, 20 per cent and 15 per cent respectively, and Kerala leads the country in this respect as well. According to an impact assessment report of the Digital Literacy Mission, Kerala has the highest-level of digital literacy by various measures in the 14-49 age group, while it ranks very high in other age groups as well. Kerala's achievements in literacy and school education have clearly stood the State in good stead in achieving such-levels of literacy, reflecting the emphasis on computer education in the school curriculum.

Another striking feature of Kerala's IT sector is the emphasis on e-governance and the large number of relevant initiatives involving all aspects of governance and all categories of stakeholders. This is in keeping with the people-centric thrust of development in the State that is periodically reinforced by the presence of

democratic and progressive trends in the polity that are also able to be in direct charge of governance periodically. As a consequence, there is significant public sector effort in Kerala in e-governance and related initiatives to promote digital access to the citizenry. The State has taken the lead in declaring access to the internet a basic human right, a move that also has found strong support in legal decisions. The development of digital literacy and e-governance can certainly be expected to have a multiplier effect on growth. However, this alone would hardly be sufficient for the role of IT as the engine of the next stage of development of the State.

The challenge before Kerala today is to leverage this aspect of the State's human development advance for the growth of the State's economy, especially in the IT sector. Currently, Kerala's IT footprint in the national IT sector is reasonably significant given the relative size of the State's economy. A more all-round view would suggest that there is an urgent complementary need, alongside promotion of digital literacy and e-governance, to develop the IT industrial sector. The current-levels of growth are certainly promising but clearly the gaps between Kerala's potential and promise as well as the gaps between Kerala and the leading States in the IT sector need to be bridged expeditiously. Secondly, the hardware or electronics manufacturing sector is also woefully inadequate and needs urgent attention so that at least a minimal electronics manufacturing supply chain is available in the proximity of the major software centres in the State.

One very positive sign for the future is the active startup ecosystem in the State that has been nationally recognised for its efforts. The extent to which such investment in the IT industrial sector can be regionally or spatially decentralised remains open, despite the State's commitment in recent years to a hub-and-spoke model that sought to have a more decentralised investment, that did not always live up to its promise. The positive externalities of agglomeration and clustering cannot be neglected, though an active land-use and land-acquisition policy is needed to ensure the spatial requirements of rapid and large-scale growth.

The triple helix configuration of industry, Government and academia is crucial for the development of the IT sector. In Kerala, the establishment of a Digital University around the IIITM-K is a welcome step, but much more needs to be done to evolve a strong research and development and higher education infrastructure of high quality in the State.

The IT sector in Kerala has undoubtedly been affected by the macro-economic headwinds that the State has had to face over the last few years. Apart from the overall stringency in resource mobilisation that States face, two successive years of floods and landslides rendered it difficult for the Government of Kerala to undertake even the normal course of investment that it devoted annually to the IT sector, though the sector suffered only a moderate direct impact due to the floods. Following on this, the body blow of the Covid-19-induced recession has seriously affected the sector.

Nevertheless, substantial gains in various dimensions of the IT sector have been registered under the present Government. The sector has also undoubtedly benefited from the continued commitment to planning that the State has held to steadfastly under the present Government. In the subsequent sections we present in detail some of the main policy features and major initiatives and developments in this sector over the period of the current 13th Five-Year Plan.

Approach for 13th Five-Year Plan

The salient features envisaged in the growth of the sector under the 13th Five-Year Plan were as follows:

1) Employment creation: Creation of more employment opportunities through generating one lakh jobs during the 13th Plan.
2) Human resources: Making available trained human resources through ensuring skill development activities in all educational institutions.
3) Startups: Development of an ecosystem for startups through the promotion of constant innovation through new startups, thereby developing new products and services.
4) Development Missions: Enabling IT for the management and monitoring of the activities of the four missions of the Government of Kerala.
5) Public access: Public access to high speed digital services by providing wi-fi hotspots.
6) Data platform: Integration of wide variety of data of Government departments, agencies and institutions on a single platform.

Vision

The vision of the sector was to establish Kerala as a knowledge-powered digital society by 2020 through application of digital technologies within the governing principles of freedom, inclusion, transparency, safety, and security.

Goals

1) Kerala State Information Technology Mission (KSITM)

- Enable a harmonised, interoperable, interconnected, and integrated Government.

- World class infrastructure, integrated e-service architecture, digital citizenship.

2) IT parks
- Establish Kerala as a preferred IT hub for emerging technologies.

3) Kerala Startup Mission
- To be a leading knowledge start-up ecosystem in India.
- Creating a sustainable and inclusive ecosystem for developing knowledge-based startups through multiple interventions.

4) Indian Institute of Information Technology and Management-Kerala (IIITM-K)
- To be an iconic knowledge institution focusing on emerging technologies.
- To develop as a sustainable institution with national repute and global recognition.

5) International Centre for Free and Open Source Software (ICFOSS)
- Leverage FOSS for enhancement of quality of life of the people through development of inclusive and assistive technologies.

6) Kerala State Information Technology Infrastructures Limited (KSITIL)
- Transform KSITIL into a top-class agency for development of physical and electronic infrastructure required for IT sector.

7) Hardware Mission.
- Act as a single point of contact for international connects and enable growth of electronics and hardware industry in the State.

New initiatives of 13th Plan

1) Skill Delivery Platform Kerala: This is one of the major initiatives taken up in the 13th Plan to help engineering colleges in the State to improve the employability skills. This platform links engineering colleges in the State with IT parks via tele-presence network connecting 150 hi-tech classrooms to deliver skills training to approximately 50,000 students in a year.

2) Kerala Fibre Optic Network (KFON): The aim of the project is to build a scalable and resilient core network and create an access network to connect more than 30,000 Government institutions comprising offices and educational entities and collaborate with regional service providers to provide free internet to 20 lakh economically backward households through this network. This will be provided through a new optic fibre pathway created in parallel to KSEB electric power network.

IT Policy 2017

The IT policy announced by the Government in 2017 aims to generate projects to mould Kerala into a knowledge-based society. The main objective of the policy is to establish Kerala as a leading IT destination and generate direct and indirect employment opportunities in the sector, build necessary technological infrastructure for creation of an environment favourable to ICT development, enhance the necessary human capital required to both produce and use innovative technologies through education and skill building and establish Kerala as an IT industry destination by attracting investments from within and outside Kerala. The policy aims to:

- Establish Kerala as a preferred IT and ITeS hub and leverage ICT to contribute significantly to GDP and employment.
- Create schemes to attract the global IT players to the parks.
- Create 1 crore square feet built-up space and provide 2.5 lakh jobs.
- Utilise the capabilities of cooperative sector and the capital from NRIs to develop the parks.
- Maintain a steady annual growth of exports in IT and ITeS service and products.
- Create a science and technology driven ecosystem for research and development and innovation.
- Increase the quality and competitiveness of small and medium IT enterprise and connect them to the international market.
- Foster technology entrepreneurship culture and create a sustainable start up ecosystem by creating technology hubs.
- Provide inclusive, affordable, and accessible electronic service delivery system for public services.
- Ensure universal open access to data, information, and knowledge resources in a digital domain.
- Make the State 100 per cent e-literate and utilise ICT in all walks of life to ensure equitable and inclusive development of the society.
- Give special emphasis to promote research and development in Malayalam language computing and develop tools for the same.
- Develop a talent pool within the State in skills for sunrise industries and human resources capabilities for emerging and futuristic technologies.
- Make IIITM-K and ICFOSS as centres of excellence for research and development and studies in IT sector.
- Strengthen IT at schools.
- Create a safe framework for digital living in terms

of cyber security, privacy and freedom of internet, conduct training and awareness programmes, and promote electronic transactions.
- Leverage IT in the day-to-day operations and in the delivery of services in hospitals.
- Adopt open source and open technologies in public domain and promote the same in SMEs and industry.
- Manufacturing of electronics goods/components will be made possible among all.
- Strengthen the operation of Keltron so as to regain the prominence it had in the past.
- Research and development institutions shall be established in the area of convergence of IT and biotechnology and technology shall be utilised to improve the quality of exports in fruit and vegetables, fish, and spices from Kerala.
- Create an infrastructure to enable women to work in the IT sector ensuring them safe transportation and secure environment at the work place.

Performance of IT Sector in Kerala up to 2020

- According to the Internet and Mobile Association of India (IAMAI) report titled "India Internet 2019," Kerala's internet penetration rate is the second highest in the country (54 per cent), with Delhi NCR topping the list with 69 per cent penetration. The report also notes that Kerala, Tamil Nadu, and Delhi have the highest proportion of female internet users.
- Kerala is the first State to make internet access a basic right. Kerala Fibre Optic Network (KFON), costing Rs 1548 crore project initiated by Government of Kerala for providing seamless internet connectivity to Government offices and free internet connectivity to 20 lakh economically backward households is nearing completion. A new joint venture company (KFON Limited) was formed in the share holding pattern of 49:49:2 in favour of KSEBL, KSTIL, and Government of Kerala as the SPV for the project.
- The e-district Kerala, a lighthouse project in India, has touched 4 crore mark with respect to issuing various certificates to the citizens through Akshaya centres.
- The revamped Kerala Spatial Data Infrastructure (KSDI) Portal was launched in 2017 and Kerala became the first State in the country to start geo-tagging of Government offices. The KSDI has more than 300 beneficiaries including users from 39 Government departments.
- Wi-fi hotspots were established in 1,888 locations across the State, and the average unique users per day are 32,000. Completed installation of second phase of 1000 wi-fi hotspots and nearly 15 lakh unique mobile users are availing the facility. Data consumption per day is up to 8 TB.
- About 196 lakh square feet built up space, Rs 4,982.1 crore investment, Rs 22,204.57 crore turnover, and 109,740 jobs were created through 923 companies operating in the three IT Parks.
- 2706 Akshaya centres are functioning across the State giving employment to 7547 persons.
- Under the banner of Kerala Startup Mission and several of its sector-specific partner organisations, there are 2900 registered startups with more than 4 lakh square feet of incubation space, Rs 1500 crore external investment, value creation of Rs 1,00,000 crore, created 25,000 employment and more than 230 Innovation and Entrepreneurship Development Cells.
- Kerala ranked as the top performing State in the Department for Promotion of Industry and Internal Trade's (DPIITs) State Startup ranking.
- Availability of resources for startups is more than Rs 1000 crore through Fund Scheme.
- IIITM-K established 10 research centres and published 65 research papers in national and international journals.
- Ten GIS-based web application/portal projects were started for various departments and six other projects are under development.
- Three Android-based GIS mobile applications have been developed and deployed.
- Various GIS based workshops for Government departments, schools, universities, and colleges were conducted, in addition to provisioning of internship facility for students.
- KSUM received international recognition as the World No.1 Public Business Accelerators in the world and national recognition as top performer (top 3) in Government of India State Startup Ranking, 2019.
- In 2020, 399 startups have registered in Kerala, showing a growth of 18 per cent over the last year. Currently among startups, Maharashtra is first with 5477 active startups and Kerala is ninth with 1292 active startups.
- Maker Village of IIITM-K was awarded with "Smart Incubator of the Year 2020" by India Smart Grid Forum (ISGF).
- Technopark has become the largest employment base campus in Kerala and with the commissioning of Technopark Phase III, it became the largest IT park in India with 380 acres of land, 9.7 million square feet built-up area.

- On January 18, 2020, Government of Kerala upgraded IIITM-K to "Kerala University of Digital Sciences, Innovation, and Technology" a unique Centre of Excellence of global repute.

Financial Performance of IT sector from 2016-17 to 2020-21

Table 6.1 *Plan outlay and expenditure* in Rs crore

Annual Plan	Outlay	Expenditure	Percentage
2016-17	479.38	328.10	68.44
2017-18	549.3	350.1	63.7
2018-19	587.6	269.1	45.8
2019-20	574.38	188.04	32.7
2020-21	500.10	196.38	39.3

Source: Budget documents, various years, Government of Kerala

Performance of IT sector agencies

The agencies involved in the implementation and promotion of Information Technology in the State are Kerala State Information Technology Mission (KSITM), Indian Institute of Information Technology and Management Kerala (IIITM-K), International Centre for Free and Open Source Software (ICFOSS), Technopark, Infopark, Cyberpark, Kerala State Information Technology Infrastructures Limited (KSITIL), Kerala Startup Mission (KSUM), IIIT- K Pala, and C-DIT.

1. Kerala State Information Technology Mission (KSITM). Kerala State IT Mission is an autonomous nodal IT implementation agency of the Department of Information Technology, Government of Kerala, which provides managerial and technical support to various initiatives of the Department. KSITM performs diverse roles including, enactment of ICT-related policies, development of guidelines and standards for e-governance, ICT facilitation for the Government entities, provide end-to-end support and guidance to State departments in digitisation efforts, act as a bridge between the Government and industry, undertake capacity building initiatives and bridge the digital divide, establish and sustain common IT Infrastructure and take up various e-governance initiatives. The focus activity is delivering the best of the digital services to the citizens keeping in mind "Citizen First" approach. As a result of these proactive policies and projects, Kerala achieved major progress in the transformational journey towards "Digital State."

Some of the remarkable achievements, major awards and accolades of KSITM are shown below.

- Kerala was declared as the first Digital State in India by Government of India in 2016.
- Hi-speed rural broadband network was first commissioned in India at Idukki.
- First State in India to issue over 4 crore e-certificates.
- 100 per cent of the gram panchayats are connected through optical fibre network.
- National E-Governance Award 2020, Elets eIndia Award 2020, NCEG Award 2019, Governance Now Award 2019, Digital India Award 2019, SKOCH Award 2019, Tech Sabha Award 2019 are some of the laurels received by KSITM.

Key activities of KSITM

Kerala has been a forerunner in e-governance and mobile governance by promoting and developing core infrastructure and e-literacy programmes.

1) K-Fi/Public wi-fi: K-Fi is a free wi-fi project that aims to establish 2,000 wi-fi hotspots across the State to provide free internet to the citizens of the State. Out of which, wi-fi hotspots have been established in 1888 locations across the State. Completed installation of second phase of 1000 wi-fi hotspots for free and provided 1 GB data to citizens on daily basis for each mobile number. Nearly 15 lakh unique mobile users avail the facility, up to 88,000 sessions per day and up to 8 TB data usage per day. Users increased from 13,000 to 47,000 per day between completion of phases I and II. Installation of wi-fi hotspots at selected coastal sites and the remaining sites are in progress.
2) E-office aims to conduct office procedures electronically thereby transforming Government offices to paperless offices and bringing out the benefits of digital communication that ultimately leads to faster decision making. E-office has been implemented in all departments in the Secretariat, 66 Directorates/Commissionerate/other Government offices, all Collectorates, 17 Sub-Collectorates/ RDOs. The Government has decided to roll out e-office to grassroots-level in taluks and village offices in coming years. Electronic file movement per month is more than 5 lakh. The training on e-office imparted to more than 30,000 end users. In 2019-20, e-office has been implemented at 13 RDOs/taluks/directorates/other offices.
3) Core infrastructure for e-governance in the State consists of Kerala State Wide Area Network (KSWAN), Secretariat Wide Area Network (SECWAN), State Data Centre, and State Service Delivery Gateway (SSDG). KSWAN is the

backbone of the State Information Infrastructure (SII), connecting Thiruvananthapuram, Kochi, and Kozhikode extending to 14 districts and 152 blocks panchayats and 63 mini-civil stations/ revenue towers across the State. Around 4,000 offices of Government Departments are connected to KSWAN through wireless and a larger number through leased lines and LAN. All the gram panchayats of Thiruvananthapuram District are connected through the National Information Infrastructure (NII) pilot project by integrating KSWAN with National Optical Fibre Network.

Around 500 offices including Akshaya centres were connected as part of the NII pilot project in Thiruvananthapuram. State Data Centres (SDCs) are the heart of e-governance framework of the State, hosting various applications and websites of the Government entities and provisioning associated services. The objective of the State Portal and SSDG project is to provide a "one- stop" shop to the citizens for Government services, both informational and transactional. Kerala State Portal "https://kerala.gov.in" provides all Government related information and departmental services routed through services gateway (SSDG). A new website layout is designed by interacting with various stakeholders and intellectuals for accommodating all the contents from kerala.gov.in, with around 100 additional new pages and satisfying the Government of India guidelines for websites and State Portal Framework guidelines.

4) e-District, a State Mission Mode project under Digital India, targets delivery of high volume citizen services provided by the district administration, at taluk or village-level, through back end computerisation to enable online availability of these services through Common Service Centres (CSC) and State portal. During 2019-20, the number of applications received was 8,360,940. Of this, 7,630,945 applications were approved and the number of applications rejected was 61,026. Some of the major services availed through e-District project are:

- Implemented 25 Revenue Certificate Services across the State
- RTI and Public Grievance Services.
- Online utility bill payment systems enabled in e-District portal.
- Various services of other Departments are also online/getting integrated with the e-District portal.

5) M-Keralam, the unified mobile application which will bring together all the services rendered by different Government departments under one umbrella. Currently, the app provides 101 services of 18 departments of the State.

6) e-Government Procurement (e-GP) is being implemented in the State, 54 Government departments and 335 PSUs/Autonomous bodies/ Government agencies are utilising the common e-Procurement system. In 2019-20, 113,303 tenders were floated using this platform and the total value of tenders floated was Rs 39,848 crore. From April 2019 to March 2020, 1027 number of officials were trained. In 2019-20, 617 offices migrated to the e-Procurement System and 2769 officials registered in the e- Procurement system.

7) Friends Janaseva Kendras have been established in all the 14 district headquarters. In 2018-19, an amount of Rs 148.1 crores revenue for the Government was collected. The Government plans to make all services currently available through Akshaya to be made available also through Friends without service charges. It is a single window "no queue" integrated remittance centre, where the citizens have the opportunity to pay all taxes and other dues to the Government, under one roof, at no extra cost. On an average, 1000 to 1050 people visit each centre every day. A new software with more facilities and for facilitating online services for replacing the existing software called FREES (FRIENDS Re-engineered Enterprise Enabled System) was developed at the Friends Janasevana kendram.

8) Akshaya is an innovative project launched on November 18, 2002 to bridge the digital divide. It works on public private participation mode. In the initial stages, the objective of the project was to make at least one person in a family e-literate. Gradually the focus of Akshaya shifted to citizen service-centric mode. Akshaya project acts as the enrolment agency and conducts Aadhaar enrolment through the Akshaya centres.

- 2,706 Akshaya centres are functioning across the State giving employment to 7,547 persons.
- More than 1,700 Akshaya Centre Act as banking kiosks for different banks.
- 5.5 million citizens got enrolled under UID through Akshaya centres. Enrolment under UID through Akshaya is 92.7 per cent against the national average of 62 per cent. Akshaya is also the premier agency in UID enrolment having generated 75 per cent of total UIDs in Kerala.

Table 6.2 *Details of Akshaya centres in Kerala*

Year	No. of Akshaya centres	No. of persons employed	Turnover (in Rs crore)
2016	2628	7476	46.1
2017	2679	7774	65.3
2018	2906	7942	73.6
2019	2716	7577	43.4
2020 (as on September 30, 2020)	2706	7547	41.9

9) Kerala State Spatial Data Infrastructure (KSDI) is a mechanism to provide geospatial data sharing at all levels of Government, the commercial sector, the non-profit sector, and academia. The major achievements of the project are as follows.

- KSDI geoportal is upgraded using Erdas Apollo 2016 web server with new features.
- KSDI collected data from 20 departments with more than 400 layers in various file formats and after quality checking, uploaded 59 seamless layers.
- Presently, KSDI has more than 300 beneficiaries including users from 39 Government departments.

Government of Kerala was assigned as the State registrar for Aadhaar enrolment by UIDAI.

Electronics and IT Department of Kerala was approved as the nodal Department and KSITM was approved as the nodal agency for Aadhaar enrolment in the State. In addition, UIDAI has approved KSITM as the Authentication User Agency and e-KYC User Agency. Aadhaar based services like DigiLocker are also being rolled out to departments. At present, there are about 900 Permanent Enrolment Centres, 1500 Child Enrolment Centres, and 1450 Update Centres by Akshaya CSCs to facilitate Aadhaar Enrolment and changes to details in Aadhaar.

10) Using VC infrastructure, KSITM was able to conduct around 750-800 VCs this year. The management of VC sessions, upkeep of VC equipment and studios are with the support of C-DIT.

DigiLocker service is currently integrated for the following:

- e-District project – revenue certificates.
- Food and Civil Supplies Department – ration card.
- Pareeksha Bhavan – Secondary School Leaving Certificate (SSLC).
- Motor Vehicle Department – driving licence and vehicle registration.

2. Indian Institute of Information Technology and Management-Kerala (IIITM-K). The Indian Institute of Information Technology and Management-Kerala was set up in 2000 as a premier institution of excellence in science, technology and management. It emphasises quality education to students and develops professionals and leaders of high calibre imbued with values of entrepreneurship, ethics and social responsibility. The institute focuses on education, research, development and training in basic and applied information technology and management.

IIITM-K is the implementing agency for the various e-governance initiatives of Government of Kerala and Government of India. It coordinates national and international conferences and workshops to provide opportunities to students to interact with world class experts and researchers.

There are four specialised post graduate programmes (MSc) being offered by the Institute in computer science with specialisation in cyber security, machine intelligence, data analytics, and geospatial analytics. Along with the above four specialised courses, the Institute also offers MPhil ecological informatics, MPhil computer science, and PG diploma in e-governance. The MPhil and MSc degree are awarded by Cochin University of Science and Technology (CUSAT) and post graduate diploma by Directorate of Technical Education, Government of Kerala.

3. Digital University. On January 18, 2020, the Government of Kerala upgraded IIITM-K to make the "Kerala University of Digital Sciences, Innovation and Technology." The University started functioning from the new campus of IIITM-K in Technocity and the new building was inaugurated in February 2021. The University is envisaged to become a unique centre of excellence of global repute by conducting education, research and extension activities in areas of digital technologies, science and humanities. The University is aiming to create capacity building in masters and doctorate programmes in the areas of artificial intelligence and natural language processing, internet of things, electronic systems and automation, imaging technologies, data analytics and big data, cyber security, block chain, ecological informatics and geospatial analytics. The University will start schools in the areas of computer science and engineering, digital sciences, electronics systems and automation, informatics, digital humanities and liberal arts. The new University will initially create about 200 job opportunities in academic and research-level.

The pass outs from IIITM-K hold commendable positions in internationally reputed IT companies such as JFWTC-General Electric, Accenture, Amdocs, Siemens, Ernst and Young, ARS Software, Allianz Cornhill, IBM, IBS, Infosys, Tata Elxsi, Tata Consultancy Services, UST Global Technology, and Wipro. The new campus of the Institute at Technocity shall facilitate and promote studies, research, and incubation in Information Technology and its application domains. The campus would have a built up area of 48,161 square metres on completion.

Major awards and recognition of IIITM-K are:

- Maker Village of IIITM-K is awarded with "Smart Incubator of the Year 2020" by India Smart Grid Forum (ISGF).
- Maker Village awarded as "Incubation Centre of the Year with Prominent IP Culture 2019" by IP Promotion Outreach Foundation (IPPO), Ahmedabad.
- Hardtech 2019, Future and the Design Summit provided an unparalleled platform for the startups to showcase their competence.
- Evelabs of Maker Village got CII Design Excellence award.
- Sastra Robotics of Maker Village got DST ISBA Startup Award.
- Irov: IESA Spacetronics/Deftronoics of Maker Village got award for the Promising Startup of the Year 2018.
- Maker Village is the finalist of Nava Design and Innovation: Global Impact Challenge 2018.
- Resnova Technologies of Maker Village got South India's Vibrant young entrepreneur award by TOI Edex.
- Chief Ministers Project Monitoring System won the Technology Times of India Sabha National Award.
- The startup companies at Maker Village, which is the largest exclusive hardware incubator in the country, are developing state-of-the-art hardware electronic products in divergent areas such as automation, robotics, drones, internet of things, autonomous vehicles, biomedical instrumentation, energy management, etc. Most of the startups are leveraging cutting edge technologies – machine learning, artificial intelligence, augmented reality/ virtual reality, etc. to make their products innovative and globally competitive.

4. Technopark. Technopark was set up as an autonomous organisation fully owned by Government of Kerala to create global standard infrastructure and to provide total support required for development of high technology industries. It was formally dedicated to the Nation on November 18, 1995. Since then Technopark has been growing steadily both in size and employees strength.

With the commissioning of Phase III, Technopark will become the largest IT Park in India with 380 acres of land, 9.7 million square feet built up area. Technopark through its companies, currently provides direct employment to 62,000 IT employees and offers an indirect employment for another 1,50,000 persons.

With the launch of Technocity project in Kazhakuttom, the largest integrated-IT Township in 424 acres of land, the Kazhakuttom-Kovalam (NH-66) has become the first IT Corridor in Kerala. Technopark has charted out an ambitious target of creating 50,000 new jobs by 2021. Technocity project is a flagship project by Technopark. Technocity project is broadly divided into two such as IT integrated township and knowledge city, which is designed to have six Centres of Excellence (CoEs) in emerging technologies to create a sustainable and healthy IT ecosystem by building a startup habitat. CoEs will be based on emerging technologies in IT such as i) cyber security, blockchain, ii) Fintech and blockchain, iii) artificial intelligence and machine learning, iv) virtual/augmented reality, v) e-Mobility, and vi) space science.

Table 6.3 *Physical achievements of Technopark, 2015-16 to 2019-20*

Particulars	2015-16	2016-17	2017-18	2018-19	2019-20
Total turnover (in Rs crore)	12000	12000	14000	14000	15000
Total export (in Rs crore)	6250	5000	6452	7000	7350
Total investment (in Rs crore)	4970	4970	4970	4979	4979
Total employment (in no.)	51865	52746	56000	60000	62000
No of companies	390	370	400	410	450
Total land (acres)	330	760	760	770.2	769.84
Total built up space (in lakh square feet)	72	93	97	97	103

Source: Technopark

Technopark currently owns 20 IT buildings within the campus. The built-up space in the Technopark has increased from 72 lakh square feet in 2015-16 to 102.7 lakh square feet in 2019-20, out of which Technopark has created 32.8 lakh square feet areas for industrial modules and total built up space completed by companies is 70 lakh square feet.

Details of the major events held by IT parks during the last 4 years are:

i) #FUTURE 2018 was the first conclave based on digital disruption conducted in Kerala. It was organised on March 22 and 23, 2018 at Hotel Le Meridien, Kochi. Roughly 1800 attendees attended these sessions over the two days.
ii) Global connect sessions in the US, Europe, and Dubai. Many company executives attended these events and the following multinational companies have engaged with Kerala either by establishing a facility or by participating in Government initiatives.

Existing companies like Allianz, Infosys, TCS, CTS have been engaged through these events and have been pushed to expand as well. Notable success in this is Allianz which has set up a Global Centre of Excellence for blockchain projects in Thiruvananthapuram. This provides high-end technology-centred employment for about 30 professionals. Big MNCs which came to the IT parks in Kerala include Nissan Digital, Way.com, H&R Block.

In Technocity, a new building named "Kabani" with a total area of 2 lakh square feet was inaugurated in February 2021. This new building will provide more than 2000 new employment opportunities.

5. Infopark. Infopark, Kochi is the second largest IT hub in Kerala with spokes at Cherthala and Thrissur. The objective of Infopark is creation of the state-of-the-art infrastructure facilities such as space for IT/ITeS companies, supply of power, water and connectivity. Since its inception in 2004, Infopark and its co-developers created over 9 million square feet builtup space and have provided employment to over 47,000 IT Professionals through 427 IT companies who have taken space in its Parks.

Infopark has five campuses which is spread over 323 acres under various phases of development. In case of Infopark Technology Business Centre, a built up partly fitted space of 25,845 square feet at Kaloor International Stadium was taken over from KSITM in the year 2013. Infopark undertook necessary balance fit outs, modifications/rectifications in the fitted out space and now the facility is mainly used for providing office space for startup companies.

Major achievements of Infopark are:

- Commissioned 500 kwP solar power plant. This can generate around 4 lakhs units/year, thereby a saving of around Rs 24 lakh per year in electricity bill.
- The total employee strength increased to 47,000. In 2018-19 it was 40,000.
- The number of IT companies increased to 427. In 2018-19, it was 392.
- New IT building by M/s Claysys group completed and occupied.
- Total export revenue increased to Rs 5,200 crore. In 2018-19, it was Rs 4,700 crore.
- Settled Land Acquisition and Resettlement (LAR)

Table 6.4 *Multinational companies that engaged with Kerala*

Company	Employment in Kerala	Other engagements
Tech Mahindra	350 (Thiruvananthapuram)	
Cisco	–	ThinQbator – Startup tinkering facility in IIITM-K. Smart Village (VKC) Initiative through Kerala IT Mission
Teranet	150 (Thiruvananthapuram)	–
IQVIA	300 (Kochi)	–
Byjus	Office requested in Technocity. Yet to start.	–
E&Y Scaleup	This is an ongoing process. Approximately more than 500 people have been added in the last couple of years.	–
Wipro IIoT centre	50 staff	–
University of Illinois, Chicago	–	Tie-up with Kerala Startup Mission and ICT Academy for skilling

Table 6.5 *Physical achievements of Infopark*

Particulars	2015-16	2016-17	2017-18	2018-19	2019-20
Total turnover (in Rs crore)	3200	3200	4013	6606.75	7200
Total Employment (in number)	32800	33116	37000	40000	47000
Number of companies	282	298	396	392	427
Total land (in acre)	321.86	323	323	323	323
Total built up space (in million square feet)	6.96	6.6	8	9	9

Source: Infopark

liability in connection with Phase II land acquisition as per court order there by saving interest cost.

6. Cyberpark. Cyberpark was established in the lines of Technopark in Thiruvananthapuram and Infopark in Kochi based on a hub and spoke model. It was set up to bridge the IT infrastructure gap along the west coast starting from Kochi to Kasaragod. The objective of Cyberpark is to provide cost effective and top of the line infrastructure to the IT/ITeS investors and thereby encouraging, promoting and boosting the export of software/software services and creating employment opportunities in the Malabar region. It is the responsibility of Cyberpark to interface between Government and Industry, interact with potential investors, strengthening the IT/ITeS base, holding promotional campaigns, developing human resources for IT and ITeS. Kerala State IT Infrastructure Limited (KSITIL) holds the ownership of the entire area of 43 acres of land at Kozhikode Cyberpark.

The major achievements of Cyber Park are:

- First IT Building "Sahya" (2.88 lakh square feet) completed and started operation. Spaces have been allotted for 23 companies.
- Total investment of Rs 3.12 crore with a total turnover of Rs 16.78 crore including exports worth Rs14.95 crore.
- Forty one companies started operation in SEZ and created around 560 direct employments.
- Cyber park in association with Internet and Mobile Association of India (IAMAI) established app incubation hub, first of its kind in Kerala.
- Twenty four startup companies became operational in Cyber Park and created 127 IT jobs.
- Created a Centre of Excellence for mobile incubation hub in Cyberpark.
- Created around 570 direct jobs in the campus.
- In 2019-20, total investment was Rs 3.12 crore with a total turnover of Rs 4.572 crore.
- Export revenues have been increased to Rs 17 crore.

7. Kerala State IT Infrastructure Ltd (KSITIL). KSITIL is a public limited company formed for the creation of the infrastructure for IT/ITeS in the State. The company leverages the valuable land assets owned by the Government and through viable financial models, generates funds for building the IT Infrastructure in the State in a Private Public Participation model.

The business model of the company is to acquire land and develop basic infrastructure facilities like electricity, water, road and compound wall in the area, obtain SEZ status and other such Government approvals that may be required and then allot land to private developers for development of either IT SEZ or IT parks.

Major projects of KSITIL are Kozhikode IT Park, Kannur IT Park, Kasaragod IT Park, Kollam IT Park, Koratty IT Park, Cherthala IT Park, Ambalapuzha IT Park, Infocity Pala, IIIT-Kerala and Technolodges.

Some of the major projects of KSITIL are as follows:

Table 6.6 *Major physical achievements of Cyberpark, 2015-16 to 2019-20*

Particulars	2015-16	2016-17	2017-18	2018-19	2019-20
Total turnover (in Rs crore)	3.96	6.65	10.68	16.78	4.57
Total export (in Rs crore)	3.96	6.65	10.68	14.95	29.29
Total investment (in Rs crore)	0.33	0.85	2.39	3.12	3.12
Total Employment (in number)	55	112	266	558	748
Number of companies	4	8	13	23	46
Total land (in acre)	166.52	42.49	43	43	43
Total built up space (in lakh square feet)	2.88	2.88	3.0	3.0	3.0

Source: Cyberpark.

i) Skill Delivery Project, Kerala: SDPK is a prestigious project assigned to KSITIL by Government of Kerala. The objective of the project is to bridge the gap between students and industry. SDPK consists of a virtual platform with teleconferencing system being installed in all the 150 engineering colleges and 3 studios, which are being setup as part of the project. As part of the project Government of Kerala is setting up Hi-Tech classrooms with a minimum seating capacity of 60 students.

ii) Kerala Fibre Optic Network (KFON): KFON, a State-wide optical fibre network capable of providing high-speed connectivity to all government and educational institutions, offer free internet to 20 lakh economically backward families and subsidised internet for others by leveraging KFON Infrastructure. It shall act as the perfect platform for the State to pioneer in IoT and other emerging technologies like artificial intelligence, and block chain and give impetus to innovation and entrepreneurship.

iii) Village Knowledge Centres works at Dharmadom and Taliparamba: The work involves the construction of Village Knowledge Centre buildings using Glass Fibre Reinforced Gypsum (GFRG) panel in 15 panchayats. The entire work is expected to be completed on March 2021.

8. International Centre for Free and Open Source Software (ICFOSS). Government of Kerala established ICFOSS as an international centre in collaboration with Free Software Organisations in India and abroad to promote development and application of free software and free knowledge. It is a nodal agency in all matters relating to free and open source software including consultancy, research and development, academics, studies and service, training, publishing, certification, international co-operation and collaboration. ICFOSS has carried out many FOSS-based training programmes, workshops, seminars, research programmes, projects, malayalam computing activities, student internships and projects, summer camps, faculty development programmes, and fellowship programmes.

The major activities of ICFOSS are the following:

- 20 faculty development programmes for teachers in which 600 teachers participated, 25 student training programmes in which 750 students participated, 6 training programmes for professionals and SMEs in which 200 persons participated, 10 sci-lab training programmes in which 300 students and teachers participated, student project works, internships, and fellowship programmes were conducted.
- Launched assistive technology products such as T-slide mouse, flip mouse, and on-screen Malayalam keyboard.
- FOSS cell co-ordinators meet was conducted and 45 co-ordinators attended.
- Training provided to government employees on FOSS solutions and malayalam computing in 62 batches. 1700 employees participated.
- International conference Swathanthra 2017 in which 300 students and professionals participated.
- Completed first phase of Malayalam screen reader for visually challenged with DTE.
- Conducted 5 women hackathon sessions, 1 winter school for women, 2 back-to-work programmes, and 2 faculty development programmes.
- Hardware team conducted international workshops and conducted 2 summer camps for school students.
- Designed a localised version of Tablexia, a modern educational application aiming to support the development of cognitive abilities, primarily for children who are differently abled.
- Completed Gcompris Malayalam website and Malayalam audio to Gcompris applications project work.
- Under fellowship programme, 8 out of 15 fellows joined ICFOSS and they are engaged in different research projects.
- Completed integration and functional testing of already implemented functionalities and completed installation and setting up iDempiere.
- Developed a first-level prototype having the features for creating, modifying, transferring and closing an office file.
- Conducted training on "LoRaWAN and RISCV for IoT" at CET and Summer School on IoT.
- Conducted workshop on "LoRa in a Box" at Science Hack Day 2019, organised 2-day bootcamp on "creating a RISC-V Microcontroller using Chisel," conducted workshop on "RISC-V CPU Design using Chisel" at TrEst Research Park.
- Conducted one day workshop on product development using Free CAD at different colleges at 12 districts.

9. Kerala Startup Mission (KSUM). Kerala Startup Mission (KSUM) is the nodal agency of Government of Kerala for implementing the entrepreneurship development and incubation activities in the State. Kerala Start up Mission, formerly known as "Technopark Technology Business Incubator" is India's first successful non-academic business incubator. It started operations in 2007.

The objective of the Mission is to identify and develop entrepreneurial talents among youth and students in Kerala, address the technology based entrepreneurship development requirements in the traditional sectors of Kerala, build appropriate training programmes suitable for Kerala's socio-economic culture, identify niche market for technology products and services, interfacing and networking among academic, research and development institutions, industries and financial institutions, establishing a platform for speedy commercialisation of the technologies developed in the institutes to reach the end-users.

Under the banner of KSUM and several of its sector-specific partner organisations, there are presently 2900 registered start-ups, more than 4 lakh square feet of incubation space, 40 incubators, 280 mini-incubators, more than 230 Innovation and Entrepreneurship Development Cells (IEDC), all of which are evenly distributed across various districts and cities such as Kochi, Thiruvananthapuram, and Kozhikode. Many of these facilities also house advanced labs that focus on sectors such as hardware, biotechnology, electronics and advanced computing.

Since 2016, 2900 startups have emerged providing employment to 20,400 persons. Out of 2900 startups, 13 per cent were registered in the first three quarters of 2019 alone.

The number of startups in Kerala has increased even during the Covid-19 period. This is because of increase in return emigrants, the interest of youth in ventures and the quality of Government facilities offered for startups. In 2020, 399 startups have been registered in Kerala, showing a growth of 18 per cent over the last year. Currently among startups, Maharashtra tops with 5477 active startups. Kerala is ninth with 1292 active startups.

In January 2019, KSUM launched the Integrated Start up Complex in Kochi, a sprawling complex, spread over 1.80 lakh square feet with dedicated facilities for various sectors. It also hosts

i) Maker Village – India's largest electronic hardware incubator and Electronics System Design and Manufacturing (ESDM) facility.

ii)Bionest – State of the art biotechnology instrumentation platform to promote and develop new entrepreneurs.

iii) BRING – India's first international accelerator for hardware startups.

iv) BRIC – an incubator dedicated to developing solutions for cancer diagnosis and care.

v) Centre of Excellence established by UNITY and CERA.

KSUM has collaborations with Government, PSUs and corporates to enable and empower startups and youth with opportunities in the tech industry and the digital economy.

The major events organised by the KSUM are:

1. Huddle India is the focal point for startups and tech talent as well as top-tier investors, executives and media. The conference features stage programmes, side-events such as networking sessions, roundtable discussions and facilitated workshops to help startups connect with the right investors and corporates. The philosophy behind Huddle India is to help the next-generation world-conquering startups come forward and succeed. Huddle primarily focuses on emerging sectors such as blockchain, cryptocurrency, IoT, gaming and esports, cybersecurity, digital entertainment, AR/VR, AI, UI/UX and e-governance.

Table 6.7 *Key projects of KSUM*

Sl. no.	Project Name	Status
1	Building integrated startup complex (1.8 lakh square feet) in Kochi	Inaugurated in 2019. Around 200 companies are working.
2	Construction of two buildings under KIIFB in Kochi	Buildings are expected to be completed by September 2021 and February 2022.
3	Construction of 50,000 square feet in CDAC Building at Technopark for ACE accelerator	Inaugurated on November 2, 2020. 20 startup companies onboarded.
4	Super fab lab at Kochi	Machine installation complete.
5	Support to other incubators	KSUM supports four other incubators – Maker Village, Bionest, Mobile10X and BRINC.
6	Investment in fund of funds	Investment in select fund of funds for investing in startups.
7	Regular activities	Continuing on online mode now.

2. Seeding Kerala, a two-day investor-focussed event.
3. Meetup Café is the place for startups, industries, institutions and investors to come together, share their knowledge and develop a community whose focus is the overall development of the ecosystem. The café is developed as a mentorship and investment centre for startups across the State , as well as a one-stop centre for all technology awareness. Meetup Cafe is hosted every month in the three cities of Kerala namely Thiruvananthapuram, Kochi and Kozhikode.
4. Investor café is an opportunity for startups looking for funds to connect with investors and get funded.
5. Women Entrepreneurship Startup Programmes.
6. Whyhack. An exclusive woman-only hackathon in partnership with TCS and ICFOSS. TCS offered internship opportunity to the winners of the Hackathon.
7. She Loves Tech National Challenge. KSUM has partnered with Singapore based SHELOVES TECH, a platform to promote women entrepreneurs across the globe. KSUM organised national competition for women founders. More than 90 women founders participated in this competition and winner took part in global competition.
8. Women Startup Summit. KSUM organised the second edition of Women Startup Summit with the support of TiE Kerala and IWN Kerala Chapter. The objective of the summit was to celebrate the success of women entrepreneurs and promote technology-based entrepreneurship among women. A five-day virtual entrepreneurship programme was organised for aspiring and budding women entrepreneurs with the support of people foundation.

The many achievements of Kerala Startup Mission are:

- Kerala ranked as the top performing State in DPIIT's State startup ranking in 2019.
- Home to one of India's largest innovation hub of 1.8 lakh square feet – the Integrated Startup Complex.
- Established centres of excellence in AR/VR with global tech giant Unity.
- Established the BRINC Hardware Accelerator and XR Accelerator in collaboration with Unity.
- Incubation infrastructure for niche sectors such as cancer research, spacetech, and biotech.
- Established Space Technology Application Development Ecosystem (STADE).
- Establishing Super Fab Lab at Kochi.
- Conducted 32 fab workshops imparting digital fabrication expertise to more than 250 participants.
- 47 funded startups in the State and13 among these were funded in 2019.
- 316 startups built through Innovation and Entrepreneurship Development Centres (IEDC)
- More than 40 incubators and 4 accelerators in the State.
- 13 per cent women startups in Kerala, 30 women startups registered with KSUM.
- Conducted IEDC Summit 2019. Over 4000 students from 226 academic IEDCs across 14 districts of Kerala had attended the summit.
- Organised 5th edition of Seeding Kerala 2020 in Kochi. The Summit was attended by a select cohort of 150 investors and high net worth individual and is the flagship event for the Angel Investor Community in the State
- Conducted Huddle Kerala 2019. Kerala Startup Mission (KSUM) has signed Memorandum of Understanding with Oppo, Future Group, Wadhwani Foundation, and Orbit.
- Conducted Women Startup Summit 2019, an event with an aim to promote women entrepreneurship.
- Conducted K-WINS workshop, a programme that aims to enable qualified women who are on a career break (or not under full-time employment) to take up flexible freelance assignments. 55 women who took a career break participated in this programme.
- Establishment of Technology Innovation Zone at Kalamassery, Kochi is in progress.
- Organised InQ Innovation hackathon. As many as 18 teams took part in the InQ Innovation hackathon organised jointly by Incubate IND and KSUM.
- Organised Entrepreneurship Development programme with the proactive support of C-DAC.
- Seven startups under KSUM took part in the Innovfest Unbound in Singapore.
- Conducted IGNITE Angel Investment master class, an education programme to create awareness about angel investing in startups and 27 startups attended the programme.

10. Centre for Development of Imaging Technology (C-DIT). C-DIT has been functioning as an Information and Communication Technologies (ICT) solutions provider in the Government sector.

The major programmes undertaken by C-DIT are:

- Reorganisation of Chief Minister's Public Grievance Redressal system and Distress Relief Fund assistance mechanism into an integrated online portal www.cmo.kerala.gov.in.
- Online Blood Disorder Registry, Ashadhara for the National Health Mission.
- Integrated Co-operative Department Management System for the Registrar of Co-operative Societies/ Department of Co-operation.

- Portal for the management of Thozlilai Sreshta Award for the Labour Commissionerate.
- Suggestion System for the Office of the Registrar of Co-operative Societies.
- Design and development of software for conducting online examination and on screen evaluation of written answer sheets for Kerala Public Service Commission and question bank for the Kerala Public Service Commission.
- Digitisation of old manuscripts and documents for State Archives and Registration departments.
- Online admission portal for ITIs for the Scheduled Caste Development Department.
- Revised version of the E-group 2.0 for the Registration Department.
- Upgradation of fair value application for the Registration Department.
- Admission and Recruitment Management System for the SIMET.
- Onsite technical support for Research Fellowship Online Examination for KSCSTE.
- Design, hosting and maintenance of over 200 Government websites and social media platforms MIS/ERP systems for various Government departments.
- Carried out hologram embedded tax label production for Kerala State Beverages Corporation for affixing in Indian made foreign liquor bottles. Besides, hologram embedded security documents such as RC Book, driving license were also supplied to Motor Vehicles Department.
- Successfully carried out Facility Management System for all the RT offices under MVD Vehicles Department.
- Providing infrastructure facility for training to Government employees in handling SPARK software.
- Conduct of Advanced Training programme for students belonging to Scheduled Caste.
- Completed digitisation of documents in sub-registrar offices in six districts, digitisation of old registration cards in employment directorate, and digitisation of palm leaves and archaeological documents in Sree Padmanabhaswami Temple.
- Completed online examination software for Entrance Examination Commissionerate, fair value application software for Registration Department, online payment gateway system for Registration Department and Kerala State Chalachithra Academy, Recruitment Management System for SIMET, e-monit system for Irrigation Department, WINGS project for Public Works Department, e-suraksha software for Social Security Mission.
- Facilitated Nammal Namukkai under Rebuild Kerala Initiative and Transgender Advocacy Campaign.
- Creative support for the Break the Chain Campaign to prevent the spread of Covid-19 pandemic.
- Creative support and technical facilitation of Break the Chain Campaign for Kerala Social Security Mission, "Koode" the portal for the Covid-19 affected patients, technical support for the creation of lessons for preschool learning titled "Kilikonchal," tutorial video for the Samoohika Sannadha Sena were the other projects of C-DIT in 2020-2021.

11. Institute of Information Technology-Kerala, Pala (IIIT-K, Pala). Government of Kerala started IIIT-K in 2015-16 at Pala, Kottayam under PPP mode to lead, organise and conduct research and innovation in IT and allied fields of knowledge. This is a joint initiative between Government of India, Government of Kerala and Industrial Partners with 50 per cent, 35 per cent, and 15 per cent share participation. The approved project cost is Rs 128 crore excluding land.

Way Forward

To stay competitive as an IT destination, the IT sector in Kerala must significantly enhance the value addition it brings to the State economy. It must attract investment in emerging areas in the IT sector and not rely solely on established IT/ITES activities. As the Indian IT sector as a whole grapples with issues of the changing focus and emerging issues within the global IT sector, Kerala must also keep pace with these changes. At the same time, the considerable advances that have been made in the digital empowerment of the population and the spread of IT awareness and use must continue to be built upon and developed with further investment in appropriate infrastructure. These would continue to serve the State's needs over a period of time and prevent obsolescence.

Education-enabled ICT, research and development and innovations need to be identified and promoted to strengthen the State's economy. It is expected that the thrust placed by the Government in infrastructure development, human resource development and overall economic development would open up more and more opportunities for the meaningful use of Information Technology. Our leap forward in IT related areas is dependent on attracting substantial investment in this sector and identifying and promoting young entrepreneurs through startups.

Chapter 7
Leveraging Science and Technology for Development

In this chapter we examine the current scenario with respect to science and technology in Kerala and the future development of this sector as part of the larger effort at Kerala's development. This is particularly relevant in the circumstances in which Kerala finds itself today in facing the challenge of sustainable development. Indeed, as we near the end of the 13th Five-Year Plan, the significance of the science and technology sector is perhaps even more evident and relevant than it was initially.

Introduction and Overview

It is a truism that science and technology are critical to development. However, as with all truisms about development, achieving it in practice does not follow in any automatic way. At the national-level, the recognition of the importance of science and technology as part of the development effort came early on, on the occasion of national independence itself, backed by a near universal political and social consensus. This has stood the country in good stead and provided it with the basic scientific and technological infrastructure that, by the 1970s, had placed India among the leading nations in science and technology in the developing world, and provided some hope of a bright future with a competitive scientific infrastructure by even developed country standards. Unfortunately, it may be argued that these hopes and aspirations for India still remains substantially in the future rather than having been realised in practical terms.

The reasons for this gap between hopes and their realisation are not difficult to track down. It may be argued that Indian science and technology increasingly presents the picture of an inverted pyramid with a substantially advanced infrastructure that rests on a fairly weak base. While the public sector institutions constitute a major part of the nation's science and technology assets, the private sector has not developed such institutions or a corresponding science and technology infrastructure, except in a very few select areas. These include pharmaceuticals (India's vaccine production capacities have been noted world-wide in the Covid-19 pandemic), some chemicals, and to a certain extent electronics and software. Overall, India's footprint in global patenting is very limited.

If technology research remains limited in scope and scale in the country, basic scientific research remains restricted in practice to a few institutions, even if they are of very high quality and the best of them truly world-class. In contrast, research in the higher education sector is overall fairly limited and questions may be raised as to its quality. In a larger sense, the decline in public investment in higher education has also further exacerbated the contrast between the best of India's basic science and the relatively low-level of the major part of science teaching and research in the higher education sector.

Kerala, however, presents a somewhat different picture. In contrast to most of the country, the State can justifiably boast of a school education sector that is not only comprehensive and universal in its coverage, but also set on a path of ever-increasing quality. Even more pertinently, Kerala's civil society is highly invested in science popularisation and the promotion of a scientific temper, on a scale that has no parallel in the country. But despite these two striking features, Kerala per se has only a limited footprint in the science and technology sector in the country. Some part of this is undoubtedly due to the limited Central investment in science and technology institutions in the State, with many of them focused on application-oriented research rather than in fundamental science. This has begun to change somewhat in more recent times. One must not forget though that there is a Kerala diaspora, a substantial section of it trained at least up to undergraduate-level in Kerala that is increasingly successful in competitive entry into scientific institutions in the country and outside.

While no individual State Government can match the scale of Central investment that is essential to drive regional science and technology development, Kerala has one of the more active and well-organised State-level departments of science and technology. It has a well-established network of institutions devoted to some scientific issues that are relevant to Kerala's ecological setting, a good connect with the higher education sector and definite areas of expertise, though in a limited range. While these are laudable they are still distant from the kind of integration of science and technology that is necessary for leveraging development in the future.

One area of success in this regard though is the role that Kerala's research and development institutions played recently in assisting the State in dealing with the natural disasters of two consecutive years in 2017

and 2018. The study led by the KCSTE on the flood and landslides in the State, their causes and potential mitigation, is a landmark that demonstrated the kind of specific contribution that these institutions could make to the sustainable development of the State.

We list below a few issues that, inter alia, need to be examined in the context of leveraging science and technology for development.

The first is the role of technology research and its relation to actual production. Two areas relevant in this respect are information and biotechnology. Neither of the two sectors can boast of an adequate linkage between research and production.

Promoting linkages between knowledge generation and actual production requires active partnership between industry and academia, especially in scientific and technical education, with the increasingly active engagement of industry professionals in specialised teaching. It is also essential to promote a broader culture of innovation throughout the higher education system. A valuable beginning can be made with promoting a mandatory course on innovation for all undergraduates and the encouragement of innovation as the focus of all final year project work that is now ubiquitous in higher education.

A second issue that has been much discussed is of quality. While it should not be exaggerated, the need is really to ensure institutional mechanisms for quality rather than mere exhortations.

A third serious concern is the need to maintain adequate and strong linkages with leading institutions outside Kerala. Currently institutions do maintain some links, but these are often dependent on individual contacts and are limited in number. Institutional-level linkages are at another level and developing these is a challenge. One outcome of such linkages is to bring scientists and researchers from outside the State into the Kerala Science and Technology system. Elsewhere in the country it cannot be missed that institutions with a cosmopolitan culture, drawing talent from across the country, are among the most successful. Locations that were in the lead in science earlier but had not developed such a culture have indeed fallen behind.

It must be recognised of course that much of the above cannot be driven solely by State-level finance, as these are meagre for the task at hand and will remain so for some time to come. Hence attracting Central investment, or external higher education investment that is in tune with the State's needs, are important avenues for growth of science and technology in Kerala. At the same time, prudent deployment of State resources where it can have the maximum impact without duplication is essential.

In the following sections, the developments in the science and technology sector in the 13th Five-Year Plan are sketched in some detail, though some of the lessons have already been noted above. Two notable successes have been the consolidation of the work of the Kerala School of Mathematics and its launching a new phase of growth and the other the establishment of the Institute of Advanced Virology, which is clearly a timely and noteworthy investment especially in the context of the issues raised by the Covid-19 pandemic.

Science and Technology in the 13th Five-Year Plan

The projects for the 13th Five-Year Plan were planned for the promotion, support and popularisation of science and technology and for the implementation of focused research programmes for the overall growth and development of the Kerala. It was proposed to encourage high quality research to take the State to a higher-level in research. Introduction of schemes on nanotechnology and biotechnology for addressing various State-related issues like pollution, waste management, and better life care were also envisaged for the plan period. The approach towards the science and technology development in the current plan was focused on the real developmental needs of Kerala. The approach of funding to individual projects in the random order, of course, on some general major theme, was to be replaced by funding to integrated collaborative and multidisciplinary science and technology research by bringing all the research and development centres to specific goals. The overall focus was on science, technology and innovation for sustainable development and inclusive growth in the socio-cultural economic context of the State .

Key Features of Approach to 13th Plan

- Science and technology investment at the State-level must improve the capacity of the State Government to attract investment, develop local resources and facilitate innovations.
- State efforts should complement rather than substitute Central support for the science and technology sector.
- It is essential to ensure an adequate system of peer review, project evaluation and timely delivery for research projects, research grants and fellowships granted by Kerala State Council for Science, Technology and Environment (KSCSTE).
- Promoting coordination and collaboration between research institutions and higher education system.
- Support to improve participation of women, people

of the Scheduled Castes and Scheduled Tribes in science and technology for a diverse and inclusive human resource base for science and technology.

Vision

The 13th Plan envisaged implementing programmes to achieve excellence in science and technology within the State and to provide service to the society at large. The overall plan focuses on science, technology, and innovation for sustainable development and inclusive growth in the socio-cultural and economic context of the State .

Mission

Delivery of science and technology led solutions for improving the quality of life of the people and the environment being the thrust, the plan is framed in conformity to this vision.

Public investment in science and technology sector in Kerala has been focusing on generating new income and employment opportunities in the State. The two major institutions in the Science and Technology sector in the State are the Kerala State Council for Science, Technology and Environment (KSCSTE) and the Regional Cancer Centre (RCC), Thiruvananthapuram.

Kerala State Council for Science, Technology, and Environment (KSCSTE)

The main objective of KSCSTE is to plan and formulate science, technology and innovation policy pertaining to the development of the State. The council promotes and activates programmes for increasing the stock of knowledge in science, and fine tunes policies which are significant and for the sustained development of humanity. It also drives the research and development efforts of the research and development centres and offers assistance for the creation of physical infrastructure and procurement of scientific infrastructure through the development and selective augmentation of research and development activities. The other initiatives include,

- Science popularisation programmes
- Research development programmes
- Ecology and environment related programmes
- Awards and recognition for science promotion
- Technology development and transfer
- School-level promotional activities

New initiatives suggested in the 13th Plan

- Green Technology initiatives: Programmes on green technology are proposed to be undertaken through inter-institutional collaborations with CSIR National Institute for Interdisciplinary Science and Technology (NIIST), Central Tuber Crops Research Institute (CTCRI), universities and the research and development institutions of KSCSTE.
- Preparation of database of Women in Science in Kerala: Programme to analyse the representation of women in various sectors of science and technology to address the concerns on under representation in any of the science and technology sectors. Online baseline data on women in science will be collected through an online directory and analysed to arrive at the present status of women in various sectors of science profession which will help to address the concerns on their under representation in any of the sectors.
- New programme to support the research and development on assistive technology.
- Institute of Virology, Kerala, for strengthening epidemic preparedness, rapid response and risk communication to the public apart from the high end research in the area of basic as well as translational virology. It is proposed to have the biosafety measures in the institute to handle high risk viruses.
- Research and development activities in areas of green energy harvesting, natural resource development and management, recirculation aquaculture, waste management and technology options for livelihood support.
- Green technology initiatives for making all activities of KSCSTE environmentally sustainable.

Physical achievements upto 2019

The plan allocation to KSCSTE under science and technology component is made under the following schemes:

i. Research and development institutions under KSCSTE
ii. Infrastructure Strengthening of KSCSTE
iii. Schemes and programmes of KSCSTE
iv. Grant-in-aid support to science and technology institutions
v. Biotechnology Development Programme
vi. Special programmes of KSCSTE
vii. Karamana River Scientific Management Project

During the current Five-Year Plan period, the following new schemes were initiated:

i. Institute of Advanced Virology (IAV)
ii. Institute of Diabetic Research

Highlights of major achievements

- **Establishment of Institute of Advanced Virology.** The Institute of Advanced Virology (IAV) is a significant milestone in Kerala's efforts to embrace

Table 7.1 *Outlay and expenditure of science and technology sector,* in Rs crore

Year	Outlay	Expenditure
2016-17	159.15	86.01 (54.08%)
2017-18	175.07	82.00 (46.84%)
2018-19	194.08	90.59 (47%)
2019-20	225.18	65.36 (29%)

Source: Plan Space Kerala

world class science research and development. It was established in 2019 in the Bio 360 Life Sciences Park, Thonnakkal, Thiruvananthapuram by the Government of Kerala is envisioned as an institute of global standards networking Global Virology Institutes with most modern laboratories focusing research, diagnosis and management of emerging and re-emerging infectious viral diseases. Its vision is to harness the best and eliminate the worst of viruses for a better human life and to work as a centre of excellence in collaboration with international institutions for training and education in the context of research covering basic science and translational research, providing sufficient scientific inputs to enable the prevention and control of viral infections. Its mission is to develop state-of-the-art infrastructure, skilled scientific and technical personnel, and services and products in virology to serve local, national and global needs. The institute has been virtually inaugurated in October 2020.

- Scaling up of activities Kerala School of Mathematics (KSoM) through initiation of an integrated MSc/PhD programme and strengthening of postdoctoral scholars' recruitment.
- Established Analytical Instrumentation Centre at Kerala Forest Research Institute which will benefit the research students from central and north Kerala.
- A total number of 689 research fellowships were awarded under various schemes/programmes of KSCSTE.
- Kerala hosted the National Children's Science Congress for the first time in the history of the State.
- Organised Rural Investment Meet, TECHFEST, Science Congress, etc.
- Young scientist awards were given to 22 scientists.
- Upgradation of science labs in schools, especially after the flood in the State. 62 science post-graduate labs and labs in 179 government and aided schools in the State were augmented under SARD scheme.
- Launched new online portal for receiving application for Prathibha scholarship and a total number of 357 scholarships were awarded.
- Flood mapping, and biodiversity documentation after the floods.
- Malabar Botanical Garden initiated establishment of a Science centre at Kozhikkode.
- Initiated academic attachment programme for those undergoing studies in plant science in the colleges of Kerala.
- Improvement of Lab facilities in more than 20 educational institutions under Sasthraposhini scheme.
- Women empowerment programmes were undertaken for supporting women who had undergone a career break and for attracting women and girl students to science stream.

  i. About 15 research fellowships were awarded under Back to Lab Research Fellowship programme.

  ii. Awareness Programme on "Technological advances in transforming women's lives." 600 to 700 women participants had benefited from the programme on technological advances in sectors such as energy management in household, food and nutrition, soil and water conservation, and organic farming.

  iii. Preparation of database of Women in Science in Kerala – an important initiative suggested to be taken up during the 13th Plan. 2,918 registrations were made in the online directory which is developed for obtaining base-line data on the status of women in various sectors of Science in the State.
- Extended financial support to 145 new research projects.
- Published about 180 science journals, more than 1500 science research articles and 40 books.
- Prepared GIS-based information system for inland water ways in Kerala
- Trainings imparted through various programmes and more than 1500 persons were trained through these programmes.
- Developed green technology for organic compost production.
- Infrastructure development in all the research and development institutions under KSCSTE.

Research and development centres under KSCSTE

There are seven research and development centres under the Council which conducts research and development activities in specific mandated domains.

Major initiatives/achievements of the centres are detailed below:

1. Kerala Forest Research Institute
   - The Bamboo Primary Processing Centre (BPPC) was set up under the Bamboo Technical Support

Table 7.2 *Overall performance of research and development centres*

Details	Number
PhDs	42
Persons trained (Research)	1255
Persons trained (Technical)	986
Patents filed	5
Technology transferred	3
Research papers	59
Trainings	37
Publications in refereed journals	60
Book/chapters	11

Group with the support of the National Bamboo Mission (NMB).

- A database of forestry literature developed under the project titled "An Information System for Forest of Kerala." This database consists of 6200 records which include scanned books, reports, and journal articles, working plans, management plans and thesis. Scanned materials are processed and metadata is provided for each record.
- Bibliographic citations of 9600 articles related to Indian Forestry were covered.
- Developed a digital library for the Teak Museum.
- Conducted district-level survey for studying factors affecting roosting ecology of birds in Kerala.
- The Central Instrumentation Unit of KFRI generated an income of Rs 2.7 lakh.

2. National Transportation Planning and Research Centre (NATPAC)

- Prepared GIS-based road and traffic database for the roads in the State.
- Air Pollution Index of the State was developed.
- Developed a traffic growth rate model for national highways in the State.
- Conducted study on the impact of duration of flooding on different layers of flexible pavements of flood prone roads in Kerala.
- Prepared regional transportation development plan for various districts in the State.
- Conducted study on the effect of vehicle type in the saturation flow at signalised intersections.
- About 13 road safety projects/programmes pertaining to schools, panchayats, drivers and other road users were competed reaching a target more than 3000 road users.
- Carried out 28 research projects and 34 externally funded projects.
- Devised a system for emergency vehicle priority for the operation of ambulances**.**
- Prepared reports on investigation of major accident spots, causative analysis and mitigation measures.
- Prepared GIS-based information system for water ways in Kerala.
- Prepared database pertaining to road accidents, pavement management system, traveller/tourist information system for Kerala in GIS pattern.
- Completed study on failure of roads in Kuttanad region.

3. Centre for Water Resources Development and Management

- CWRDM has prepared Water Security Plan for 13 gram panchayats for Jalanidhi Project-Phase II in Malappuram, Kozhikode, and Kasaragod Districts.
- Prepared Hydrological Information System for the river basins in Kerala.
- Water quality testing and issuance of water card is being done routinely based on request from panchayats/municipalities/corporations/other public bodies.
- Assessed water, sanitation, and hygiene (WASH) facilities in Attappady block under UNICEF Project.
- Coordinated the preparation of District Irrigation Plans for Palakkad and Idukki Districts under Pradhan Mantri Krishi Sinchai Yojana (PMKSY).
- Developed irrigation schedule for coconut and pepper for different agro-ecological zones.
- Prepared preliminary investigation report for Mitigation Measures for Flood Abatement in upper Kuttanad.
- Completed study on analysis of climatic parameters in Kozhikode.
- Identified community based water supply schemes in different local bodies with the objective of evaluation of impact of such schemes in the State.
- Developed regional flood frequency model using L moments with the purpose of regionalising the river basins of the State and developing flood frequency relations for each region.

4. Jawaharlal Nehru Tropical Botanic Garden and Research Institute

- Ethnomedical survey and systematic documentation of Traditional Knowledge among 13 tribal communities in 17 gram panchayats of 3 districts of Kerala were completed.
- Ethnobotanical survey in the coastal areas of three southern districts of Kerala has been

completed, based on which 3069 information were documented including food plants (422), medicine (2117), fodder (132), fishing tools and implements (281), fuel (117), etc.

- An integrated research and development centre of JNTBGRI, for promoting green industry established at Kuzhoor Panchayat, Kodungallur, Thrissur District, with the financial support of Kerala State Industrial Development Corporation (KSIDC), Government of Kerala.
- Competed Ethno botanical survey in the coastal areas of selected panchayats in Thrissur for the systematic documentation of ethno-medico botanically important plant species used for food and medicine by different tribal communities in the district.
- Community Agro Biotech Resource Centre of JNTBGRI conducted training programme for 300 rural women on medicinal plant cultivation and production of value added products from locally available plant resources with the objective of disseminating appropriate technologies to rural population for economic upliftment and income generation.

5. Kerala School of Mathematics

Kerala School of Mathematics (KSoM) imparted training to Maths Olympiads and Maths talent search, organised summer and refresher trainings and orientation programmes to college teachers and conducted national and international workshops and seminars. They conducted 29 training programmes and workshops. It has now initiated, with recognition from the University of Calicut, an integrated Masters/PhD programme. It is also expanding its post-doctoral research programme. KSoM conducted a very successful international mathematics conference that was widely attended and attracted large viewership.

6. Srinivasa Ramanujan Institute for Basic Sciences (SRIBS)

The institute has organised colloquia, seminars; workshops benefitting students, teachers and researchers in various areas of science. Academic programmes were conducted in which there were about 50 participants across the State every year.

7. Malabar Botanical Garden and Institute of Plant Sciences (MBGIPS)

- The United Nations University-Institute for Advanced Studies (UNU-IAS), the academic and research arm of the UN, recognised MBGIPS as the Regional Centre of Experts (RCE) in sustainable education.
- Number of publications-32
- Trainings conducted-10

Schemes and programmes of KSCSTE

The schemes and programmes of the Council are aimed at the development of high quality science education system in the State. With a view to identify and implement programmes to achieve excellence in science and technology within the State and to provide service to the society at large, the Council is implementing various schemes and programmes, focusing on popularisation of science and promotion, research and development, ecology and environment, technology development and transfer, biotechnology development, school-level promotional activities, and science programmes for women.

Table 7.3 *Overall achievements of schemes and programmes*

Scheme/ programmes	Projects sanctioned	PhDs	Publications			Trainings	Patents filed
			Refereed journals	Books/ book chapters	Conference/ seminars		
HR development in science and technology							
Science research scheme (SRS)	133	10	558	-	487	166	18
Emeritus scientist scheme	17	23	546	9	70	-	3
Students projects	417	-	-	-	-	-	-
Scheme for Promotion of Young Talents in Science (SPYTiS)	581	-	-	-	-	-	-
KSCSTE research fellowship	-	55	197	-	64	-	-

Postdoctoral fellowship	38	-	25	3	66	-	-
22 best paper/poster awards were given in conferences under SRS							
Infrastructure development in science and technology							
Selective Augmentation of Research and Development (SARD)	62 science post graduate laboratories/research institutions and 179 Government/aided schools in the State were augmented. Published 31 papers.						
Sastraposhini	17 Government schools and 4 model residential schools were selected for establishing model science laboratories						
Technology development and transfer							
Engineering Technology Programme	Sanctioned projects-19, PhDs-19						
Technology development and adaptation programme	Sanctioned projects-11						
Rural technology programme	Sanctioned projects-18						
Patent information centre	Patent applications processed-105						
Support to women in science							
Back to Lab research fellowship programme	25	14	48				1
Awareness Programme on "Technological advances in transforming women's lives"	Sanctioned Projects-7 600 to 700 women participants had benefited from the programme on technological advances in sectors such as energy management in household, food and nutrition, soil and water conservation, organic farming, etc.						
Project on Preparation of database of "Women in Science in Kerala."	2,918 registrations were made in the online directory which is developed for obtaining base-line data on the status of women in various sectors of Science in the State.						
STARS (Students with talent and aptitude for research in science)							
Pratibha scholarship scheme	Lunched new online portal for receiving application for the scholarship No. of scholarships-357						
SPEED (Student Programme for Excellence in Experimental Design). In 2018-19, a five-day residential science camp for Prathibha scholars was organised at Indian Institute of Science Education and Research (IISER) under SPEED (Student Programme for Excellence in Experimental Design)							
Kerala Young Scientists Awards were given to three scientists in 2018-19							

Box 7.1
Institute of Advanced Virology

The Institute of Advanced Virology is a significant milestone in Kerala's efforts to embrace world-class science research and development. It was established in 2019 in the Bio 360 Life Sciences Park, Thonnakkal, Thiruvananthapuram by the Government of Kerala. It is envisioned as an institute of global standards networking global virology institutes with most modern laboratories focusing research, diagnosis, and management of emerging and re-emerging infectious viral diseases. Its vision is to harness the best and eliminate the worst of viruses for a better human life and to work as a centre of excellence in collaboration with international institutions for training and education in the context of research covering basic science and translational research, providing sufficient scientific inputs to enable the prevention and control of viral

infections. Its mission is to develop state-of-the-art infrastructure, skilled scientific and technical personnel, and services and products in virology to serve local, national and global needs. The institute with a total project cost of Rs 202 crore is aimed to work for industrial transfer/facilitation of technology and Kerala State Industrial Development Corporation will be a partner to provide land and infrastructure. The construction of campus at Thonnakkal, Thiruvananthapuram, spread over 25 acres of land is in two phases, Phase I and Phase II consisting of Phase 1A Prefab building (25,000 square feet) of 2 floors housing Administrative block, biolabs, common instrumentation room, biosafety-level facilities, and diagnostic facilities and Phase IB main building (78,000 square feet) of 3 floors with administrative block, biolabs, biosafety-level facilities and functional division. The institute was virtually inaugurated in October 2020 and is affiliated to the Global Virus Network, which has 45 centres of excellence in over 29 countries. The clinical virology and viral diagnostic divisions became operational in the pre-fab building.

Regional Cancer Centre

Globally, about 1 in 6 deaths is to cancer. Approximately 70 per cent of the deaths from cancer occur in low and middle income countries. Regional Cancer Centre (RCC), Thiruvananthapuram, is an autonomous scientific institution sponsored jointly by the Government of Kerala and Government of India. The centre was established in the year 1980 as a tertiary referral centre for the diagnosis and treatment of cancer. RCC ranks in the top three among the 28 Regional Cancer Centres in India. It is the only comprehensive, dedicated centre for diagnosis, treatment, and control of cancer in Kerala. On an average 60,000 new patients occur every year in the State and out of this nearly one third comes to RCC for treatment. The Centre undertakes basic, translational and clinical research and disseminates the knowledge.

13th Plan

Vision. The vision of RCC in the 13th Plan is to emerge as a global leader in cancer control.

Mission.

- Deliver highest quality cancer care at affordable cost.
- Create cancer awareness among public and health professionals.
- Generate trained manpower in cancer control.
- Organise outreach programmes in cancer control.
- Conduct focused cancer research relevant to society.
- Lead cancer control activities in the State

Targets and strategies for the 13th Plan

- Construction of a 14 storey building: New block with state of the art facilities building in 14 floors with 2.75 lakh square feet built up area hosting radiotherapy block, new Blood Bank, 10-bed bone marrow transplant unit, modular operation theatres, 8-bed nuclear medicine ward, robotic surgery unit, advanced microbiology laboratory, ICUs, surgical and medical wards, pay wards and hostels costing Rs 187.22 crore with the target of improved space for patient care facilities.
- Creation of infrastructure facilities and procurement of machinery and equipment in the new building.
- Implementation of the centrally sponsored scheme upgradation of RCC as State Cancer Institute: Under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke (NPCDCS), the Central Government has approved a project costing Rs 120 crore for upgradation of RCC as State Cancer Institute on cost sharing mode of 60:40 between Government of India and Government of Kerala. The expected outcome of the scheme includes capacity building at various-levels of health care for prevention, early diagnosis, treatment and operational research, ensuring support for diagnosis and cost effective treatment at primary, secondary and tertiary-levels of healthcare and support for development of database of non-communicable diseases (NCDs) through a robust Surveillance System and to monitor NCD morbidity, mortality, and risk factors.

Table 7.4 *Profile of RCC at a glance, 2016-17 to 2019-20*

New cases registered	63,799
Review cases registered	10,09,345
In-patient admissions	46,077
Radiotherapy	27,782
Brachytherapy	2166
Surgical procedures	24,641
Endoscopic procedures	9976
Chemotherapy administered	46,240
Bone marrow transplantations	147
Cancer detection programmes	1432
Cancer education programmes	790
Ongoing research projects	695

- Augmentation of facilities for early detection of cancers.
- Upgradation of training and research facilities for maintaining high standards in training and research.

Central and State Government schemes

- Both Central and State Governments have initiated various schemes to ensure free or subsidised treatment for cancer patients.

Major initiatives of RCC

In addition to the Government-supported schemes, RCC provides support to patients and families through various other schemes as detailed below:

1. Free Drug Bank: The Free Drug Bank functions according to specific guidelines and is monitored by a committee constituted by the Director, RCC. The drug bank provided full or partial help to 999 patients up to 2019.
2. Free food (*Akshayapathram*): Free food was provided to 20,423 patients belonging to vulnerable socio-economic groups with the support of many philanthropic organisations.
3. Support for Pediatric patients: "Prathyasa," a voluntary group working in collaboration with pediatric oncology division gives financial and psychosocial support to children and their families.
4. Indian Cancer Society Support Scheme: RCC was selected as one of the five cancer centres across India for receiving financial support from the Indian Cancer Society for treatment of cancer. 476 patients received support through the scheme.

Human resources development

1. International School of Colposcopy. 65 doctors were given one-week hands on training and 101 BSc (MLT) students and 21 nurses were given one day orientation programme on low cost Cervical Screening Strategies such as pap smear VIA, VILI, and colposcopy.
2. Trainer-trainee programmes: A total number of 10,816 people were trained in 2018-19 through trainer-trainee programmes conducted for healthcare providers which included doctors, post graduate medical students and paramedical staff from Governmental and non-Governmental institutions, Community Volunteers such as NSS and ASHA workers, NCC cadets, jail warders, etc. Out of the total people trained, more than 50 per cent were community volunteers.
3. House Surgeon's Training programme: A total number of 104 house surgeons participated in the training programme for house surgeons of Government Medical College and Government Dental College, Thiruvananthapuram, on cancer prevention and control.

Cancer control activities

1. Early cancer detection. A total number of 9807 persons attended the early cancer detection clinic of RCC. As a result, 1321 cancers and 2145 pre-cancers were detected.

Table 7.5 *Central and State Government schemes, 2016-17 to 2019-20*

Scheme	Patients enrolled (new Cases)	Total no. of people benefited	Amount spent (in Rs crore)
Central Government Schemes			
Prime Minister's Relief Fund	992	4551	8.29
Health Minister's Rashtriya Arogya Nidhi (RAN)	505	6161	2.81
Health Minister's Discretionary Fund	9	68	0.0153
Indian Cancer Society	34	320	2.76
Health Minister's Cancer Patient Fund (HMCFP- CSR Scheme)	67	173	0.30
State Government Schemes			
Cancer Suraksha Scheme	2055	20,639	23.38
Chis Plus	19,475	14,3,069	51.38
Karunya Benevolent Fund	15,509	91,043	107.12
Sukrutham	5030	31,449	36.53
Thalolam	43	390	0.09
Scheduled Tribe Patient Fund	110	1413	0.86
Snehasanthwanam for Endosulfan victims	22	195	0.08

2. Cancer outreach programmes. A total number of 213 cancer detection camps were conducted in various parts of the State in which 25,167 people underwent screening. A total number of 14711 trainees were sensitised in cancer control through 113 cancer awareness programmes.

Apart from these, 22 camps were conducted as part of the bi-weekly cervical cancer detection clinic for the women residing at Mangalapuram in Thiruvananthapuram and of the 140 women screened, 1 cervical cancer and 6 cervical pre cancers were detected. 74 tobacco users attended the Clinic for Tobacco Cessation. Programmes on substance abuse threat in Model Residential Schools in Kerala, cancer prevention among vulnerable groups in tribal settlements, and cancer detection camps were arranged with the support of Scheduled Tribes Department as part of the cancer prevention and control activities in 6 panchayats in tribal areas of Thiruvananthapuram.

3. Research and development activities. The RCC as a pioneer research institution in cancer research has produced several PhDs in cancer research. Until 2019, around 85 scholars were pursuing PhD, 99 residents undertook specialisation in medical, pediatric and surgical oncology super specialty courses, and 141 residents undertook postgraduate courses in anaesthesia, pathology, radio diagnosis, and radiotherapy in the centre. The number of ongoing research projects is 480.

4. Infrastructure development in RCC.

i. Expansion of Physical infrastructure

The preliminary works of the construction of a state of the art building of 14 floors with 2.75 lakh square feet built-up area hosting radiotherapy block, new blood bank, 10-bed bone marrow transplant unit, modular operation theatres, 8-bed nuclear medicine ward, robotic surgery unit, advanced microbiology laboratory, ICUs, surgical and medical wards, pay wards, and hostels costing Rs 18,722 lakh has been started by RCC in a phased manner with the target of improved space for patient care facilities.

ii. Diagnostic and treatment facilities added during the period 2018-19.

- Three anesthesia work stations and four ICU ventilators.
- Integrated bipolar and ultrasonic cutting and coagulation units.
- Digital radiography and fluroscopy system.
- Supersonic USG machine with elastography.
- Fourier transform infrared spectrometer.
- New casuality was inaugurated.
- New facilities were added to various divisions such as radiodiagnosis, radiation physics, microbiology, pathology, anesthesia, bone marrow transplantation unit, transfusion medicine, surgical oncology, new casuality, research and information system division.

Covid-19 related activities

- Decentralisation of cancer care in all districts through RCC trained doctors in district and taluk hospitals.
- Effective containment of Covid-19 infection in RCC through formation of Covid monitoring cell.
- Distribution of cancer drugs worth Rs 47 lakh to patients at their homes through Kerala Fire Services.

RCC: Challenges ahead

1. Completion of 14 storied building in RCC.
2. Create more space by expansion of physical infrastructure.
3. Virtualisation of IT hardware infrastructure
4. Hyper converged IT infrastructure
5. Tobacco related cancers in Kerala State are still high. Scale up tobacco control measures to reduce the burden of tobacco related cancers in collaboration with various departments in the State.
6. Training of doctors and nurses in State Health Services Department. The intention is based on the fact that more than 60 per cent of common cancers occurring in the community are diagnosed in advanced stages. To counter this it is essential to give prime importance for early cancer detection for which doctors of primary and community health centres have a major role to play.

Chapter 8
Tourism in Kerala

Tourism is regarded globally as a sector that has high economic value, because it creates employment, generates foreign exchange, spurs regional development and promotes traditional industries. International tourist arrivals across the world grew 4 per cent to reach 1.5 billion in 2019. Tourism is the third largest export sector in the world, accounting for 7 per cent of global trade. The tourism value chain extends across several verticals and industries, involving lodging, travel, transportation, food industry, retail trade, and entertainment sectors. Because of its extensive backward and forward linkages, tourism also plays a major part in local economic development. The sector is important in developing economies because of its emphasis on small businesses and its potential for generating local employment and livelihoods, particularly for youth and women.

Tourism in India

The growing influence of the tourism sector as an economic powerhouse and its potential as an instrument of development has been recognised at the national-level. The Government of India has devised schemes that aim to harness the direct and multiplier effects of tourism on employment and poverty eradication in the country. It has been estimated through the Satellite Tourism Accounts Framework that tourism contributes 5.06 per cent to the GDP of the country, of which 2.63 per cent is direct and 2.43 per cent is indirect. The role of the Government in tourism development has been redefined from that of a regulator to that of a catalyst involving synergy and convergence with different stakeholders. Improving tourism infrastructure, easing the visa regime, assuring quality standards in the services of tourism service providers, projecting the country as a round-the-year destination, and promoting sustainable tourism are some of the policy areas that have been identified in order to increase and facilitate tourism in India. One of the notable initiatives of the Government of India in recent years is the introduction of a facilitative visa regime, extending the e-visa facility to a majority of countries, thereby making it easier for visitors to travel to India. In 2019, a total of 2.93 million foreign tourists arrived on e-tourist visas, a growth of 23.6 per cent.

Tourism in Kerala

In Kerala, the tourism industry is characterised by strong branding, consistent growth, diverse products, and the strong presence of local entrepreneurs. Tourism has been a significant contributor to the State's economy for the last three decades, bringing in earnings of Rs 45,019 crore in 2019 and providing employment to approximately 1.5 million people, directly and indirectly. The State Government has identified the sector as one of the most significant growth areas, one that can contribute substantially to the State economy. Within its constraints, the State has invested in the tourism sector, developing basic amenities in tourism destinations, investing in creating tourism products and experiences, providing information and facilitation centres, providing visitor facilities and building infrastructure for land and water-based tourism activities. Although there has been State investment in the creation of accommodation facilities, there has been a decrease in investment in such infrastructure over the years, in the light of substantial private investment in building hotels and resorts. Another major area of investment for the State has been marketing and promotion in national and international markets. The State machinery is involved in quality assurance and certification programmes, defining service standards, and conducting approval and accreditation programmes.

The growth trajectory of Kerala as a tourism destination is distinctive, considering the fact that the State does not have the notable heritage tourism assets that characterise destinations such as Delhi, Rajasthan, or Uttar Pradesh. Although the State is a relative latecomer in the sector, it has managed to carve a niche for itself in the national and international arenas. The destinations of the State showcase the rich natural beauty in a variety of settings, ranging from its beaches and backwaters to mountain landscapes. Most importantly, the State has managed to attract visitors by capitalising on its human resources potential, drawing on its image as a friendly, safe destination, and opening its doors to guests. Another feature of the State that has attracted tourists is the character of its accommodation facilities, featuring local and small-scale options that provide a personal and intimate experience.

Approach during the 13th Plan period

After the boom period of the 1990s and early 2000s, the rate of growth of tourism arrivals declined in Kerala. Tourism, however, has continuing and promising potential in the State. There is the vast and

relatively unexploited tourist potential of the northern parts of the State. Backwater-based tourism is presently confined to the Alappuzha region, and there are several picturesque areas in other regions that are conducive to the development of tourism. Similarly, in its effort to attract new segments of travelers, the State has to broaden its offerings to include active and adventure tourism, special interest groups, and visitors interested in niche experiences.

Tourism development requires technical expertise and all-round planning. It must cater to all sections of tourists, ranging from luxury tourism through lower-income family tourists to backpackers. During the 13th Plan period, the Government aimed to put in place a new growth strategy for tourism in the State, with ambitious targets of doubling the number of foreign tourists, increasing domestic tourist arrivals by 50 per cent, and creating around 400,000 jobs in the sector over the Plan period.

Public spending on infrastructure and destination development is still substantially more than investments in marketing and promotion. The department sought to correct this imbalance by aiming to raise the share for tourism promotion to at least one-third of the total allocation. In order to realise the full potential of the State, the policy is to explore and utilise all available tourism resources, natural and cultural. This involves the development of non-traditional tourism destinations and products, thus extending tourism geographically across all regions, and throughout the year. Significant investments were planned to develop heritage resources that were hitherto under-exploited, and to promote international cultural events such as the Kochi-Muziris Biennale.

In view of the capacity of the sector to absorb skilled manpower, the State also planned to expand operations in developing the human resources needed for the sector, preparing youth with the skill-sets required to deliver high-quality services. The initiative aimed not only to upgrade human resources for domestic service providers in the State, but also to prepare young people for employment in the tourism sector in other parts of India and the rest of the world. Although there has been continuous increase in private investment in the sector, the Plan laid emphasis on substantially increasing the number of places providing quality accommodation in the State, aiming to double the number of classified rooms and to add one thousand units of homestays. A thrust area identified for special attention was the development of properties and activities in northern Kerala, which was lagging behind other regions in terms of arrivals. In addition, special attention was to be paid to develop the potential for activity and adventure tourism, which has a rich resource base of natural forest. This involves the identification and development of new trekking routes, camping sites, and adventure tourism centres, all of which was to be done in collaboration with the Forest department.

On the marketing front, efforts had to be taken to refresh the Kerala tourism brand, infusing more appealing campaigns catering to the diverse segments of visitors. There would be focus on the cultural products and experiences, such as the Kochi-Muziris Biennale and the Muziris, Alappuzha and Thalassery heritage circuits.

Table 8.1 *Plan outlay and expenditure in tourism sector in Kerala, 2016-17 to 2019-2020* in Rs crore and per cent

Year	Outlay	Expenditure
2016-17	311.56	285.76 (91%)
2017-18	342.73	308.32 (90%)
2018-19	379.00	289.31 (76%)
2019-20	372.37	192.62 (59%)

Major Achievements

1) Tourist arrivals: After the 2018 floods, the tourism sector rebounded strongly in 2019 and witnessed the highest growth rate in domestic and foreign tourist arrivals in the last 24 years. There was 8.52 per cent growth in foreign tourist arrivals and 17.81 per cent growth in domestic tourist arrivals in the State in 2019 than 2018.

2) New Tourism Policy 2017: Ensuring tourist-friendly, secure and safe destinations, formation of Kerala Tourism Regulatory Authority (KTRA), development of tourism projects of international standards in selected destinations through PPP mode, addressing key issues of the tourism industry such as waste management, initiating concerted efforts to tackle issues of connectivity to Kerala from major parts of the domestic and international markets, formulation of Kerala Tourism Entrepreneurship Fund (KTEF), preparation of action plan for sustainable tourism development.

3) Champions Boat League: As part of a novel venture to protect and promote the tradition of the land, Kerala Tourism has launched the Champions Boat League. The main objectives of the event are conservation and promotion of Kerala's traditional festivals, to create an annual event to be marketed as a tourism product

and to showcase backwaters of Kerala to the world. It has been conceived on the model of the Indian Premier League to transform the State's legendary and historically-significant *vallamkali* (snake boat race) into a world-class sporting event.

4) Jatayu Earth Centre Project: Jatayu Earth Centre, a unique combination of all aspects of tourism is the first major BOT tourism project in the State which offers a complete Kerala, God's own country experience to every tourist. The project is spread over 65 acres of multi-terrain landscape at Jadayupara near Chadayamangalam in Kollam District. The Jatayu Adventure Centre offers the largest adventure park within a natural terrain. Paintball, valley crossing, bouldering, zip line, trekking, archery, rappelling, jumaring, and wall climbing are among the myriad activities available in the centre. It is a unique combination of artistry, mythology, technology, culture, adventure, leisure, and wellness.

5) Responsible Tourism (RT) Mission: A unique initiative of the department that has caught the attention of the world. At present there are 17008 individual/ group units (out of which 13567 women owned/led units) registered with RT Mission and 92980 local community members are directly or indirectly linked with tourism and generating income. The registered units of RT Mission generated 25.50 crore from the formation of the Mission.

6) Launched first phase of barrier-free tourism project for making 70 destinations across the State disabled and elderly friendly.

7) IT initiatives

i) Kerala Tourism's Facebook page (more than 37 lakh followers), Instagram account (more than 3 lakh followers), and Twitter account (19 lakh followers) occupy first position in India.

ii) Prepared e-catalogue for Kerala tourism videos.

iii) Kerala tourism resource mapping for selected destinations.

8) New and innovative marketing campaigns: In order to retain market supremacy, Kerala Tourism launched innovative marketing campaigns like digital and social media campaigns that resulted in attracting more visitors and succeeded in branding Kerala.

i) Human by Nature Campaign: Internationally acclaimed campaign which showcased the culture and daily life of the people of Kerala and the strategy behind the campaign was the revival of the tourism sector that had suffered in the wake of 2018 flood and the outbreak of Nipah virus. About 3.10 crore people watched this campaign online.

ii) Advertisement campaign to promote tourism in the off season "Come Out and Play."

9) Emphasis on developing infrastructure in the northern region, including infrastructure projects for developing basic amenities, information centres, and infrastructure for land and water-based adventure tourism. Small and Medium Industries Leveraging Experiential Tourism (SMiLE) project implemented by Bakel Resort Development Corporation (BRDC) aimed to promote and facilitate tourism based small and medium entrepreneurial ventures, which have resulted in 93 new entrepreneurs of which around 30 per cent are women entrepreneurs, and opening of 50 units with accommodation for 400 tourists.

10) Farming on fallow land: Kerala Tourism extended its support to the State Government's *Subiksha Keralam* project, an initiative to ensure food security in view of Covid-19 pandemic, and converted one acre of unused plot at Akkulam in Thiruvananthapuram into a banana farm.

11) Covid loss assistance Scheme: The Government has announced a scheme to support the stakeholders in the tourism industry for the revival of the tourism sector in the wake of Covid-19.

12) Infrastructure development projects:

i. Set up Miniature Railway at Veli, Kanakakkunnu Digital Museum showcasing history of Travancore, light and sound show at Thenmala Ecotourism Centre, Renovation of Chalai market and Mittayitheruvu , Vagbhadanantha Park, Vellar Arts and Crafts Village , completed first phase of Panchalimedu tourism project at Idukki , second phase of Madavoorpada project, Akkulam Tourist Village.

ii. New buildings for Food Craft Institute at Uduma and Kannur and completed construction of SIHM building at Kozhikkode.

iii. Heritage Projects: notable projects focused on developing destinations were Muziris, Thalassery, and Alappuzha heritage circuits. The second phase of the Muziris Project is in final stage. Thalassery Project covers 3 districts and is divided into 4 circuits and total of 61 destinations are included under the project. Alappuzha Project – construction of Living Coir Museum, Coir Factory Museum, Coir History Museum, and Yawn Museum is nearing completion.

iv. Centrally Sponsored Schemes: Completed Pathanamthitta-Gavi-Wagamon-Thekkadi project under Swadesh Darshan Scheme, Sree Padmanabha Swami-Aranmula-Sabarimala project under Spiritual Tourism Project and Development of Guruvayur

Temple under Pilgrimage Rejuvenation and Spiritual Augmentation Drive (PRASAD) scheme.

13) Human resources development

i. Initiated diploma courses in adventure tourism
ii. Development of web portals: Tourism Careers in and tourism and hospitality.
iii. 114 regional and State-level tourism guides underwent training programmes conducted by Kerala Institute for Tourisim and Travel Studies (KITTS).
iv. More than 80 per cent students from KITTS, State Institute of Hospitality Management (SIHM), and FCI got placement.

Tourist Arrivals

In Kerala, the tourism sector rebounded strongly in 2019 after the 2018 floods and 2019 witnessed the highest growth rate in domestic and foreign tourist arrivals in the last 24 years. There was 8.52 per cent growth in foreign tourist arrivals and 17.81 per cent growth in domestic tourist arrivals in 2019 over 2018 in the State. Figure 8.1 reveals the trends in the arrival of foreign tourists in India and Kerala during the period 2010–2019.

Although the growth rate in Kerala was higher than that of India in most years, the State has been witnessing a declining growth rate after 2010. The number of foreign tourists who visited Kerala in 2019 was 11,89,771 as against 10,96,407 in 2018, recording 8.52 per cent growth as compared to 2018.

Seasonality in foreign tourist arrivals

In 2019, around 14 per cent of the total foreign tourists visited the State in January followed by December (around 13 per cent). January 2018 also witnessed maximum number of foreign tourist arrivals followed by December. The lowest foreign tourist traffic in 2019 was registered in June (3.83 per cent) and this trend has been continuing for the last 12 years. Figure 8.2 depicts the month-wise comparison of foreign tourist arrival in Kerala from 2010 to 2019.

Over the last decade, the United Kingdom, with a share of around 15 per cent, has been topping the list of the countries from which foreign tourists come to the State. The USA occupied the second position, with around nine per cent share. France and Germany are the other major markets. A notable feature in foreign arrivals in recent years is the rapid increase in arrivals from the Kingdom of Saudi Arabia and other GCC countries, indicating a sharp rise in interest in these markets for destinations in Kerala. The Tourism department, with its partners, has been consistently investing in developing these markets, through advertising campaigns, participation in travel fairs and organisation of trade meets. Another feature that may have contributed to this phenomenon is the increasing connectivity of destinations with source markets, with flights by several international carriers connecting three airports of the State to capitals of the GCC countries. Figure 8.3 illustrates the share of foreign tourist arrivals

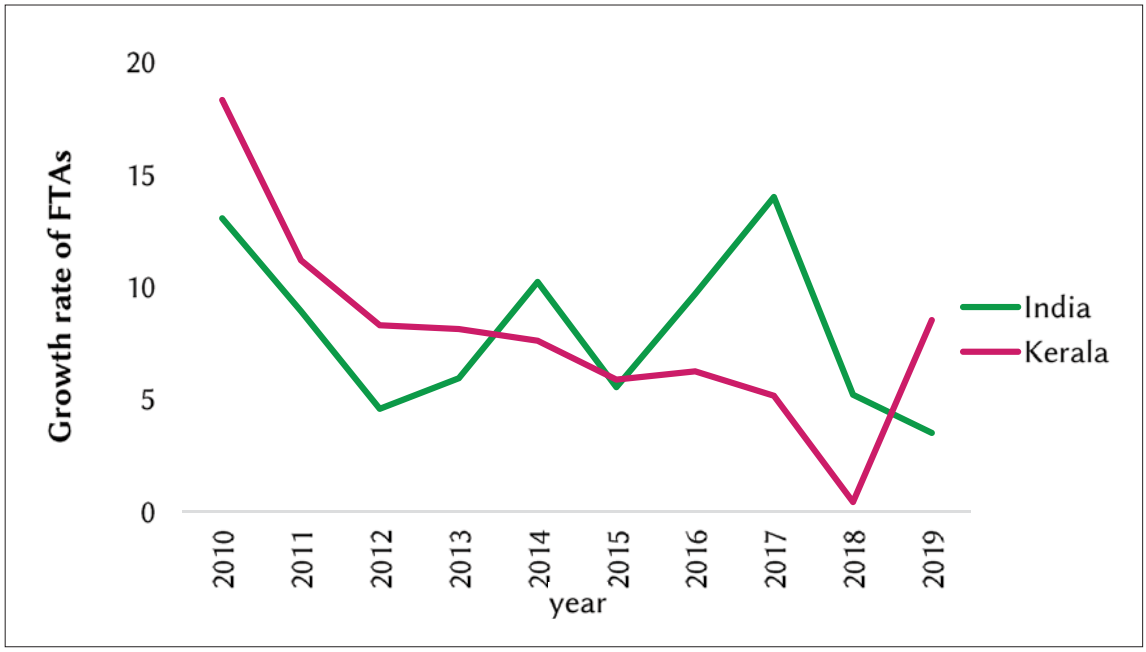

Figure 8.1 *Annual growth rates in foreign tourist arrivals (FTAs) in India and Kerala from 2010 to 2019* in per cent
Source: Department of Tourism, Government of Kerala

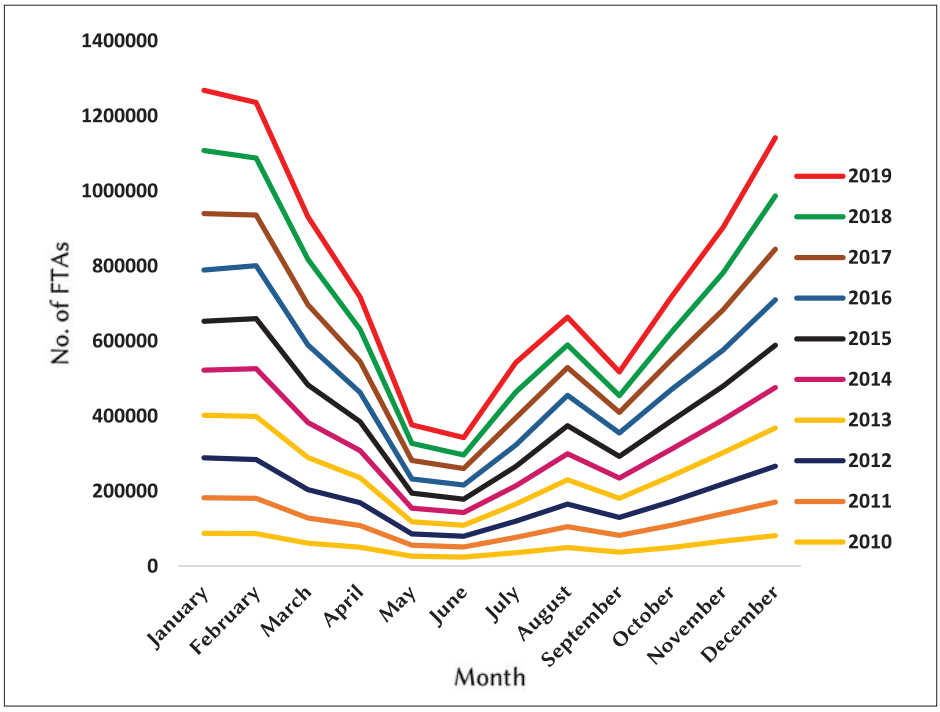

Figure 8.2 *Month-wise comparison of foreign tourist arrivals in Kerala from 2009 to 2019* in number
Source: Department of Tourism, Government of Kerala; Markets of Foreign Tourist Arrivals

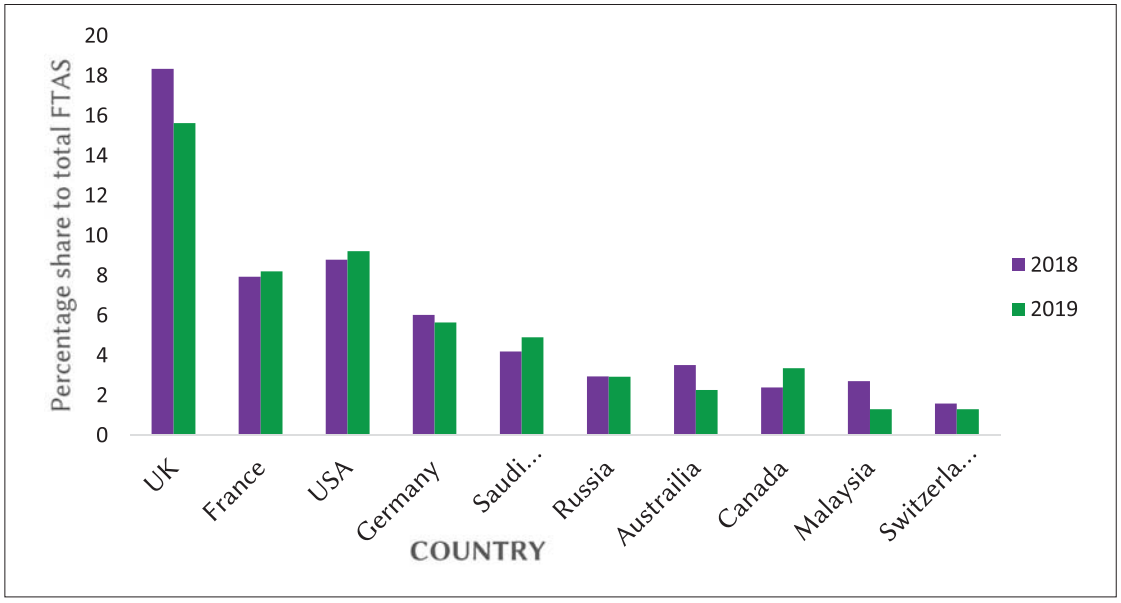

Figure 8.3 *Share of foreign tourist arrival from top ten countries of the world to Kerala in 2018 and 2019* in per cent
Source: Department of Tourism, Government of Kerala

to Kerala from top ten countries in 2018 and 2019.

For the last few years, the two districts that recorded the largest foreign tourist arrivals in the State were Ernakulam and Thiruvananthapuram. Pathanamthitta and Palakkad recorded the lowest number of foreign tourist arrivals. Region-wise figures of foreign tourists visiting the State indicate that around 57 per cent of tourists visited Central Kerala, comprising Ernakulam, Idukki, Alappuzha, and Thrissur districts. Thirty seven per cent of foreign tourists visited South Kerala, comprising Thiruvananthapuram, Kollam, Pathanamthitta, and Kottayam districts. It is notable

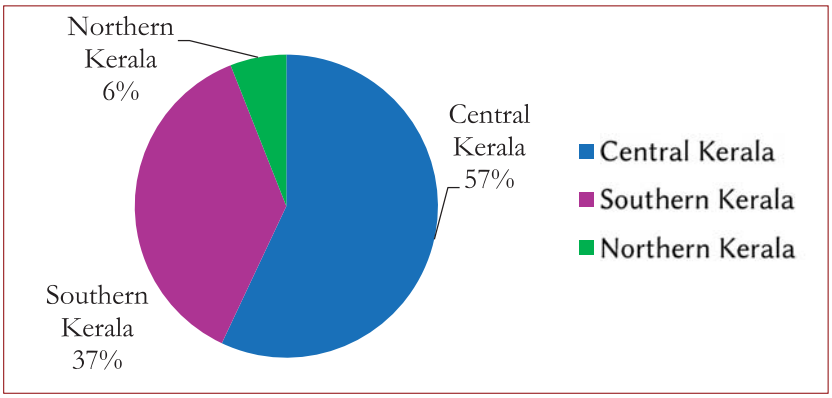

Figure 8.4 *Region-wise foreign tourist visits in Kerala in 2019* in per cent
Source: Department of Tourism, Government of Kerala.

that the six districts of North Kerala received only six per cent of all foreign visitors to the State. Figure 8.4 presents the region-wise arrival of foreign tourists in Kerala in 2019.

Domestic tourist arrivals

The number of domestic tourist arrivals to Kerala in 2019 was 1,83,84,233, which is 17.81 per cent higher than the previous year. Figure 8.5 reveals the trends in the arrival of domestic tourists in Kerala during the period from 2010 to 2019.

From 2009 to 2011, the growth rate in Kerala with respect to domestic tourist arrivals increased, and then began to decrease. The State had been witnessing a steady growth rate during 2012-2014. In 2015, the growth rate was 6.59 per cent, which dropped to 5.67 per cent in 2016. But the year 2017 recorded 11.39 per cent growth in the arrival of domestic tourists in the State which dropped again in 2018 and reached 6.35 per cent. But in 2019, the State witnessed 17.81 per cent growth in domestic tourist arrivals.

The month-wise data on the arrival of domestic tourists in Kerala shows that the highest inflow of tourists was for the month of December and the lowest was in the month of August. Figure 8.6 portrays the month-wise arrival of domestic tourists in Kerala from 2010 to 2019.

The data on the distribution of domestic tourist visits in Kerala by State of origin show that about 64 per cent originated within the State. With respect to the distribution of other States, Tamil Nadu ranks first, with a share of around nine per cent, followed by Karnataka (six per cent) and Maharashtra (four per cent). Figure 8.7 shows the State-wise share of domestic tourist arrivals to Kerala from the top 10 States of origin in 2018 and 2019.

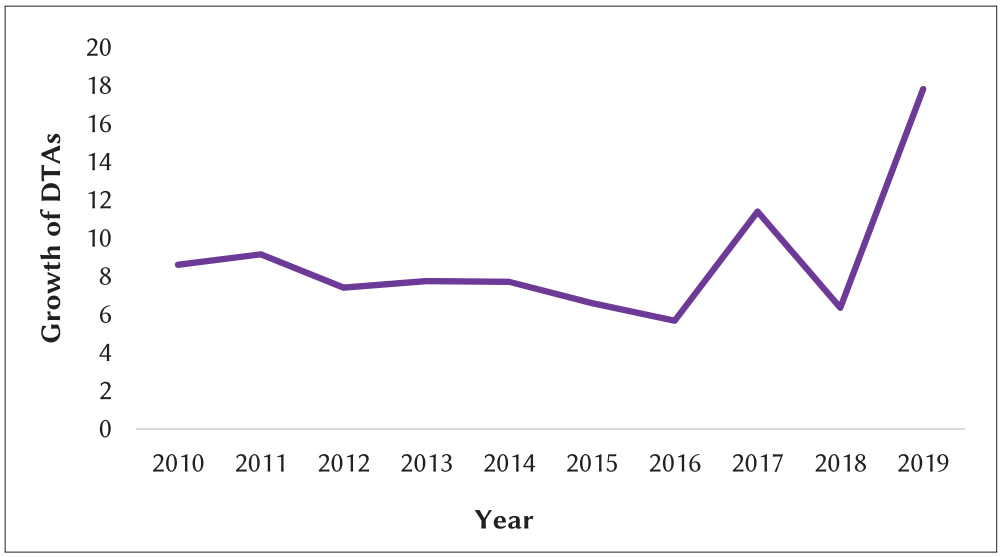

Figure 8.5 *Annual growth rates in the arrival of domestic tourists in Kerala from 2010 to 2019* in per cent
Source: Department of Tourism, Government of Kerala

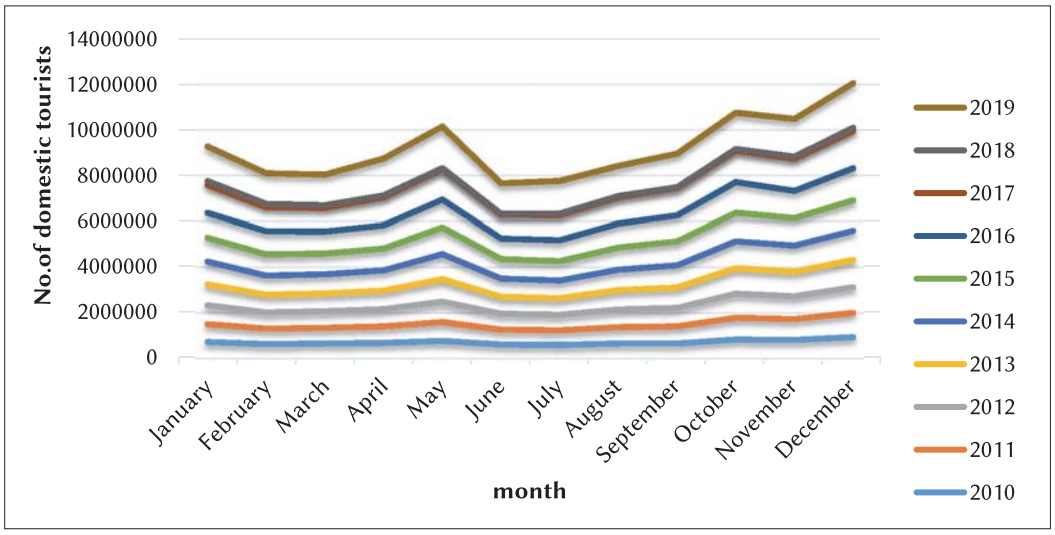

Figure 8.6 *Month-wise arrival of domestic tourists in Kerala from 2010 to 2019* in number
Source: Department of Tourism, Government of Kerala; Markets for Domestic Tourism.

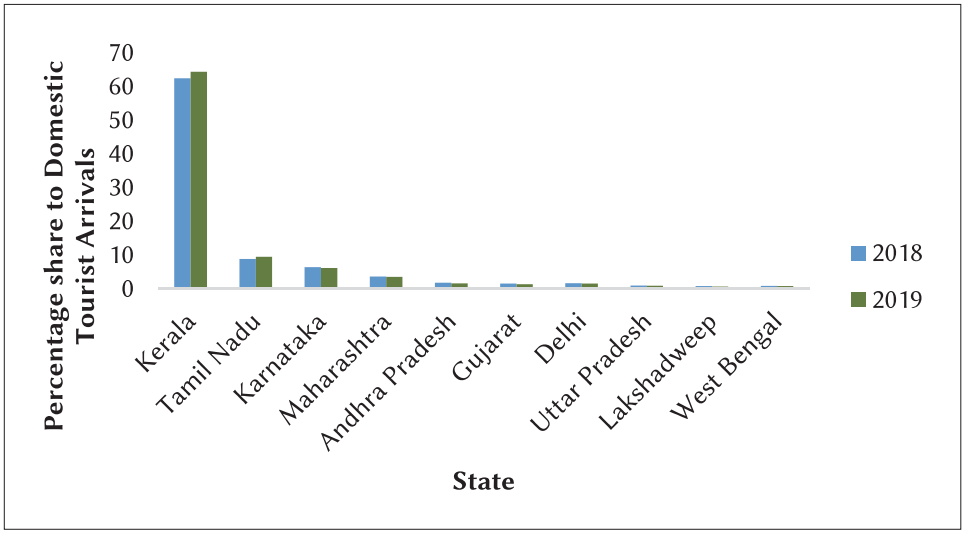

Figure 8.7 *Share of domestic tourist arrivals from top ten States to Kerala in 2018 and 2019* in per cent
Source: Department of Tourism, Government of Kerala.

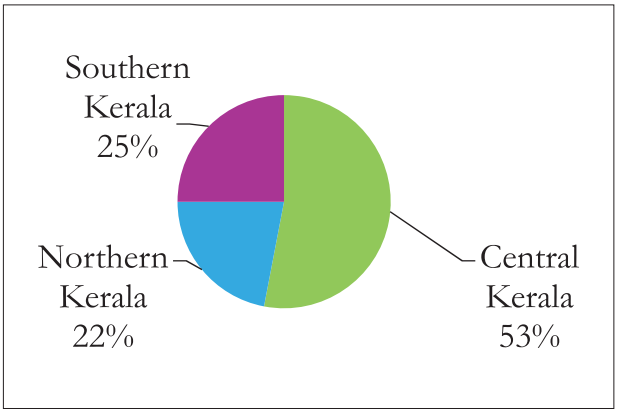

Figure 8.8 *Region-wise domestic tourist visits in Kerala in 2019* in per cent
Source: Department of Tourism, Government of Kerala

Ernakulam and Thiruvananthapuram were the leading districts, with Pathanamthitta bringing up the rear. A region-wise analysis that districts of Central Kerala get about 53 per cent of domestic visits, followed by South Kerala (25 per cent) and North Kerala (22 per cent). Figure 8.8 illustrates region-wise domestic tourist visits in Kerala in 2019.

Economic impact of tourism

Foreign exchange earnings from tourism in the year 2019 were Rs 10,271 crore and domestic tourist earnings were Rs 24,786 crore. Total earnings, including direct and indirect means, in 2019 was Rs 45,011 crores, which is an increase of 24.13 per cent over 2018. Figure 8.9 presents total earnings from tourism in Kerala from 2010 to 2019.

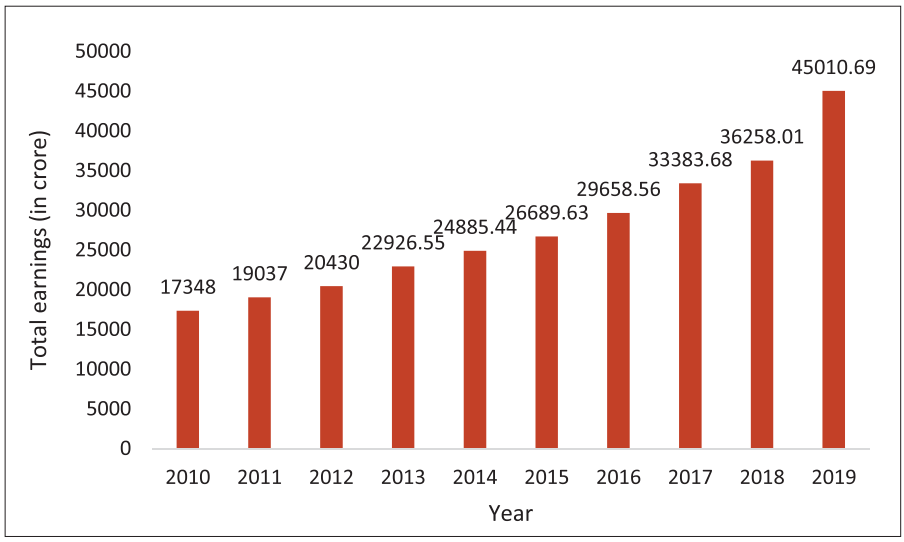

Figure 8.9 *Total earnings from tourism in Kerala, from 2010 to 2019* in Rs crore
Source: Department of Tourism, Government of Kerala.

Initiatives of Department of Tourism

With a view to give a strategic direction and thrust to the sector, Government issued a Tourism Policy, outlining the new policy framework and significant areas of attention. Prior to the beginning of the tourism season, the department took the lead in ensuring the involvement of all concerned agencies, and embarked on the "Green Carpet" project, which focuses on cleanliness and safety in major destinations. More than 300 projects, with a commitment of over 300 crore rupees, were initiated in the last four years with a view to develop infrastructural facilities in destinations, most of which have been completed. Special emphasis has been given to the Malabar region, with over 100 projects sanctioned. The 325-crore river-cruise project centred on the eight rivers in North Kerala will open up this picturesque region for tourism, leading the way to more investment. The Jatayu Earth Centre, opened recently, is the best example of a vibrant public-private partnership model. Four projects taken up under Alappuzha heritage tourism project at a budget of Rs 29 crores have been completed.

The Department of Tourism has taken several initiatives to promote destinations in the State across national and international markets. The Kerala Tourism YouTube channel is a very popular channel, with more than 170,000 subscribers. A GIS-based festival Inventory of Kerala has been prepared, recorded by over a thousand festivals of the State. In order to retain its leadership position, Kerala Tourism launched innovative marketing campaigns on digital and social media platforms such as Kerala Blog Express, off-season promotion campaign and virtual reality houseboat installation. The department led delegations of private sector businesses on promotion and marketing initiatives, comprising of over 25 international roadshows, twelve international travel fairs, sixty national travel fairs, and over thirty national partnership meets.

As part of a novel venture to protect and promote the traditions of water sports, Kerala Tourism launched the Champions Boat League, conducted at 12 different venues across Kerala. The main objectives of the event are the conservation and promotion of Kerala's traditional festivals, the creation of an annual event to be marketed as a tourism product and exposure to less-known backwaters.

Among the notable projects focused on developing destinations, special mention must be made of the Muziris, Thalassery, and Alappuzha heritage circuits. There has been an emphasis on developing infrastructure in the northern region, including infrastructure projects for developing basic amenities, information centres, and infrastructure for land and water-based adventure tourism. Small and Medium Industries Leveraging Experiential Tourism (SMiLE) project implemented by Bekal Resorts Development Corporation (BRDC) aimed to promote and facilitate tourism based small and medium entrepreneurial ventures, which have resulted in 93 new entrepreneurs of which around 30 per cent are women entrepreneurs, and opening of 50 units with accommodation for 400 tourists. Infrastructure development for Guruvayur was taken up under Pilgrimage Rejuvenation and Spiritual Augmentation

Drive (PRASAD) scheme of Government of India. Barrier Free Tourism to make destinations accessible for people with disabilities by providing differently-abled friendly infrastructure was taken up in seventy destinations. A comprehensive programme to develop ecotourism has been initiated.

As human resource development has been identified as one of the thrust areas in tourism, there have been several important steps taken in the State. A permanent campus for the State Institute of Hospitality Management was opened in Kozhikode. The Kerala Institute for Tourism and Travel Studies (KITTS) launched an online job portal and started a diploma and certificate course in adventure tourism. In addition, 114 regional and State-level tourism guides underwent training programmes conducted by KITTS.

The innovative work of the department has won numerous national and international awards. Prominent among these are the UNWTO Award for Emerging Global Destinations – Accessible Destination award 2019 for Barrier-free Tourism Project implementation, the PATA Grand Award for Kerala Tourism "Human By Nature" Campaign, the Das Goldene Stadttor 2020 for Kerala Tourism "Human By Nature" campaign, the PATA Gold award for Kerala Tourism Campaign "Come Out and Play," the PATA Gold Award for Kerala Tourism website, and the PATA Gold Award for women empowerment.

Responsible Tourism Mission

A unique initiative of the department and one that has caught the attention of the world is the Responsible Tourism (RT) movement that the State has started in several destinations. With its emphasis on economic, social, cultural and environmental responsibility, the RT Mission of the department has forged a new path in destination development, empowering local communities to take advantage of the economic opportunities presented by tourism. At present, there are over seventeen thousand individual and group units, out of which over thirteen thousand are women-led units, registered with RT Mission under various categories. There are 92,980 local community members directly or indirectly linked with tourism and generating income. The registered units of the RT Mission generated Rs 25.50 crore. 850 families are linked with the Experiential Tour Packages of RT Mission; 60 packages are operational. RT Mission launched Clean Kerala Initiative to keep prime tourism spots across the State plastic and garbage free. As part of the Kuttanad Package second phase, various tourism projects are getting expanded to the Kuttanad project area. Aymanam Village which comes under the Kuttanad project area, has been declared as the first Model RT Village.

Impact of Covid-19 on the Tourism Industry

Tourism is one of the sectors most affected by the Covid-19 pandemic, which affected economies, livelihoods, public services and opportunities in all continents. All parts of the vast value-chain of tourism have been affected. Export earnings from tourism could fall by $910 billion to $1.2 trillion in 2020. This will have a wider impact and could reduce global GDP by 1.5 per cent to 2.8 per cent. As many as 100 million direct tourism jobs are at risk. Also at risk are sectors associated with tourism such as labour-intensive accommodation and food services industries, which provide employment for 144 million workers worldwide.

The Covid-19 pandemic brought the businesses of all tourism stakeholders to a standstill, affecting the livelihood of entrepreneurs as well as employees in the industry. The tourism industry in the State is facing unprecedented losses in the wake of widespread disruptions in travel and restrictions in accommodation, entertainment and activities.

Anticipating 10 per cent growth over 2019, the number of foreign tourist arrivals estimated for the period from January 2020 to September 2020 was 901,971. However, as per estimations by the Department after the onset of Covid-19 pandemic, the number of foreign tourist arrivals was only 349,575 in this period, a 61 per cent decline. Similarly, assuming a 20 per cent growth in domestic tourist arrivals, the projected number of tourist arrivals between January to September, 2020 was 1,58,21,071. However, the estimated number of domestic tourists in this period is only 39,31,591. The decline in numbers is almost 75 per cent. The total loss in the sector from January to September 2020 is Rs 24,971 crore. The loss in earnings from decline in foreign tourist arrivals is estimated to be Rs 5,274 crore and from domestic tourist arrivals is Rs 19,697 crore.

A scheme to support stakeholders in the tourism industry for the revival of the tourism sector has been announced. The Government of Kerala has announced the Chief Minister's Tourism Loan Assistance Scheme (CMTLAS) in a bid to support the State's travel and tourism sector. While entrepreneurs/establishments in the travel and tourism sector can opt for Tourism Working Capital Support Scheme (TWCSS) to stay

afloat, employees engaged in the industry can avail of short-term personal loans under Tourism Employment Support Scheme (TESS). Houseboats owners can make use of Tourism Houseboats Support Scheme (THSS) to get financial assistance for executing urgent repairs and maintenance to the assets. Under the Tourism Guides Support Scheme (TGSS), eligible tourist guides will be given a one-time financial assistance. Through these relief measures, the Government of Kerala intends to help all stakeholders in the industry to tide over the current crisis and start functioning as soon as the pandemic is contained.

KIIFB Funded Projects

Alappuzha heritage project

The Alappuzha heritage project is part of a comprehensive ongoing attempt to revive Alappuzha and showcase its golden age. Various heritage, religious, and industrial structures in the town, which have much historical importance will undergo conscious conservation, by preserving the physical and cultural aspects, some being converted into museums and other into public spaces as part of this project, which will be implemented by INKEL. This project has been considered in five phases and KIIFB has given approval for a total outlay of Rs 76.06 crore. The approved projects include renovation of museums, temples, masjids and other heritage buildings in Alappuzha, construction of sea-pier, canal side development etc.

Thalassery heritage project

The Thalassery Heritage Project (THP) is a project aimed at exposing the rich cultural heritage of Northern Kerala, especially of the Malabar region, before the tourists. Over 61 heritage destinations are covered within the project spreading across three districts Kannur, Kozhikode, and Wayanad, with Thalassery in Kannur as the centre and connected by unique storytelling experience circuits. The destinations majorly lie along Kannur district under Thalassery, Thaliparamba, Kannur, and Iritty taluks. A few stretches up to Mananthavady in Wayanad district and Vadakara in Kozhikode district. The unique culture and art forms, myths in the lines of native traditions, and the life and legacy of Pazhassiraja, etc. are categorised into four circuits or trails for the tourist to experience the unexplored heritage sites of North Kerala. The circuits are Harbour town circuit, Pazhassi circuit, Folklore circuit, and Cultural circuit. Development of 28 destinations are considered under KIIFB funding for total estimated cost of Rs 78.16 crore and the project will be implemented by Kerala Irrigation and Infrastructure Development Corporation (KIIDC) as SPV.

Looking Ahead

Over the past few years, a series of natural disasters, demonetisation, and the pandemic have all adversely affected the tourism sector in Kerala. Globally, tourism industry is one of the earliest to be affected by such problems, and often the last to recover. As the world grapples with dealing with the pandemic and its aftermath, the tourism industry will struggle to regain its trajectory, affected as it is by the travel restrictions, closure of businesses and sluggish growth of the national and global economies.

However, there are several indicators that Kerala will lead the country as it recovers from the effects of Covid-19. As statistics have shown, over 90 per cent of the tourism business in the State is generated through domestic tourism, which is relatively more agile in recovering from shocks as compared to inbound tourism from outside the country. The sharp spike in arrivals registered during 2019 is a clear pointer to the resilience of the sector, driven mainly by buoyancy in domestic tourism. Indeed, the sector is showing signs of activity and increased business, almost immediately after the restrictions on inter-State travel were lifted. The Kerala brand still remains attractive and desirable, and it is only reasonable to assume that the industry will rapidly improve once conditions turn favourable.

The tourism industry and entrepreneurs will need working capital infusions to spur the revival, and the State would do well to step in and facilitate this process through provision of easy financing options. The focus should be firmly on revival of domestic tourism, which will call for a more focused and aggressive marketing campaign in important source markets within the country. Keeping in mind the fact that competing foreign destinations such as Sri Lanka, Maldives and South-East Asian countries would go all out to woo the same target markets, it is imperative that the department embark on a series of promotional programmes that will showcase the myriad attractions of the State. In parallel, the department has to work closely with industry associations so that there is a synergistic partnership between the efforts of the private sector and the overarching campaigns of the department. The industry has several issues with organs of the State, such as restrictive excise policies, infrastructural bottlenecks in destinations, relationships between destination management entities and tourism service providers and other regulatory bodies. It is important to generate a positive and industry-friendly approach, and

it is incumbent on the tourism department to take up these issues vigorously with sister departments and find solutions.

In the long run, Kerala should strive to strengthen its brand positioning, creating and promoting experiences that are unique and attractive. New destinations and products have to continuously be introduced, maintaining visitor interest and prompting repeat visits. There is clear scope for expanding operations into new areas, particularly in North Kerala, to which connectivity will continue to improve. The emphasis must be on facilitation of conducive business environment for micro, small and medium-sized enterprises (MSMEs), which form the backbone of private investment. Care must be taken to ensure efficient use of resources, environmental protection, preservation of cultural values and heritage. Kerala must continue to strive to strengthen its positioning as a resilient, competitive, resource efficient and environmentally sensitive destination.

Chapter 9

Cooperatives in Kerala: The Movement, Positioning and the Way Forward

Introduction

In Kerala, the growth of the cooperative sector, especially in the northern parts of the State, was intertwined with the movements for Independence and social reform.

The Travancore Cochin Cooperative Societies Act of 1951 brought together pre-Independence laws in the States of Travancore and Cochin. The Kerala Cooperative Societies Act of 1969 emerged from this Act. Cooperatives, which brought together employees, workers, farmers, fish workers, small producers, and other groups into organised self-reliant groups, were influenced by the social and political factors of the period.

Some of the first trade unions, such as Sree Narayana Beedi Thozhilali Union in Tellicherry, formed in 1934, were of beedi workers that sought to ensure higher wages and better working conditions for the workers. The Kerala Dinesh Beedi Cooperatives, which at its peak gave employment to more than 25,000 workers with high wage and non-wage benefits in the districts of Kannur, Kasaragod, and parts of Kozhikode, is an outstanding example of a successful cooperative. Another outstanding example of the success of cooperation is the *Uralangal Aikya Nanaya Sangham* that was registered in Kozhikode District in 1922. Today it is the Uralungal Labour Contract Cooperative Society (ULCCS). ULCCS is one of the largest construction cooperatives in Asia, and has diversified into information technology parks and even a special economic zone.

In the early years, these societies were registered with unlimited liability. The recovery of loans became a problem and many societies were liquidated because of excess liability over assets. The societies were changed to limited liability enterprises from 1918 onwards. The Land Mortgage Bank was formed in 1932 to provide long-term loans. The Cochin Co-operative Societies Act was enacted in 1913. The first co-operative society registered under this Act was "The Advanced Co-operative Society."

Cooperatives in central and southern Kerala were the beneficiaries of the policies of the Princely States of Travancore and Cochin. The first cooperative that was registered after the passage of the Travancore Cooperative Societies Regulation Act of 1914 was the Travancore Central Cooperative Bank, which was later transformed into the Kerala State Cooperative Bank. In fact, the first cooperative legislation in Travancore, the Travancore Cooperative Societies Regulation Act of 1914, had provision to encourage the funding of cooperatives.

The 13th Five-Year Plan document indicates that "the development of co-operative credit institutions was the key to the historical weakening of usury in rural areas of the State." As the Report of the Committee on the impact of demonetisation appointed by the State Planning Board observes, "Cooperation and primary cooperatives are Kerala's strength, a rich legacy of our freedom movement. People's confidence in these institutions is part of Kerala's historical heritage." Today, these institutions form the backbone of much of rural economic activity in the State.

Cooperatives in Kerala operate under the jurisdiction of different departments of the Government. The largest and the most significant segment come under the administrative control of the Registrar of Cooperative Societies (RCS) in the Department of Cooperation. It includes apex cooperatives, federal cooperatives, district cooperative banks, credit cooperatives, consumer/school/college cooperatives, marketing, and processing cooperatives, and others. Together, there were around 15,761 cooperatives in 2019.

In addition to these cooperatives, there are also around 6000 cooperatives that operate under the jurisdiction of other departments of the Government. They include 604 khadi and village industry cooperatives, 1190 coir cooperatives, 611 handloom cooperatives, 3284 dairy cooperatives, 394 industrial and 749 fisheries cooperatives. Dairy cooperatives in Kerala operate in three tiers. The Kerala Cooperative Milk Marketing Federation Ltd (KCMMF) is the apex body. Below, there are three regional cooperative milk producer unions and further below, there are the village-level dairy cooperatives. Matsyafed is the apex cooperative of the primary-level fishermen welfare cooperative societies.

Cooperatives in Kerala play a vital role in mobilising people and pooling their resources to meet the common needs of members and thereby the larger society. The approach paper to the 13th Five-Year Plan prepared by Kerala State Planning Board in 2017 indicated that there were 70 types of cooperative societies engaged

Table 9.1 *Budgetary support for cooperatives in Kerala, 2012-13 to 2020-21* in Rs crore

Year	State plan outlay		SDG support		Total outlay		Gross plan
	State Plan	NCDC support	State plan	Central share	State plan	Central share	
12th Five-Year Plan							
2012-13	62.00	50.00	0	0	62.00	50.00	112.00
2013-14	70.00	30.00	0	0	70.00	30.00	100
2014-15	83.39	35.00	106.39	51.34	189.78	86.34	276.12
2015-16	85.39	45.00	14.28	0	99.67	45.00	144.67
2016-17	95.00	45.00	0	0	95.00	45.00	140
13th Five-Year Plan							
2017-18	130.00	55.00	28.76	100	158.76	155.00	313.76
2018-19	154.75	65.00	324.95	100	479.70	165.00	644.7
2019-20	154.25	65.00	28.1	5.31	182.35	70.31	252.66
2020-21	134.96	65.00	4.62	22.5	139.58	87.50	227.08

Notes: SDG stands for supplementary demand for grants; NCDC stands for National Cooperative Development Corporation.

Source: Kerala State Planning Board.

in various kinds of economic and business activities in the State. They were categorised as apex societies (12), federal societies (4), cooperative central banks (14), credit societies (4045), consumer societies (20), primary societies (4651), marketing and processing societies (615) and miscellaneous societies (5926). In 2020, the 13 central banks (the District Central Cooperative Banks) were merged with the apex bank (the Kerala State Cooperative Bank) to form the new Kerala Bank.

Thus, unlike in the advanced economies where cooperative movements were largely outside the sphere of Government influence, the cooperative sector in Kerala experienced an active role of the Government in their development and functioning. In fact, most of the cooperatives in Kerala have a Government shareholding in its paid-up capital with the levels differing widely across regions and sectors.

Unlike other States, the cooperative movement has been strongly supported through successive plans and supplementary grants in Kerala (Table 9.1). Further, the Annual Plans lay emphasis on making sectors "cooperative friendly," thereby enhancing the effectiveness of scheme implementation by departments. In the project document of *Subhiksha Keralam* project, the Kerala State Planning Board gave major emphasis to the promotion of farming through cooperative institutions with cooperative credit support. The Special Liquidity Facility (SLF) extended by NABARD was effectively utilised for food production by channelising it through 1643 Primary Agricultural Cooperative Credit Societies (PACS) in the State.

Emerging Issues and the Way Forward

In this section, we highlight some of the major issues that have plagued the cooperative sector in Kerala and the potential steps to address them.

Reduction in the proportion of non-functional to functional societies

There has been a surge in the number of cooperative societies in Kerala over the years. Between 2013 and 2019, the total number of societies under the RCS increased by 10 per cent from 14,205 to 15,761 (Table 9.2). However, there has not been a commensurate reduction of growth in the number of non-functional societies in Kerala.

By the end of March 2019, one in every three societies remained defunct. The policy on the cooperative sector needs to address this aspect. These societies are either dormant or are under liquidation. For example, as on March 31, 2017, there were 680 societies under liquidation, which was 4.3 per cent of the total number of societies.

Table 9.3 shows the distribution of non-functional societies in different districts of the State. There is a higher proportion of non-functional societies in three districts – Idukki, Thiruvananthapuram, and Kollam. The reasons for this may be largely attributed to the financial performance of individual societies, the

Table 9.2 *Year-wise distribution of non-functional cooperative societies in Kerala, 2013 to 2019*

Period	Total number of societies	Number of functional Societies	Number of non-functional Societies	Share of non-functional to functional (%)
March 2013	14,205	10,830	3375	31
March 2014	14,602	11,270	3332	30
March 2015	14,896	11,565	3331	29
March 2016	15,287	11,908	3379	28
March 2017	15,428	11,966	3462	29
March 2018	15,624	11,892	3732	31
March 2019	15,761	11,994	3767	31

Source: Compiled from the *Economic Review*, various years, Kerala State Planning Board

Box 9.1
Kerala Bank

The decision of the State's cooperative sector to amalgamate the District Cooperative Banks is historic. The State, which has a long history of cooperative-led rural growth, has ushered in a transformative paradigm shift in forming the Kerala Bank. Chief Minister Pinarayi Vijayan played a pivotal role in conceiving and leading the idea of creating a large cooperative bank through amalgamation to ensure that credit-led growth of the State achieves a higher trajectory. The amalgamated Kerala State Cooperative Bank, known as Kerala Bank, came into being on November 29, 2019. In terms of business and number of branches, it is the second largest bank in Kerala. The total business of the bank is over Rs 1 lakh crore. With 769 branches, 7 regional offices, and 13 credit processing centres, the bank has successfully rolled out priority-sector lending products in the sectors of agriculture, MSME, retail, and housing. The Kerala Bank can transform into a priority bank of Government of Kerala in providing loans to the beneficiaries of approved schemes of departments such as agriculture, small-scale industries, fisheries, animal husbandry, and dairy, and also Kudumbashree (Self-Help Groups). The Kerala Bank strives to provide world-class and IT-enabled banking to villages, farmers, and the unorganised sector. The Bank has formulated and implemented schemes for the effective implementation of programmes for financial inclusion for all sectors in the State. The Kerala Bank has the vision to reach all marginalised sections of the people and to become a universal bank covering all sections of the people.

weak supervisory structure and lack of coordinated efforts to understand the problems of these societies to suggest remedial actions. Through the Plan schemes, the Government allocates considerable amount of assistance to these societies every year. But apart from such endowments, there has been very little technical support provided to these societies to overcome their problems. Any attempt at providing generalised solutions may not produce the desired results. The Department of Cooperation should facilitate the auditing of each of these societies by a team of experts consisting of professionals. Once such an audit is completed, the issues including human resources, technical, and financial can be better understood. The northern districts which show lesser percentage of non-functional societies have better supervisory mechanisms. For example, the (erstwhile) District Cooperative Banks had established PACS Development Cells (PDC) with the help of NABARD for improving the working of PACS.

Need for technological interventions

Technology infusion is a grey area for Kerala cooperatives. There have been considerable efforts to implement IT-based solutions for the financial management of individual PACS. However, there has also been very little headway in introducing a unified software for all PACS. Because of this, customers of individual PACS are unable gain access to the facilities of other PACS. Through technology adoption by way of a unified platform, customers can move from a captive environment to a trajectory of broader and more convenient banking experience.

Formation of subsidiary enterprises

The new age challenges for cooperatives demand the alignment of trust and technology with the spirit

Table 9.3 *Distribution of non-functional cooperative societies in Kerala, 2017*

District	Total no. of societies	No. of functional societies	No. of non-functional societies	Share of non-functional to total societies (%)
Thiruvananthapuram	2139	1424	715	33
Kollam	1269	879	390	31
Pathanamthitta	653	559	94	14
Alappuzha	1027	773	254	25
Kottayam	1020	797	223	22
Idukki	740	426	314	42
Ernakulam	1406	1145	261	19
Thrissur	1478	1123	355	24
Palakkad	917	710	207	23
Malappuram	1089	942	147	13
Kozhikode	1221	1099	122	10
Wayanad	437	244	193	44
Kannur	1415	1318	97	7
Kasaragod	617	527	90	15
State	15,428	11,966	3462	22

Source: RCS, Kerala; Statistical Abstract 2016-17.

of cooperation. Cooperatives need to sow the seeds of the establishment of successful enterprises by the transformation and creation of subsidiaries. By the word transformation, we mean adjusting to the new financial standards, new technologies, and a new outlook for creating value-driven enterprises. The new age enterprises are driven by valuation rather than profits. The valuation is based on future cash flows and exponential growth potential.

Cooperatives may not be able to fund subsidiary enterprises such as Farmer Producer Organisations (FPO) fully from their own sources. Substantial funding needs to come from outside the system. The funding support usually depends on how much value the enterprise brings to the investor, which appears to be in contradiction with the model of cooperatives, particularly with regard to ownership. The ownership lies with the members and the members normally do not focus on long term returns and accumulation of wealth for future returns, which in turn are the drivers of valuation. The 14th objective of the Kerala Cooperative Policy deals with revisiting the provisions of KCS Act to face newly emerging situations. We need to initiate and coordinate efforts to transform the sector so that value is created in the sector to pave way for additional investment from diverse sources including private equity.

Correcting the age factor

It is often noticed that there is an absence of involvement of youth in the business and development activities of rural cooperatives. This makes cooperatives aging enterprises. The previous point of transformation is the key, which will bring youth into the sector. The European cooperative enterprises stand apart in the world because of the active participation in governance and use by the youth. As an economic institution, cooperatives compete with other forms of organisations. The potential customer base has a significant proportion of youth. The co-operative institutions have to evolve into user-friendly institutions free from archaic rules of governance and develop products that focus on youth.

The 10th and 11th objectives of Kerala State Cooperation Policy mention the involvement of youth. This needs to be implemented in its letter and spirit. The AI-based solutions play a greater role in creating a favourable ecosystem for attracting the youth. The cooperatives can also engage in funding new enterprises, especially the start-ups. Cooperative institutions with their local feel and presence can turn themselves into local "engines of growth" through technology adoption and professionalisation, thereby providing gainful employment to the rural youth and transforming themselves into "youth driven institutions."

Professional approach to governance

It is well known that any financial restructuring of cooperatives without addressing the root causes of their weaknesses would fail to create a sustained revival of the system. Kerala has already taken the bold step of transforming its bulky three-tier structure of cooperatives to a two-tier structure of cooperatives in 2020 by forming the Kerala Bank. The approach to the formation of Kerala Bank clearly indicates a commitment to professionalisation and technology infusion, and to transform the Bank into a leading modern financial institution. The base entities also have to be professionalised in the process. The Cooperative Policy, in its 6th objective, states that "the State shall infuse professionalism in cooperative department and transform the department so that it keeps pace with the changes that take place in technological and regulatory environments." This process needs to be hastened.

Chapter 10
Human Development

School Education Surges Ahead

The 13th Plan was a period of transformation in the sphere of school education, particularly in government and aided schools. The period was marked by new investments in school education, particularly in infrastructure, the improvement of the quality of schools and instruction, and by the improvement of social coverage and inclusion in the school education system. High quality school education was made available to wider sections of the people than ever before.

The bedrock of Kerala's development achievements is school education, because school education was the instrument that made progress in other fields possible. The task that the Government of Kerala set in this 13th Plan period was to make the best possible school education available to every child in the State, regardless of considerations of income, region, or social group. Kerala achieved universal literacy in the 1990s and has also achieved the goal of free and universal school education for its children.

A remarkable outcome of recent policy is that more than 680,000 additional children enrolled in Government and aided schools over a four-year period.

Status of Schools in the State

There were 12,961 schools in Kerala in 2018-19. Of them 4695 (36.22 per cent) were government schools, 7216 (55.68 per cent) were aided schools, and 1050 (8.10 per cent) were unaided schools. Of all schools, 2077 schools were higher secondary schools (HSS), with a total of 7249 batches. Of these 839 (40.4 per cent) were government schools, 858 (41.3 per cent) were aided schools and the remaining 380 (18.3 per cent) were unaided schools. There were 389 vocational higher secondary schools (VHSS), with a total of 1101 batches. Of these, 261 were in the government sector and 128 in the aided sector.

National sources of data consistently rank Kerala as a better performer than the rest of India in respect of key indicators in school education. According to the National Family Health Survey, the median number of completed years of schooling for women above the age of 16 years was almost 9 years in Kerala and 4 years in India in 2015-16. Kerala has achieved the distinction of having the lowest dropout rate of school students among Indian States. School enrolment and retention-levels among pupils of the Scheduled Castes and Scheduled Tribes are higher in Kerala than in India as a whole. The School Education Quality Index (SEQI), with reference year 2016-17, was developed by the NITI Aayog to provide insights and data-based feedback on the success of school education across the States and Union Territories of India. According to the report, Kerala, with a score of 82.2 per cent score, topped the table.

School Education in the 13th Plan Period

School Education Mission

As part of the Nava Kerala Mission, an overall quality-based school education developmental programme called the "Public Education Protection Mission" (*Pothuvidyabhyasa Samrakshana Yajnam*) was launched by the Government. Its focus has been on raising the quality of services in school education in the public sector. Through various programmes for supporting public educational institutions across the State, the mission brought together teachers, parents, student alumni, and people's representatives on a single platform, encouraging them to work in a people's campaign mode.

Local government institutions and State Plan programmes have contributed much to the overall development and improvement of physical infrastructure and common facilities in Government schools in the State. KIIFB has also played a significant role in the remarkable enhancement of school infrastructure after 2016. With KIIFB assistance, international-level infrastructure in selected government schools and hi-tech class rooms in all government and aided schools has been created.

Increase in enrolment

The most telling proof of the success of the school education policy is the extraordinary surge in enrolment in government schools over the last few years. This reverses the previous trend of an exodus to the private sector of school education. All over India, parents who want an education of quality for their children have, in recent years, had to resort to high-fee private schools. The improvement in facilities in government and aided schools has created a new pull factor in school education in the State, and has, in the process, made the system of school education generally more socially inclusive.

The Directorate of General Education undertook an exercise to calculate the additional enrolment in Standards I-X between 2016-17 and 2020-21. The method was as follows: In each standard, the size of a

normal cohort at the beginning of an academic year was assumed to be the size of the cohort in the preceding standard in the previous year. The excess in the size of a given standard in a given year over the size of the cohort of the preceding standard in the preceding year was assumed to be the *additional* enrolment in the given standard in the given year. The sum of additional enrolment over all Standards (i.e., I-X) was taken to be the total additional enrolment for the year. By this calculation, more than 6.8 lakh *additional* pupils were estimated to have joined government and aided schools in Kerala between 2017-18 and 2020-21 (Table 10.1)

Table 10.1 *Estimated number of additional pupils enrolled, Standards I-X, government and aided schools, Kerala, 2016-17 to 2020-21* in numbers

Management	Total I to X
From 2016-17 to 2017-18	
Government	59852
Aided	96713
Total	156565
From 2017-18 to 2018-19	
Government	70644
Aided	115327
Total	185971
From 2018-19 to 2019-20	
Government	65215
Aided	98343
Total	163558
From 2019-20 to 2020-2021*	
Government	69344
Aided	106956
Total	176300
From 2016-17 to 2020-21	
Government	265055
Aided	417339
Grand Total	682394

Note: In each standard, the size of a normal cohort at the beginning of an academic year was assumed to be the size of the cohort in the preceding standard in the previous year. The excess in the size of a given standard in a given year over the size of the cohort of the preceding standard in the preceding year was assumed to be the *additional* enrolment in the given standard in the given year. The sum of additional enrolment over all Standards (i.e., I-X) was taken to be the total additional enrolment for the year.
Source: Directorate of General Education
*Enrolment data for 2020-21 are from KITE.

Investment in School Education

In Kerala, several departments are involved in financing school. The major departments that finance school education in some way are the Departments of General Education and Technical Education. Other departments that spend on schools and school children include the Departments of Sports and Youth Affairs, Labour and Labour Welfare, Scheduled Caste and Scheduled Tribe Development, Minorities Development, Fisheries, and Local Self-Government. After 1996, local bodies have come to play a new role in funding and administering schools.

Investment in school education in Kerala increased sharply over the past five years; at the same time, there was important variation in the pattern of investment. The major source of investment in school education in the Government sector shifted from the line department to local body plans (Table 10.2). (The decline in expenditure in Table 10.2, Column 4 in 2019-20 was because of resource constraints in the wake of natural disaster.)

Additionally, a large chunk of investment responsibility in the sector was taken over by KIIFB. KIIFB approved 138 projects in which the investment is Rs 2861 crore in the sphere of school education. KIIFB has allocated Rs 5 crore each to 141 schools to raise them to the level of "centres of excellence." It has allocated Rs 3 crore each to 395 schools for improving basic facilities. One crore was allocated to each of 973 schools to develop basic facilities. Special financial support was provided to schools that are more than 200 years old ("legacy schools") and more than 150 years old ("heritage schools"). Financial support was also given to 106 higher secondary schools, 27 vocational higher secondary schools, and 181 lower primary and upper primary schools for the improvement of their infrastructure facilities.

IT Enabled Education

The hi-tech school project provides IT-enabled education facilities from Standard VIII to XII in 4752 Government and aided schools in the high school, higher secondary and vocational higher secondary streams. The scheme provides schools with laptop computers, audio-visual equipment, and electronic teaching aids. In all, 13,980 government and aided schools, including 9941 primary and upper primary schools, have been given broadband connectivity. A sum of Rs 292 crore was allocated in order to set up computer labs in all primary and upper primary schools.

Table 10.2 *Public investment in school education, Kerala, 2016-17 to 2020-21*, in Rs crore

Year	State Plan*	Local Bodies Plan	Total Plan	Non-Plan	Total (Plan and non-Plan)
1	2	3	4 (2+3)	5	6 (4+5)
2016-17	1282.73	387.95	1670.68	12366.33	14037.01
2017-18	1250.67	540.57	1791.24	14043.95	15835.19
2018-19	1277.37	613.1	1890.47	14069.33	15959.8
2019-20	947.92	459.96	1407.88	14119.39	15527.27
2020-21(BE)	926.75	1023.38	1950.13	12116.95	14067.08

Note: *Includes investment by General Education, Technical Education, and Sports and Youth Affairs departments

"Samagra" e-Resource Portal is a platform to enhance communication in the hi-tech classrooms established by the government. A very wider range of digital resources (comprising 31,031 different individual resources) has been developed as part of the programme, including audio-visual and different types of teaching material.

KITE's Open Online course (KOOL), an online training programme has been started to give training to the teachers so that their working hours in schools will not be interrupted in any way. "Sametham" portal is prepared to provide the basic information regarding the schools of the State to the public. It opens the doors to view the basic details of schools including its physical infrastructure, and governing mechanisms. Details available in "Sametham" include the approved classes in each school, details of students in each class, and teachers and non-teaching staff (without personal details) which can be used for generation of various reports at school, educational sub-district, educational district, revenue district, and State levels.

"Little KITEs" IT Club, the largest student IT network in the country, has over 1,25,000 members in more than 2,060 schools. The project is an initiative by KITE to instil interest and creativity among students, by providing specific training in animation, cyber safety, Malayalam computing, hardware, electronics, Internet of Things (IoT) devices, and 3D character modelling. As part of the Little KITES, the digital magazines of over 2000 schools have been made available online (these be viewed at the "digital magazine" link in the portal www.schoolwiki.in or through the web portal www.dm18.kite.kerala.gov.in)

Enhancement of Academic Excellence

Textbooks are free for pupils from Standards I to VIII. Each textbook is printed in three volumes, one for each term, in order to reduce the weight of schoolbags. All the text books for an academic year are distributed to schools before the closing of the preceding academic year.

Shradha is a programme to provide additional academic support to students from standard 3 to standard 8. As part of Shradha, special attention was given to pupils who needed help with operational mathematical skills.

Samagra Shiksha Kerala (SSK) has designed several learning activities that address learning gaps identified in National Achievement Survey. These include programmes to enhance capacities in Malayalam (*Malayalathilakam*), English (Hello English), Hindi (*Sureeli Hindi*), and mathematics (*Ganita* Vijayam)

The *Sastrayanam, Sasthrajalakam*, and *Sastrapadham* projects are special programmes in the sciences for school pupils. The Ideal Lab Project aims to provide laboratories in schools that meet international standards. Biodiversity parks have started functioning in 12000 schools in the State.

Sitar is a programme for pupils who excel in a particular area of interest, providing them opportunities to learn in professional educational centres in the State and elsewhere in India.

The "Teacher Transformation Course," a new experiment, is a programme for higher secondary teachers that is being conducted in different colleges across the State.

School Facilities for Children with Disabilities

The State has taken special steps to address the needs and requirements of children with physical and intellectual disabilities

Special teachers training institute

There are about 320 registered institutions in the State meant for the education of children with intellectual disabilities Specially qualified teachers are required for the functioning of such schools.

Barrier-free schools (disabled-friendly infrastructure)

The scheme provides assistance to schools to develop facilities for children with disabilities.

Autism park

The main objective is to encourage social participation by autistic children and to enhance their communication abilities.

C H Mohammed Koya Memorial State Institute for the Mentally Challenged

This imparts special education, training, and rehabilitation for children with intellectual disabilities.

National Institute for Speech and Hearing (NISH)

NISH was established with the objective of rehabilitating hearing-impaired persons in the State and providing higher education to the hearing impaired.

National Institute of Physical Medicine and Rehabilitation

It is an institute dedicated to providing state-of-the-art services – including early identification, intervention, management, rehabilitation and research -- for children and adults with disabilities.

Other financial support for children with disabilities

"Social security initiatives for marginalised groups or unorganised groups" is an umbrella scheme with different components. *Vijayamrutham* recognises the educational achievements of children with disabilities; *Sahachari* promotes inclusive education of persons with disabilities through peer group support and financial assistance to the children with disabilities; and *Vidyajyothi* provides financial assistance for uniforms and study materials to students with disabilities and special assistance package to special schools.

Educational assistance is given to children with disabilities in the endosulfan-affected region. The Government runs programmes for the rehabilitation of children with autism spectrum disorders under the State initiative on disabilities (*Anuyatra*). The *Snehapoorvam scheme* is for the welfare of orphans, single-parented, and vulnerable children. As part of the scheme, assistance to aftercare and follow up services and victim rehabilitation, educational assistance to the children of prisoners and victims, and educational assistance for professional courses of children of prisoners are also being implemented.

Interventions in literacy and continuing education

Since 2016, Kerala State Literacy Mission Authority (KSLMA) has been involved in the implementation of programmes in the field of literacy and continuing education. KSLMA has launched social literacy programmes in the field of health, environment, gender, renaissance of Kerala, the Constitution of India, and e-learning. KSLMA conducts focussed and specialised literacy programmes for persons belonging to Scheduled Caste and Scheduled Tribe, migrant workers, and transgender persons. Adult learners are the direct beneficiaries of these programmes. In 2018-19, around 15,00,000 people benefitted under these programmes.

The number of people who attended seventh standard equivalency examination has been increasing for the last two years. KSLMA is making efforts to bring a large number of persons back to studies and to enrol them in 10th and higher secondary equivalency courses (Table 10.3).

Learners from the Scheduled Castes and Scheduled Tribes constitute a major portion number of the persons benefitting from these programmes.

Wiping out Illiteracy

Since Kerala has already achieved universal literacy, recently Kerala State Literacy Mission Authority (KSLMA) has entered into new avenues. These include focussed and specialised literacy programmes, including programmes on environmental literacy, literacy among persons belonging to Scheduled Castes and Scheduled Tribe, literacy for migrant workers, and literacy for transgender persons.

Programmes to wipe out illiteracy (*Aksharalaksham*), for coastal regions (*Aksharasagaram*), for Scheduled

Table 10.3 *Persons who enrolled in higher secondary and 10th equivalency courses, 2018 and 2019, Kerala* in number

Course	Year	Female	Male	Transgender	Scheduled Caste persons	Scheduled Tribe persons	Persons with disabilities	Total
Higher secondary	2018	19,702	14,052	39	9308	1331	288	33,793
	2019	19,792	12,842	36	7779	1220	454	32,670
10th	2018	15,225	21,263	40	8925	1620	354	36,528
	2019	15,567	18,460	29	7786	1381	748	34,056

Source: Kerala State Literacy Mission Authority

Caste persons (*Samagra*), for Scheduled Tribe persons (*Navachetana*), for migrant workers from other States (*Changathi*), and for transgender persons (*Samanvaya*) have been implemented.

School Education and Covid-19

The policy response of Governments to the impact of the pandemic on school education has been a matter of international concern and discussion. In Kerala, the expansion of ICT-enabled school education in the three years preceding the pandemic was a factor of enormous importance in the State's response in this field.

The remarkable initiative called "First Bell" of General Education Department in the field of school education during the pandemic received national and international acclaim.

The 2020 academic year for schools began, as in previous years, on June 1. Classes under the First Bell programme were telecast live through the KITE Victers educational channel and were uploaded in the YouTube channel (www.youtube.com/itsvicters) for offline and deferred viewing. As a result of the hi-tech project in schools, over 1.2 lakh laptops and 70,000 projectors along with other ICT equipment were made available for students who did not have a cable connection or television in their homes. Initially there were some students who did not have access to these classes due to lack of equipment, but this problem was tackled socially by means of various-levels of interventions, particularly involving the distribution of televisions and smart phones.

Viewership for specific classes exceeded 40 lakh. Classes were viewed in India and by hundreds of people in the Gulf region, the United States, and Europe. In addition to classes in English and Malayalam, KITE organised classes in Kannada and Tamil for children in Kannada- and Tamil-medium schools. KITE has been able to continue digital classes for all standards in a pre-set time schedule.

Higher Education

Improving the quality of higher education is a necessary condition for the success of the next stage of Kerala's social and economic development. Kerala has received international recognition for its advances in education, particularly in universalising and improving the quality of school education in the State. Less noted are the significant advance in higher education, the broad-basing of social entry into the higher education system, and the rise of the gross enrolment ratio in higher education in the State.

The State must seek ways of continually improving the quality of syllabi and pedagogy in higher education. The second feature is the need for a general improvement in the quantity and quality of research in the higher education system. The academic achievements of men and women from Kerala elsewhere in the world point to the enormous potential for change in higher education in Kerala. Success in this regard will have very significant positive consequences for the future of the State over the next few decades.

There are 14 State universities functioning in Kerala. Out of these, four universities – Kerala, Mahatma Gandhi, Calicut and Kannur – are general in nature and are offering various courses. Sree Sankaracharya University of Sanskrit, Thunchath Ezhuthachan Malayalam University, the Cochin University of Science and Technology, Kerala Agricultural University, Kerala Veterinary and Animal Science University, Kerala University of Health Sciences, Kerala University of Fisheries and Ocean Studies, Kerala Technological University offer more specialised courses in specified subject areas. Besides these, the National University of Advanced Legal Studies (NUALS) and Central University of Kerala, Kasaragod, are also universities that function in the State.

Arts and Science Colleges

There are 229 arts and science colleges in the State, 163 private aided colleges and 66 government colleges. Apart from these, various unaided and self-financing arts and science colleges affiliated to general universities also function in the State.

The total number of students enrolled in various arts and science colleges (excluding unaided colleges) in the four general universities in Kerala in 2019-20 is 3.32 lakh. Of this 2.25 lakh (67.7 per cent) are women students (Table 10.4).

The number of students belonging to the Scheduled Castes (SC) in degree and post graduate courses in the State is 42,486, that is, 12.79 per cent of all students in 2019-20. The number of students belonging to the Scheduled Tribes (ST) in degree and post graduate course in the State is 7,311 or 2.2 per cent of all students in 2019-20.

Engineering Colleges

There are 177 engineering colleges in the State with a sanctioned intake of 49,136 in 2019-20. Of these, 165 (93.2 per cent) are self-financing colleges (unaided), 9 (5.1 per cent) are government colleges, and 3 (1.7 per cent) are private aided colleges. The sanctioned intake of government colleges in 2020 was 3,430 (7 per cent), aided colleges 1,844 (3.75 per cent), and unaided colleges 43,862 (89.3 per cent).

Table 10.4 *Enrolment of students in government and aided arts and science colleges in Kerala, 2019-20* in numbers

Course	Total	Women	Men	Percentage of women in total students
B.A.	1,37,576	88,768	48,808	64.5
B.Sc.	1,05,545	78,908	26,637	74.8
B.Com.	46,403	29,472	16,931	63.5
Total	2,89,524	1,97,148	92,376	68.1
M.A.	15,924	10,167	5,757	63.8
MSc.	19,971	12,757	7,214	63.9
M. Com.	6,874	4,828	2,046	70.2
Total	42,769	27,752	15,017	64.9
Grand Total	3,32,293	2,24,900	1,07,393	67.7

Source: Directorate of Collegiate Education, Kerala

Table 10.5 *Proportion of students belonging to the Scheduled Castes and Scheduled Tribes in higher education, Kerala, 2019-20*

Course	SC (in %)	ST (in %)	Others (in %)
B.A	10.39	2.25	87.09
B.Sc	15.47	0.97	83.57
B.Com	13.35	1.85	84.8
Total	12.72	1.85	85.44
M.A	15.77	6.02	78.22
M. Sc	11.26	3.33	85.41
M.Com	13.30	4.90	81.8
Total	13.26	4.58	82.15
Grand Total	12.79	2.20	85.01

Source: Directorate of Collegiate Education, Kerala

At undergraduate or postgraduate-level, the proportion of women to all students in government and aided colleges was 37.8 per cent in 2019-20. 1356 students were admitted in Government and aided engineering colleges for postgraduate courses in 2019-20. Women constitute 64 per cent of all postgraduate students in government and aided engineering colleges.

Major Initiatives and Achievements in 13th Five-Year Plan

New institutions and institutional development

Sree Narayana Guru Open University, which will impart higher education through distance learning and online, was established. A digital university, Kerala University of Digital Sciences, Innovations and Technology (formerly IIITM-K) has also been established. Land acquisition for the Malayalam University and Kerala Technological University are in the final stages.

An exam comptroller office and a supervisory development centre, State Institute of Technical Teachers' Training and Research (SITTTR) functions under the technical education department. State Board of Technical Education was reorganised for the comprehensive development of employment-oriented education in the State. In 2019, the Higher Education Department appointed a committee with Dr B Ekbal, Member, State Planning Board, as Chairperson to study and submit a report regarding the possibility of bringing the engineering and polytechnic colleges now being managed by the LBS Centre for Science and Technology, Centre for Continuing Education Kerala (CCEK), Centre for Professional and Advanced Studies (CPAS), and Institute of Human Resources Development (IHRD) under one umbrella.

New posts and recruitment and courses

More than 1,000 teaching posts have been created and a number of innovative courses have been started in Government and aided colleges. Seventeen courses on new technologies were started in engineering colleges at the undergraduate and postgraduate-levels.

Infrastructural development

Development work of a project value of Rs 570 crores is being carried out in colleges with financial assistance from Kerala Infrastructure Investment Fund Board (KIIFB). Infrastructural work in institutions under the department of a total project value of Rs 70 crore was inaugurated on October 27, 2020. Construction of an air strip for the training of NCC cadets has been completed. KIIFB has provided funds to colleges as follows – 48 colleges were given a grant of Rs 8.5 crore

Table 10.6 *B.tech result in engineering colleges, Kerala, 2020* in number

Management	Boys			Girls			Total		
	Registered Students	Passed Students	Pass Percentage	Registered Students	Passed Students	Pass Percentage	Registered Students	Passed Students	Pass Percentage
Government	2,088	1,259	60.3	1,252	1,005	80.27	3,340	2,264	67.78
Private aided	1,270	844	66.46	594	489	82.32	1,864	1,333	71.51
Govt. self-financing	2,725	1,159	42.55	2,423	1,636	67.52	5,148	2,795	54.3
Private self-financing	12,645	4,499	35.59	8,871	5,512	62.21	21,516	10,011	46.56
Total	18,728	7,761	41.45	13,140	8,642	65.82	31,868	16,403	51.50

Source: Kerala Technological University, 2020

each, 5 heritage colleges were provided Rs 30 crore each, and 12 colleges were provided Rs 10 crore each. The construction works of 45 buildings are in progress as part of the basic infrastructure development. More than 30 buildings were completed between June 2016 and November 2020 and handed over to the respective institutions.

Rashtriya Uchchatar Shiksha Abhiyaan (RUSA) fund

RUSA fund for the infrastructure development of colleges of Rs 2 crore was made available to each of 121 institutions in the State, including 15 Government colleges and 106 aided colleges. A university and college teachers collective, the RUSA Research Network Group (RRNG), has been formed to achieve excellence in the field of research and also to gain access to national and international funds for research.

Jeevani

A counselling project called "Jeevani" has been established to address the mental health needs of the students across Government colleges in Kerala. The "Jeevani-College Mental Awareness Programme" was implemented in 67 arts and science colleges in 2019-20 to provide psychological assistance to students.

Online programmes and services

The Collegiate Education Department implemented three study series – Beyond Syllabi, Malayala Sahitya Yatra, and Winglish under the Online Resource Initiatives of Collegiate Education (ORICE) through the Meghanad Saha Centre for Content Development Studio. In Government colleges, high-speed stable internet services were provided by installing BSNL single optical fibre network. Most services offered by universities, including admissions and certifications, were made online; entrance exams to professional courses other than engineering were conducted online.

Scholarships

Various scholarships at postgraduate and undergraduate-levels are being given to improve the quality of education and to ensure equity in higher education. Central-State sector scholarships of 13 types are given to students. Various scholarships including post matric scholarships (65,626), District Merit Scholarship (20,409) and Kerala State Suvarna Jubilee Scholarship (4473) were given in 2019-20. Apart from these, "Aspire" scholarship, scholarships separately for social sciences, literature, music, arts, and performing arts are also being given. Special merit scholarships are given by the Higher Education Council to undergraduate degree and post-graduate students in arts and science courses.

Academic enhancement programmes

The department conducts the Scholar Support Programme, Walk with Scholars and FLAIR (Fostering Linkages for Academic Innovation and Research) for ensuring academic excellence. A Centre for Excellence project has been initiated for converting research centres and institutes of higher education into centres of excellence.

"Lead" induction training

Student union chairpersons in universities were sent for training in foreign universities under the Lead Induction Training Programme.

Research and development in engineering colleges

The following research and development centres or multidisciplinary research centres were established.

1. Reusable Building Systems at the Rajiv Gandhi Institute of Technology, Kottayam
2. Centre for Bamboo Technology at Barton Hill Engineering College
3. Transportation research centre and an electrical vehicle testing lab at Government Engineering College, Trivandrum

4. Robotics and artificial intelligence nodal centre at the Government Engineering College, Thrissur
5. Centre for excellence in systems, rural technology development centre, and energy and environment, at Government Engineering College, Kannur
6. Preliminary work for the launching of CET-SAT satellites are in progress.
7. A product design development centre and a high performance computing facility were opened in College of Engineering Thiruvanathapuram, and the facilities are open to students from all engineering colleges.

e-Journal consortium

The consortium promotes free access to e-journals across institutions in the country through Information and Library Network Centres. Kerala State Higher Education Council is the nodal agency in the State in this regard and all Universities in the State participate.

KALNET (Kerala Academic Libraries Network)

KALNET is a network of libraries attached to higher education institutions in the State that enables the sharing of resources among them.

Advanced skill development in technical institutions

To bridge the skill gap in engineering and polytechnic institutions and to connect students with future technologies, ASAP set up Advanced Skill Development Centres (ASDCs) in 66 engineering colleges and 45 polytechnics across Kerala. ASDCs partner with industry leaders and offer advanced courses in, among other subjects, artificial intelligence and machine learning, and robotic process automation. Women students have enrolled in large numbers for these advanced courses. 9180 students enrolled in ASAP-level 2 courses (ASDC courses), and 96 students were placed in artificial intelligence and machine learning courses.

Earn while learning – internship programme for graduate students

State Government entrusted ASAP with the task of operating State Internship Portal to offer graduate students an opportunity to work while undergoing a conventional educational programme. The State Initiative on Internship for Employability Enhancement project is an online web platform designed to provide a platform for students, academics, and industries to meet at the same point. A salient feature of the internship portal is that it connects students not only with industries but also with State departments that involve technical work.

Community Skill Parks

ASAP's flagship initiative, Community Skill Parks (CSPs), have conceived as an industry-led public private partnership model of skill training. They have been developed as multi-skill training centres equipped with state-of-the-art training facilities in various locations across the State. CSPs operate on a hub and spoke model and connect with academic institutions, vocational training institutions, and local industry to foster a skill development ecosystem. A total of 16 CSPs are to be implemented in the State, of which nine are already operational, while construction work in the remaining seven CSPs are in the initial phase.

National Qualification Register (NQR)

ASAP has acquired the expertise and competence to develop skill qualifications as per National Skills Qualification Framework (NSQF). Over the last two years, ASAP has developed five NSQF Qualifications that are now available in the National Qualifications Register (NQR). With this ASAP has entered the domain of skill course curriculum development. ASAP qualifications in the NQR are:

1. Communicative English Trainer (NSQF Level 6)
2. Junior Correspondent Course (NSQF Level 5)
3. Assistant Offset Printing Operator (NSQF Level 4)
4. Air Cargo Management Executive (NQF Level 6)
5. Certificate Course in Hi Tech Farm Management (NSQF Level 6)

In 2019, four more qualifications were developed. The qualifications have obtained approval of the NSQF and they are as follows;

1. 3D Prototyping Manager-NSQF-level 6
2. Manager Pre press-NSQF-level 6
3. Binding Machine Operator-NSQF-level 4
4. AI-Machine Learning Developer-NSQF-level 7

She Skills

"She Skills" is an exclusive training programme for women above 15 years of age for a period of three months. Improving living standards by helping women, mostly home makers, to learn marketable skills, and promoting entrepreneurship to become economically self-sufficient is the mandate of this special drive. She Skills 2019 offered 23 courses in 11 job sectors. Placement grooming, softs-skills training are salient features of the programme. The programme had 5529 women enrolled in 2019-20.

Professional Student Summits

Professional student summits were organised to provide opportunities for professional students to interact with experts in their respective fields and to exchange ideas. Students Leaders' Conclaves were organised to allow students to express their ideas on building a

new Kerala and to interact with the Chief Minister. "For The Students" – an online complaint resolution centre to redress students' complaints about education centres – was established. Rest centres for women students equipped with modern facilities were built in Government colleges.

Moving to the Future

An important feature of the State Budget for 2021-22 is a new emphasis on higher education. The new thrust involves new investments in the expansion of the higher education sector, in new faculty positions, new centres of excellence, postdoctoral fellowships, infrastructure development, and modernisation.

The international conference and consultation title "Kerala Looks Ahead," which was organised by the State Planning Board in February 2010, suggested certain important areas in which the State needs expert opinion to help formulate the way ahead for higher education in Kerala. These areas include:

1. Curricular reform and innovation

The issues to be covered in this category include: capacity-building in individual disciplines/subjects; the formulation of strategies for undergraduate and post-graduate education and academic research; course design; planning for departments of excellence and centres of excellence; sharing experiences with national experts on centres of excellence; and teacher training and development.

2. Institutional reform and innovation

The issues to be covered in this category involve learning from successful examples in order to develop administrative regulations that are flexible, transparent, and responsive to the requirements of teachers and students.

3. Online course development

Explore new technologies of instruction, such as MOOCs (Massive Open Online Courses) which can best be introduced in colleges and universities and set up inter-university groups for developing online courses.

4. Networks for teaching, research, and student exchange

Kerala looks forward to substantially expanding national and transnational networks for teaching, research, and student exchange.

5. Library development, IT on campus

Kerala needs to learn more about (1) ways in which libraries have been transformed; (2) sharing e-resources between institutions on different campuses; and (iii) the use of information technology and data resources on campus.

6. Equity

The issues to be covered in this category include ways and means of ensuring and deepening the socially inclusive character of higher education and ensuring regional balance in higher education.

7. Microplanning

The issues to be covered in this category involve drawing up specific plans and programmes for individual universities, colleges, and related institutions as the need arises.

Kerala's Health: Some Perspectives

Kerala continues to attract international attention for its achievements in the sphere of the health of its people. It continues to lead the country in respect of indicators such as life expectancy at birth, infant mortality, maternal mortality, and the ratio of males to females in the population. All important national metrics place Kerala at the top of the table with respect to health. In NITI Aayog's Performance of States in Health Outcomes Index in June 2019, Kerala, with an overall score of 74.01, ranks at the top in terms of overall performance.

International trends in the era of neoliberalisation have been towards insurance (rather than universal access) and privatisation (rather than strengthening the public sector in health). In direct contrast, during the 13th Five-Year Plan, the Government of Kerala emphasised and strengthened the public sector in preventive, curative, and palliative health care. Public intervention has consistently been designed to make the best possible health care in public sphere. It has been designed to transform the quality of public sector in health to improve access and affordability and to expand physical facilities for health and sanitation.

In the current era, the State has to tackle problems of non-communicable diseases and of the resurgence of certain infectious diseases, with problems of large scale privatisation of health sector and with the health of the elderly. State policy is also paying increasing attention to issues of mental health, substance abuse, adolescent health, and the widespread phenomenon of road traffic accidents. The State has to take special care of the health of specific sections of people, including people of the Scheduled Caste and Scheduled Tribes, fish workers, plantation workers, and others.

Initiatives under the 13th Five-Year Plan

In 1996, the Government of Kerala initiated a bold policy move, bringing health institutions such as

Table 10.7 *Demographic and health profiles, Kerala and India*

Indicators	Male/Female	Kerala	India
Infant Mortality Rate #		7	32
	Male	9	32
	Female	5	33
Maternal Mortality Ratio**		43	113
Expectancy of life at Birth***		75.3	69.4
	Male	72.5	68.2
	Female	77.9	70.7
Percentage of deaths receiving medical attention*		95.5	80.8
Percentage of live births by type of medical attention received by mothers*		99.9	92.8

Note: **Special Bulletin on MMR 2016-18
***SRS Life Table 2014-18
Source: # SRS 2020 May/* SRS Statistical Report 2018

Primary Health Centres (PHC) and Community Health Centres (CHC) under local self government institutions (LSGI). The expectation was that this would result in more accountable and efficient health institutions. It was also expected that public health, health promotion, and inter-sectoral initiatives in health would thrive through planned interventions by local bodies. In practice, many institutions focused on improving health care facilities that were directly demanded by the population; this improved infrastructure and service in primary and secondary healthcare institutions and widened healthcare delivery.

The approach of the 13th Five-Year Plan was to provide the best possible preventive, curative, and palliative care in the public sector by improving the infrastructure and quality of services. The Approach Paper envisages the successful implementation of the Aardram Mission. Expansion of insurance coverage, achievement of total sanitation, waste disposal and mosquito eradication, are some of the other outcomes that were priority in order to achieve a healthy life for all segments of the population in the State. In 2016, the Government of Kerala formed a committee with Dr. B. Ekbal, Member, State Planning Board, as Chair to formulate a new Health Policy for Kerala.[15]

Achievements under Aardram Mission

The major objectives of the Aardram Mission are: (i) patient friendly transformation of the outpatient (OP) wings of medical college hospitals and other Government hospitals, (ii) standardisation of the district and taluk-level hospitals, (iii) developing the PHCs into FHCs in a phased manner and (iv) ensuring protocol based treatment guidelines in the management of patients in hospitals.

Under the Mission, Primary Health Centres (PHCs) are being converted to Family Health Centres (FHCs), that are, capable of meeting the healthcare needs of all through personalised service packages and to address the preventive, promotive, curative, palliative, and rehabilitative health care needs of the local community. The facilities provided include web-based appointment system, patient reception, and registration, electronic display boards for each consultant, the facility for patient to wait for their turn, improved amenities in waiting areas, and location maps and signages. The Mission includes the improvement of clinical management by ensuring guideline-based case management and monitoring the quality of services. The highlight of this transformation is that local governments play the crucial role in the functioning of Family Health Centres. Availability of drugs has improved at the primary-level, and the Government has been recruiting manpower in health despite the financial setbacks induced by successive years of natural disasters and the onset of the Covid-19 pandemic. Supportive institutions such as the Kerala Institute of Virology have been set up to improve capabilities in the public sector to deal with health emergencies.

Aardram Mission is implemented in three stages in Government medical college hospitals, district hospitals, taluk hospitals and primary health centres. The conversion of PHCs as Family Health Centres with adequate supply of drugs and assured treatment protocols ensures better health among people and enhances their trust in the public health system.

[15]https://kerala.gov.in/documents/10180/17220f0b-b9d6-4c6a-8754-3aa47aa3fe01

i. PHCs and CHCs as Family Health Centres

In the first phase (2017-18), the Government identified 170 PHCs in 14 districts for developing into FHCs. Of these, 162 FHCs have been made functional and the rest are progressing. In the second phase (2018-19), 504 PHCs were selected for developing into FHCs; 315 have been completed and work in the other PHCs is at different stages. Transformation of the PHCs into FHCs has evoked encouraging community response. In the third phase, 212 PHCs were selected for developing into FHCs using funds under the National Health Mission. In addition to this, 76 Community Health Centres (CHCs) will be converted into Block Family Health Centres.

ii. District hospitals: people-friendly outpatient facilities

The Aardram Mission aims to transform all district hospitals into institutions that provide all basic specialty services and essential multi-specialty services. The specialty services include new-born care, psychiatric services, physical medicine and rehabilitation services, accident and trauma services, dialysis services, and anti-retroviral therapy.

Medical college hospitals and district hospitals are large institutions providing outpatient care for a large number of patients every day, and a patient-friendly transformation of the outpatient wings of these hospitals was taken as a priority item under Aardram Mission. The facilities that have been transformed include outpatient registration counters, patient waiting areas, seating facilities, drinking water facilities, toilet facilities, public address systems, information education and communication arrangements and signage systems. Support of patient-care coordinators for larger institutions will also be provided. These changes are being implemented in Government medical college hospitals and district hospitals.

There are a total of 18 General hospitals and 18 District Hospitals in the State. Of these, 17 institutions have been selected for OP transformation (one hospital each in 11 districts and two hospitals from Kannur, Kasaragod and Wayanad districts). Construction work in 9 hospitals is complete and is progressing in other hospitals. Of the total 86 taluk hospitals, 75 have been selected for standardisation in a phased manner.

iii. Speciality services in district-level hospital through KIIFB

As a part of enhancing the district-level hospitals as institutions which provide essential specialty services, cath labs, dialysis centres and cardiac care units (CCUs) have been set up in district and taluk hospitals with funding from Kerala Infrastructure Investment Fund Board (KIIFB). For this purpose, an amount of Rs 150 crore has been provided to start 44 dialysis centres and 10 cath labs and CCUs. 98 per cent works of dialysis centres and 80 per cent works of cath labs and CCUs have already been completed while the balance works are expected to be completed by July 2021.

Table 10.8 *Setting up of cath labs and dialysis units through KIIFB*

Project	Dialysis centres	Cath lab and CCU
Total outlay (in Rs crore)	69	80
No. of centres	44	10
Started functioning	41	8
Completed	2	0
Progressing	1	2

Source: Directorate of Health Services, Government of Kerala

iv. Transformation of Medical Colleges

The Aardram Mission, as mentioned, aims to provide patient-friendly and quality care services at the outpatient wing of medical colleges. As a first step, medical colleges at Thiruvananthapuram, Paripally, Alappuzha, Kottayam, Ernakulam, Thrissur, Malappuram and Kozhikode were selected for the implementation of the programme to transform outpatient departments. Work in 8 Medical Colleges has been completed.

Human Resource Development in the Health Sector

In order to implement the Mission activities, additional posts of one medical officer, two staff nurses and one lab technician each were created in each FHC. These posts were filled in order to ensure that there would be a minimum of 3 doctors and 4 nurses in each FHC. In the first phase of the Aardram Mission, 830 posts were created; these include medical officers (170), staff nurses (340), pharmacists (150) and lab technicians (170). In the second phase, 1000 posts were created: medical officers (400), staff nurses (400), and pharmacists and lab technicians (200). Another 1217 posts have been created subsequently.

Service delivery in these institutions in terms of clinical care and public health activities have been augmented and outpatient care is provided up to 6 pm. The e-Health project is expected to further develop individual patient care plans and family health plans based on family health register data. Ward and panchayat-level health plans that focus on preventive, promotive, and rehabilitative

Table 10.9 *Status of infrastructural development in hospitals under Aardram Mission* in number

Type of hospitals	Phases	Total institutions	AS issued	Work completed	Work progressing
PHCs into FHCs	First phase	170	170	163	7
	Second phase	504	432	315	117
	Third phase	212	212	0	212
	Total	886	814	478	336
OPs of district-level hospitals	First phase	8	8	1	7
	Second phase	18	18	0	0
	Third phase	10	10	0	0
	Total	36	36	1	7
Medical colleges	First phase	8	8	8	0

Source: Directorate of Health Services, Government of Kerala
Note: AS is administrative sanction.

Table 10.10 A*dditional posts created in health services and under Aardram Mission, 2016 to January 15, 2021* in number

Post	Total Health Services	Aardram Mission
Doctors//Medical Officers	982	836
Nurses	1042	937
Pharmacist	189	180
Lab Technician	677	460
Others	470	308
Total*	3360	2721

Note: *With the 1217 posts created recently, the total number of posts created during the 5 year period adds up to 4577.

health care services will be developed in association with panchayats and with public participation. A new health volunteer system called Arogyasena was launched as part of the Aardram Mission. Public health interventions focusing on the re-organisation of the primary health care system based on the epidemiological needs of Kerala society especially with respect to the challenge of non-communicable diseases constitute the focus of the programme. Treatment guidelines for 53 common medical conditions to be managed at PHC-level have been prepared and made available to Medical Officers.

Training status. Revised job responsibilities and FHC transformation guidelines have been prepared and module-based training programmes have begun for major categories of staff. The State Health Systems Resource Centre (SHSRC), Kerala, has been entrusted with the responsibility of training. Training in three spheres has begun: team-building training, concept-based training, and skill training.

Aswasam clinics. Aswasam depression management as primary care has been started in 149 Family Health Centres across the State. Health workers and staff nurses were trained in screening using Patient Health Questionnaire 9 (PHQ9) and psychological first aid, while doctors were trained in diagnosis and management of depression. Referral Protocols for cases to be seen by District Mental Health Programme (DMHP) psychiatrists are included in the programme. The number of persons screened in 2019-20 was 25,587 of which the number of positive cases was 4901.

COPD Prevention and Control Programme – SWAAS. A Chronic Obstructive Pulmonary Disease (COPD) control programme called SWAAS is being implemented from the Family Health Centre-level upwards as part of the Aardram Mission.

Aardram People's Health Campaign. The Aardram People's Health Campaign was launched on November 18, 2019. Following the State-level launch, the campaign began at the district and local-levels throughout the State. The State-wide campaign is being implemented locally under the leadership of respective LSG and Heath and Family Welfare Department with active involvement of Missions, line departments and agencies, NGOs, and Community Based Organisations. Local-level implementation of the campaign starts from the ward-level under the leadership of an expanded Ward Health Sanitation and Nutrition Committee (WHSNC). At the panchayat/block/urban area-level it is under the leadership of an expanded Arogya Jagratha Committee. District-level implementation is through the coordination of LSG-level committees, the

existing District Health and Family Welfare Society, and the District Aardram Task Force headed by District Panchayat President, District Collector and DMO (Health). The Minister in charge of the district, MPs and MLAs of the districts are the chief patrons of the district-level committees. At the State-level, leadership and guidance for the campaign is given by the Nava Kerala Karma Padhati Committee chaired by the Chief Minister. The State Level Implementation Committee functions under the leadership of the Minister for Health (Chairperson) and Principal Secretary, Health (Vice Chairperson). The following are the five areas of focus in the people's campaign:

1) Preventive and promotive health and improvement in health-seeking behaviour.
2) Healthy food
3) Exercise and physical activity
4) Mental health and de-addiction (against alcohol, smoking and substance abuse)
5) Cleanliness and waste disposal

e-Health Project. The e-Health Project aims to link health institutions all over Kerala. The project aims to build a database of individual medical records easily accessible to the medical practitioners. It includes unique patient identification in different settings and the exchange of data between different health care delivery units at primary, secondary and tertiary-level across the State. Health records can help avoid repeated medical tests and reduce out of pocket expenses. The scheme is being implemented in all the fourteen districts of Kerala, with Thiruvananthapuram as the pilot district. The e-Health programme has been completed in 140 hospitals, of which 63 are working as paperless hospitals. NITI Aayog has acclaimed the e-health project of the State. Kerala is the only State in the country where a database covering 2,59,21,080 people has been collected and stored as electronic records**.**

Investment during the 13th Five-Year Plan

Studies have pointed out that the increase in per capita out-of-pocket health expenditure between 1987 and 2004 was more than double the increase in the cost of living index. Globalisation and privatisation challenge the foundations of a health system care built on low-cost health care and motivated by principles of distributive justice. In order to address this issue, funds have come to the health sector from the Plan and KIIFB.

Plan and non-Plan expenditure on health have increased over these five years. In 2020-21, the Government spent more than originally estimated in the budget because of expenditure caused by the pandemic.

The steady increase of budgetary investment is shown in Figure 10.1.

Investment through Kerala Infrastructure Investment Fund Board (KIIFB)

KIIFB, which was launched for financing infrastructure projects in the State, is instrumental in setting up a wide range of infrastructure development projects under health sector since 2016. Projects with an amount of Rs 4240.12 crore have been approved by KIIFB and out of these, projects with an amount of Rs 1503.42 crore have already been started. Specialities such as cath labs and dialysis centres in district and taluk hospitals could be materialised with KIIFB fund.

The projects approved for financing are currently under various stages of execution. Some of the major projects of KIIFB in the health sector are listed below:

1. Government Medical College, Thiruvananthapuram

The first phase development is for improving external infrastructure, including the development of internal roads, construction of a multilevel parking system, traffic regulations, junction improvements, and measures for pedestrian access and safety. Rs 58.37 crore

Table 10.11 *Investment in health and family welfare, Kerala* in Rs crore

Year	Revenue expenditure			Capital expenditure			Total expenditure		
	Plan	Non Plan	Total	Plan	Non Plan	Total	Plan	Non Plan	Total
2017-18	1593.55	4580.85	6174.4	269.4	38	307.39	1862.95	4618.85	6481.79
2018-19	1640.16	5206.89	6847.05	222.6	28.91	251.51	1862.76	5235.8	7098.56
2019-20	2024.97	5269.62	7294.58	221.64	22.59	244.23	2246.61	5292.21	7538.81
2020-21 (RE)	2476.33	5289.98	7766.62	138.53	65.68	204.19	2614.86	5355.66	7970.81
2021-22 (BE)	2261.72	6283.21	8544.94	151.42	85.18	236.6	2413.14	6368.39	8781.54

Source: Budget in Brief, Government of Kerala

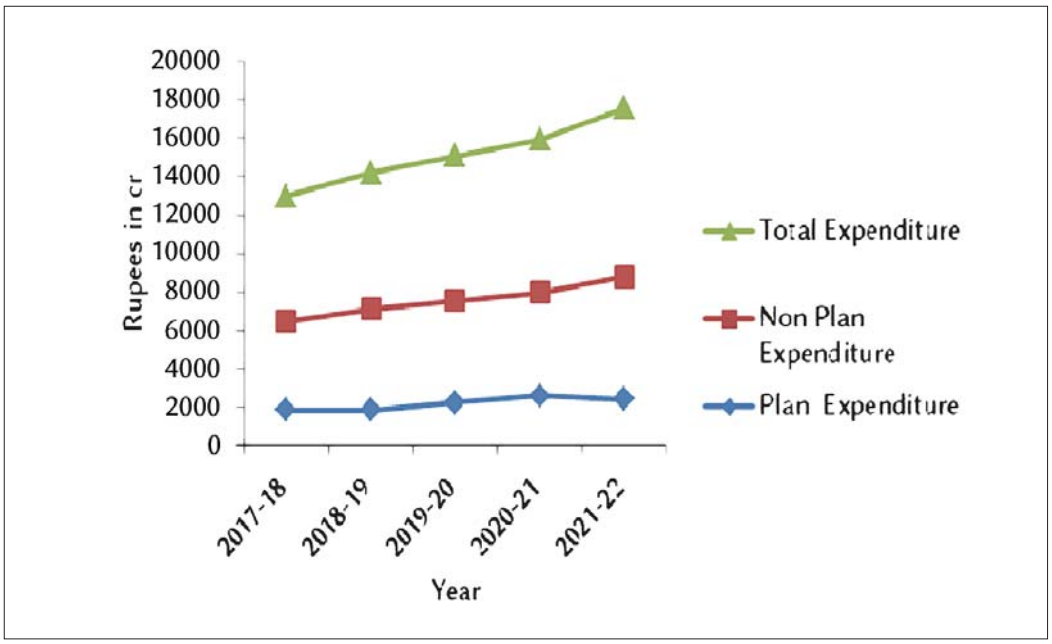

Figure 10.1 *Investment in health in the 13th Five-Year Plan* in Rs crore
Source: Budget in Brief, Government of Kerala

has been approved for this purpose. The project under Phase II that has been proposed for the development of Government Medical College, Thiruvananthapuram, includes construction of an operation theatre cum surgical ward block, paediatrics block, and academic block for a medical laboratory technology block at a total estimated cost of Rs 194.33 crore. INKEL Ltd is the SPV designated for executing the project.

2. Malabar Cancer Centre, Thalassery

The Phase-I project is for the upgradation of MCC as a Post Graduate Institute of Oncology Sciences and Research which shall provide infrastructure of state of art facilities with high quality teaching. The existing hospital lacks modern diagnostics and therapeutic equipment, proper emergency service and intensive care units, essential pharmaceuticals and supplies, referral support and resources. There are also space constraints for many departments in the hospital. The scope of work includes construction of new radiotherapy block renovation of main outpatient (OP) building and site development works. The renovation works mainly includes demolition of existing partition wall, repair of toilets, providing new partition wall, provision of false ceiling, orthopaedic OP, and roofing for open terrace courtyards. Site development works include rainwater tank, interlocked paved parking, covered parking, drain, and retaining wall. The Phase-I works were approved for Rs 75.18 crore and M/s BSBL is the SPV for the project. KIIFB has also approved the project submitted by M/s WAPCOS Ltd (SPV) for its Phase-

Table 10.12 *Status of projects in health sector funded by Kerala Infrastructure Investment Fund Board* in Rs crore

KIIFB Approved Projects	No. of projects approved	57
	Approved amount (in Rs crore)	Rs 4240.12
KIIFB Tendered Projects	No. of projects tendered	28
	Approved amount of the tendered projects (in Rs crore)	Rs 2471.65
	Tendered amount (in Rs crore)	Rs 1703.59
KIIFB Started or Awarded Projects	No. of projects started/awarded	24
	Approved amount of the projects awarded (in Rs crore)	Rs 2049.63
	Work contract amount (in Rs crore)	Rs 1503.42

Source: KIIFB

II components like construction of 14 floor hospital building and infrastructure. The total estimated cost of Phase II is Rs 345 crore.

3. Cancer Hospital and Research Centre, Kochi

Primarily, cancer treatment facilities are available largely in the tertiary hospitals. Decentralisation of the cancer treatment from tertiary hospitals to district/general hospitals will promote early detection of cancer and cure a large number of cases. Every year 35,000 new cases of cancer are detected in Kerala. The proposed project at Kochi would reduce the burden on Regional Cancer Centre (RCC), Thiruvananthapuram. The project shall come up in the 12 acre campus in phases. The first phase shall have four blocks: medical block, administration block, services block and pain and palliative care block. The total estimate cost approved by KIIFB for the project is Rs 379.73 crore and M/s INKEL Ltd is the SPV.

4. Government Medical College, Thrissur

The project approved by KIIFB includes the construction of a super-specialty block, and the development of ancillary and supporitng facilities (including water supply, water conservation and waste water management, power supply, and solid waste management facilities). The estimated cost of the project is Rs 153.25 crore.

5. International Research Institute for Ayurveda

The project is intended to promote research work linking ayurveda with biotechnology and to ensure global standards for ayurvedic medicines. Phase I of the project includes the construction of a new 100-bed hospital building, a manuscript building, and a nursery building. The total estimated cost of Phase I is Rs 153.25 crore.

People's Access to Public-Sector Health Facilities

One of the objectives of Aardram Mission is to transform the public health sector, making it patient friendly and affordable for the poor and ordinary citizens of our State. The Government has designed various strategies to provide an effective healthcare system to the people in the public domain with better infrastructure and quality services. One of the direct outcomes of the Government's efforts through Aardram Mission is that people's dependence on Government hospitals has increased, mainly because the facilities in Family Health Centres and in district-level hospitals have been improved. Table 10.13 shows the increase in hospital beds between 2016 and 2020.

Increased reliance of people on Government hospitals is reflected in the increased number of inpatients and outpatients during this period. As shown in Figure 10.2, there was an increase of nearly 3 crore patients in modern medicine hospitals from 2016 to 2019 (the number went down in 2020 on account of the pandemic). Visits to ayurveda and homeo institutions increased in 2020.

Table 10.13 *Number of hospital beds, 2016 to 2020*

Year	Modern medicine	Ayurveda
2016	50,751	3064
2017	50,783	3064
2018	51,197	3074
2019	51,331	3154
2020	51,567	3154

Source: *Economic Review*, various years, Kerala State Planning Board

Nipah outbreak in 2018 and 2019

Kerala experienced a first ever outbreak of Nipah virus disease, an emerging zoonotic disease marked by high fatality rates. The outbreak response activities undertaken by the health system contained the outbreak in 10 days (16 lives were lost). All contacts of the confirmed/probable cases including the health care providers of various health facilities were listed out, tracked for their health status daily, samples were tested in probable cases, and the contacts were continuously monitored through the incubation period. Thus, about 3500+ contacts spread over the two affected districts were contacted by health staff and volunteers. Kerala's historic response was subsequently commended internationally, for example, by the Baltimore Institute of Human Virology in July 2018.

Kerala floods

Kerala experienced another public health challenge in the form of unusual floods that hit almost all districts of the State in July-August 2018.

An incident command centre and control rooms were set up in the Directorate of Health Services and all district headquarters. The control room contact numbers were publicised. State and District Disaster Management system were activated from August 9, 2018 onwards in the northern districts and from August 14, 2018 onwards in other districts. The State Rapid Response Team convened an emergency meeting to draft guidelines for control measures. A representative of Regional Director of Health (RDO-Thiruvananthapuram) participated and contributed to the formulation of the guidelines. At State Control Room, separate cells were designated for logistic

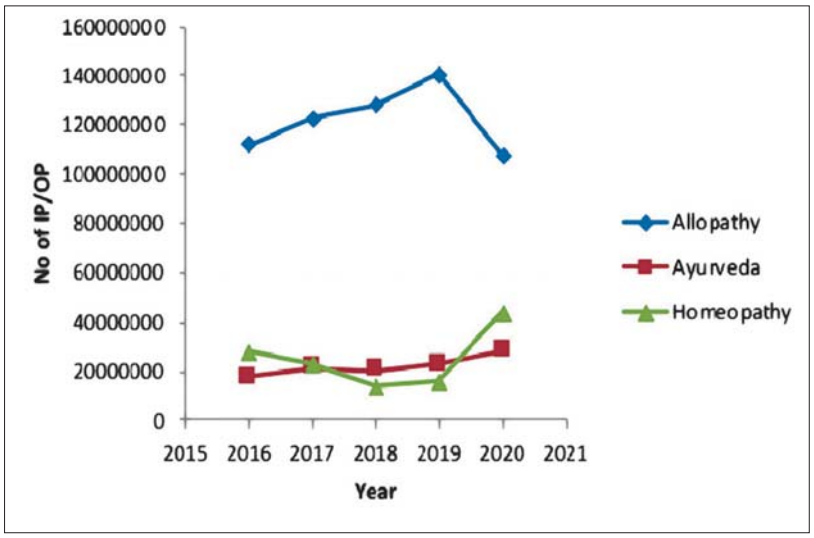

Figure 10.2 *Inpatients and Outpatients, Kerala, 2016-2020* in numbers
Source: *Economic Review*, various years

management, media management, and data management. Available department staff were designated to provide 24-hour service in these control rooms, supplemented by deployment from non-affected regions. These centres monitored the situation twice daily and reported to the State and Central Governments. Guidelines for the prevention and control of communicable diseases and for the systematic functioning of relief camps were formulated and circulated. A health inspector/multipurpose health worker was entrusted to supervise the health and sanitation part of all relief camps. Local Accredited Social Health Activists (ASHA), Anganwadi Workers (AWW) and Kudumbasree volunteers and members of Village Health Sanitation and Nutrition Committee (VHSNCs) worked full time in relief camps. Advisories in English and Malayalam regarding preventive health were formulated and circulated to health workers, public and NGOs. Health authorities focussed on preventing food-borne infections, water borne diseases, leptospirosis, and snake bites. Unusual symptoms to be reported immediately to Primary/Family Health Centres. When the flood water began to recede, steps were taken for the safe return of the victims of this disaster to their homes. All damaged houses were restored in a phased manner, temporary shelters were provided for families whose homes were completely damaged. Counselling services were arranged for those traumatised in the tragedy. State and District Mental Health teams ensured the necessary support to the victims. Steps were taken to ensure continued treatment for non-communicable diseases. The disease surveillance system was strengthened. Steps were initiated to clean and super-chlorinate all drinking water sources and to ensure the safe disposal of carcasses with help of officers of the Animal Husbandry Department. Steps were also taken to disseminate correct information and status reports on the impact of the flood to various media on a regular basis.

Covid-19 Pandemic

Kerala reported the first case of Covid-19 in the country, less than a month after the disease was first notified by the World Health Organisation. The State Government, which had learned from the Nipah experience, responded by activating its public health emergency response system. Kerala quickly established a surveillance system, enhanced its existing infrastructure capacity, and trained its entire workforce to tackle the new challenge. Kerala was the first State in India to start RT-PCR testing in its laboratories. Through a systematic implementation of a Test, Trace and Treat programme, the State was able to prevent the rapid progression of the pandemic and ensured that the health system was never overrun by the sheer number of cases. Kerala has among the lowest case fatality rates in the country and is among the States that test the highest number of persons per million population. Even during the lockdown and unlock phases, the Government took steps to ensure continuous care to all persons with non-communicable diseases and other chronic illnesses by providing medicine at home and ensuring access to health care through telemedicine and tele-counselling services. Kerala also ensured psychosocial support to all its citizens during the lockdown period and beyond. The elderly and other vulnerable persons were protected by ensuring reverse quarantine. The efforts of Kerala Government in "flattening the curve" have widely been commended, including by organisations such as the World Health Organisation and other national and international public health bodies.

Chapter 11
Infrastructure

Bridging the Infrastructure Gap in Transport Sector

Introduction

Transport development in Kerala must build on the specific features of its geography and its human-built resources. The geographic features of the State are unique. The land space available for building transport facilities is limited. The State has a coastline of 580 km, and is, at its widest, 120 km from coast to the eastern border. It has three broad topographical regions running north to south – the coastal plain, undulating midlands, and the highlands. Forty four rivers cut across the State. Built transport infrastructure includes significant sectors of road, rail, air, inland waterway, and coastal transport. The future of transport thus lies in an integrated system of connectivity. In the last five years, the Government of Kerala has made significant interventions to develop such an integrated transport sector in the State.

Transport Infrastructure in the State

Roads

The road network in the State is owned and maintained by different departments and agencies, including the National Highways Authority of India (NHAI), Public Works Department (PWD), Local Self Government Department (LSGD), Harbour Engineering Department (HED), Irrigation Department, Forest Department, and Indian Railways. The total road length in the State in 2019-20 was 3.3 lakh km. The road density in Kerala at 3.9 km per square km is much higher than the national average of 1.80 km per square km. More than 80 per cent of road network is through national highways, State highways and major district roads (MDR).

The Government of Kerala has been acutely aware of the importance of enhancing the quality and length of the road network in Kerala. It has initiated development of two important road networks, the coastal highway and the hill highway. The coastal highway, which is 654 km long, stretching from Manjeswaram in Kasaragod to Poovar in Thiruvananthapuram, passes through nine districts. It provides connectivity between major ports, including Vallarpadam, Vizhinjam, and Kollam. The hill highway envisages the development of North-South corridor through the hilly regions by upgrading and improving the existing network. The hill highway, as now aligned, is 687 km and passes through all districts of Kerala except Alappuzha.

The road network of Kerala, though well connected, faces severe constraints to expansion because of the urban sprawl and the "ribbon" development along all routes. Existing traffic levels along most stretches are excessive and beyond the road capacity. The traffic on roads is increasing at a rate of 12 to 14 per cent a year. Capacity augmentation of existing roads is beset with problems relating to limited rights of way and land acquisition. The existing road network has to undergo a qualitative improvement with the aim to reduce traffic congestion and delay, easy access to destinations and reduction in accident risks. Most PWD roads have to undergo massive upgradation; this includes widening and incorporating road safety features. Among the issues to be addressed are geometrical improvement, junction improvements, pedestrian facilities, laying utility ducts, re-laying roads incorporating technical corrections and entering into maintenance contracts. Roadside parking is another issue to be addressed.

Road transport

The number of vehicles per thousand population in Kerala as on March 2019 was 425, much higher than the all-India figure of 18. In 2019, 41,111 crashes were reported, resulting in 4440 deaths and 46,055 injuries. National Transportation Planning and Research Centre (NATPAC), in 2019, identified 340 priority crash black spots across the State of which 221 were on National Highways, 80 on State Highways, and 39 on other roads.

The mismatch between the growth in motor vehicle traffic and the capacity augmentation of roads has resulted in increasing traffic congestion and road accidents throughout Kerala. Most of the roads in the State do not have adequate width to address the existing-level of traffic; only one-fourth of the roads have either two lanes or four lane capacity while most of the roads have single lane or intermediate lane capacity. The bulk of inter-city and inter-state traffic is on national and State highways, which constitute only 8 per cent of the total network.

Rail network

The State has a rail network of 1257 km route length with a total track length of 1588 km and 20 ordinary stations operating through Palakkad and Thiruvananthapuram Railway Divisions, covering 13 railway routes.

Mass rapid transit systems

1) Kochi Metro Rail Project
   This is the flagship project of Government of Kerala designed to address the transportation woes of Kochi city. The project is implemented through KMRL, which is an SPV jointly owned by Government of Kerala and Government of India through equity participation. The Aluva-Pettah stretch (25.6 km) with 22 stations was developed with an investment of around Rs 6000 crores.
2) Light Metro Rail Project
   Kerala Rapid Transit Corporation Limited is entrusted with the implementation of Mass Rapid Transport Systems in Kochi and Kozhikode at a total cost of Rs 6728 crores.
3) Silver Line Project
   Thiruvananthapuram-Kasaragod Semi-high Speed Rail Corridor Silver Line project with a design speed of 200 km per hour is a major project envisaged by the Government. The debt funding of the Rs 64,000 crore project through Kerala Rail Development Corporation has been approved by Government of India.

Airports

Kerala has four international airports – Thiruvananthapuram, Kochi, Kozhikode, and Kannur. All civilian airports functioning in the State are international airports, a feature unique to Kerala.

The Government of Kerala expedited the completion of Kannur International Airport. Phase I of the airport was inaugurated in December, 2018. The facilities in the airport include a runway length of 3,050 m (10,006.56 ft), with a terminal building of 96,000 square metre, 20 parking stands (apron), and 22, 000 square metre car/bus parking, 1200 square metre ATC/ technical building and around 7750 square metre near the apron area of Ground Service Equipment Parking area. The 180 acre land acquisition process is going on for extending the runway to 4,000 m in phase I.

Ports

Kerala has a coastal length of approximately 585 km. There is one major port at Cochin and 17 non-major ports. Of the 17 minor ports in Kerala, four are considered intermediate ports based on the berthing, cargo handling, and storage facilities available. They are Vizhinjam, Beypore-Kozhikode, Azhikkal, and Kollam ports. Ports are being developed on a priority basis for coastal shipping operations. Cochin port recorded the highest growth rate among the major ports in India in handling cargo in 2018 and 2019.

Vizhinjam International Transshipment Terminal, the first deep-water transshipment terminal in India, is under construction. The main advantage of Vizhinjam port is a natural depth of 18 m, proximity of 10 m to the international shipping route and minimal littoral drift along the coast. The Government of Kerala has constituted a special purpose vehicle namely Vizhinjam International Sea Port Limited (VISL).

The port construction works were initiated in December 2015 and construction work on 565 m length of breakwater, 800 m long berth, a container yard, boundary walls and access roads are in progress. A water treatment plant with a capacity of 3.3 million litres a day and an 11 kV power substation are complete.

Azhikkal Port Limited, an SPV formed with the Chief Minister as Chairperson and Minister for Ports as Vice Chairperson, was incorporated on March 6, 2018 for the development of Azhikkal port. The port is now renamed Malabar International Port and SEZ Ltd. The authorised capital of the Company is Rs 100 crore and the initial paid up capital is Rs 25 crore. It is wholly owned by Government of Kerala and registered under Companies Act, 2013. Technical Consultancy Services have been awarded to M/s Howe Engineering Projects India Pvt Limited on April 23, 2018 and the agreement was signed on May 9, 2018. The port will have facilities to cater to vessels with drafts of 14.5 meter and will have 2 to 3 berths. These will be augmented in later phases. Facilities such as additional berths and LNG facility shall be considered in future phases.

Inland water transport

Inland water transport is the most economical and environment-friendly mode of transport. The State Water Transport Department (SWTD), Coastal Shipping and Inland Navigation Department (CSIND), and Kerala Shipping and Inland Navigation Corporation (KSINC) are the major agencies for the development of inland waterways in Kerala. The development of State waterways is undertaken jointly by CSIND and Kerala Waterways and Infrastructure Ltd (KWIL), a special purpose vehicle formed by the State Government with Cochin International Airport Ltd (CIAL) as a major partner. With KIIFB assistance, KWIL has nearly completed development activities in the Parvathi-Puthanar (Kovalam-Akkulam) stretch.

Major Policy Initiatives in the 13th Plan

Electric Vehicle (EV) Policy

Kerala has formulated a draft policy for electric vehicles. The policy is to promote electric mobility for commercial use by providing attractive incentives,

subsidies for the replacement of fossil fuel vehicles, procurement of electric vehicles, establishing charging infrastructure, retro fitment, promotional programmes such as shared electric and connected mobility and other innovative programmes. The vision is to embrace electric mobility as a tool to promote shared mobility and clean transportation and ensure environmental sustainability, pollution reduction, energy efficiency and conservation and to create an ecosystem for manufacturing electric vehicle (EV) components in Kerala.

Kerala Metropolitan Transport Authority

The Government of Kerala formed the Kerala Metropolitan Transport Authority (KMTA) in 2019. The authority is an umbrella body responsible for the development, operation, maintenance, monitoring, and supervision of urban transport in urban mobility areas. As per the KMTA Act, Metropolitan Transport Authorities are to be formed in three major cities, Thiruvananthapuram, Kochi, and Kozhikode. The activities of KMTA are the integration of transport, fare revision, renovation of bus transport systems, locating new parking lots and implementing a single ticketing system, by which people can use one ticket for various modes of travel through an Intelligent Transport System. KMTA was formed in Kochi and has been functional since November 1, 2020.

KIIFB funded projects

The role of KIIFB is instrumental in setting up a wide range of infrastructure development projects since 2016. The projects so far approved for financing are currently under various stages of execution.

1) Construction of Nedumbrakkadu-Vilakkumaram Bridge Across Vayalar Kayal in Alappuzha. Four-laning of NH-47(66)-Karamana Kaliyikkavila Phase-I Reach II-Pravachambalam to Vazhimukku in Thiruvananthapuram.
2) Construction of coastal highway in Malappuram District reach-I: Padinjarekkara to Unniyal junction (km 0/000-15/000)
3) Flyover at Vytilla in Ernakulam district: The flyover at Vytilla, a six-lane structure with divided carriage way and costing Rs 87.43 crore, was commissioned recently.
4) Flyover at Kundannoor: The flyover is a six-lane continuous bridge with total length of 700m. It was inaugurated on January 9, 2021.
5) Hill highway: The hill highway starts from Nandarapadavu in Kasaragod district to Parassala in Thiruvananthapuram District, with a length of 1332.16 km. The envisaged outlay for the project is Rs 1500 crore. The proposed Hill highway along with the Coastal Highway network would relieve pressure on the State highways and major district roads besides providing alternative pathways for traffic movement in times of disaster/ crisis events. 48.1 km road between Punalur KSRTC junction with Kollayil junction, has been completed.
6) Urban Regeneration and Integrated Water Transport System in Kochi: Five canals are proposed to be taken up under the project: Edappally Canal (11.23 km), Thevara-Perandoor Canal (9.88 km), Chilavanoor Canal (11.15 km), Thevara Canal (1.41 km), and Market Canal (0.66 km).
7) Modernising Water Transport in Alappuzha canals: The Project mainly intends beautification of 9 main canals and 59 sub-canals in Alappuzha. The project is to be executed in two phases for a total funding cost of Rs 96.5 crore by KIIFB. The project is implemented by Kerala Irrigation Infrastructure Development Corporation as Special Purpose Vehicle (SPV).

Achievements in the Sector in the 13th Plan

Public Works Department

- Total road length in Kerala increased from 2,18,942.426 km to 3,31,904.2 km from 2016-17 to 2019-20. Renovated 5612 km using BM and BC and 5968.2 km using chipping carpet from 2016-17 to 2020-21.
- Completed Amabalappuzha-Thiruvalla road work under KIIFB.
- Administrative sanction issued to implement road reconstruction works for Rs 3346.09 crore under RKI utilising World Bank assistance of Rs 1200 crore and KfW loan (German bank assistance) of Rs 1800 crore.
- The DPR of 25 reaches 1251.04 km hill highway prepared and submitted to KIIFB for financial sanction. Out of 25 reaches, KIIFB has accorded financial sanction for 18 reaches for a total amount of Rs 1506.24 crore. Works completed in Punalur reach of Kollam District.
- Kerala Highway Research Institute (KHRI) has been upgraded as Centre of Excellence and will focus on following thematic areas such as innovation in design/construction practices road asset management, road safety management, quality assurance and contract management and promoting indigenous research and development.
- National Transport Planning and Research had

finalised the list of 340 priority black-spots all over Kerala. Out of 18 black spots identified along PWD (NH), 15 has been rectified.

- The estimated cost of coastal highway, which is around Rs 6500 crore, is being financed from the Kerala Infrastructure Investment Fund Board (KIIFB). A stretch of 15 km of coastal highway construction from Padinjarekkara to Unniyal in Malappuram District, amounting to Rs 52.78 crore, is in progress and currently 52 per cent of the work has been completed.
- 302.2 km work have been completed by KSTP under RKI in 10 stretches. 79.98 per cent physical progress except one bridge have been achieved along the Thalassery-Kalarodu stretches.
- PWD (Bridges) maintains 2716 bridges. 375 bridges works across the State has been undertaken and completed 112 works during 2016-2020 (as on December 2020).127 KIIFB projects, 15 NABARD projects, 8 Kasaragod Development projects, and 19 Reconstruction works are in ongoing stage.
- Completed Vyttila and Kondannoor flyover.
- Kollam bypass work completed and inaugurated on January 15, 2019 at a project cost of Rs 352.05 crore and Alappuzha bypass work completed and inaugurated on January 28, 2021 at a project cost of Rs 348.43 crore.
- Completed and inaugurated Phase I-Reach II Pravachambalam to Balaramapuram (5 km) road works.
- Project Management Unit under KRFB (Kerala Road Fund Board) has been established as Special purpose Vehicle for KIIFB funded projects. As on March 31, 2020, 110 projects are ongoing, total project outlay is Rs 4663 crore and 14 projects are completed.

Road transport

- The number of motor vehicles having valid registrations has increased from 1,20, 42, 691 in 2018 to 14,184,184 in March 31, 2020.
- Traffic crashes involving two wheelers has decreased from 34,473 (94 per day) in 2018 to 16,970 (46 per day) in 2019.
- The Motor Vehicles Department (MVD) has rolled out 65 electric vehicles for enforcement activities - a novel initiative in electric mobility.
- Introduced VAHAN and SARATHY online portal for vehicle registration and driver licensing.
- Commissioned heavy computerised vehicle testing station at Kozhikode, computerised driver testing tracks at Uzhavur and Muvattupuzha and automated enforcement control room at Kozhikode.
- Started commercial-scale production of Kerala's own e-auto "Neem-G."
- Opened 13 sub-RT offices.
- KSRTC commenced "Relay" point-to-point service on June 26, 2020 to facilitate long distance travel during Covid-19 phase and Bus-on-Demand ("BonD") service on July 2, 2020 and launched mobile ticket booking app "Ente KSRTC."

Ports

- Automated cargo handling gears were installed at Kollam, Beypore, and Azhikkal ports.
- Commissioned container handling crane at Azhikkal and Beypore ports and a 750 HP Tug at Azhikkal port.
- Commissioned multipurpose passenger cum cargo wharf at Kollam port at a cost of Rs 20 crore.
- Started Crew changing facilities at Vizhinjam and Beypore Port.
- 127,520 tonne cargo handled at Beypore port during 2019-20.
- Transit shed, electronic data interchange facility and electronic weigh bridge completed in Beypore port.

Coastal Shipping and Inland Navigation (CSIND)

Status of the Development of different reaches of West Coast Canal is given below:

- Kovalam-Kollam Reach (0-74.18 km): Canal renovated and made navigable from Akkulam lake to Vettoor, Parvathy Puthanar stretch from Kovalam to Akkulam made navigable and special boat operated in this stretch. Completed works of 5 stretches in Kollam canal (except third reach) in the Eravipuram-Ashtmudi lake, Varkala lake to Eravipuram Canal made navigable.
- Vadakara-Mahe reach (450.08-467.69 km): In Varkala to Mahi canal, 10 km stretch made navigable and constructed 3 out of 6 foot bridges; completed the construction of two Road Bridge (Parambil, Kallayi) and opened to traffic.
- Valapattanam to Neeleswaram reach (526.20-590.53 km): Stretch made navigable from Valappattanam to Neeleswaram.
- Constructed boat jetty near KMML, Chavara for handling hazardous materials like sulphuric acid and furnace oil.
- Renovated 7 boat jetties and constructed Chempakkulam Jhankar boat jetty in Alappuzha.

Kerala Waterways and Infrastructure Limited (KWIL)

- KWIL is a special purpose vehicle involving State

Government and Cochin International Airport Ltd (CIAL) formed to take up development of State waterway with KIIFB assistance. KWIL has nearly completed the development activities in Parvathi Puthanar (Kovalam-Akkulam stretch). Canoli canal and Kallayi stretch in Kozhikode made navigable.

Kerala Shipping and Inland Navigation Corporation Limited (KSINC)

- Luxury Cruise vessel "Nefertiti" launched in 2019 (Class VI passenger vessel with 200 nos passenger capacity).
- Double ended RO-RO vessel in operation for the Cochin Corporation.
- Launched KSINC indigenously built 500 MT bulk cargo barge "Orion."
- Built and handed over an FRP 42 pax tourist boat to Tourism Department.

State water transport

- Inaugurated high-speed a/c Speed boat Vega-120 between Vaikom-Ernakulam on November 4, 2018 and launched "Vega 2" High speed AC passenger (120 Pac) passenger cum boat on March 10, 2020 between Alappuzha-Kumarakom-Kottayam.
- India's first water taxi Nirva was inaugurated on October 2020. Kerala is the first State to rollout a water taxi in India.
- India's first solar cruise boat inaugurated on December 2020.
- Inaugurated India's first solar boat Aditya, with 75 passenger capacity on January 2017. In 2020, Aditya won the Gustave Award for Best Ferry in the World.
- Introduced 5 nos of IRS class mono-hull steel boats with all safety equipment and conducted Kainakari Circular Service.
- Inaugurated the double-deck passenger cum tourist vessels "See Ashtamudi" especially designed for both normal commuters and tourists enjoying the beauty of Ashtamudi lake in Kollam district.
- Procured 5 number of highly advanced rescue vessel for five major station. This will help in evacuating people trapped in flood affected areas to safe shelters during the time of heavy flood.
- Inauguration of First Route and Terminal buildings of Kochi Water Metro and Launch of Integrated Urban Regeneration and Water Transport System (IURWTS) was held on February 2021.

Other transport

- Kannur International Airport was inaugurated in December 2018.
- Kochi Metro-Aluva to Petta (part of Phase I) stretch 25.2 km with 22 stations started operation.
- Government of India has accorded in-Principle Approval (IPA) for Silver Line project (Semi High speed rail project).

Sectorwise Strategies

Road transport

- Review road transport requirements and prepare long term development plans.
- Adopt people friendly regulations for safe, clean, and efficient transport system.
- More IT, ITes focussing passenger and freight services on PPP mode.
- Develop NHs, SHs, MDRs and other roads as per IRC standards to ensure seamless connectivity with enhanced safety features.
- Road investments focussing on reduction in travel time, accidents, travel and freight charges and vehicle maintenance costs.
- Integrated district-level road network development plans.
- Intelligent transport system with real time data on vehicles, passengers, freight, and road assets for seamless governance.
- State of the art logistic hubs and more way side amenities and parking spaces.
- Inspection and certification services on PPP mode.
- HR development and capacity building for project planning and implementation.
- Adoption of modern/innovative technologies through NATPAC, KHRI, and other institutes.
- Multimodal passenger/freight terminals/facilities.
- Time bound completion of NH widening, Hill and Coastal Highways.
- Zero accident blackspots by 2025.
- More transport infrastructure attracting private investments.

Railways

- Complete north-south track doubling works in the railway network by standardising the station facilities, removal of level crosses, automation of the signalling system and improving the track and its fastening system to handle high speeds.
- Rail-Road coordination to be well planned: the railways for long-distance travel and logistics while road transport should be for short distance travel.
- Install Roll on-Rollover (Ro-Ro) operation facilities in stations through KRDCL.
- New railway lines and routes in pipeline to be expedited.

- Capacity augmentation of the railway should be in tune with the demand and supply rather than the entire railway network.
- Light Metro projects (Thiruvananthapuram and Kozhikode) to be realigned with new metro policy.
- Phase II and JNL Stadium-Infopark, projects of Kochi Metro lines, to be fast tracked.
- Silver line semi-high speed project to be completed as per time lines.
- Projects in pipeline: Thalassery-Mysore new broad gauge line; Nanjangud-Nilambur railway line to be completed.

Airports

- Focus on completion of phase II expansion of KIAL.
- Develop Kozhikode Airport to handle more international flights.
- Development of airstrips and helicopter taxi services for encouraging tourism sector.
- Explore the possibility of private sector participation in the airport modernisation and operation.
- Expansion and development of Maintenance, Repair, and Overhaul (MRO) hub facilities for market-leading aircraft types in existing international airports.
- Development of new airports to consider the impact on existing airports, viability, and environment impact.
- NABH-Nirman Scheme should be explored to generate scientific proposals for futuristic Airport infrastructure development in the State.
- Research and development need to be strengthened to collaborate with foreign aircraft manufacturing companies.

Inland Water Transport Sector

- Comprehensive master plan for the waterways in the State, and prioritisation of development activities. Based on the master plan, the passenger and cargo potential to be explored.
- Classification of existing waterways and development of proper standards including feeder canals.
- Standard operating procedure for waterway maintenance.
- External funding including PPP to be explored. Encouragement of private participation in waterway management and operations.
- To operate waterway of Kovalam-Kasaragod stretch as per national standards by 2025.
- Incentives for procuring modern vessels as well as passenger and freight movement.
- Establishing terminal facilities and connectivity between ports and hinterland.
- Sustainable development of IWT in line with Integrated Multimodal Transport Policy.
- Promote industrial corridors along river banks and foster waterways-based industrialisation.
- Policies to promote river based tourism projects

Ports

- Strengthen Maritime Board to ease the Port business and to ensure efficient regulation and facilitation of cargo movement.
- Expedite completion of Vizhinjam and Azhikkal Ports.
- Focus on bringing in more coastal shipping activities in already active minor ports.
- Expedite the completion of various projects under Sagaramala, especially those aimed at improving port connectivity, setting up coastal economic zones (CEZs) and establishing new ports.
- Gradual adoption of international standards for increasing the efficiency and ensure compatibility
- Non-major ports in Kerala to act as coastal gateways.
- Minor/Non major ports need to be fully equipped with adequate draft, proper connectivity, modern material handling equipment, storage facilities and security system.

Kerala needs an integrated transport policy for the development of an integrated transport system in the State that covers the multiple departments and organisations in the State that are involved in the transport sector. The vision for transport development in Kerala should be to provide safe, economic, efficient, and environmentally sustainable means of transport system to improve the mobility of people and goods by means of an appropriate intermodal integration of transport facilities.

Sustainable Energy Infrastructure

Introduction and Key Issues

In this chapter, we discuss some key issues concerning the electricity sector in Kerala. Though the term "energy" encompasses other sources as well, the key issues in the short to medium term are related to electricity generation, distribution, and consumption.

Power production, in its earlier avatar, was mainly a question of technological feasibility, natural resource endowments, and the magnitude of demand. However, in the last few decades, power production has also become contentious from the viewpoint of environmental concerns. As a result, to some sections of public opinion, a narrow interpretation

of environmental sustainability, most appropriately described as "do-nothing" environmentalism, overrides all other considerations of the earlier era. This interpretation in its original form was characterised primarily by opposition to all kinds of dam construction, for whatever purpose, including power and irrigation. But increasing global concern over climate change has, contradictorily enough, reinforced the importance of hydel power as a non-fossil fuel source of power, while the opposition to power generation is now focused on opposition to coal-based generation.

There has also been a steady stream of opposition to nuclear power, to the extent that in some developed countries, there is increased fossil fuel dependence. Navigating this thicket of opposition has become a significant decelerating factor in India's expansion of power generation, though the long-term sluggishness of industrial demand, the lack of capital, and the inadequacy of other infrastructure have also been important constraints.

Renewable energy, mainly solar and wind power generation, now occupies centre-stage in the development of power generation. Yet the enthusiasm for renewables, especially because of the rapidly decreasing costs of generation, often ignores the costs that will be incurred in building up the infrastructure required for significantly high-levels of renewables in the electricity generation mix. Renewables also require land, and land on the scale required will not be easy to obtain in all regions of the country. All serious studies of India's future energy and power sector development clearly indicate that fossil fuels will continue to play a significant role well past the halfway mark of this century. India cannot afford a commitment to carbon neutrality at an early date, given its development deficits, and in any case, it is worth recalling that the commitment to carbon neutrality in the Paris Agreement implies one at the global scale that is by no means equivalent to a country-wise requirement.

In this background, in technological terms, Kerala's power sector has undergone an interesting evolutionary trajectory, not so much in its actual material nature as in the perceptions surrounding it. Kerala's natural energy resource endowment being water, its energy development began with the rapid development of hydro-power. In the early years of the post-independence era, grid connectivity across India was low, both in qualitative and quantitative terms, forcing many States in the country to seek self-reliance in power generation. The expansion of hydropower subsequently slowed down as low-hanging fruit were quickly picked, and further exploitation became increasingly more complex and expensive. At the same time, the national and global debate on the claimed adverse impact of hydel power has had a distinct effect on Kerala, with the result that the expansion of hydel power has slowed down considerably. Small-scale projects, and those already in the pipeline, some of which are extensions or completions of earlier projects, have been the main source of new hydel generation. But while this debate was playing itself out, hydel power has acquired renewed salience in the context of climate change.

At the same time, the development of the power grid across the country has enabled the increasingly reliable purchase of power by power deficit regions from other parts of the country that are power surplus, and local self-reliance is no longer a pressing or even a significant necessity. Thus, Kerala's hydel generation becomes part of the country's commitment to increasing non-fossil fuel generation, while the State's deficit in power can be met from other regions.

Despite the long-standing public enthusiasm for renewables, Kerala's record has been fairly limited in comparison to other States in the country. The reasons are not far to seek. Given the experience, reach, and sheer scale of Kerala's public sector utility, the Kerala State Electricity Board (KSEB), and given the structure of Kerala's economy and industrial sector, the expertise and capacities of KSEB are critical to any kind of technological push in the power sector, including renewables. The second reason for the limitation is that land availability on the scale of Gujarat, Rajasthan, Maharashtra, Tamil Nadu, and Karnataka is simply not there in Kerala and hence the large-installation model followed by these States has limited reach here.

The other dimension of Kerala's power story is the rapid changes in the governance, regulation, and institutional structure of the power sector at the national-level. Successive Governments at the Centre, irrespective of political affiliation, have insisted on the mantra of privatisation, and have relentlessly required States to follow suit, while Central and State regulatory authorities have driven the process on their part as well. The result is a skewed system where the social costs of power supply are borne by a large public sector on the distribution side, while the profitable parts of the power generation sector has a substantial private presence. At the same time, without the economic fundamentals being sound and as the public distribution companies increasingly come under stress, the power generation sector is also under financial stress. Regrettably, the proposed amendments to the Electricity Act by the

Central Government seeks to remedy the situation by further tilting the scales in favour of the generation sector, especially the private players, without balancing the interests and compulsions of all aspects of the power sector.

Kerala has sought over the years to swim against the tide in a principled fashion, except where overridden by the economic clout of the Centre or the pressure from the regulators. And it has done so with the Government receiving strong support from large sections of public in the State. Today, the Government of Kerala is committed to maintaining the dominant position of the public sector in the State's power sector. The KSEB is unarguably one of India's best performing public utilities, on all aspects of its functioning including technical, customer service and financial parameters. In the series of disasters that have affected the State over the last three years, including two major episodes of flood and landslides and the Covid-19 pandemic, the KSEB has provided outstanding service to the people of the State in all respects. This includes maintaining the highest possible-level of service, undertaking repairs and restoring damage speedily, and providing tariff and related concessions across many different sectors of the economy and the domestic sector, especially during the ongoing Covid-19 pandemic.

Kerala is the first State in the country to attain 100 per cent household electrification. Electricity is being provided throughout the State 24x7x365 without any major or routine recourse to power cuts or load shedding. Having achieved universal electrification, the State is now concentrating on the moderation of the grid to meet the ever-increasing customer aspirations concerning reliability, to attain the lowest-level of system losses, to meet the requirements thrown up by decentralised renewable generation, and to ensure the safety of installations. In addition to all these, the State has also embarked upon a mission to build a state-of-the-art transmission network by constructing new lines, substations, and modernising existing systems, to be ready for taking in the projected boom in e-mobility. The State has kicked off the ambitious "*Oorja* Kerala Mission" which is a bouquet of five inter-related projects – Dyuthi 2021, Soura, Filament free Kerala, Transgrid 2.0, and e-safe – woven together as a combination of priorities set by the above aspects. The underlying spirit of all the projects envisaged in the power sector of the State is to contain the challenges of climate change and to reduce the carbon footprint of the power sector.

The vision of the State in the power sector does not see the KSEB as a competitor ranged against the development of renewable energy, as is the dominant paradigm elsewhere. The KSEB's participation indeed holds the key to the rapid deployment of solar energy, especially grid-connected solar, and other innovative solar and wind projects across the State. The "Soura" programme referred to above, has been conceptualised in this framework, with the KSEB handling a major part of the deployment. The technological capacities of the KSEB need to be harnessed to the development of renewable energy rather than being set aside or left unutilised.

The power sector in the State is fully alive to the technological advances that have taken place in the recent two decades in the country, and the State's strategy in the sector is drawing on the benefits of this advances. It also leverages several innovative ideas and new initiatives to maintain its growth in the new era of sustainability. Especially in the era of renewables, newer forms beyond solar and wind need to be considered and evaluated for development and deployment in the State. The participation of the State's Science and Technology as well the technological higher education institutions in such efforts would be mutually beneficial to both these institutions as well as the power sector itself.

In what follows we provide a more technically detailed account of the power sector, drawn mainly from the latest *Economic Review* 2020 of the Kerala State Planning Board. The interested readers are invited to read the full account in the *Economic Review* 2020 for several details that are not covered in this chapter.

The Power Sector in Kerala

Power demand

Peak demand of the State in 2019-20 was 4316.8 megawatt (MW) on March 27, 2019 between 22.00 hours and 22.30 hours. Morning peak demand during 2019-20 was 3465 MW, on May 23, 2019 between 08.00 hours and 08.30 hours. The minimum demand was 1302 MW on August 9, 2019 between 4.30 and 5.00 hours. The average power demand in the State in 2020 was 3567 MW. Kerala's Power scenario for 2019-20 is given in Table 11.1.

Sale of power inside the State

The KSEBL sold 22,948.82 million units (MU) of power to 1,28,26,185 consumers in the State in 2019-20 including 11 bulk licences. A total revenue of Rs 13,91,754 lakh was generated. The total revenue from sale of power, including sales to other utilities outside the State is Rs 13,918.79 crore.

Power consumption

Consumption of all categories of consumers increased except for the decrease in the public lighting category,

Table 11.1 *Kerala's power scenario for 2019-20* in million units (MU)

Particulars	Energy in million units (MU)
Gross generation KSEBL	5781.23
Power purchase from CGS at Kerala periphery	10,082
Power purchase through long term, medium term, and short term contracts and swaps at Kerala periphery	9993.52
Total Power purchase from IPPs and CPPs inside the State	308.23
Total power purchase at Kerala periphery	20,383.76
Energy injected by Private IPP's at generator end for sale outside the State through open access	37.50
Energy availed through open access at Kerala periphery	405.86
Auxiliary consumption to be deducted.	58.42
EXPORT: Energy sales by KSEBL, swap, return by KSEBL, and energy injected by Private IPP's at KSEB periphery for sale outside the State through open access	323.84
Total energy input to Kerala periphery for meeting the consumption of the State including energy wheeled through open access	26,226.08
Total energy at consumer end including energy wheeled through open access	23,058.91

Source: KSEBL

the low tension (LT) industrial category and extra high tension (EHT) consumers. The decrease in public lighting can be attributed to increase in light-emitting diode (LED) lamps. The reason for the decrease in LT industrial category and EHT category has been assessed to be a consequence of the impact of flood 2019 and Covid-19 in last quarter of the year.

In Kerala, electrical energy consumption increased to 23,058.91 MU (include open access consumption) in 2019-20 from 21,750.25 MU in 2018-19, an increase of 5.67 per cent. Electrical Energy consumption in Kerala in 2013-14 to 2019-20 is depicted in Figure 11.1.

Aggregate Technical and Commercial (AT&C) losses

In 2019-20, AT&C loss increased to 14.07 per cent from 13.14 per cent and transmission and distribution (T&D) loss came down to 12.08 per cent from 12.47 per cent. KSEB has made significant achievement in the field of reducing T&D loss. But AT&C loss increased because of the impact of the Covid-19 pandemic and lockdown restrictions. For distribution Strategic Business Unit (SBU), the AT&C loss is 10.77 per cent and distribution loss is 8.70 per cent in 2019-20. The AT&C loss and T&D loss from 2014-15 to 2019-20 is illustrated in Figure 11.2.

Performance of Power Sector Agencies

Power development activities in the State are carried out mainly through four agencies, namely, Kerala State Electricity Board Limited (KSEBL), Agency for Non-

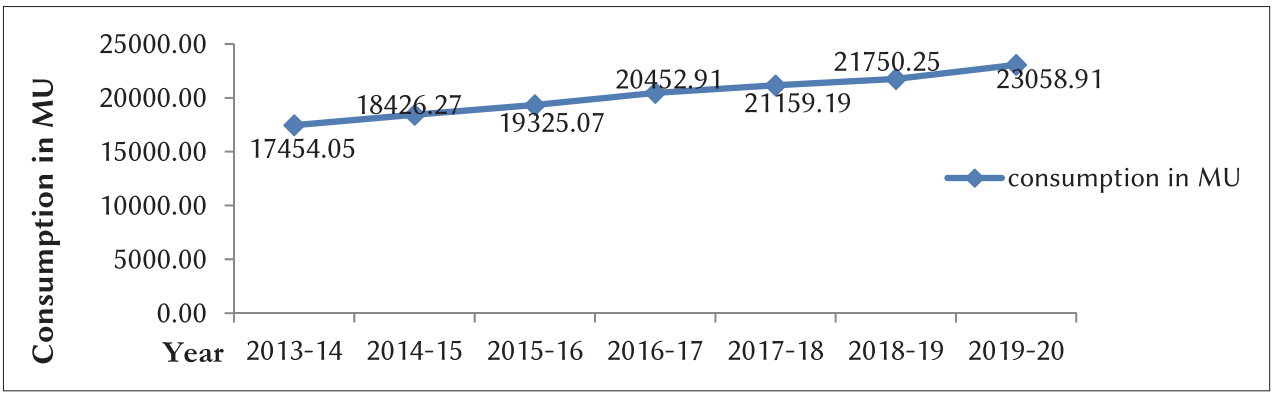

Figure11.1. *Electrical energy consumption in Kerala* in million units
Source: KSEBL

Conventional Energy and Rural Technology (ANERT), Electrical Inspectorate, and Energy Management Centre (EMC).

Kerala State Electricity Board Limited (KSEBL)

Kerala State Electricity Board Limited is a (power utility) company incorporated under the Companies Act 1956 (Central Act 1 of 1956). It is fully owned by the Government of Kerala, under provisions of section 131 of the Electricity Act, 2003 by re-vesting (under subsection (2) of section 131 and 133 of the Act) the functions, properties, interest, rights, liabilities, proceedings, and personnel vested in State Government from erstwhile Kerala State Electricity Board. Re-vesting was done on October 31, 2013. KSEBL is a single

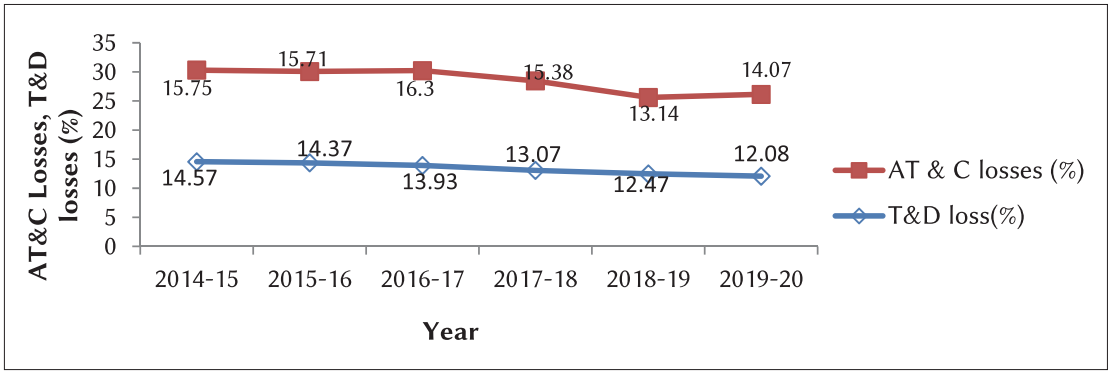

Figure 11.2 *Aggregate technical and commercial (AT&C) losses, and transmission and distribution losses (T&D)* in per cent

Source: KSEBL

Table 11.2 *Status of Solar Projects, Kerala*

Project	MWp	Target date	Status
Rooftop Solar Phase 1 EPC	46.5	2020-21	Under implementation through three vendors.
Rooftop Solar Phase 1 RESCO	60	2020-21	For 60-megawatt peak (MWp) in Renewable Energy Service Company Operator (RESCO), demand aggregation from roof tops of Government buildings envisaged.
Rooftop Solar Phase 2 Subsidy (sanctioned)	50	2020-21	Under tender process (12.5MW to be implemented by ANERT) and is expected to be completed by April 2021
Rooftop Solar Phase 2 Subsidy (anticipated)	100	2020-21	Under tendering process and expected completion date is December 2021
Solar Park Ambalathara	50	–	Commissioned
Solar Park Paivallika	50	2020-21	Ongoing, developed by THDCIL
Solar Park Cheemeni	100	2021-22	Land handed over to RPCKL by Government
NTPC Floating Solar	225	2021-22	Detailed Project Report received for 100MWp in Anchuruli and 25MWp in Cheruthoni. Another 100 MWp planned.
SECI Floating Solar	150	2021-22	Kulamavu, 50MWp and Banasurasagar 100MWp Bathymetric survey to be conducted
Reverse bid by KSEBL from IPPs	200	2020-21	Bid floated after approval from KSERC
Total	1031.5		

Note: THDCIL is Tehri Hydro Development Corporation Ltd and RPCKL is Renewable Power Corporation of Kerala Ltd.

Source: KSEBL

holding company with distribution, transmission, and generation strategic business units with separate accounting. The company was incorporated on January 14, 2011, and it started operation as an independent company with effect from November 1, 2013. KSEBL is responsible for the generation, transmission, and distribution of electricity in the State, with a particular mandate to provide electricity at an affordable cost for domestic as well as agricultural purposes.

Oorja Kerala Mission. The Government of Kerala started the *Oorja* Kerala Mission in 2018 for the integrated development of the electricity sector in the State. It aims at implementing five important projects detailed in the following section.

1. Soura. KSEBL intends to achieve a cumulative capacity of 1000 MW through solar projects by 2021. Of this 500 MW is from rooftop plants. The status of the solar projects is given in Table 11.2.

2. Filament-free Kerala. Through this project, all existing compact fluorescent lamp (CFL) and filament bulbs in the domestic and street lighting sector in the State will be replaced with energy-efficient and long-lasting light-emitting diode (LED) lamps targeting a reduction in peak demand, global warming, and Hg (mercury) pollution. More than 13 lakh consumers have already registered for LED lamps in the 1st phase in which the domestic sector was targeted. One crore LED bulbs will be distributed as part of the project.

3. Dyuthi 2021. Dyuthi 2021 is a Rs 4000 crore project to modernise the distribution grid and to reduce power interruptions, consisting of more than 90,000 individual projects spread across 25 project areas. The project as a whole will be completed in four-year period (by end of 2022). . Floods in 2018 and 2019 and Covid-19 has affected the progress of the project.

4. Transgrid 2.0: 2nd Generation Transmission Network. Transgrid 2.0. is a Rs 10,000 crore project to reduce the transmission losses and to remove the current limitations and constraints in the transmission network. The project is scheduled to be implemented in two phases. Phase I of the project is scheduled for execution from 2017 to 2022 and Phase II from 2019 to 2024. Administrative Sanction for Rs 6375 crore from Government of Kerala has been obtained for Phase1 of the project. Sanction obtained for KIIFB fund. The first phase of the project has been started. The target is to upgrade the existing 220 kV line to 400 kV.

The works included in the 1st phase of the project are grouped into 13 packages and comprises construction of 12 substations and 2084 circuit kilometre (Ckt-Km) of EHT lines. Out of these 12 substations, 4 are Air Insulated Substations (AIS) and the remaining 8 are Gas Insulated Substations (GIS). The packages in the first phase will be completed by 2021. Twelve substations (3 AIS and 9 GIS) are included in Phase II of the project which is grouped into 12 packages. The physical progress of the work as on September 2020 is given in Table 11.3

5. eSafe. The eSafe project jointly mooted by the Electrical Inspectorate and KSEBL aims at zero electrical accidents in the State. The programmes include safety awareness, rewiring tribal households at Agali, Sholayur, and Pudur Panchayat, pilot implementation of safety system by preventing accidents from snapping of overhead lines, and electric fence energiser test. Also, the Local Self Government Department has accorded sanction to local bodies in 2020 to prepare a project including Non-Paying Group (NPG) consumers to rewire their premise with at least four points and Earth-leakage circuit breaker (ELCB) ensuring safety standards for Rs 12,287 per family. With the completion of the project, it is expected that all domestic households will be connected with earth leakage protection as per standards.

Capacity addition in 2019-20. The total installed capacity of power in the State as on March 2020 was 3,061.37 MW. Of this, hydel power contributed the major share amounting to 2,129.42 MW (69.56 per cent), while 676.54 MW was contributed by thermal projects (22.10 per cent), 70.28 MW from wind (2.30 per cent), and 185.13 MW (6.04 per cent) from solar. Figure 11.3 highlights the total installed capacity of Kerala from hydel, thermal and renewable sources.

Of the total installed capacity of 3,061.37 MW in 2019-20, the contribution of State sector is 2,238.22 MW (73.11 per cent), Central sector 359.58 MW (11.75 per cent), and private sector 463.57 MW (15.14 per cent).

Installed generation capacity. Kerala State Electricity Board Limited owns 38 hydel stations with a capacity of 2058.76 MW, one wind farm of 2.025 MW, two thermal plants of 159.96 MW, and solar plants of 17.47 MW at various places. In 2019-20, the major addition was the 60.39 MW capacity by private plants. The KSEBL added only 0.62 MW solar plants. The Rajiv Gandhi Combined Cycle Power Plant (RGCCPP) Kayamkulam is the only Central Generating Station (CGS) in the State. Indian Renewable Energy Development Agency Limited (IREDA) Solar Park of 50 MW at Kasaragod

Table 11.3 *Progress of Transgrid 2.0 - Phases I and II in 2019-20*

Sl No	Work	Quantum of work	Progress
A	Transgrid 2.0 - Phase I		
a	KIIFB Funded works		
1	Substations (220 kV: 11, 400 kV: 1)	12 nos	220 kV s/s Manjeri commissioned on 23.06.2020. Other 11 substations works are in progress
2	Construction of transmission lines	321 route-km	220 kV Karukkadam to Kothamangalam charged on 11-12-2019. Other works are in progress
b	PSDF Work		
1	Construction of transmission lines	211.46 route-km	Two packages are funded in PSDF. Kakkayam to Nallalam work commissioned. The 220 kV portion of MDKA-MLPA already charged on 10-7-2019. All other works are in progress.
B	Transgrid 2.0: Phase II		
a	KIIFB Funded works		
1	Erection of substations (220 kV: 8, 400 kV: 1)	9 nos	20 kV s/s Kakkad and Pathanamthitta tendered. For Sasthamcotta, Thuravur and Irinjalakuda KIIFB sanction is awaited. In case of Panjal, Palakkad and Edamon, DPR is being prepared
2	Construction of transmission lines	431.4 route-km	Kottiyam to Kollam GIS work completed. Other two works awarded. For balance 4 works sanction is awaited. For 6 works DPR is under preparation.
b	Green Corridor Package		
1	Erection of substations (220 kV: 3, 400 kV: 1)	4 nos	Approval of MNRE awaited
2	Construction of transmission lines	102 route-km	

Note: PSDF is Power System Development Fund
Source: KSEBL

Table 11.4 *KSEBL internal generation, 2019-20*

Particulars	Capacity as on 31.3.2019 (MW)	Capacity added in 2019-20(MW)	Capacity as on 31.3.2020 (MW) (2)+(3)	Total Internal Generation in 2019-20 (MU)
1	2	3	4	5
Hydel	2,058.76		2,058.76	5,741.83
Thermal	159.96		159.96	12.03
Wind	2.025		2.025	1.42
Solar	16.85	0.62	17.47	25.95
Total	2,237.60	0.62	2,238.22	5,781.23

Source: KSEBL

and 2 MW ANERT, Kuzhalmandam solar plants are State Government projects.

Ongoing generation projects in the State. The details of the ongoing hydroelectric projects in the State with expected date of commissioning are given in Table 11.5. The KSEBL is executing 10 hydel projects in the State with installed capacity of 193.5 MW, to be completed by 2021-22.

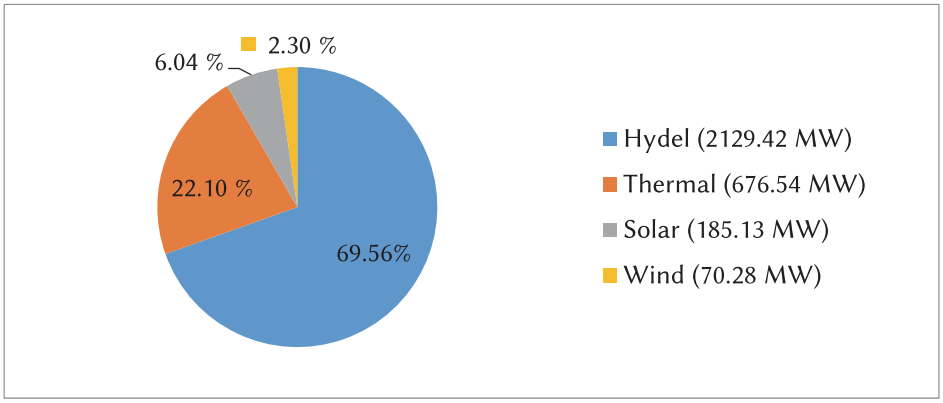

Figure11.3 *Installed capacity of power, Kerala State, 2019-20* in MW
Source: KSEBL

Table 11.5 *Ongoing hydro power projects in the State*

Name of scheme	Installed capacity (MW)	District	Date of project sanction	Expected date of commissioning
Thottiar HEP	40	Idukki	January 16, 2009	December, 2021
Sengulam Augmentation Scheme	85 MU	Idukki	July 6, 2009	March, 2022
Chathankottunada II SHEP	6	Kozhikode	November 9, 2017	March, 2021
Poringalkuthu SHEP	24	Thrissur	April 1, 2014	May, 2021
Bhoothathankettu SHEP	24	Ernakulam	February 15, 2014	August, 2021
Upper Kallar	2	Idukki	August 12, 2016	March, 2021
Pallivasal Extension	60	Idukki	March 2, 2007	December, 2021
Pazhassi Sagar	7.5	Kannur	October 27, 2017	December, 2021
Chinnar	24	Idukki	April 27, 2018	April, 2022
Peruvannamoozhy	6	Kozhikode	May 25, 2018	May, 2021

Source: KSEBL

Enhancing renewable energy component in the energy mix of the State

KSEBL is considering all option to harness renewable power. Besides development of solar power through Soura projects, installations of other renewable plants are also being taken up. The target is to meet 40 per cent of energy requirements from renewable sources by 2022. The existing, ongoing, and pipeline renewable projects for 3309 MW are given in Table 11.6.

Distribution

The distribution network as on March 31, 2020, has 64,212 circuit kilometres (Ckt-km) of 11 kilo volt (kV) lines, 2,93,280 Ckt-km of LT lines and 81,470 distribution transformers with a step-down capacity of 9,915 mega volt ampere (MVA). The infrastructure development of the distribution system is included in Dyuthi 2021 project, under *Oorja* Kerala Mission.

During the Covid-19 lockdown, KSEBL implemented several relief measures to consumers to support them during hard times. Also, the Customer Care Centre was strengthened and new services introduced to achieve customer loyalty and facilitate the care of service.

1. Service at door steps. Pilot implementation started in 39 sections under electric circle, Palakkad. As the name indicates the programme is to provide all services provided by KSEBL to the public as well as consumers at their doorsteps on call. The pilot implementation has attracted the attention of all parties and is lauded as an earnest step in customer satisfaction by the public as well as the media.
2. Self-meter reading app. The KSEBL has developed a self-meter reading app, which serves as a solution to door lock problems and meter reading errors.
3. E-samayam. e-samayam, a virtual queue to visit

Table 11.6 *Ongoing and pipeline renewable projects, Kerala State, 2020*

	Project	Capacity in MWp	Present status
A	Solar		
I	Existing	204.22	
II	Ongoing and Proposed		
1	KSEBL projects	23.27	Ongoing 13.355 MWp and Proposed 9.912 MWp
2	Solar Park: THDCL Paivallika, Kasaragod and Cheemeni.	150	Paivalika 50 MWp ongoing, Cheemeni 100 MWp-land handed over to RPKCL
3	Saura Rooftop Solar: Phase1	110	46.5 MW in EPC mode under implementation. For 60MWp in RESCO demand aggregation from roof tops of Government buildings envisaged.
4	Saura Rooftop Solar: Phase2 MNRE subsidy scheme	150	50 MWp allocated by MNRE is under tender process (12.5 MW to be implemented by ANERT) and is expected to be completed by April 2021. Balance 100MWp allocation expected from MNRE is also under tendering process and expected completion date is December 2021
5	NHPC Floating Solar, West Kallada	50	Tendering in process
6	NTPC Floating Solar, Kayamkulam	92	Draft PPA Signed, work awarded by NTPC.
7	NTPC Floating Solar	225	Detailed Project Report received for 100 MWp in Anchuruli and 25 MWp in Cheruthoni. Another 100 MWp in Cheruthoni is under consideration
8	Reverse bid by KSEBL from IPPs	200	Bid on solar from ground mounted plants floated after approval from KSERC on all India basis
9	PM-KUSUM	50	Demand aggregated for 10 MWp sanctioned .Requested for additional 40 MWp to MNRE
10	SECI Floating Solar	150	Kulamavu 50 MWp and Banasurasagar 100 MWp-bathymetric survey to be conducted
11	Solar Power through SECI	200	Negotiation in process
	Total solar – existing, ongoing and proposed	1604.49	
B	Wind		
I	Existing	80.28	
II	Ongoing and proposed		
1	NHPC Palakkad	8	Ongoing
2	Ramakkalmedu (Pvt.)	2	Ongoing
3	SECI TRANCHE VI scheme	200	PSA executed

4	SECI TRANCHE VII scheme	100	PSA executed
5	KSEBL Kanjikkode	2.5	Ongoing
6	KSEBL Intercropping	2.65	Ongoing
	Total ongoing and proposed	395.43	
C	Hydel (Renewable)		
i	Existing	215.56	
ii	Proposed and ongoing	193.5	
iii	On pipeline	894	(Includes 780 MW Idukki extension scheme)
	Total Hydel under RE: existing, ongoing and proposed	1303.06	
D	Waste to energy		
1	Wayanad	0.2	Planned
2	Njalianparambu	6	Tender invited for work
	Waste to energy – total, ongoing, and proposed	6.2	
	Total capacity expected at the end of 2021-22	3309.18	

Source: KSEBL

section offices of KSEBL is being implemented as a pilot in Kesavadasapuram and Vellayambalam section in Thiruvananthapuram.

Transmission

To achieve the goal of 24x7 uninterrupted quality power to the consumers and also for the availability of power on demand, sufficient capacity of the transmission network is to be developed. Also, works are necessary to satisfy the N-1 planning criteria put forth by the Central Electricity Authority. It is targeted to complete another 45 substations of different voltage-level and 1300 circuit kilometre of transmission lines by March 2022.

Other flagship projects of KSEBL

In addition to the five projects included in *Oorja* Kerala Mission cited above, the following four projects also form the flagship projects of KSEBL

E-Mobility. Kerala is the first State in India to prepare an e-mobility policy. The KSEBL has been designated as the State nodal agency to ensure the deployment of e-vehicle charging stations across the State. With a State funding of Rs 8.2 crore, the KSEBL planned to set up 32 charging stations covering all districts of the State for ensuring State-wide charging facility for e-vehicles. Of these, 6 stations are completed and work for remaining stations are in progress. Under the Department of Heavy Industries, Government of India's Faster Adoption and Manufacturing of Electric Vehicles in India (FAME-India) phase-II scheme, 30 charging stations are being installed in seven cities with over one million populations. As on October 15, 2020, the Central Government has sanctioned another 181 stations and the installation of these 181 stations will be completed by March 2022.

Kerala Fibre Optic Network (K-FON). The scope of the project is to build a wide area network across the State to provide a cost-effective and high-speed internet connection to 30,000 Government offices and educational institutions, and free internet access to 20 lakh BPL families. Implementation and maintenance of the network will be carried out by a special purpose vehicle (SPV) with equity partnership of KSEBL, Kerala State Information Technology Infrastructure Limited (KSITIL), and the State Government. The KSEBL and KSITIL will hold 49 per cent equity each in fund and remaining two per cent by the State Government. Among other benefits to KSEBL, the project ensures high-speed internet connectivity to all its offices. KSEB will get pole rent plus 4 fibres free of cost along the

distribution line (47,289 km). It will meet additional data communication requirements for control and protection, smart grids and smart meters and internet of things. The assets created will vest with KSEBL.

The works are awarded in two packages. Package A with Probable Amount of Contract (PAC) of Rs 1028.2 crore funded by KIIFB consists of K-FON works and package B for reliable communication and data acquisition network (RC and DA network) with PAC Rs 99.2 crore in power system development fund. The Operating Expenses (OPEX) for Package A and B for seven years is Rs 363.42 crore.

Enterprise Resource Planning (ERP). ERP will allow KSEBL to use a system of integrated applications to manage the business and automate many back-office functions related to accounting, material management, and human resources. The project was conceived as a centrally sponsored scheme under Integrated Power Development Scheme (IPDS). ERP project plan was submitted to Power Finance Corporation (PFC). The first instalment of Rs 42.64 crore, that is 60 per cent of the grant amount, has been sanctioned and Rs 6 crore has been released. Extension up to March 2021 has been issued by PFC. ERP software is being developed in-house. The project plan is finalised and development team has been formed. Coding is in the final stages. The project got delayed because of Covid-19 restrictions.

Communicating Fault Pass Detectors (CFPD). The employees of KSEBL, after in-house research, developed cost-effective and user friendly CFPD. KSEBL intends to deploy 16,267 plus CFPDs in its HT network by 2022. As on September 2020, 3255 units were assembled and issued. 2564 units have been installed as on October 6, 2020. Out of the total installed 801 units are found faulty. The training of system supervisors for field-level maintenance assistance for CFPDs has been completed.

Central Government Schemes

The important Central Government power sector schemes in Kerala are detailed below. The State Government, however, through the KSEBL, exercises its discretion in the implementation of parts of these schemes as warranted.

Ujwal DISCOM Assurance Yojana (UDAY). This is the financial turnaround and revival package for electricity distribution companies (DISCOMs) initiated by the Government of India. Government of Kerala and KSEBL have signed a memorandum of understanding (MoU) with the Government of India (GoI). The objective of signing the MoU is to improve the internal efficiency of the KSEBL. No financial assistance is included in the MoU. The KSEBL has achieved important operational targets except for smart meter installation, ERP, and rural feeder audit. ERP, which is developed in house, is in the coding stage and feeder monitoring has been completed for rural feeders. The KSEBL has decided to not to implement smart metering.

Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY). Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) for the rural areas, a Government of India scheme, was implemented in Kerala for rural electrification, strengthening of sub-transmission, and distribution infrastructure, including metering at distribution transformers, feeders and at consumers end. The closure report has already been submitted to Rural Electrification Corporation (REC).

Pradhan Mantri Sahaj Bijli Har Ghar Yojana ("Saubhagya"). Under Saubhagya scheme, free electricity connection to all households (both APL and poor families) in rural areas and BPL families in urban areas including single-point wiring was envisaged. Saubhagya as such was not sanctioned to Kerala. However, in 2018, Rs 95.75 crore was sanctioned to Kerala to reconnect 3,19,171 households de-electrified in the 2018 floods. Of which, Rs 54.59 crore has been received. The closure report of Saubhagya has already been submitted to Rural Electrification Corporation (REC).

Integrated Power Development Scheme (IPDS). IPDS stage-1 was implemented in 25 distribution circles in the State to strengthen sub-transmission and distribution networks, metering of distribution transformers, feeders, and consumers in an urban area. Closures of IPDS (system strengthening) for 25 circles are in progress for submission to PFC.

The progress of the IT-component initiatives in the three ower sector is as follows:

- Phase-II IT implementation under IPDS. The detailed project report (DPR) for Rs 22.86 crore, covering 21 towns was sanctioned in 2017. Implementation related activities like ring-fencing have been completed in all 21 towns. 367 modems in border meters and feeder meters of all 21 towns has been installed. Modems are communicating with a central server. The integration of software applications with the existing Restructured Accelerated Power Development and Reforms Programme (RAPDRP) applications are progressing.
- Real-Time Data Acquisition System (RT-DAS) for non-Supervisory Control and Data

Acquisition (SCADA) towns under IPDS. Tender for implementing RT-DAS was invited on July 9, 2019. Since only one bidder qualified for the technical evaluation, retendering was done. Letter of Acceptance was issued to M/s. SCOPE TNM Private Limited on June 11, 2020.

- RAPDRP Part A-SCADA/Distrubution Management System (DMS) Project. Part-A installation of SCADA completed in all three cities, Thiruvananthapuram, Kochi, Part-B and Kozhikode. A third-party inspection has been completed. Part- B works were completed on March 31, 2018. Project closure was done on June 2018.
- Big Data Analytics. It is envisaged to develop a system for big data analytics to transform a large amount of raw data from the core applications of KSEB to a knowledge base for analytical purpose.
- Cyber Security Projects. KSEBL will implement advanced cyber security measures for improving the overall IT security landscape of the organisation and avail ISO Certification for the Data Centre/Data Recovery (DR) Centre.

Pradhan Mantri Kisan Urja Suraksha Evam Utthan Mahabhiyan (PM-KUSUM). PM-KUSUM envisages utilisation of barren agriculture land for installing solar plants, providing a permanent income to farmers from power generation and solarisation of agriculture pumps which will reduce utilisation of power from the grid and in turn reduce the requirement of financial support from the Government in the form of subsidies. Ministry of Non-Renewable Energy, Government of India, has allotted 10 MW solar plants to the State in component-A of the PM-KUSUM scheme. The KSEBL is implementing the scheme and has put forward two models for landowners. The first one is the lease model where panels are installed on lease (Engineering, Procurement, and Construction (EPC)/ Renewable Energy Service Company Operator (RESCO) method) and the second one is the investment model (PPA method) where investment is done by landowners itself. 169 participants have registered in PM-KUSUM.

Detailed survey was completed and locations suitable for 10 MW plants have been identified in both models. Discussion with applicants in investment mode is to be initiated. In component–C of the scheme, solarisation of 10 lakh grid-connected agriculture pumps of individual pump with capacity up to 7.5 HP is included. The Government of India will provide financial support of up to 30 per cent while the State is to provide at least 30 per cent of the cost of solarisation. The balance cost will be shared by the beneficiary farmer. ANERT is entrusted to implement solarisation of grid-connected pumps.

Sustainable Rooftop Implementation for Solar Transfiguration of India (SRISTI). Government of India, phase II grid connected rooftop solar programme, aims to achieve a target of cumulative capacity of 40,000 MW from rooftop solar (RTS) projects by the year 2022. This programme will be implemented with the total central financial support of Rs 11,814 crore. Power distributing companies (Discoms) are the implementing agencies. Domestic consumers with a ceiling of 10 kWp plants are eligible for central financial assistance (CFA). 50 MW has been allocated to the State in this subsidy scheme. The 37.5 MW capacity of the project will be executed by KSEBL and the rest 12.5 MW by ANERT. The State has requested an additional 200 MW for 2020-21.

24x7 Power for all. Kerala attained 24x7 power supply status in all areas of the State including for agriculture consumers. 1,100 urban feeders and 640 rural 11 kV feeder are connected to the national power portal (NPP) and can be monitored.

Unnat Jyoti by Affordable LEDs for All (UJALA). This scheme provides LED bulbs to domestic consumers with a target to replace 770 million incandescent bulbs in the country with LED bulbs by June 2020. Up to September 2020, Kerala has replaced 135.6 lakh lamps in households with LED bulbs.

Perform Achieve and Trade (PAT). PAT scheme is a flagship programme of the Bureau of Energy Efficiency under the National Mission for Enhanced Energy Efficiency (NMEEE). The second cycle of PAT notified in March 2016 covers DISCOMs also. The Kerala State Electricity Board Limited has complied with all requirements mandated by the PAT Rules. KSEBL has ensured prompt and timely fulfilment of all action points stipulated in the PAT scheme, as part of the PAT Cycle II. KSEBL has also complied with all the mandatory provisions of the Energy Conservation Act 2001, as an electricity distribution company.

State Funded Projects

The progress of State Government funded projects in 2019-20 are given in Table 11.7

Power Grid Corporation of India Limited: Interstate projects

The major interstate transmission projects relevant to Kerala are the following.

Pugalur-Trichur High Voltage Direct Current (HVDC) project. This project is an extension of 600

MW Raigargh-Pugalur HVDC corridor to Kerala. The Raigargh to Pugalur corridor has been test charged on May 2020. This 320 kV DC line of length 153.5 km has 92 km inside Kerala. Of this, 64 km up to Vadkkanchery is as overhead and rest 28 km is through underground (UG) cable. The line has 2000 MW capacity. As on September 30, 2020, 95 per cent of work related to 400 kV HVDC station Thrissur was completed, transit station Vadakkanchery is nearing completion, 320kV HVDC-UG cable Vadakkanchery-Thrissur stretch – completed 320 kV HVDC OH Portion (Ozhalapathy to Vadakkanchery), stringing on 12.34 km out of total 63.641 km is pending, and completed 400 kV LILO section (Thrissur S/S to 400 kV Kochi-Thrissur line).

Edamon-Kochi 400 kV line. The inauguration of the 148 km long Edamon to Kochi power highway will increase the State's power import capability by 800 MW. The Edamon to Kochi power highway can transmit power to Kerala from any part of India through the 400 KV network. The total project cost, including construction and compensation expenses, comes to around Rs 1300 crore and has been completed. The Edamon to Kochi line passes through Kollam, Pathanamthitta, Kottayam, and Ernakulam. The new line reduces power import via inter-state Udumalpet to Palakkad and Mysore to Arikode lines.

Dam Rehabilitation and Improvement Project (DRIP). Dam Rehabilitation and Improvement Project (DRIP) aims to improve the safety and sustainable performance of existing dams and associated structures with the assistance of World Bank through Government of India. It is a flagship project of Ministry of Water resources, River Development, and Ganga Rejuvenation, Government of India. The project has been extended to March 2021. The components of DRIP are:

Component 1. Rehabilitation; remedial measures and improvement of basic facilities of 12 hydroelectric projects consisting of 37 dams.

Component 2. Institutional strengthening.

Component 3. Project management.

The total expenditure incurred in all the components till June 30, 2020 is Rs 102.7 crore. The amount of claim reimbursed till date to Government of Kerala through Government of India is Rs 99 crore. The amount received by KSEBL from Government of Kerala is Rs 62.8 crore.

DRIP II. In line with ongoing DRIP projects, Central Project Management Unit (CPMU), Central Water Commission is pursuing with the second phase of DRIP with World Bank Assistance. Administrative sanction has been obtained for Rs 70 crore works from KSEBL. Works amounting to Rs 22.5 crore have been tendered. The works included are strengthening of Poringalkuthu dam, strengthening road, and setting up Cement Concrete (CC) lab at Idamalayar dam.

Power Theft

Cases of power theft and connected abnormalities are very low in the State because of the strict enforcement of law and awareness in society. The KSEBL constituted the Anti Power Theft Squad (APTS) in all districts to detect pilferage and misuse of electricity. Field staff is also given monthly targets for inspection. In 2019-20, 338 theft cases were detected, from which 2.38 MU were estimated as extracted by theft and malpractices. The cost of energy collected from assessments made during inspections in 2019-20 is Rs 7.66 crore. Compared to 2018-19, there is an increase of 42.61 per cent in the number of cases detected and a 114.41 per cent increase in MU estimated. The cost of energy collected from assessments increased by 284.92 per cent.

Table 11.7 *Progress of State Government funded projects, 2019-20* in Rs crore

Project	Requested by KSEBL	As accorded by Government	Expenditure
ERP implementation	5.68	5.68	5.68
Smart Grid Kochi	17.6	–	–
Tidal and Wave energy	0.02	.02	–
ESCOT project- HVDS	0.46	.46	–
ESCOT Project- Standardisation of DTR	0.54	.54	–
Edamon Kochi 400KV line compensation	3	–	3
Total	27.3	6.7	8.68

Source: KSEBL

Electrical Accidents

The KSEBL has targeted 2019-20 as a zero-accident year and efforts were made to attain the objective. Considerable progress has been achieved in reducing accidents to department staff. There were 113 fatal accidents to human beings and 39 fatal accidents to animals from KSEBL installation. Compared to 2018-19 there is a decrease of 8.13 per cent in fatal accidents to human beings and a decrease of 30.35 per cent fatal accidents to animals. There were also 185 non-fatal accidents to human beings in 2019-20, while it was 211 in 2018-19. From consumer installations, 126 fatal accidents occurred to human beings and 25 Non-fatal accidents to human beings.

Recent Disasters and their Impact

Impact of Covid-19 on the power sector

There was a considerable impact on the power sector because of Covid-19 and consequent lockdown. There was a substantial reduction in electricity consumption due to lockdown. Also consumers were unable to pay their due to the distribution companies. This affected the liquidity position of the distribution companies impairing their ability to pay the generation and transmission companies

Important policy measures announced by Central Government. Ministry of Finance, Government of India clarified that disruption of supply chains due to spread of novel Corona virus in China and any other country will be considered as a natural calamity and force majeure clause may be invoked wherever considered appropriate following due procedure.

To address the liquidity crunch of the distribution licensees, Ministry of Power, Government of India relaxed the provision of 100 per cent payment security to be ensured by the State Load Dispatch centres for the purchase of power by distribution licensees. As per the relaxation, it was decided that considering the unprecedented and force majeure situation, power may be scheduled even if a payment security mechanism is established for 50 per cent of the amount for which payment security is to be otherwise established contractually till June 30, 2020.

Ministry of Power, Government of India issued Directions under Section 107 of the Electricity Act to Central Electricity Regulatory Commission in the public interest to specify a reduced Late Payment Surcharge (LPS) for payments which become delayed beyond a period of 45 days from the date of presentation of a bill during the period from March 24, 2020 to June 30, 2020 to generating companies and licensees treating the restrictions placed by the Central Government as *force* majeure event. The reduced LPS is applicable for a period till June 30, 2020. Further, it was stipulated that the LPS should not be more than the cost that the generating companies and transmission licensee would have to bear because of the delayed payment. In the case of generating companies and transmission licensees, whose tariff was determined under section 63, DISCOMS may claim the relief from its obligations regarding the rate at which LPS is to be paid as per the *force majeure* provisions in the Power Purchase Agreement (PPA).

The Government of India has also requested the State Governments to issue similar directions under Section 108 of the Electricity Act to respective State Commissions and the distribution companies pass on similar or more benefits to the consumers with respect to LPS. Further to this, Central Government issued advisory to all power generation and transmission CPSEs under Ministry of Power and all subsidiaries/ joint ventures of power generation and transmission CPSEs under the Ministry of Power for deferment of capacity charges for power not scheduled, to be payable without interest after the end of lockdown period in three equal instalments and to provide a rebate of about 20-25 per cent on power supply billed (fixed cost) to Discoms and inter-State Transmission charges levied by Power grid Corporation of India (PGCIL). The advisory was communicated to the Government of Kerala and Discoms for passing on to the end consumers in the electricity bill for the lockdown period on account of Covid-19 pandemic.

The Ministry of Power communicated the amount of rebate as Rs 50.86 crore and the capacity charges deferred is Rs 63.38 crore to the State of Kerala.

Reliefs announced by the Government of Kerala. The Government of Kerala also announced several measures for coping with difficulties encountered during the lockdown. The Chief Minister, Government of Kerala in the press conference held on April 21, 2020, announced that the Industrial and Commercial Consumers of KSEB Ltd. have been provided with an option for the deferred payment of fixed charges for the months of March, April, and May, 2020 up to December 15, 2020, at an interest rate of 12 per cent (instead of 18 per cent) on deferred fixed charges. Later, this facility was extended to private hospitals also, as per the directions of the State Government. The domestic consumers were also allowed to remit half of their bill

amount during the lockdown period and to remit the balance amount in two equal instalments.

Impact on finances of KSEB. The Covid-19 pandemic has adversely impacted the financial position of KSEB Limited. It is estimated that the loss sustained by the utility during the period March to July 2020 because of the pandemic and considering the factors mentioned hereunder will be around Rs 1240 crore. A summary of financial impact of Covid-19 on KSEB is given in Table 11.8.

Floods and the aftermath

Most of the losses caused by the floods in 2019 were in the northern districts of the State – Palakkad, Kannur, Kozhikode, Malappuram, and Wayanad. The three generators of Kakkayam, seven minor hydroelectric power stations, and floating solar plant on the Barapole Canal were damaged. The operation of 43 substations, including two 220 kV substations and six 110 kV substations, was disrupted. It is estimated that 50.47 lakh consumers were affected by the 2019 floods. KSEBL suffered a loss of Rs 243.05 crore.

In 2020, the State of Kerala witnessed heavy cloud bursts followed by incessant rains bringing in large scale damages. A large number of structures including electrical installations were damaged and some installations were washed away because of landslides. KSEB Ltd. was one of the affected departments with many of its installations damaged and its distribution network in disarray. Damages caused widespread interruptions, especially in the Idukki and Kannur districts.

In the distribution network, damages to 56 transformers and 8506 poles were reported, along with distribution line snapping at 36,274 locations causing damages to the extent of Rs 86.18 crore as per KSEBL estimates.

Emergency action Plans for dams. Emergency Action Plan (Tier-I) for 37 dams approved by CWC has been published in KSEBL website. Stakeholder consultation meeting for 24 dams of KSEBL was conducted. Operation and Maintenance (O&M) manuals for 36 dams approved by CWC have been published by KSEBL.

De-siltation of reservoirs. In the light of unprecedented rain fall and consequent landslides and flood in 2018 and 2019, KSEBL accorded sanction to invite Request for Proposal (RFP) for the desiltation of reservoirs of KSEB as per the guidelines specified in the approved Standard Operating Procedure (SOP) by Government of Kerala. Desiltation work of Lower Periyar reservoir has been awarded to M/s Travancore Cements Ltd. The work could not be started for want of temporary diversion of forest land for stacking the desilted material. In case of Maduppety, Anayirankal, Ponmudi, Sengulam, and Kallarkutty reservoirs, tenders were invited for assessing the storage capacity and letter of acceptance issued to M/s. Geo Marine Solutions Private Ltd., Mangalore in 2020. For Poringalkuthu reservoir, bathymetric survey was arranged through Kerala Engineering Research Institute, Peechi. Kundala reservoir storage capacity was assessed and no desiltation requirement was found. Storage assessment study of major reservoirs is planned in DRIP-II.

Table 11.8 *Financial impact of Covid-19 on KSEB (as estimated on July 31, 2020)*

Particulars	Amount
Loss of revenue due to reduced sale of energy	865.13
Arranging transportation for stranded employees	0.08
Waiver of interest on delayed payment of electricity charges (domestic)	12.28
Absorption of bank transaction charges for online payment	4.5
Providing cashback for promotion of online transaction	9
Waiver of application fee	1
Rebate on fixed charges (industries/commercial establishments and private hospitals)	76.62
Interest burden on deferred payment of fixed charges	3.24
Additional subsidy to domestic consumers	200
Interest burden due to deferment of additional security deposit	17
Setting up Covid-19 relief facilities	50
Interest burden due to deferment of pole rental charges	0.2
Total	1239.05

Key Challenges and Issues

The following are some of the key challenges and issues that the KSEB faces in the immediate future.

Legal environment

Further liberalisation of the electricity market as proposed in the Electricity (amendment bill) 2020, if realised would erode the consumer base and revenue of the utility considerably. The new sub license clause may lead to induction of private licensees in profit prone areas. In the case of draft Electricity (Rights of Consumers) Rules, 2020 the bulk of the proposals have already been implemented by the KSEB expect some proposals such as prepaid metering have financial implications. The draft standard bidding documents for privatisation of distribution licences if implemented will leverage the process of privatisation. These amendments question the very existence of the utility in public sector.

Power purchase

KSEBL has been able to keep power purchase cost at an optimum-level. However, because of exorbitant cost, Kerala is not in a position to absorb power from the Kayamkulam unit of NTPC; but is paying the fixed charge. Intervention of the Ministry of power, Government of India, was requested to ensure that the burden is brought down to a minimum by reduction in annual fixed cost and additional allocation of alternate cheaper power to Kerala. But there has been no intervention so far to solve the problem. Also increase in cost of thermal power due to Flue-Gas Desulfurisation (FGD) and Removing Nitric oxide gas from coal (DeNOx) equipment installation in thermal power stations across the country and the transfer of the burden to distribution companies remains a threat.

Transmission. Inadequate power corridors to import power from the northern grid and insufficient network of intra-State transmission lines have been the issues faced by the State. Right of way problems and scarcity of land for drawing new transmission lines is the main hindrance for intra state transmission network development. As per the Central Electricity Regulatory Commission (CERC) (Sharing of inter-State Transmission Charges and Losses) Regulations, 2020, the transmission charges of AC line under balance component will lead to transferring of liability of underutilised capacity to States as Kerala who are not responsible for these asset additions. It is expected that there will be an increase in transmission charges payable by State to two to three times the existing charges. Also, in case of the Raigargh-Pugalur-Madakkathara HVDC line, 70 per cent of the transmission charges have to be paid as regional component. If the line is declared as national asset, the burden on State can be reduced by 30 per cent.

Distribution. The network has many bottlenecks such as poor networking, old and under rated lines, lack of alternate feeding facility, low HT/LT ratio, and non-standard structures. Increasing electrical accidents is another issue faced. Upcoming e-vehicles boom demands adequate charging infrastructure and additional power. The task of installation of smart meters in distribution as envisaged by Government of India is also a challenge to KSEBL. Installation of smart meters can possibly can reduce losses and enhance prudent revenue collection.

Covid-19. Impact of Covid-19 on the utility has been severe. Liquidity infusion schemes are required. The liquidity infusion schemes under the "Atmanirbhar Bharat Abhiyan" is only a loan package, that too with an unreasonable interest rate and conditions such as Government guarantee. Moreover, the scheme which proposes to transfer the amount directly to generating companies to clear their dues from DISCOMs is practically of no use to utilities such as KSEB who make prompt payment.

KIIFB Funded Projects

TransGrid 2.0. The objective of the TransGrid 2.0 project is to develop a robust and integrated power system in Kerala. Any transmission system is expected to be capable of meeting the demand at any part of the network without any overloading/constraints in a secure, reliable, efficient, and economic manner even under contingency conditions. The benefits of the project include

1. 24x7 uninterrupted supply to all consumers in the State
2. Better and strong national grid through the State to ensure power from anywhere to any place in the State.
3. Reduction of transmission losses
4. More power flow towards northern region of Kerala as most of the generation assets are in southern region.

Kochi Lines Package (Construction/Upgrading 220/110 kV line using narrow base MCMV towers). The main purpose of the upgradation of the lines in the project – Kochi Lines Package – is to facilitate the import of power from the Power Grid Coporation of India Limited (PGCIL) to meet the growing demands,

to evacuate the hydro power from the ongoing and future hydro stations of KSEBL, and to strengthen the Kochi metropolitan power supply lane.

The project includes four transmission line sections that are part of Kochi line package (CLP) in Transgrid 2.0 as well as 220 kV cable from Thuthiyur to Kaloor substation as continuation of Package C (Brahmapuram to Thuthiyur) transmission line section. The project consists of four components.

Project A. 3.6 km from Karukadam to Kothamangalam SS
Project B. 11.1 km from Pallikara substation (SS) to Aluva SS
Project C. 4.5 km from Brahmapuram to Thuthiyoor and 7 km UG cable from Thuthiyoor to Kaloor
Project D. 81 km from Pallivasal PH to Aluva SS and 1.9 km Line In Line Out (LILO) to Kothamangalam SS The approved amount for the project is Rs 372.73 crore.

Air Insulated Substations (AIS). The project involves construction of Air Insulated Substations at 4 locations, upgradation of existing substations at Kothamangalam and Chalakkudy, and construction of new substation at Chithirapuram and Manjeri for a total estimated cost of Rs 138.44 Crore. It includes the following components.

Project 1: Upgradation of 66 kV substation at Kothamangalam to 220 kV level.
Project 2: Construction of a new 220 kV substation at Chithirapuram
Project 3: Upgradation of 110 kV substation at Chalakkudy to 220 kV level.
Project 4: Construction of a new 220 kV substation at Manjeri.

Non-conventional and renewable sources of energy
ANERT, the Agency for Non-conventional Energy and Rural Technology (ANERT) and Energy Management Centre (EMC) are the major agencies in this field.

Agency for Non-Conventional Energy and Rural Technology (ANERT)
ANERT, the Agency for Non-conventional Energy and Rural Technology (ANERT) is an autonomous body under the Power Department, Government of Kerala. ANERT is the independent agency for the implementation and propagation of non-conventional sources of energy in the State. It is also the nodal agency for the Ministry of New and Renewable Energy Sources (MNRE), Government of India, to carry out the Central Government programmes in Kerala.

Energy Management Centre (EMC)
Energy Management Centre (EMC) is the State designated agency of Bureau of Energy Efficiency, Ministry of Power, Government of India for promoting energy conservation, energy efficiency, and enforcing Energy Conservation Act, 2001 in the State. EMC also promotes small/mini/micro hydel schemes. Small Hydro Power (SHP) Cell constituted by Government of Kerala under Power Department is also attached in EMC to give impetus for development of SHPs through private participation.

Department of Electrical Inspectorate
The Electrical Inspectorate is functioning under the Department of Power, Government of Kerala. Safety inspections are carried out and sanction for energisation for all HT/EHT and other medium voltage installation in the State are issued by this inspectorate. Meter Testing and Standards Laboratory (MTSL) under the Department of Electrical Inspectorate provides testing and calibration of various types of electrical equipment. At present, calibration facilities is available for voltage, current, resistance, frequency, power, power factor, and energy. The testing facilities include pre-commissioning tests for protection relays and instrument transformers. Pre-commissioning tests are also conducted for power transformers, cables and circuit breakers. All calibrations and tests are conducted as per national and international standards. Enquiry into all electrical accidents occurring in the State, forwarding the reports to the State Government, and taking actions against responsible person/authority are also done by Electrical Inspectorate.

The Electrical Inspectorate department implements three schemes namely; Meter Testing and Standards Laboratory, Effective Implementation of Quality Control Order, and E-Safe Kerala. Revenue from the department for the last two years is Rs 107 crores (excluding duties from KSEBL), which includes testing fees from Meter Testing and Standards Laboratory (MTSL), other Regional Testing laboratories, and from other services.

Kerala Power Policy 2019
The key objectives of Kerala's Power Policy are the following.

- Transform Kerala power sector to provide electrical infrastructure services matching global standards living up to the expectations on "Nava Keralam."
- Modern electric network that is reliable, safe, efficient and smart.
- Meeting the electrical energy requirements of the

State continuously without any form of restrictions.

- Balancing the need of sourcing power at the most competitive rates and at the same time ensuring energy security of the State.
- Enhancing share of renewable energy in the generation mix, addressing its variabilities using appropriate technology with a framework for sharing associated costs.
- Keeping price of electricity affordable and at the same time ensuring financial health of electricity industry.
- Improving efficiency and effectiveness of KSEB Ltd and rationalising its operational costs.
- Bridging the gap between consumer expectations and actual-levels of service delivery through organisational revamping and increased utilisation of information technology.
- Overcoming limitations of present electrical industry structure to offer next generation services in areas such as renewable energy, energy efficiency, electric motor vehicles and storage technologies.

Major Achievements of Power Sector Agencies

KSEBL

- **Kerala became a fully electrified State.** Kerala was declared a fully electrified State on May 29, 2017 by providing connections to over 1.5 lakh applicants under the "Total Electrification Scheme." The State also did away with power cuts and load shedding.
- **Transmission and distribution loss**. It is targeted to reduce aggregate technical and commercial losses below 10 per cent. Overall transmission and distribution loss in 2015-16 is 14.37 per cent and that for 2018-19 is 12.47 per cent. Transmission and distribution losses was brought down to 12.08 per cent in 2019-20. Aggregate technical and commercial loss for Distribution Strategic Business Unit has remained at 10.77 per cent despite the impact of Covid-19 in last quarter of 2019-20 and distribution loss was reduced to 8.70 per cent in 2019-20 from 9.09 per cent in 2018-19.
- Provided uninterrupted power and maintained all essential services during Covid-19 lockdown.
- **Generation.** Commissioned Vilangad Hydro Electric Project (HEP) (7.5 MW), Barapole HEP (15 MW), and Adyanpara HEP (15 MW) in 2015-16, Vellathooval SHEP (3.6 MW) in 2016-17, and Perumthenaruvi Project (6 MW, 25.77 MU) in 2017-18, and Kakkayam Project (3 MW, 10.39 MU) in 2018-19.
- KSEB received "Smart Infrastructure Innovation Award" from Indian Express Group in November 2017 for open-source platform based applications and a special honour from REC for 'Urja Mitra', the Outage Management System.
- **Oorja Kerala Mission (2018-22).** Government of Kerala launched the "*Oorja* Kerala Mission" in 2018 aimed at the integrated development of electricity sector in the State. It aims at implementing five important projects – Saura, Filament free Kerala, Dyuthi 2021, Transgrid 2.0, and esafe. The progress of work on these schemes have been stated earlier in this chapter.
- **Mission reconnect 2018**. This was launched by KSEBL during the floods of 2018. 16,158 distribution transformers were repaired, 1735 distribution transformer stations were reconstructed, 25.60 lakh service connections were restored, 5275.80 km distribution lines including one lakh damaged poles were reconstructed, three lakh single phase energy meters and fifty thousand three phase energy meter were replaced, and restored 720 single-point connections where existing installation were damaged in the floods. This work was completed in 21 days.
- Six e-Vehicle charging stations were set up with State funds.
- Commissioned Kanchikode solar plant 1 MW and solar projects of total capacity 5.90 MWp.
- **Transmission Sector.** 62 new substations were constructed and commissioned. Of these, 6 are 220 kV, 25 are 110 kV, 6 are 66 kV and 25 are 33 kV. Constructed and commissioned 1130 Ckt-km transmission line. A total of 16 lakh service connections were provided. Installed 7600 km 11 kV lines and 9400 transformers. 1600 kVLT lines were constructed.
- **Distribution Sector.** Service Connection - 1108086 Nos, DTRs- 6553 (Nos), faulty meter replacement (Nos)- 3924986, LT line extension (km) - 7353, Re- conductoring - LT (Ckt km)- 20309, Re-conductoring - HT (Ckt km) - 1945 (up to June 30, 2019). Further, 1080.5 km of 11 kV line and 3689.141 km of LT lines constructed.
- **Edamon to Kochi power highway.** Completed construction work of Tirunelveli-Idaman-Kochi-Madakathara 400 kV line from Idaman to Kochi on September 25, 2019 with the objective of strengthening the power transmission network of Kerala and facilitating the supply of power to the State from Kudankulam Nuclear Power Station. As a result, the power import capacity of the State has increased by 500 MW. In addition, there has been a significant increase in voltage levels. Construction

of Pugalur to Madakkathara 325 kV HVDC Line has been completed. As a result, the power import capacity of the State is expected to increase by 2000 MW.

- As a result of measures taken to improve domestic production, 310.4625 MW of electricity has been generated from renewable energy sources, including small hydropower projects. 200 MW of electricity was generated from solar power plants. 27 MW of power was generated from wind farms.
- Electricity Adalats were conducted in all the districts and out of 17000 complaints, received 15000 were resolved in the Adalats. Social auditing was started for the smooth functioning of the sector.

ANERT

- Received the National Energy Conservation Award for the last three years as a result of the State's involvement in energy conservation activities.
- Rolled out 140 Akshaya Urja Service centres across the State
- Grid connected 2 MW solar power plant at Kuzhalmannam, Palakkad fed 49 lakh units of electricity to KSEBL grid. This is the first grid connected solar photo voltaic (PV) plant in the State under Independent Power Producer (IPP) mode. Off-grid solar roof top power plant of cumulative capacity 1941 KW installed.
- Completed empanelment of agencies for the installation of solar water heating systems, solar lanterns, solar home lighting systems and solar LED street lighting. Empanelment process for manufacturers of batteries and invertors is initiated. Empanelment process for biogas and improved chulah was completed.
- Three grid connected solar power plants with aggregate capacity of 470 kW and five off grid solar power plants with aggregate capacity 35 kW installed.
- Installed 2199 Biogas plants (capacity 0.75 and 1 cubic metre per day), 2827 improved chulah, and solar water heating system in 7926 sq. metre.
- Installed 4195 kW grid interactive solar photo voltage (SPV) power plants of 2 kW to 100 kW to individuals/ institutions and 3279 kW off-grid rooftop solar PV power plants of capacity 1kW to 5 kW.
- Under Total Electrification Programme, 1625 houses and public buildings in Idukki District, 681 houses and public buildings in Palakkad District and 16 houses and public buildings in Wayanad District were electrified
- Established integrated renewable energy complexes in all the 14 districts and procured one Battery Operated Mobile Exhibition Unit.
- Installed 25 kW on-grid and 41 kW off-grid solar power plants in public buildings during 2018-19
- Under Innovative RE projects, 3 solar power coir ratt installed on pilot basis and 1000 solar lanterns have been distributed under "Jyothi" – solar power pack for street vendors.
- Launched e-Market place in 2018, incentivising users for utilising the electronic market place (www.buymysun.com).
- Mobile apps were developed for the use of public and various field activities of ANERT and empanelled vendors. The features of the apps include interaction with individuals and institutions to express their interest to partner with ANERT, checking feasibility on installing renewable energy systems, online installation reports by vendors for renewable energy systems, and online verification of installation by ANERT officials.
- ANERT installed a solar cold storage system at Subicsha Coconut Producer Company Ltd, Kozhikode as a pilot project to support farmers. The system consists of a 5 hp compressor motor and solar panels with 6 kW capacity, and can hold up to 5 tonnes of products. In the event of a power outage the cold storage can maintain its cold temperature for up to 30 hours. It was inaugurated on September 24, 2019.
- Installation of Solar Radiation Resource Assessment Stations: ANERT had installed two Solar Radiation Resource Assessment Stations at Kuzhalmannam (Palakkad) and Ramakkalmedu (Idukki) in association with National Institute of Wind Energy (NIWE) (Government of India). These are in addition to the existing ones at Kannur and Pulinkunnu (Alappuzha) installed by NIWE under MNRE programme.
- Solar cooking system: A parabolic-trough concentrator-based steam cooking system was installed by ANERT in the pre-matric hostel, Neriyamangalam, Ernakulam in 2019. The community solar steam cooking system is designed for cooking food for 100 inmates It is the first solar community steam cooking system installed in Kerala.
- Accreditation of Solar Power Plant Installers (Technicians). Considering the increased interest in renewable energy sector and to ensure quality of installations ANERT has started accrediting installers of solar power plants and 150 installers were trained in 5 batches.
- Installed 1 kW power plant solar wind storage hybrid at Ramakkelmedu.

Energy Management Centre

- Through energy conservation efforts saved 464 MU of electricity and 88,194.75 MT of oil.
- Inaugurated Pathamkayam SHP (8 MW), 4 kW Pico Hydel project at Echampetty tribal colony, installed 20 kW Vortex Micro hydroelectric project at Kaduvetti bridge, and 2 kW at Murikkassery police station.
- Produced short film *"Aanayum Mumbe"* (Before the light goes off). The film received special jury award in the 9th National Science Film Festival of India 2019 held at Mohali.
- Model energy efficient panchayat. Three gram panchayats – Aryad Gram Panchayat, Vathikudy Gram Panchayat, and Rajakkad Gram Panchayat – were made energy efficient.
- Received the Future Kerala Brand Awards 2018 in the category of responsible Energy Conservation Brand on March 27, 2019 at Kochi.
- Implemented energy audit report recommendations in three Civil Station buildings – Alappuzha, Kollam, and Pathanamthitta.
- Made Pelicode panchayat in Kasaragod, the first incandescent lamp free panchayat in India
- Allotted 20 SHP projects, totalling an installed capacity of 43.8 MW to private parties on BOOT basis.
- Retrofitting of energy efficient equipment in 10 primary health Centres (327 LED tubes, 145 Ceiling fans, 240 LED bulbs).
- EMC's Green Building, recognised by UNEP in its Global Status Report-2017 on zero emission, efficient, and resilient building, received IGBC-Lead Gold Rating.
- EMC bagged the National Energy Conservation Award instituted by the Ministry of Power, Government of India in the category of State Designated Agency.
- NITI Aayog with the support of BEE prepared the first State Energy Efficiency Preparedness index and Kerala topped the index with 77 points.
- Model Energy Efficiency Village Programme in Aranmula Gram Panchayat inaugurated on June 22, 2019. As part of the programme, Walk Through Energy Audits and awareness campaigns were conducted at schools/Government offices/buildings by the concerned selected audit firm and EMC resource persons
- As part of Model Energy Efficiency Village programme, 6000 nine watts LED bulbs were distributed to the domestic consumers of the Perumbalam Gram Panchayat at the rate of Rs 50 per bulb. With the support of BEE, EMC was awarded the work of installation of 10 kWp Off Grid Solar PV system at the primary health centre at Perumbalam Gram Panchayat. The work is being implemented through ANERT.
- The detailed energy audit of six major HT pumping stations of Kerala Water Authority (KWA) is performed through EMC empanelled energy audit firm.
- As part of *Urja Kiran*, 700 awareness programmes, 280 energy conservation rallies, and 280 awareness programmes, covering all the 140 constituencies in Kerala was conducted in association with 155 NGOs.
- As a part of Energy Clinic Programme, 372 women across nine districts were given training. 5,000 Energy Clinics were conducted which covered about 1 Lakh consumers.
- Three-day training programmes on LED bulb repair for children with disabilities from National Career Service Centre, Nalanchira was conducted in May 2019 and two-day training programme on LED star making was given to the same batch of students in December 2019

Electrical Inspectorate

- Revenue from the department for last two years is Rs 124 crore as a result of modernisation of laboratories.
- Successfully launched online software "SURAKSHA" on October 1, 2018. Application for scheme approval and energisation are now received via online.
- Completed standardisation and rewiring work with Earth Leakage Circuit Breaker for 400 houses at Agali, Sholayur, and Pudur, in Palakkad District and remaining work for 460 houses is under progress.
- Retained "SEVOTHAM CERTIFICATION" (Service Quality Management System Certification) as per IS.15700:2005 from the Bureau of Indian Standards.
- Procured two fully-automatic energy meter test bench (10 positions) at regional testing lab in Kozhikode and Ernakulum, and three fully automatic transformer test set for conducting pre-commissioning test as per quality control order and power system analysis software, ETAP and compact LED testing equipment in Meter Testing and Standards Laboratory (MTSL).
- Short film on Electrical Safety "Velicham" was released on June 14, 2018 for spreading the awareness on electrical safety.
- To resume electric supply and equipment in the flood affected areas, department has launched a

safety programme named Operation Suraksha and its objective is to standardise and ensure safety.

- SKOCH. Electrical Inspectorate online software Suraksha was awarded SKOCH order of Merit award in e-governance category.
- Retained National Board for Testing and Calibration Laboratories (NABL) certification for electro technical calibration in Meter Testing and Standards Laboratory, Thiruvananthapuram. NABL accreditation has also been obtained for Regional Meter Testing Laboratories at Thrissur, Wayanad, Palakkad, Kozhikode, and Kasaragod Districts.
- Procured Power System Analysis Software ETAP and Compact LED testing equipment in MTSL.
- Banned substandard ELCB.

The Way Forward

The Government has fulfilled the objective of total electrification in the State. The State distribution grid can now provide uninterrupted power on demand at reasonable cost to any inhabited locality.

To ensure adequate economic and social growth in any country or regions, it is indispensable that all available energy sources be used in the most effective and economical manner. The Government of Kerala's priority is to increase power generation to meet increasing demand. It is also an important objective of Government policy to tap the full potential of wind, solar, and small and medium hydro projects.

KSEBL aims to meet the challenges in the power sector essentially by improving operational efficiency *sans* privatisation and achieving global standards by means of its *Oorja* (Energy) Kerala Mission. The experience of the restructuring in Kerala was distinct: it emphasised, first, that only an integrated utility could assure effective services, and, secondly, the advantage of achieving financial control by vertical unbundling into strategic business units.

The model created by KSEBL has evolved as a sustainable and replicable model.

Chapter 12

Environment and Growth: Achieving the Balance

Introduction and Overview

The challenge of sustainable development that is at the heart of the conundrum that the title of this chapter expresses is not particular to any nation, region, landscape, or ecosystem. It is a pervasive challenge that, policy-makers must appreciate, is not easily met. Unfortunately in the era of the Anthropocene, with the sense of urgency arising because of the problem of global warming, the tendency has been to argue that solutions are readily available, if only the requisite political will is summoned. Global experience shows that this is hardly the case. Sustainable development involves such a comprehensive re-ordering of the productive capacities of society that such simplistic views are clearly misplaced. In reality, sustainable development can only evolve as a process, an evolution that must include the local and the global. Solutions cannot be drawn purely from either the social, the economic or the scientific dimensions of the problem, but most involve all such factors in interconnected fashion.

Popular enthusiasm for environmental action and sustainable development is certainly on the increase. However, such enthusiasm, unless suitably guided, is in danger of missing the scientific and technological dimensions of the problem or the complexity of the economic issues. Typically, popular enthusiasm, especially in developing societies, but also in the developed world, is drawn to the romantic notion that downgrading technological advance is the key, or to the equally romantic view that simply restricting consumption of material goods, with some ascetic ideal of saving the planet, will be sufficient. Such romanticism is clearly misplaced in societies that still harbour grave social and economic inequalities and where the leading question is not the restriction of the over-consumption of material goods but the absence of elementary or basic material needs. Other tendencies include the idealisation of traditional knowledge. In fact, the current challenge of sustainable development has no parallel in the past and hence traditional knowledge is indeed relatively powerless to deal with contemporary realities. Thus communities that depend on traditional knowledge for their basic sustenance are far more likely to be victims of large scale ecological transformations rather than the harbingers of means to deal with such transformations.

These challenges are common to the vast majority of nations and societies. However, in developing societies such as India the challenge of sustainability has a dual aspect that must be noted. Both aspects are associated with inequality, but there is a need to note that inequalities in countries like India arise from both international as well as domestic inequalities. This is particularly relevant to global environmental questions such as climate change, where recognition of global inequalities is fundamental to the understanding of both the problem and its solution. Regrettably the moral attitude to the environmental challenge, calling for renunciation of material development even by the very poor, or the reduction of their civilisational aspirations to the mere provision of three square meals a day, has gained considerable traction in policy circles.

Thus it must be understood that sustainable development would be one-sided if the significance of both the words were not given due weightage. Second, especially in developing societies the development of productive capacities cannot be short-circuited or set aside in the name of sustainability. Third, the challenge of environmental sustainability and development can only be overcome with the greater use of science and technology and not by a retreat from it.

Fourth, science is also the indispensable ally and foundation on which to build beyond traditional knowledge, from which there may be many things to learn. But science is also indispensable to separate the grain of valid experiential knowledge from the chaff of hearsay, prejudice or plain obscurantism. Fifth, without science as a guide, popular enthusiasm for environmental protection may also slip into an alarmist mode that cannot but have a retrogressive impact not only on development, but on society as a whole.

Sixth, the importance of science has been recently re-emphasised by the Covid-19 pandemic and the discussions that have ensued over its origins, the means to contain its impact, and the need to monitor and, to the extent possible, guard against such zoonotic outbreaks. On another front, the impact of the recurrent floods and landslides over the previous two years, preceded by an unprecedented drought, have also brought home the need for science-based study and intervention, to build resilience to climate extremes in the era of climate change.

These comments and observations are obviously not exhaustive but are made keeping in mind not only their general validity but also their relevance to Kerala in particular.

Kerala and Its Environment

Kerala is one of the States of India where the development-environment connection thrusts itself on life, society, and governance in inescapable fashion. The landscapes and ecosystems of the State are unique in many ways because of the particular features of its geography and climatic conditions. Kerala is one of the country's and world's distinctive biodiversity hotspots. It has all the three maximally productive and biodiversity rich ecosystems in the world, namely tropical rainforests, freshwater and brackish water wetlands, and marine coral reefs. There has been progressively rising pressure on the environment and the natural resources of Kerala over the years from the high density of population as well as the State's developmental needs. The serious consequences of this pressure are becoming increasingly evident. Development in Kerala has to ensure, utilising the best of ongoing scientific and technological development, that the demands on the environment do not exceed its carrying capacity for the present as well as future generations.

The State of Kerala may be justifiably proud of the high-level of popular awareness of environmental issues. Environmental consciousness is pervasive in Kerala society, and related issues are debated intensely in the public sphere, extending well beyond the narrow confines of an intellectual elite. However, it is not always evident that such consciousness or awareness is matched by an adequate scientific and technological appreciation of the issues involved and the recourse to science to solve these issues. In the absence of adequate scientific inputs, there will be a slide into privileging conservation or even over-riding developmental efforts. It needs to be emphasised that even the notion of "carrying capacity" is not a static one and that science and technology can actively develop and enhance the carrying capacity, including the biocapacity, of any given landscape or ecosystem.

With a scientific outlook guiding all activities in the environmental sphere, many of the decentralised institutions envisaged and set up for environmental governance, such as Biodiversity Management Committees (BMC), may be provided specific and concrete agendas of work in monitoring various specific aspects of the environment. This would be a valuable way in which popular enthusiasm can be used to promote scientific information gathering and data collection, with appropriate training. To date, all over India, it has proven difficult to provide focused, active work to the BMCs beyond the initial effort to list and catalogue various environmental assets at the local level in the preparation of the Peoples' Biodiversity Registers. In the absence of a definite work agenda, BMCs may tend to become local lobbyists for environmental protection of whatever form that may strike their fancy, thus creating local-level conflicts rather than a cooperative understanding.

At the level of governance, the Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991. This necessitated a State Policy Statement with the objective of complementing and supplementing the National Strategy and Policy. Kerala's Environment Policy came into existence in 2009. This Policy document provides a framework within which conservation and development can be achieved simultaneously with a view to maximising the quality of life for all in the State, optimising the ecological load on the natural systems as well as building up the State's economy while minimising environmental degradation.

One of the key achievements of the present Government of Kerala has been its own particular addition to the raising of environmental awareness and action through the Haritha Keralam Mission. As the umbrella terms for a vast variety of local initiatives, the Haritha Keralam initiative has raised the bar on environmental awareness building in the country. Specific interventions by the Mission are given at the end of this section. We note here also that environmental work in the State will benefit from specialisation by various Government departments and agencies in their roles in environmental protection.

Climate change and Kerala

Climate change poses an emerging challenge to the sustainability of social and economic development, livelihoods, and environmental management across the globe. The rise in greenhouse gases in the atmosphere causes a rise in temperature, which in turn leads to unpredictable weather, including flash floods and drought, and a rise in sea levels. India is highly

vulnerable to climate change because of high physical exposure to climate-related disasters (65 per cent of the country is drought-prone, 12 per cent is flood-prone, and 8 per cent is susceptible to cyclones) and because India's economy and population depend on climate-sensitive sectors such as agriculture, forests, tourism, and fisheries. India started work on its action plan in 2007 and the National Action Plan for Climate Change (NAPCC) was released in October, 2008. The NAPCC set eight National Missions to respond to climate change; these included National Missions on Solar Energy, Enhanced Energy Efficiency, Sustainable Agriculture, Sustainable Habitat, Water, Sustaining Himalayan Eco-Systems, Green India Mission and Strategic Knowledge for Climate Change. These covered a range of actions, including adaptation and mitigation. The principles guiding the NAPCC include achieving a sustainable development path while advancing economic and environmental objectives.

Subsequent to the introduction of NAPCC in 2008, State Governments were also encouraged to prepare their own State Action Plan on Climate Change (SAPCC) consistent with strategies in the NAPCC. The first Kerala SAPCC was drafted by the Directorate of Environment and Climate Change (DoECC) with inputs from relevant Departments, Agencies and Research Institutions. This was endorsed by the Government of India in 2014. It is proposed to identify specific vulnerabilities and plan appropriate responses keeping those in focus. As the foremost impact of the changing climatic pattern relates to the land and water resources, a system for monitoring will be the first imperative. Thus the SAPCC will build on the existing policies of the State Government by taking into consideration the ongoing programmes and schemes being implemented at the State-level as well as the NAPCC. The SAPCC will have to be integrated into the State-level planning process so that the resource allocation of the implementation of identified adaptation measures can be made with the objective to achieve the development goals of the State Government. Adaptation is a key part of Kerala SAPCC and it is about taking action now to protect State from the challenges caused by a changing climate. The Kerala SAPCC developed by the Department of Environment and Climate Change, Government of Kerala aims to address negative consequences of climate change and thus reduce risk associated with it. It is also envisaged that climate change strategies need to be integrated into the development planning process in the State.

However, in many ways, climate action in Kerala is still in its infancy. While there is a SAPCC for Kerala, there is little buying into this Action Plan by various Departments and agencies of the State Government, as well as other stakeholders. This is the inevitable consequence of consultant-driven processes that conduct proforma stakeholder meetings that rarely go beyond the superficial. Efforts to have a more systematic input from academic and research institutions in Kerala into the second edition of the SAPCC based on adequate knowledge capacity building and peer review, with the active participation of Government departments as well are still to bear fruit.

It is necessary in formulating Kerala's response to climate change that it meshes in appropriate fashion with national policy. There is no case here for the competitive evaluation of different States in their meeting the challenge of climate action. In a national economy, resource sharing and cooperation in sharing the ecological burden is the key and not a competitive approach. While tapping local enthusiasm is important, slogans such as carbon neutrality of particular regions or even local jurisdictions as small as a panchayat is not in accordance with national policies. But formal adherence to national policy goals apart, such goals are not even entirely coherent. Kerala's significance lies in the preservation and enhancement of its forest and tree cover and the protection of its coastal ecosystem. The adaptation of its ecosystems and landscapes to global warming is the key challenge for Kerala, and local mitigation efforts such as the carbon neutrality of particular panchayats is simply diversion from the real effort that is required, whatever its populist appeal. Regrettably, such local mitigation efforts are likely to attract some modest funding adding to their appeal. But most of such funding is part of the larger policy initiatives from developed countries to persuade local jurisdictions to undertake commitments that have been rejected by the country at the policy level in international climate negotiations.

Environmental regulation in Kerala

In this section we deal with a number of specific aspects of environmental regulation in the State of Kerala.

Air quality monitoring

The Kerala State Pollution Control Board monitors ambient air quality at 34 stations in the State. Of these, 28 stations come under the National Ambient Air Quality Monitoring Programme (NAMP). It includes four new stations established in 2019 – Thiruvalla (Pathanamthitta), Kuttipadam (Ernakulam),

Perinjadoor (Thrissur), and Kalpetta (Wayanad). The State Ambient Air Quality Monitoring Programme (SAMP) is implemented at seven stations, including a new station established in 2019 in Moovattupuzha. A PM 2.5 sampler was installed at each of the 19 Air Quality Monitoring stations in 2018-19. Seventeen RDS and PM 2.5 samplers for ambient air quality monitoring and eight for measuring microbalance were purchased in 2019-20. The latter were installed at district offices in Thiruvananthapuram, Alappuzha, Ernakulam, Wayanad, Kannur, Perumbavoor, Kollam, and Thrissur.

The Kerala State Pollution Control Board had established and commissioned Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Kozhikode (one station) and Ernakulam (two stations). In 2019-20, the Board established and commissioned CAAQMs at Kollam, Thrissur and Kannur. Various ambient air quality parameters are monitored continuously and displayed to the public.

Water quality monitoring

A total of 128 water quality monitoring stations function under the National Water Quality Monitoring Programme (NWMP). Under this programme are included 72 stations in 48 rivers (major, medium and minor rivers), six in reservoirs, three in fresh water lakes, eight in estuarine lakes, three in canals, two in ponds, and 34 in ground water. The State Water Quality Monitoring Programme (SWMP) operates at 115 stations in 23 rivers and 23 stations in four lakes.

Box 12.1
Ban on Single Use Plastic

A ban on single-use plastic comes into force from January 1, 2020. With the Plastic Waste Management Rules (2016) the State Government imposed strict restrictions on the use and sale of plastic carry bags less than 50 microns to facilitate collection and recycle of such plastic. The State Government has already taken steps with regard to setting up of facilities for collection, segregation and disposal of all forms of waste, including plastic waste. Even so, the uncontrolled and irresponsible usage of plastic has been posing environmental as well as health hazards. Plastic items mostly end up in rivers and water bodies, making even recycling impossible. The ecological system, and marine ecology in particular, have been badly affected. The grim situation was never been more evident than after the floods in Kerala. Mountains of plastic debris were washed up on the shores of the sea and lakes. The Government appointed an Expert Technical Committee to list the plastic items to be banned and find substitutes for them. The Expert Technical Committee submitted its report to the Government recommending partial ban on some items like PVC and flags, and has recommended regulating the use of a many other items through establishing a return-and-earn scheme.

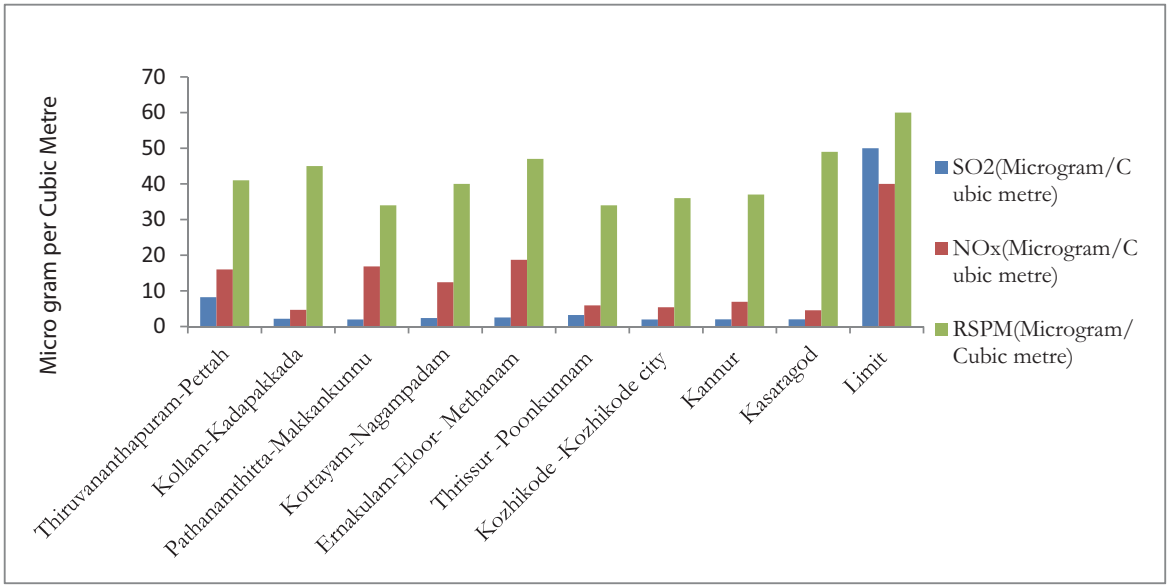

Figure 12.1 *Annual average values of air pollutants at 10 monitoring stations in residential areas of Kerala 2019*
Source: Water and Air Quality Directory 2019, KSPCB

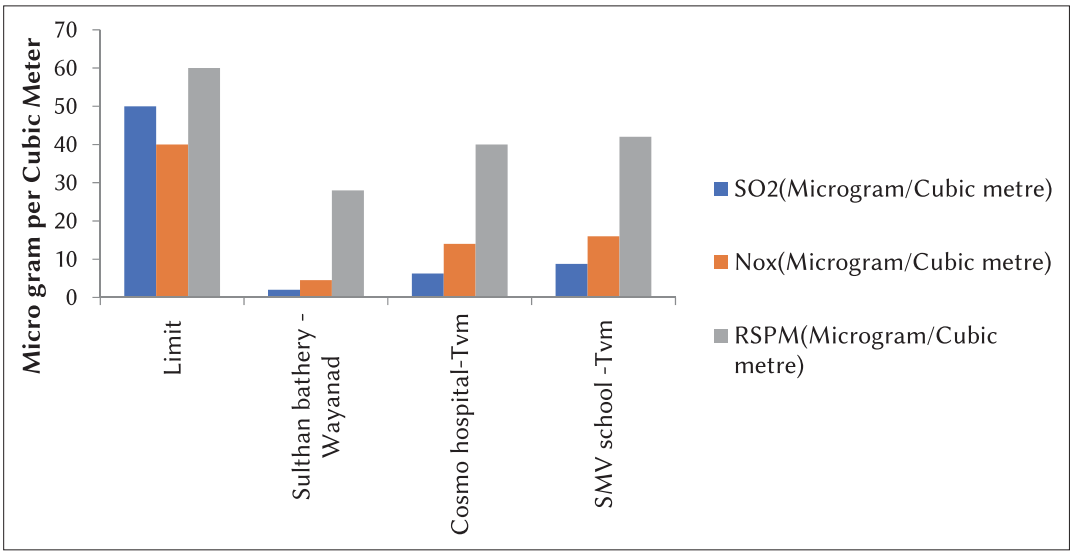

Figure 12.2 *Annual average values of air pollutants at three monitoring stations in sensitive areas of Kerala 2019*
Source: Water and Air Quality Directory 2019, KSPCB

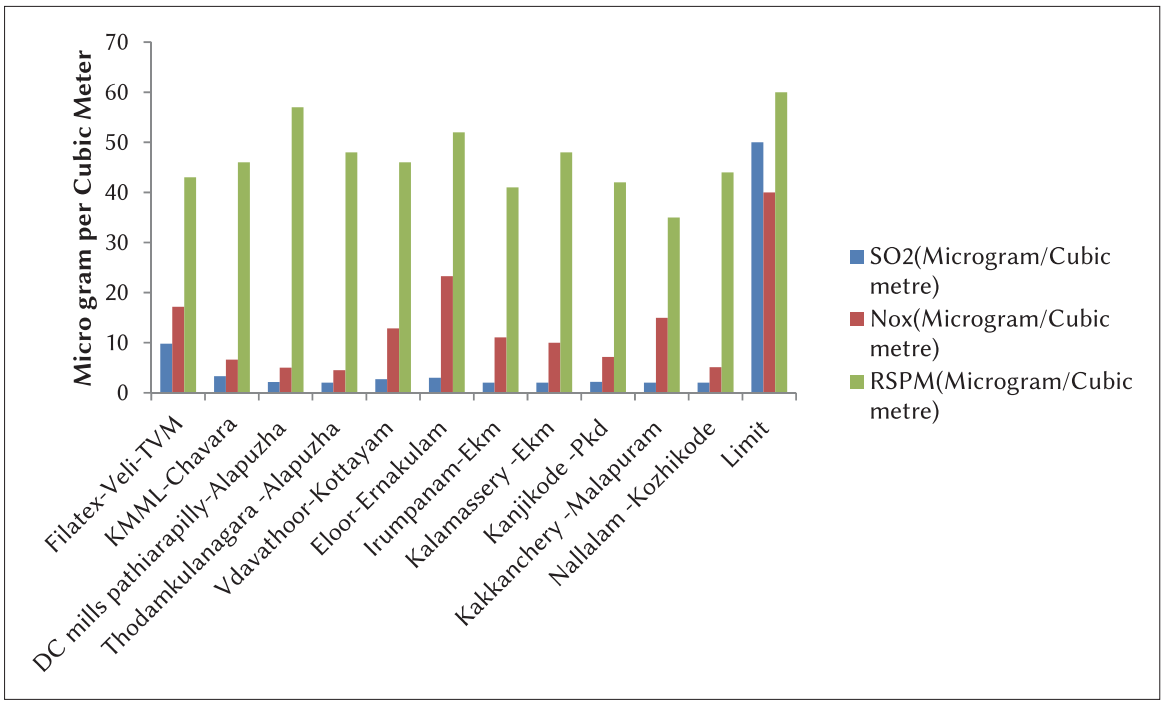

Figure 12.3 *Annual average values of air pollutants at 11 monitoring stations in industrial areas of Kerala 2019*
Source: Water and Air Quality Directory 2019, KSPCB

Some of the rivers having high biochemical oxygen demand (BOD) values are Pamba river (during Sabarimala festive seasons) and downstream rivers Karamana, Periyar, Bharathapuzha, Vamanapuram, and Kadalundi. Coliform count at Munnattumukku in Karamana river, Kallayi bridge in Kallayi river, Pamba river, Purakatteri in Korapuzha river, Thodupuzha river and Munnar river are reported as being very high.

With regard to rivers, the BOD is plotted in Figure 12.4. It shows that BOD is highest for Periyar (higher than the 2013 levels). Bharathapuzha and Chalakudy rivers showed an increase in BOD levels compared with 2013. Achenkovil, Kallada, and Pamba rivers show a drop in BOD levels as compared to the 2013 level.

Biodiversity in India and Kerala

India has done well in raising awareness about biodiversity, which is an important thrust area in several programmes of the Government. As a

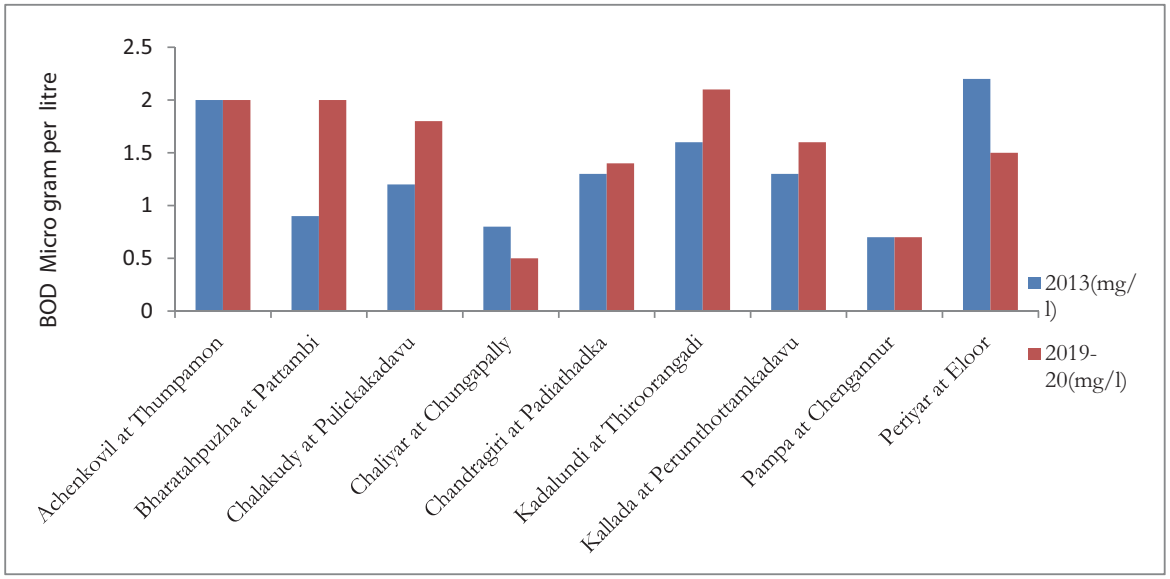

Figure 12.4 *Biochemical Oxygen Demand-levels at selected river stations, 2013 and 2019*
Source: Water and Air Quality Directory 2019, KSPCB

Box 12.2
Surveillance of Sabarimala during Pilgrimage Season

During the Sabarimala pilgrimage season, the Pollution Control Board has to ensure quality of drinking water in the pilgrimage area. For this purpose a laboratory is provided at Pamba. Besides continuous monitoring of river water quality at different locations, sampling from effluent treatment plants are also done for ensuring good environmental conditions. Ambient air monitoring and noise monitoring are also done at camp offices setup at Sannidhanam, Pamba, and Erumeli with sufficient sampling as well as laboratory staff for this purpose. The Board has conducted various awareness programmes among the public. Plastic carry bags, canned food, and bottled water in the pilgrimage area are banned.

megadiverse country holding nearly 7-8 per cent of globally recorded species while supporting 18 per cent of the global human population on a mere 2.4 per cent of the world's land area, India's quest for inclusive economic development while maintaining the integrity of its natural capital is being pursued through various programmes and strategies.

India has been investing a huge amount on biodiversity directly or indirectly through several development schemes of the Central and State Governments. This runs to Rs 70,000 crore per annum as against the estimated annual requirement of nearly Rs 1,09,000 crore. India has nearly two third of the population of wild tigers in the world. The population of lion has risen from 177 in 1968 to over 520 in 2015, and elephants from 12,000 in 1970s to 30,000 in 2015. One-horned Indian Rhino, which was on the brink of extinction during the early twentieth century, now number 2,400. Further, while globally over 0.3 per cent of total recorded species are critically endangered, in India only 0.08 per cent of the species recorded are in this category.

A little more than two-thirds of India's geographical area is arid, semi-arid, or dry sub-humid on which depend a vast majority of rural and semi urban poor for their livelihoods. Studies have repeatedly emphasised that the rural poor and particularly women are severely impacted by the effect of environmental degradation on soil fertility, quantity and quality of water, air quality, forests, wildlife and fisheries.

However, while biodiversity conservation is well understood, there is still much to be understood of the economic value of biodiversity and how exactly it is to be valued and enhanced. Such confusion is of course, not merely restricted to Kerala or even India but is a global problem.

Biodiversity Management Committee (BMC) for conservation

Kerala State Biodiversity Board (KSBB) had constituted BMCs in all panchayats, municipalities and

corporations in 2012. After the local body elections, BMCs were reconstituted in 2015-16. In 2019-20 KSBB initiated constitution of BMCs in the remaining upper two tiers of Panchayati Raj systems in the State namely, in block panchayats and district panchayats. The process of BMC constitution in 152 block and 14 district panchayats were completed in December 2019. In the 13th Five-Year Plan, it was aimed to strengthen the BMC through capacity development and policy support to sustainably manage the natural resources at local - level. In 2017-18, 20 BMCs were selected, and in 2018-19, 28 model BMCs were selected (two from each district) and they are being empowered and provided financial support for focused projects.

Implementation of People's Biodiversity Register (PBR)

The PBR is a comprehensive document on biodiversity prepared with the support of Kerala State Biodiversity Board and technical support groups (TSG). In 2019-20, a total of 75 PBRs has been prepared. The process of compiling PBRs of the locality along with associated traditional knowledge prepared by BMCs with technical preparation was completed in all 1,034 local bodies i.e. in 941 gram panchayats, 87 municipalities, and six corporations.

Impact of flood and natural disasters on biodiversity

The Kerala State Biodiversity Board conducted a rapid assessment of the impact of floods on biodiversity through BMC in 2018. This revealed that about 771 different landscapes, including riverine, forest, plantations, and agricultural fields were affected. About 287 varieties of agricultural crops, 1,053 types of flora and 695 types of fauna were affected. The major causes of disaster were found to include changes in land use in wetland areas, removal of river bank vegetation, construction activities on hill slopes and unsustainable quarrying. As a followup to this, areas requiring attention was prioritised and 28 studies on the impact of floods and landslides on biodiversity and ecosystems with special emphasis on riverine rejuvenation were awarded to research and development institutions and universities across Kerala. As an outcome of this study, the Periyar, Pamba, Bharathapuzha and Chalakudy river areas have been prioritised for recovery measures. The management and control of soil erosion at selected areas of the Pamba river have been taken up. Areas vulnerable to landslides have been identified and the regeneration of riparian vegetation has been prioritised as part of the recovery process.

Major Initiatives and Activities of the Department

The Indian Constitution directs the State to "take measures to protect and improve the environment and to safeguard the environmental quality". It also makes it a fundamental duty of every citizen to protect and improve the natural environment including forests, lakes, rivers and wildlife.

The Directorate of Environment and Climate Change in Kerala provides environmental education and awareness through their programmes like *Paristhithikam* and *Bhoomitrasena* Clubs. *Paristhithikam* focuses on conducting awareness and activity-oriented programmes under the theme "Fight Against Air Pollution." Presently there are 369 BMCs functioning in various higher secondary schools and colleges all over Kerala to create and promote environmental awareness among the students.

The major initiatives of Directorate of Environment and Climate Change in 2019-20 were as follows:

- Water quality monitoring programmes were conducted in different water bodies, including drinking water sources in the flood affected regions and its potability and/or suitability of use ascertained by selected BMCs.
- Environmental awareness and action-oriented environmental conservation programmes were conducted in different parts of the State under the title *"Paaristhithikam"* based on the theme "Combating Air Pollution."
- A project titled "Grid connected solar powered charging station for electric vehicles" for the promotion of sustainable energy in the automobile sector was initiated.
- Documents on wetlands namely (i) Kavvayi, (ii) Kattampally, (iii) Kadalundy, (iv) Kottuli, (v) Pookode (vi) Ponnani estuary/Purathur (vii) Chetuvai kayal (viii) Paravur (ix) Vellayani was prepared by Centre for Water Resources Development and Management (CWRDM) for State Wetland Authority Kerala.

The Kerala State Biodiversity Board established the Biodiversity Museum in Vallakkadavu, Thiruvananthapuram to create awareness among the people on the importance of biodiversity and conservation. Biodiversity clubs play a great role in furthering biodiversity education and experiences related to the nature and environment outside the class room. A total of 150 biodiversity clubs were newly registered in 2019-20. Altogether there are 1,715 registered biodiversity clubs in Kerala. The Kerala State Pollution Control Board has taken initiatives for the

implementation of the Kerala Anti-microbial Resistance Strategic Action Plan (KARSAP) in the State.

Haritha Keralam Mission

The Haritha Keralam Mission, one of the components of the "Nava Kerala Mission" initiated by the Government in 2016, is a major programme aimed at environment conservation. The Haritha Keralam initiative is concerned, in the first place, with the disposal of solid waste and the cleaning of Kerala's water bodies. This has a "hardware" aspect in the scientific and technical infrastructure of such an initiative and a "software" aspect in its thrust in changing the consciousness of people, particularly children, towards the disposal of garbage and litter. Haritha Keralam envisages a litter-free Kerala in the near future.

The Haritha Keralam Mission has three sub-missions (i) sanitation and waste processing, (ii) water conservation and, (iii) agricultural development.

The main focus areas of the Haritha Keralam Mission are:

1. To formulate methods for various levels of coordination of Plans of local governments and other departments to address the major issues in each district.
2. To ensure scientific, efficient and technical advice to local governments in order to attain practical and effective technical facilities.
3. To provide leadership in conducting activities that ensure peoples participation and social inclusion for creating "Haritha Keralam."

Major interventions

Sanitation and Waste Processing. Launched on August 15, 2017, the "Freedom from Waste" campaign created a strong foundation for sanitation and waste processing activities by local governments. The basic requirements for treatment of waste at source such as Material Collection Facilities (MCF), Resource Recovery Facilities (RRF), Haritha Karma Senas, household source-level treatment plants, and community composting units, have been provided to the local governments. The Green Protocol has become a part of social life and is implemented in 10, 010 offices and institutions in the State, district, and block-levels.

Forty-five per cent of bio-waste in the State is treated scientifically through source-level treatment of waste. These treatment systems were set up in 52.93 lakh houses. In addition, 1,320 industrial-level biogas plants, 210 community biogas plants and 2,117 community-level composting units were installed. Haritha Karma Sena units were formed in 1,033 local governments with the participation of 32,003 members. The "Zero waste on ground" project was initiated in 170 wards in 17 municipalities. A total of 1,220 tonnes plastic waste and 93.21 tonnes e-waste were collected and handed over for recycling. Further, 2,350 scrap merchants were registered in local governments. Thirty-seven Harithasahaya institutions have started functioning to give technical support for waste management facilities of local governments.

Material Collection Facility (MCF) centres and Resource Recovery Facility (RRF) centres were functioning in 1,339 and 157 local governments respectively between 2017-18 and 2020-21 (as on January 31, 2021).

Water Conservation Mission. The water conservation mission envisions the renovation of existing water

Table 12.1 *Physical achievements in sanitary waste management, 2017-18 to 2020-21* in number

Particulars	2017-18	2018-19	2019-20	2020-21
Number of local bodies where Haritha Karma Sena has been formed	521	530	931	1,033
Number of members in Haritha Karma Sena	22,592	28,533	28,533	32,003
Material Collection Centres for inorganic waste treatment	300	448	1339	1339
Resource Recovery Facility Centres	39	138	157	157
Homes equipped with source waste treatment (in lakh)	19.94	31.19	43.57	52.93
Collected plastic waste handed over for recycling (in tonnes)	200	95.08	130	1,220
Collected e-waste handed over for recycling (in tonnes)	735.84	254.23	172.8	93.21

Note: Data for 2021 is up to January 31, 2021
Source: Haritha Kerala Mission

surfaces, ensuring pure and clean water in the local areas, and the spreading of a new culture for water consumption. This seeks to facilitate good quality water supply system for drinking and irrigation. In this sub mission, the ponds, canals and streams across the State are being cleaned up, protected and conserved. Considering the topography and the peculiarity of the landscapes, appropriate technology for water conservation is being adopted. In the hilly terrains where the flow of water is fast and the land is sloppy, small water harvesting bunds are constructed, enabling the dammed water to penetrate into the soil. Centrally-sponsored schemes such as Mahatma Gandhi National Rural Employment Scheme have been effectively synchronised with the projects of the local self-governments for the conservation of water. The physical achievements of water conservation sub-mission are given in Table 12.2.

Agricultural development. The agricultural development sub-mission has a special thrust towards organic farming. Systematic, scientific and comprehensive projects at each stage, from planning to marketing, are envisaged to strengthen the agricultural sector. A comprehensive farming initiative was introduced by integrating various subsidiary agricultural activities such as animal husbandry, beekeeping, poultry farming, goat rearing, and fish farming in a mutually complementing manner. The production and marketing of value-added products of the major crops of Kerala such as paddy, coconut, vegetables, jackfruit, and honey, has been carried out by establishing a chain of small and medium agro parks. Cultivation in barren lands is being promoted with the active participation of Self-Help Groups (*Swayam Sahaya Sangam*) and Joint Liability Groups. The activities of the Agriculture Task Force (*Karshika Karma Sena*) are being strengthened in all the local self-governing institutions.

The Haritha Keralam Mission, through its sub-missions, has made significant interventions to protect, clean and conserve our environment. It has created awareness among the people to preserve environment by rejuvenating water bodies and the scientific management of waste.

Table 12.2 *Physical achievements with respect to water conservation* in number

Particulars	2017-18	2018-19	2019-20	2020-21	Total
Rivers rejuvenated (in km)	47	155	188	22	412
Streams rejuvenated (in km)	1,518	17,302	18,641	5,313	42,774
Wells recharged	18,252	37,109	6,837	723	62,921
Wells constructed	10,399	4,601	7,252	906	23,158
Wells renovated	6	4,625	9,317	6	13,954
Ponds renovated	4,221	11,529	9,437	54	25,241
Ponds constructed	98	13,877	4,651	257	18,883

Note: Data for 2021 is up to January 31, 2021
Source: Haritha Kerala Mission

Chapter 13
Local Governments

Decentralisation and Local Governments in Kerala

Introduction

Decentralisation of governance is one of the most important features of administration in Kerala. It affects all spheres of life. Local governments in Kerala have been meaningfully empowered through a large-scale transfer of resources and administrative powers. Over the years, local governments have emerged as effective instruments for the formulation and implementation of development programmes and for coordinating the work of various agencies involved in local area development. The pivotal role played by them is clearly evident in the exemplary work done by them during the floods of 2018 and 2019 and the Covid-19 pandemic.

Elections to local bodies in Kerala were conducted in 2020. A newly elected leadership took over the reins of administration at all tiers of local government. There are 1200 local governments in Kerala, which includes 941 gram panchayats, 152 block panchayats, 14 district panchayats, 87 municipalities, and 6 municipal corporations.

A prominent feature of Kerala's decentralisation is the devolution of untied funds in a formula based, non-discretionary, and equitable manner. Untied funds are devolved to the local governments in three streams as per the recommendations of State Finance Commission:

1) General Purpose Fund for meeting the expenditure on traditional functions and establishment expenses;
2) Maintenance Fund for the maintenance of assets of local governments including those transferred as part of decentralisation; and
3) Development Fund (Plan allocation) for meeting the development expenditures.

In 2020-21, the State transferred 3.5 per cent of its Own Tax Revenue as a General Purpose Fund and 6 per cent of its Own Tax Revenue as a Maintenance Fund to local governments. Twenty five per cent of the State's Plan outlay was devolved as a Development Fund. Formula-based devolution has ensured that funds reach every corner of the State, and more so its backward areas. The transfer of resources has ensured that adequate funds reach all areas, thereby giving a boost to local area development and improving the lives of people. The surplus revenue that remains after meeting the establishment and non-development expenditure, and the surplus from General Purpose Fund, is used as a source of funding for projects under the Annual Plan.

Second Phase of People's Plan

Kerala has nearly two decades and a half of experience in the field of people's planning. There have been many studies and discussions in the State in this regard. In the light of these studies and discussions, some changes, aimed at revitalising the system of decentralised democratic governance, were initiated during the last four years.

Over the last four years, the scope and role of local governments have increased as never before. This change is reflected in the timely preparation of plans by local governments, the integration of plan and budget, timely implementation and better utilisation of funds, the formulation of innovative projects, increasing allocation of funds to the productive sector, preparation of district plans and planning with the district as focus, and efficient disaster preparedness in the wake of natural disasters.

New Initiatives and Major Policy Changes Introduced in the 13th Plan

Modification of Plan guidelines and timely preparation of local Plans

The first year of the 13th Plan witnessed some major changes in the guidelines for the formulation and implementation of local government Plans. An important objective of the new guidelines was to simplify the procedures so that delays could be avoided. On account of the cumbersome procedures that existed until then, Plan formulation and its approval took more time than the time left for implementation, forcing local governments to rush through the process of implementation during the terminal months of the financial year. It was also responsible for the bunching of payments during the month of March.

The introduction of new guidelines, which ensured simplified procedures and comparatively fewer planning phases, resulted in early submission of Plans. During the first year (2017-18), all local governments in the State could complete the process of formulation of their Annual Plans by June 15, 2017. This is an unprecedented achievement in the history of local-level planning in the State. Accordingly, the year also witnessed early beginning of the implementation process, thereby getting around 10 months' lead time for plan implementation.

Based on the experience of the first year of the 13th Five-Year Plan, the Plan guidelines as well as the subsidy guidelines have been modified for the remaining four years. Modification of the guidelines became necessary to incorporate the experience gathered from the first year and address issues raised by local governments. Modified guidelines were issued sufficiently early so as to enable the local governments to get the Annual Plan for 2018-19 approved well before the beginning of the financial year. Accordingly, 1147 local governments in the State could complete the process of formulation of Annual Plans for the year 2018-19 before April 1, 2018 leaving a full year for Plan implementation.

The process of formulation of the local Plans for 2019-20 began on October 2, 2018. The process was initiated early so as to finalise the Plan proposals well before the notification for the General Election to the 17th Lok Sabha. Most of the local governments (1181) submitted Plans before the notification was issued. Even in the year 2020-21, in the midst of Covid-19 pandemic, 818 local governments were able to submit their Plans by March 31. Of the remaining local governments, all but four submitted Plans by April 21. The experience of the last four years shows that local governments have now realised the importance of the timely preparation of Plans.

An early start in the year to Plan implementation resulted in higher expenditure. In the past, money could be spent in the last months of the financial year as Plans were approved only at the end of the year. Now that has changed and from the first month onwards, the plan expenditure is recorded. That is, Plan activity has become a year-round process (Figure 13.1).

Another important achievement of timely preparation of Plan is that the Annual Plan of the local governments could be integrated with the budget presented and passed in March. Until the beginning of the 13th Plan, the practice in local governments was to integrate the Annual Plan with the Budget in the middle of the financial year. By integrating it with the Budget in March itself, the relevance and sanctity of Budget has also increased.

Focus on urban issues

The 13th Five-Year Plan of the State places special emphasis on the issues arising due to rapid urbanisation in Kerala. It recognises the importance of developing appropriate strategies and programmes for coping with challenges and opportunities thrown up by the process of urban growth. Keeping this in view, the Government had in the 13th Plan, for the first time, set up a separate set of guidelines for Plan formulation in urban local governments.

Preparation of district Plans

Another notable initiative introduced in 2017-18 is the preparation of District Plans by District Planning Committees (DPCs). It is a constitutional mandate (Article 243 ZD) that the DPCs write District Plans that design an integrated approach for the development of the district. All the DPCs in Kerala could complete this task, following the detailed guidelines issued by the State Government and thereby ensure that the suggestions in the District Plans are incorporated in the Annual Plans of local governments. DPCs have been instructed to issue district specific guidelines every year based on the District Plans before the

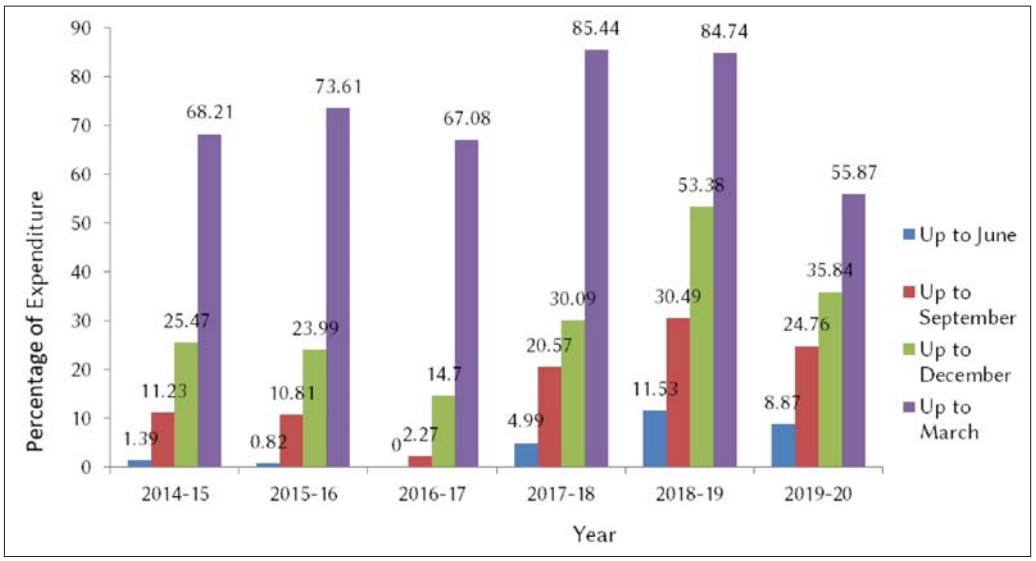

Figure 13.1 *Quarterly Plan expenditure figures of local governments, 2014-15 to 2019-20*

process of preparation local Plans starts. Preparation of District Plans is a major achievement in the history of decentralised planning in Kerala.

After fulfilling the constitutional mandate, the DPCs in the State undertook the task of converting some ideas on large scale projects that emerged in the District Plans into implementable projects that jointly be implemented by local governments and other agencies. Government introduced a scheme titled "Incentivising District Plans" for promoting such integrated projects in the District Plans.

Change in approval system: First Plan approval, then project appraisal

In the past, the Annual Plan was submitted to the DPC for its approval after the projects were scrutinised by the vetting officers concerned. The Annual Plan could only be submitted once the approval process for all projects had been completed. Since there was pressure to submit the Annual Plan, the vetting officers often faced a situation where it was not possible to address the shortcomings of the projects and proposals were approved in haste. To avoid this, it was decided to first submit the Annual Plan to the DPC and then conduct appraisal of projects. This change helped to avoid delays in the approval of Annual Plans and hasty project vetting. Vetting officers now get enough time to scrutinise the projects in detail and rectify the deficiencies. This has resulted in improving the quality of projects significantly.

More vetting officers and implementing officers

One factor that hindered the smooth implementation of projects, especially in construction projects, was the lack of facilities to scrutinise and approve projects in individual local governments. Normally, appraisal (vetting) of a project is done by an officer who is senior to the implementing officer of the project. In the past, only the senior-most officer among the officers transferred in a sector was allowed to be engaged as the implementing officer of projects in that sector. Because of this barrier, local governments were forced to send projects to other offices for vetting, which resulted in delays. For instance, construction projects of district panchayats and corporations had to be scrutinised in the offices of the superintendent engineer or chief engineer. This barrier was removed by allowing more implementing officers and vetting officers. The newly assigned implementing officers were also given treasury codes (DDO code) to withdraw money from the Treasury.

Appeal committee system restructured

A criticism that arose in the 12th Plan was that the district-level appeal committees for projects rejected by vetting officers were bureaucratic in their approach. The committee was reconstituted under the chairmanship of the Chairperson, DPC, to address this issue.

Productive sector outlay enhanced

From the beginning of the People's Plan, it was stipulated that a fixed percentage of normal share under General Sector Fund should be set apart for productive sector. However, this was done away with in the beginning of 12th Five-Year Plan. The experience in the first four years of the 12th Plan was reviewed by the present Government when it assumed office in May 2016 and a decision was taken to restore the mandatory minimum allocation with 20 per cent under productive sector, for the Annual Plan 2016-17. This was again revised in the beginning of the 13th Plan and the mandatory minimum ceiling in the productive sector was enhanced to 30 per cent in the case of gram panchayats, block panchayats, and district panchayats, whereas in the case of urban local governments it was fixed at 10 per cent. This facilitated or encouraged the local governments in allocating and taking up more projects in the productive sector who were until then concentrating on infrastructure sector. This signifies the emphasis given to enhance production as outlined in the Approach Paper to the 13th Plan (Table 13.1).

Focus on special groups

Till the 12th Plan, it was stipulated that local governments should set aside five per cent of the Development Fund for the development of children, the elderly, and persons with physical and mental disabilities. In order to give higher priority to the development of special needs groups it was decided in the beginning of the 13th Plan to increase the allocation to 10 per cent and to include transgender persons under special groups. Now, local governments have to earmark 5 per cent for projects for the development of children, persons with physical and mental disabilities, and transgender persons, and another 5 per cent for the welfare of the elderly and for palliative care projects.

Broadening the scope of subsidies

A notable change in the 13th Plan is that the subsidy norms have been comprehensively revised. Scope of subsidies that can be disbursed through local government Plans has been broadened by including more items. Further, subsidy rates have been increased and unified with the department rates. Local governments are permitted to take up those schemes'

Table 13.1 *Share of productive sector expenditure in the total expenditure under normal share of General Sector Funds of local governments, 2015-16 to 2019-20* in Rs crore and per cent

Year	Productive sector expenditure under normal share of General Sector Funds	Total Expenditure in normal share of General Sector Funds	Share of productive sector expenditure in normal share under General Sector expenditure (in per cent)
2015-16	242.43	2400.98	10.10
2016-17	373.42	2040.85	18.30
2017-18	660.46	2750.19	24.02
2018-19	674.26	3330.11	20.25
2019-20	454.92	2445.03	18.61

Source: Information Kerala Mission

which are not in the subsidy guidelines but exist in departments, in accordance with the Department guidelines. Besides, income ceiling of beneficiaries has been enhanced substantially. In the agricultural sector benefits can be given to marginal and small farmers. For paddy cultivation benefits can be given to farmers who have more than five acres of land also. For animal husbandry, dairy, and fisheries sectors the income limit has been raised to Rs 5 lakh, and the income limit for housing has been raised to Rs 3 lakh. For other schemes income ceiling has been enhanced to Rs 2 lakh for General category and Rs 3 lakh for Scheduled Castes category. Income limit for persons of Scheduled Tribes has been waived.

Special window for innovative programmes

Another feature of 13th Plan was the introduction of "Special Window for Innovative Programmes" to design schemes that are innovative and relevant but cannot be taken up by the local governments as per the subsidy guidelines. One of the key objectives of decentralised planning is to analyse the specifics of local development problems and formulate appropriate solutions based on the resource potential of that area. However, many of the projects thus emerged may not be implemented in accordance with the existing subsidy norms. A District Level Expert Committee chaired by the district collector was constituted to examine and approve such projects. This committee is to examine the innovative projects of the local governments at all-levels and decide on approval.

More investment through tender savings

There were widespread complaints in the construction works being carried out by the Beneficiary Committees. In order to address this issue and to ensure transparency in the system, in the beginning of 13th Plan, competitive tendering was introduced in the execution of public works in the place of Beneficiary Committees. The financial ceiling of such projects was reduced from Rs 5 lakh to Rs 50,000. However, this does not apply to approved agencies such as the Parent Teachers' Associations. Permission was granted to entrust works up to Rs 25 lakhs to such committees.

As a result of introducing competitive tendering, there has been substantial increase in tender savings to the tune of Rs 657.45 crore in the first three years of the 13th Plan, which helped the local governments to take up new projects (Table 13.2).

Table 13.2 *Tender savings out of Plan and Maintenance Funds of various tiers of local governments from 2017-18 to 2019-20* in Rs crore

Year	Tender savings
2017-18	239.60
2018-19	212.23
2019-20	205.62
Total	657.45

Source: LSGD Engineering Wing.

Initiatives for enhancing people's participation and providing technical support

Enhanced public participation in local plans is one of the main objectives of the 13th Plan. With this objective some reforms were initiated. Important among them are the decisions to increase the participation of experts and use the services of volunteers. Planning committees were formed in all the local governments and the participation of volunteers and experts has been ensured in these committees. It was also suggested to use the services of a volunteer expert to assist the local governments. Permission was also given to local governments to give an honorarium of Rs 5000 per month to the resource persons so appointed. Local governments were given complete freedom in selecting resource persons.

In order to make the planning process more participatory, a "Gramasabha" portal was developed

to receive the views of public, including expatriate Keralites. Another initiative introduced for enhancing participation and for improving the knowledge content of the Plans prepared by the local governments is the formation of District Resource Centres (DRC). In September 2019, the State Government directed all DPCs to form DRCs consisting of professionals from development, research, and technical institutes as well as retired experts from Government departments. The main functions of DRC are:

a) to conduct studies in areas and topics required by the DPC as well as the local governments, b) give technical advice so as to improve the knowledge content of the local government Plans, c) to prepare detailed project report (DPR) on projects as required by the local governments, d) to scrutinise the Plans prepared by local governments and point out the weaknesses and suggest measures to improve them, e) study the model projects and bring them to the attention of the State, and f) revision of the District Plan every year.

It is expected this will help in improving the quality of Plans of the local governments and in turn give emphasis to areas that require core attention.

Enhanced outlay given to local governments

Plan outlay for the local governments has been gradually increased. The Government has implemented the decision in the Action Taken Report on the recommendations of the 5th State Finance Commission that the Plan outlay should be enhanced by 0.50 per cent every year from 2017-18. The Government decision to increase gradually the Maintenance Fund allocation from 5.5 per cent to 6 per cent of the State's Own Tax Revenue has also been implemented. In addition 3.5 per cent of State's Own Tax Revenue was given as General Purpose Fund. Details on devolution of untied funds are shown Table 13.3 and Table 13.4.

Other Initiatives Introduced in 13th Plan

Making audit of accounts up to date

The audit arrears of local governments for the years up to 2015-16 had been cleared through a special drive initiated by the State Audit Department in 2016-17 and now audit of accounts is up to date. This was a mandatory condition to seek performance grant

Table 13.3 *Plan outlay (Development Fund) to local governments* in Rs crore

Year	State Plan outlay	Allocation to local governments					Percentage to State Plan outlay
		General sector		Scheduled Caste Sub-Plan	Tribal Sub-Plan	Total	
		Normal share	Central Finance Commission award				
2016-17	24,000	2995.04	1310.06	1038.90	156.00	5500.00	22.92
2017-18	26,500	3371.57	1507.88	1172.05	176.00	6227.50	23.50
2018-19	29,150	3777.58	1739.56	1289.26	193.60	7000.00	24.01
2019-20	30,610	3604.62	2338.55	1353.84	202.99	7500.00	24.50
2020-21	27,610	3534.60	1964.15	1221.15	183.10	7158.00*	25.92

Note: *Includes Rs 255 crore for the World Bank aided project of Kerala Solid Waste Management Project (KSWMP) in municipalities.

Source: Budget Documents, various years.

Table 13.4 *Devolution of Maintenance Fund and General Purpose Fund to local governments* in Rs crore

Year	Maintenance Fund			General Purpose Fund
	Non-Road	Road	Total	
2016-17	645.93	1291.86	1937.79	1233.14
2017-18	655.03	1528.41	2183.44	1364.66
2018-19	703.16	1640.72	2343.88	1426.71
2019-20	822.34	1918.78	2741.12	1626.09
2020-21	883.15	2060.68	2943.83	1717.23

Source: Budget documents, various years.

suggested by 13th Finance Commission. As per the mandate of the 13th Finance Commission, for receiving Performance Grant the local governments will have to submit audited accounts that relate to year not earlier than two years preceding the year in which the local governments seek to claim the performance grant.

Preparation of disaster management plans

Natural calamities such as floods, coastal erosion, drought, and landslides pose serious challenges to the State and its economy. To mitigate the impact of such disasters and to improve the disaster preparedness, for the first time in the country, gram panchayats and urban local governments were directed to prepare local disaster management Plans. The Disaster Management Plan of the local government has the following components:

1) Local government profile
2) Hazard and vulnerability profile
3) Capacity and resources of the local government
4) Response Plan
5) Preparedness, mitigation, and community resilience plan.

The local governments have to include projects of disaster management and mitigation in their Annual Plans considering the susceptibility of the respective local governments to natural disasters as well as their existing capacity to tackle them. All gram panchayats, municipalities, and corporations have prepared Disaster Management Plans in 2019-20.

Decentralisation round survey

Even though two decades have passed since the decentralisation programme was launched in Kerala, the State has not succeeded in developing a data collection and dissemination system capable of supporting the local-level planning in Kerala. Information Kerala Mission collects data on Plan schemes while the local governments themselves collects data on development sectors and uses it for local-level planning. However, there is a huge data gap with respect to the achievements as well as effectiveness of local Plans.

Considering that the most appropriate time for initiating a round of data collection is when the period of the incumbent elected representatives ends and new representatives assume office, the Government has decided to conduct a round of data collection called the "Decentralisation Round" survey, where data regarding the achievements of local governments with respect to subjects dealt by them will be collected based on a questionnaire. This data collection will not only help in assessing the functioning of the incumbent local governments but also help the elected representatives assuming office to plan future programmes and priorities. It will help in identifying model projects, learn from the functioning of exemplary local governments, learn from past experiences, and acquire new knowledge. The data collection and compilation responsibilities will be handed over to the Directorate of Economics and Statistics. It is planned to conduct this round every five years. This will be a rich source of information for all the researchers and planners in future.

Good governance initiatives

Some of the reforms initiated aimed at good governance are given below.

Common service for Local Self Government Department. The Integrated Local Self Government Department has been formed, unifying five departments of Local Self Government, with a view to strengthen local government system and better service delivery. It is expected that the functioning of various local governments now comes under different departments can be better coordinated. The existing Departments of Panchayats, Urban Affairs, Rural Development, Town Planning, and Engineering will come under the new umbrella.

Integrated Local Governance Management System. Integrated Local Governance Management System (ILGMS), a comprehensive software developed by the Information Kerala Mission was deployed across 150 gram panchayats in October 2020 to ensure greater transparency, accountability, accuracy, punctuality and technical supervision in providing various services to the citizens. It is a vision for typical governance management with a suite of satellite software applications integrated to a stem software application (workflow platform).

The project is being piloted in Chemmaruthi Gram Panchayat in Thiruvananthapuram District. At present, only applications for marriage registration and name registration in the case of birth certificate are open for e-filing through the Sevana software intended for birth, death, and marriage registrations. Documents need to be produced even if they are e-filed. However, with the introduction of the new software, all services such as birth, death, marriage registration, name addition and correction can be applied for without having to go directly to local governments. The services will be available online in a timely manner.

Local governments in Kerala and ISO standards. The approach paper for the 13th Plan states that all local governments in Kerala would have to meet the ISO

standards. This has now almost been fully accomplished and local governments in Kerala are in the forefront of delivering quality services to the people. Of the 941 gram panchayats in Kerala, 939 gram panchayats, and all block panchayats have achieved international quality certification ISO 9001:2015. Remaining gram panchayats, municipal corporations, municipalities, and district panchayats are expected to adopt the ISO for the current fiscal year.

ISO 9001:2015 is an international certification for quality management systems. local governments have strived to achieve this international recognition because they have a clear understanding that only with a high-quality system can they provide timely services to the people. The ISO certification is given only if the system is designed such that people receive uninterrupted services and the local bodies provide people-friendly and accurate front-office facilities, a computerised record keeping system that can create records in a very short time, and an orderly office system. The work done by local governments to achieve international certification is a major step towards the goal of providing a quality service to the people and being a people-friendly organisation.

Floods and Local Governments

Local governments were at the forefront Governmental efforts in the aftermath of floods of 2018 and 2019, particularly in respect of rehabilitating people and coordinating relief efforts. All local government staff from gram panchayat to municipal corporation-level were instructed to work in rescue and relief operations and, most importantly, to start using their funds as they deemed fit. This helped the teams for disaster mitigation carry out their mission effectively.

The floods of 2018 were worse than the floods of 2019. The local governments were permitted in August 2018 to reorient and rearrange their 2018-19 Plan so as to address the critical problems that required immediate attention. Relaxation in sectoral norms was allowed. The provision given for liberal rearrangement of the local Plan helped the local governments to mobilise enough money for repairing and renovating public assets such as roads, bridges, drinking water schemes, and public buildings.

In the backdrop of the natural disasters, especially the devastating floods, local governments were instructed to form a new working group for "Biodiversity Management, Climate Change, Environmental Protection and Disaster Management." The Working Group, to be chaired by heads of the respective local government, will have experts in the aforementioned fields as members. The Group is to include members from the Biodiversity Management Committee, Disaster Management Committee, and members of the public, including volunteers who were part of rescue and relief operations in floods. The respective local government secretary is the convenor of the Group.

Further, local governments were directed to draw lessons from the floods and pay particular attention to spatial planning at the micro-level to mitigate the impact of such disasters in future. The local Spatial Plan will be on the basis of the District Plan already drawn. The idea is to come up with comprehensive plans for spatial rearrangement or development which is essential for sustainable development in general and rehabilitation of people who live in ecologically highly sensitive areas prone to flooding and landslides. Such rethinking in the spatiality of development at the local-level will have to be in agreement with larger master plans which the State Government would be formulating for different macro-regions of the State such as Western Ghats, Kuttanad, and Periyar river system.

The Government also directed all local governments to form four Emergency Response Teams (ERTs) in each local government to lead the rescue and relief operations and give first aid in the wake of a disaster. They also had to identify community centres that could be converted into relief camps and ensure the maintenance of such centres, and ensure that they were equipped with toilets, lights, and other facilities. Considering the intensity, frequency, and uncertainty of natural disasters ravaging the State, the Disaster Management Plan is a novel and necessary measure taken by the Government, and is worth emulating all over the country.

In the Annual Plan 2019-20, Rs 250 crore was allocated as assistance to the local governments seriously affected by the floods of 2018. A committee was constituted to select the local governments eligible for assistance and decide on the criteria to distribute this fund among the selected local governments. As per the recommendation of the Committee, the Government decided to keep 15 per cent of the fund, that is, Rs 37.5 crore, for distributing among the local governments affected by landslips and landslides and the remaining fund of Rs 212.50 crore be distributed among the selected flood-affected local governments. Accordingly, 240 gram panchayats, 33 municipalities, and 3 Corporations received Rs 169.04 crore, Rs 35.85 crore and Rs 7.61 crore, respectively as special

incentives. Subsequently the Government also issued guidelines for the utilisation of this funds wherein it was stipulated that the fund should be primarily used for livelihood generation projects benefitting mainly those who have lost their livelihood due to the floods of 2018. It also permitted that the fund can be used for restoration of public assets lost in the floods and also for repair and maintenance of rescue shelters in the wake of floods.

Role Played by the Local Governments in Tackling Covid-19

Among the Indian States, Kerala was the first State affected by Covid-19. The State Government's prompt response to the pandemic in rallying local governments along with the Health Department has been noticed globally. Social investments in rural healthcare, universal education, decentralisation of powers and resources, and women empowerment are cited widely as the reasons that helped Kerala to fight against the coronavirus.

Reorientation of Local Government Plans (2020-21) in Accordance with the Award of 15th Central Finance Commission

The 15th Central Finance Commission has made significant departures from the previous Central Finance Commissions in its recommendations particularly in urban areas. The salient features of 15th Finance Commission Award to local governments and its implications in Kerala are summarised below.

As per the accepted recommendations of the 15th Finance Commission, the total grants for local governments to 28 States for 2020-21 has been fixed at Rs 90,000 crore, of which Rs 60,750 crore is recommended for rural local governments (67.5 per cent) and Rs 29,250 crore for urban local governments (32.5 per cent). This allocation is 4.31 per cent of the divisible pool estimated by the commission for 2020-21 against 3.54 per cent (Rs 87,352 crore) of the divisible pool for 2019-20. Out of the total amount, Rs 2412 crore (2.68 per cent) has been recommended by the Commission to the State during the year 2020-21.

In the case of rural local governments the Commission has recommended to give grants to all tiers of panchayats including intermediate and district panchayats. Where as in the case of urban local governments the Commission recommended to provide grants to cities under two categories for the first time: (a) fifty Million-Plus urban agglomerations/cities, and (b) all other cities and towns with less than one million population.

Rural local governments (RLGs)

The Commission recommended giving grants to rural local governments under two streams, namely (i) Basic Grants and (ii) Tied Grants. 50 per cent of the total grant will be Basic Grants and 50 per cent will be the Tied Grants. Total allocation to Kerala is Rs 1628 crore. As per the recommendation, the grants should be distributed in conformity with the following bands of 70-85 per cent for village panchayats, 10-25 per cent for block panchayats and 5-15 per cent for district panchayats. Kerala decided to apportion the funds among the village, block, and district panchayats in the ratio of 75:12.5:12.5. The inter se distribution among the rural local governments has been done, as suggested by the 15th Finance Commission, on the basis of the accepted recommendations of the latest State Finance Commission (that is, 5th State Finance Commission)

The Basic Grants are untied and can be used by rural local governments for location-specific felt needs, except for salary or other establishment expenditure. The Tied Grants are to be used for the basic services of (a) sanitation and maintenance of open-defecation free (ODF) status, and (b) supply of drinking water, rain water harvesting, and water recycling. The local governments shall, as far as possible, earmark half of these tied grants each to these two critical services. However, if any local government has fully saturated the needs of one category, it can utilise the funds for the other category.

Urban local governments (ULGs)

As described earlier the Commission recommended to provide grants to urban local governments under two categories: (a) fifty Million-Plus urban agglomerations/ cities (including seven Urban Agglomerations (UA) in Kerala), and (b) all other cities and towns with less than one million population. Of the total grant (Rs 29,250 crore) allocated to urban local governments across India, Rs 9229 crore is for the Million-Plus cities and Rs 20,021 crore for the others.

Category 1: Million-plus urban agglomerations/ cities. There are 50 million plus Urban Agglomerations (UA) in the Country (as per Census 2011). A portion of funds under this category (Rs 4400 crore out of Rs 9229 crore) has been recommended for improving air quality. However, no fund is set apart for Kerala under this stream - as ambient air quality is not a problem in the seven, Million-plus Urban agglomerations identified in Kerala (The seven UAs in Kerala are Thiruvananthapuram, Kollam, Kochi, Thrissur, Kozhikode, Kannur, and Malappuram).

Box 13.1
Local Governments and the Covid-19 Pandemic

Local governments played a key role in containing as well as tackling the Covid-19 pandemic, some of which are described below (status given is as of June 30, 2020).

1. Establishing and managing community kitchens during lock down: local governments in association with Kudumbashree started 1374 community kitchens to ensure food for needy especially migrant workers, job losers, aged, palliative care patients, stranded persons, peoples who admitted in quarantine destitute, etc. Over 95 lakh food parcels have been distributed from here. Of this, 82 lakh parcels were distributed free of cost.
2. Cleaning and disinfection activities: As part of cleaning activities, 76,067 public places and offices were disinfected. For this, 86,470 person-days were used. 6.91 lakh person-days were used as part of pre-monsoon cleaning operations.
3 Organising and running "Break the Chain" social distance campaign and awareness programmes: Awareness programmes for the elderly, the disabled and the sick have reached 24 lakh families. Special awareness programmes for families belonging to Scheduled Castes and Scheduled Tribes were extended to 9.49 lakh families. A total of 17,122 people participated in the awareness programmes conducted for the inmates staying in various care homes in the State.
4 Providing accommodation, food, and other essential support to migrant ("guest') workers: Around 3,032 camps were organised for guest workers, and 46,657 inmates were present here at various times. 173 camps were set up for the poor, where 4,549 people were rehabilitated at various times.
5 Managing the coordination of home quarantine, counselling, and isolation.
6 Setting up institutional quarantine to manage those, who returned to the State from other States and abroad.
7 Setting up and managing Covid First Line Treatment Centres (CFLTC): The Government has decided to set up CFLTCs in all local governments in view of the increasing number of Covid positive patients in the State. So far 1437 CFLTCs have been identified out of which 1,20,832 beds have been set up.
8 Engaging of personnel in health institutions managed by local governments: During this period, 463 doctors, 290 nurses, 308 paramedical staff, 388 junior health inspectors, 1779 cleaners and 793 other personnel were posted in various health institutions managed by the local governments.
9 Purchase of medicines and other equipment to the hospitals run by the local governments.
10 Distribution of free medicines: During this period, medicines were delivered to 5.83 lakh people at their homes.
11 Implementing local economic plans to help the people who lost jobs and plans for increasing food production and self-sufficiency in the field of agriculture.
12. Providing arrangement for local dissemination of online schooling internet connectivity.

The balance fund (Rs 4829 crore) has been recommended for improving conservation of supply and management of water and efficient solid waste management, which are critical for planned urbanisation. For water and solid waste management, the Ministry of Housing and Urban Affairs (MoHUA), as the nodal ministry, shall, in consultation with the State Governments, develop city-wise and year-wise targets for 2020–25 and recommend disbursal of grants to such cities. The targets will be improvements over the base year to provide incentives to make up for any slippage in performance during the years succeeding 2020-21. Allocation to Kerala under this stream is Rs 339 crore as given in Table 13.5.

Category 2: Urban local governments other than million-plus cities. For urban local governments other than in Million-Plus cities across India, the Commission recommended an allocation of Rs 20,021 crore consisting of two equal parts – 50 per cent Basic Grants and 50 per cent Tied Grants. The Basic Grants are untied and can be used by urban local governments for location-specific felt needs, except for salary or other establishment expenditure. However, Tied Grants are to be spent for (a) drinking water (including rainwater harvesting and recycling), and (b) solid waste management. These urban local governments shall

Table 13.5 *Allocation to Million-Plus Urban Agglomerations in Kerala*

Urban Agglomeration	Population (in lakh)	Allocation in Crore (based on population)
Thiruvananthapuram	16.8	47
Kollam	11.1	31
Kochi	21.2	59
Thrissur	18.6	52
Kozhikode	20.3	57
Kannur	16.4	46
Malappuram	17.0	47
Total		339

earmark one half of the Tied Grants each of the above two critical services. However, if any local government has fully saturated the needs of one category, it can utilise the funds for the other category.

Allocation to Kerala under Category 2 is Rs 445 crore. The inter se distribution has been done, as suggested by the 15th Finance Commission, on the basis of the accepted recommendations of the latest State Finance Commission (that is, 5th State Finance Commission). The lone Cantonment Board in Kerala such as Kannur Cantonment Board was provided with funds from the allocation under Category 2.

Reorientation of Local Government Plans (2020-21)

At the time of preparation of State Budget for the year 2020-21, the details of 15th Central Finance Commission award to local governments were not known. Therefore the local governments were provided with a tentative allocation in the budget and directed to prepare Annual Plans well before the start of the financial year on the basis of this tentative allocation and as per the 14th Finance Commission guidelines.

After the 15th Finance Commission Report came in June 2020, the Development Fund allocation to local governments was modified incorporating the 15th Finance Commission allocation. Subsequently local governments were directed to reorient their Plan in accordance with the revised allocation and as per the 15th Finance Commission guidelines.

The guidelines issued by the Kerala Government for the utilisation of 15th Finance Commission award stipulate preparation of a CFC Sub-Plan by the local governments. It was quite a challenge to prepare Plans for an UA area instead of the usual practice of preparing separate Plan for each local government that comes under a UA. For the purpose of preparation of Plan for the UA area, Kerala Government has asked the District Planning Committees concerned to constitute a Joint Planning Committee (JPC) with the elected head of the principal local government as the Chairperson of JPC and the Chairpersons of other local governments within the UA area and Secretaries of all local governments concerned being the members of the JPC. The guidelines issued by the Government stipulate mandatory spending of a portion of the allocation in areas other than the principal local government of UA.

Undoubtedly, the 15th Finance Commission has enhanced allocations for local governments across India to 4.31 per cent of the divisible pool, as against 3.54 per cent recommended by the 14th Finance Commission for 2019-20. As a result of this, allocation to Kerala has increased as compared to 2019-20. However, flexibility in spending is reduced to a considerable extent. In a major departure from the 14th Finance Commission that gave bulk of the funds as "Basic Grant" and allowed all expenses related to basic civic services including maintenance of community assets and roads in the case of both rural and urban local governments under Basic grants, the 15th Finance Commission has made all the grants to the million-plus cities as conditional (tied grants), and 50 per cent of the grants to other cities and rural local governments as conditional (tied grants). Further, only two critical services, water and sanitation, are allowed under tied grants. All these goes against the spirit of decentralisation and empowering local governments.

Way Forward

Local governments in Kerala have become model institutions of governance. They have risen to the challenges they have faced. Functional and financial autonomy has ensured effective decentralisation of governance.

Local governments have made effective use of the positive features of decentralisation to make progress in various spheres of development. The experience of the last 24 years shows that many local governments have created successful models in various fields.

The main objective of local-level planning in the future should be to address regional inequalities, improve the living standards of the poor, especially marginalised sections such as people of the Scheduled Castes, Scheduled Tribes, and fishworkers and create employment opportunities. It is also necessary to increase production and productivity, particularly in the field of agriculture and allied sectors and industries. Small scale industries need to be encouraged. The urban local governments should be empowered to address the challenges and problems that arise because of fast urbanisation.

There needs to be a positive change in the approach and outlook of the Women Component Plan in accordance with the possibilities and needs of each region. Special attention is also needed for the development of children, the elderly, and persons with disabilities. The quality of public services should also be improved.

Efforts have been taken to improve public participation in local-level planning; special attention needs to be paid to these efforts.

Efforts taken in the 13th Plan to strengthen the District Planning Committees need to be continued. Local-level spatial plans should be prepared and a system should be devised to provide reliable local-level statistics required for planning. The district plan should be constantly updated and a system of formulating local plans in line with district plans should be strengthened.

Urban Development Initiatives

Kerala's development is not characterised by great disparities between urban and rural areas. The absence of great disparities is because public policy is so targeted; public policy has been helped in this regard by spatial configuration of the urban and the rural in Kerala. This particular spatial geography of "rural-urban continuum" is of special significance in Kerala's development.

The spatial pattern of the settlement system characterised by dispersed but interconnected, linear but densely agglomerated stretches, differentiates Kerala from the rest of the country. There is less distinction between an urban area and a rural area here than anywhere else in the country. The urbanisation of dispersed settlements, characterised by the conversion of agricultural land, ribbon development along major roads, and the concentration of commercial built-up spaces at road junctions are some of the characteristics of urban transition in Kerala.

Urbanisation in Kerala

In Kerala, the urban population was 1,59,34,926 persons or 47.7 per cent of the total population of the State according to Census of 2011. Kerala is the third most urbanised State in India and also one of the fastest urbanising State in the country. Between 2001 and 2011, there was a 21.74 per cent increase in urban population in the State. The district in which the proportion of urban population to total population is highest is Ernakulum (68 per cent). The share of urban population is lowest in Wayanad (3.9 per cent).

The urban sector of Kerala consists of six municipal corporations, 87 municipalities, 461 census towns and 19 urban agglomerations. The highest number of towns is in Thrissur district (135), which accounts for more than 25 per cent of total towns in the State. Around 60 per cent of the towns are located in Thrissur, Kannur, Ernakulam and Kozhikode districts. Urban population has crossed one million in eight districts. Of these, Ernakulam has the highest urban population, closely followed by Thrissur, Kozhikode, and Malappuram districts. The total urban population of these four districts together constitutes more than 50 per cent of urban population in the State.

The urban population growth index in 2001-2011 increased in all districts other than Idukki. Malappuram district shows a significant increase in the urban population growth index followed by Kollam, Thrissur, and Kasaragod. Wayanad has the lowest index value.

Spatial Planning in the State

The Town and Country Planning Department under the Local Self Government Department is entrusted with the task of preparing Master Plans and Integrated District Development Plans, with special emphasis on spatial planning, to promote orderly development in the State. The Department focuses on various aspects of human settlement planning and development, such as housing, environment, transportation, mobility plan, slum improvement, and infrastructure projects. Presently, master plans for various selected towns and municipalities are under preparation. In Phase I, 32 municipalities/towns were selected for preparation of master plans. Of them, ten master plans have been published, final draft prepared for nine towns, and the remaining is being prepared. In Phase II, 31 municipalities/towns were selected for the preparation of master plans, of which nine master plans have been published, final draft prepared for eight towns, and the remaining is being prepared. In Phase III, 24 towns were selected; final draft prepared for five towns and the remaining in this group are under preparation. The Integrated District Development Plan for the district as a whole – a multisectoral, multilevel and a long-term Plan – was first prepared for Kollam district on a pilot basis. The districts of Alappuzha, Thrissur, Idukki, Palakkad, Kannur, Kozhikode, and Wayanad were selected in the subsequent phase and preparation of Plans in these districts is under way.

Major Urban Development Initiatives in the 13th Plan

Urban housing

Pradhan Mantri Awas Yojana-Urban (PMAY-U) is a centrally-sponsored scheme jointly implemented by

the State Government and urban local governments to address the housing requirement of urban poor including slum dwellers. The aim of the scheme is to provide "Housing for All" by 2022. There are four components under PMAY-Urban scheme. Under the major component, beneficiary-led construction of new houses, 493 detailed project reports (DPRs) of 93 urban local governments including three development authorities namely, Greater Cochin Development Authority (GCDA), Goshree Islands Development Authority (GIDA) and Thiruvananthapuram Development Authority (TRIDA) were approved by the Ministry of Housing and Urban Affairs (MoHUA), Government of India. Based on the DPRs, construction of 1,02,229 dwelling units was approved, of which 84,550 had started and 54,510 are completed as on March 23, 2021. The details of PMAY-U housing scheme is shown in Table 13.6.

Under the component, affordable housing in partnership with public and private sectors, six detailed project reports consisting of 774 units have also been approved, of which 352 had started and 240 are completed. Credit Linked Subsidy (CLS) component aims at expanding institutional credit flow for housing needs of urban poor. CLS is provided on home loans taken by eligible urban poor for acquisition or construction of houses. The identified beneficiaries under CLS is 25,656, of this subsidy released to 15,608 beneficiaries as on March 23, 2021

PMAY-U, being a centrally sponsored scheme, the unit assistance for house construction from Government of India is Rs 1.5 lakh. In the light of the prevailing high wage rates and cost of building materials in the State, this unit cost is too little to undertake the task. The State Government realised that this amount would not be sufficient to give momentum to housing scheme in the State. The Government adopted a comprehensive approach for addressing the housing issues and initiated the Livelihood, Inclusion and Financial Empowerment (LIFE) Mission as a flagship programme for providing houses to the houseless and landless in the State. PMAY-U was converged with the LIFE Mission and is implemented as PMAY (U)-LIFE**.** The assistance under LIFE Mission is Rs 4.00 lakh for beneficiaries. For Scheduled Tribes residing in remote hamlets, Rs 6.00 lakh is provided as assistance.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

Atal Mission for Rejuvenation and Urban Transformation (AMRUT) was started by Government of India in June 2015. The period of the project was five years from 2015-16 to 2019-20. The scheme addressed the basic challenges of urban physical and institutional infrastructure development covering components of water supply and sewerage, septage, storm water drainage, urban transport, green spaces and parks. Nine towns were selected from the State for funding under AMRUT. This included six municipal corporations and Alappuzha, Palakkad and Guruvayoor municipalities. Under the scheme, administrative sanction was accorded for 1,008 projects amounting to Rs 2277.23 crore, of which, 638 works have been completed and 339 projects are under various stages of execution. Kerala was ranked 7th in reform implementation in 2019-20 for its performance over four years of the programme and received Rs 59.52 crore from Government of India for reform accomplishments in the scheme. Moreover, credit rating was completed in all the nine mission cities. Under AMRUT, water supply project covers almost 70 per cent of the total project cost and thereby 24*7 water supply have been ensured in mission cities. The progress of work of the mission is shown in Table 13.7.

Smart Cities Mission

This is a major infrastructure development programme started in 2015 by Government of India to promote cities that provide core infrastructure and a decent

Table 13.6 *Physical achievements of Pradhan Mantri Awaas Yojana-Urban housing scheme, Kerala, 2016-17 to 2020-21* in number

Year	Units approved	Units started	Units completed
2016-17	18,845	3517	15
2017-18	42,791	20,460	2475
2018-19	26,947	31,740	13,250
2019-20	3181	19,945	32,705
2020-21	10,465	8888	17219
Total	1,02,229	84,550	65,664

Source: Kudumbashree, Government of Kerala

Table 13.7 *Progress of AMRUT project in Kerala* in number

Urban local governments	Total projects	AS accorded	TS issued	Tendered	Work awarded	Work started	Work completed
Thiruvananthapuram	270	270	270	270	263	261	200
Kollam	60	60	60	60	56	54	30
Alappuzha	195	195	192	192	184	184	123
Kochi	98	98	98	98	95	94	66
Thrissur	110	110	109	109	108	102	70
Palakkad	153	153	153	152	151	144	82
Guruvayur	34	34	33	33	33	29	10
Kozhikode	50	50	50	50	50	50	35
Kannur	38	38	38	38	37	37	22
Grand Total	1008	1008	1003	1002	977	955	638

Note: AS is Administrative Sanction and TS is Technical Sanction
Source: State Mission Management Unit (SMMU), Government of Kerala

quality of life to its citizens, a clean and sustainable environment, and adopt smart solutions for infrastructure development. Kochi was selected in the first phase and Thiruvananthapuram in the third phase of selection of cities. The total estimated project cost of the Smart City Kochi is Rs 2076.00 crore and Thiruvananthapuram is Rs1538.20 crore.

The Smart City project of Kochi aims at a planned and integrated development of Fort Kochi-Mattancherry area by improving the civic infrastructure. Under the scheme, 43 projects are envisaged, of this, 7 projects have completed, 28 projects are under implementation, 2 projects are in tendering stage, 4 projects to be tendered and two projects are under DPR preparation. Integrated command control and communication centre, smart roads in Ernakulam and West Kochi, implementation of smart LED lighting, construction of new block at Fort Kochi Taluk hospital, Mattanchery Women and Children hospital, cancer block for General Hospital, roof top solar project, Intelligent Traffic Management system, and distribution of waste bins are some of the initiated projects as on September 2020. The system of "Smartcard" was started in 2017-18. Implementation of Integrated Traffic Management System (ITMS) in Kochi worth Rs 26.90 crore was inaugurated on October 19, 2020.

The Smart City project of Thiruvananthapuram envisages 43 projects, of this, 9 projects have completed, 30 projects are under implementation, 3 projects to be tendered and 1 project is under DPR preparation. Under Smart city Thiruvananthapuram, renovation and reconstruction of public toilets, installation of drinking water kiosks at 25 locations, construction of smart bus shelters, redevelopment of Palayam market, construction of multi-level car parking at Palayam and Thampanoor, rain water harvesting, development of integrated command and control centre, integrated social housing complex project at Rajaji Nagar, improvement of public health centre at Rajaji Nagar, rehabilitation block for TRIDA, construction of open air theatre and park at Putharikandam, redevelopment of Ponnara Sreedhar park and children's park at Kerala Water Authority, smart roads, construction of interactive information kiosks are some of the projects that are in the final stages of implementation as on September 2020.

Sanitation

Suchitwa Mission is the nodal agency for evolving implementation strategy and providing technical support to the State Government and local governments in developing solid and liquid waste management projects and policies. As regards rural areas, the State is Open Defecation Free (ODF) from November 1, 2016 onwards and is focusing on ODF Sustainability and "ODF Plus" activities. In urban areas, construction of Individual Household Latrines (IHHLs) target has been achieved by constructing 29,578 IHHLs. 92 urban local governments except Cochin Corporation in the State have been declared as Open Defecation Free (ODF) by Government of India.

As stated, only one urban local government has not been declared ODF, and that is the municipal

corporation of Cochin, where ODF criteria has been fulfilled for the entire area except Post and Telegraph colony in Gandhi Nagar ward. The 87 families residing in the colony have toilets but there is no plant for treating toilet waste scientifically. Hence, the State Government decided to rehabilitate the families under the LIFE Mission.

However in the floods of 2018, 10,532 toilets in the State were damaged. The Government is taking steps to repair damaged toilets and replace totally damaged with new ones and of this 413 IHHLs are completed as on March 2021. District-wise details of Open Defecation Free (ODF) municipalities is shown in Table 13.8.

Solid and Liquid Waste Management

The 13th Plan working group report on urban issues suggested introduction of decentralised solutions for solid waste, including home/community-level composting and promoting recycling industries. The Government has taken a three-pronged approach to waste management in the State (i) source-level waste reduction and treatment of biodegradable waste at the source itself (ii) upgradation of existing common waste management facilities of local government institutions using well-known technology such as composting and bio-methanation and (iii) establishment of community-level waste management systems for handling non-biodegradable waste.

The local governments in the State formed a workforce, namely, Haritha Karma Sena for providing assistance to the households for composting of wet-waste at source and for collection of all dry discards for recycling. Suchitwa Mission extends financial and technical support to local governments for establishing Resource Recovery Facility (RRF) centres and Material Collection Facility (MCF) centres. MCF centre is for temporary storage of non-biodegradables obtained from door-to-door collection for forwarding to RRF centres. The RRF centres sorts and manages different types of non-biodegradable waste for reuse or recycling. Details of Haritha Karma Sena and resource recovery facility centres and material collection facility centres are given in Tables 13.9 and 13.10 respectively.

In order to expedite the process of source-level treatment of waste, indigenous technologies suitable for the State have been identified and implemented. These include pipe-composting, pot-composting, bucket-composting, kitchen-bin composting, and bio-bin composting, in addition to vermi-composting, ring-

Table 13.8 *District-wise details of Open Defecation Free (ODF) in urban area, Kerala* in number

Name of District	Urban Local Governments	IHHL Target	Completed	Urban Local Governments declared ODF	Municipalities declared ODF
Thiruvananthapuram	5	6317	6317	5	5
Kollam	5	3397	3397	5	5
Pathanamthitta	4	1673	1673	4	4
Alappuzha	6	1711	1711	6	6
Kottayam	6	1395	1395	6	6
Idukki	2	445	445	2	2
Ernakulam	14	3426	3407	13	13
Thrissur	8	2546	2546	8	8
Palakkad	7	894	894	7	7
Malappuram	12	2058	2058	12	12
Kozhikode	8	2855	2855	8	8
Wayanad	3	912	912	3	3
Kannur	10	1198	1198	10	10
Kasaragod	3	770	770	3	3
Total	93	29597	29578	92	92

Note : IHHL is Individual Household Latrines
Source: Suchitwa Mission, Government of Kerala

Box 13.2
Green Protocol

Green protocol is a set of guidelines for changing individual and societal attitude and behaviour towards zero-waste and improved hygiene. The guidelines encourage the public to do away with disposables, promote usage of reusables and recyclables, reduce waste, segregate waste at source, treat biodegradables at the source itself, facilitate the reuse and recycling of non-biodegradables. It maximises the use of environment-friendly materials and prevents the accumulation of disposable materials. The Government has ordered all its departments and sub-offices to observe Green Protocol. The Suchitwa Mission under the banner of Haritha Keralam Mission is building a public campaign to popularise the observance of Green Protocol all over Kerala.

Box 13.3
Declaration of Suchitwa Padavi

Suchitwa Padavi is given to the local governments which have provided basic facilities for bio and non-bio waste treatment, effectively implemented door-to-door waste collection activities, carried out the activities of the Harithakarma Sena and installed public toilets and latrines in all households. The local governments which were given the status were able to implement Green Protocol, control the consumption of disposable plastics, were successful in spreading public awareness on waste management. As on October 10, 2020, 597 local bodies in the State (31 block panchayats, 508 gram panchayats, 55 municipalities, and 3 corporations) have been given "Suchitwa Padavi" status.

Table 13.9 *Details of Haritha Karma Sena (HKS) in districts, Kerala* in number

District	No. of ULGs	No. of Municipalities	No. of Haritha karma sena started functioning in municipalities	No. of Corporations	No. of Haritha karma sena started functioning in corporations
Thiruvananthapuram	5	4	4	1	1
Kollam	5	4	4	1	1
Pathanamthitta	4	4	4	0	0
Alappuzha	6	6	6	0	0
Kottayam	6	6	6	0	0
Idukki	2	2	2	0	0
Ernakulam	14	13	12	1	1
Thrissur	8	7	7	1	1
Palakkad	7	7	7	0	0
Malappuram	12	12	11	0	0
Kozhikode	8	7	7	1	1
Wayanad	3	3	2	0	0
Kannur	10	9	9	1	1
Kasaragod	3	3	3	0	0
Total	93	87	84	6	6

Source: Suchitwa Mission, Government of Kerala

Table 13.10 *Details of material collection facility centres and resource recovery facility centres in districts, Kerala* in number

District	No. of ULGs	MCF started functioning		RRF started functioning	
		Municipalities	Corporations	Municipalities	Corporations
Thiruvanathapuram	5	5	6	3	2
Kollam	5	4	1	4	1
Pathanamthitta	4	5	0	4	0
Alappuzha	6	24	0	5	0
Kottayam	6	10	0	6	0
Idukki	2	3	0	2	0
Ernakulam	14	21	5	7	2
Thrissur	8	9	7	6	2
Palakkad	7	7	0	6	0
Malappuram	12	11	0	2	0
Kozhikode	8	7	1	1	1
Wayanad	3	2	0	0	0
Kannur	10	10	3	6	1
Kasaragod	3	4	0	3	0
Total	93	122	23	55	9

Source: Suchitwa Mission, Government of Kerala

composting and biogas plants. For promoting source-level composting of bio-degradable waste, Suchitwa Mission has empanelled more than 100 service providers for ensuring supply of composting devices.

82 urban local governments have prepared detailed project reports and Government of India has approved these DPRs. For source-level treatment of bio degradable waste in urban local governments, 8,37,763 composting pits and 94,300 number of biogas plants have been made functional at household, institutional and community-level. Four municipalities have undertaken projects for source-level treatment of waste with a total outlay of Rs 61.35 lakh. A plastic shredding facility is functional in Neendakara Harbour to shred, bale, and forward plastic materials collected from sea by the fishworkers.

With the support of Suchitwa Mission, 15 permanent and 40 temporary swap shops, that is, a public system to exchange reusable goods, has been established in the State. Suchitwa Mission has created a pool of 115 service providers with technical expertise and 35 *Harithasahayasthapanam* and 1800 resource persons for extending assistance to the local governments. About 2300 scrap merchants are now registered with Suchitwa Mission.

Ayyankali Urban Employment Guarantee Scheme (AUEGS)

The State Government started the Ayyankali Urban Employment Guarantee Scheme in 2009-10 in the pattern of MGNREGS. The Scheme addresses the unemployment and under-employment problems in urban areas. The scheme provides livelihood security in urban areas by providing at least 100 days of wage employment to every household whose adult members are willing to do unskilled manual labour. Creation of durable community assets and strengthening the livelihood resource base of the urban poor is also envisaged under the scheme. The scheme is designed in such a way that at least 50 per cent of the beneficiaries shall be women who have registered and demanded for work under the scheme.

After the floods of 2018, priority was given to the flood affected urban local governments for enhancing average person days of employment of the affected people through this scheme. Convergence of PMAY-LIFE with Ayyankali Urban Employment Creation scheme was ensured to create additional workdays. In order to provide maximum workdays and ensure smooth implementation of the scheme, essential tools and small machines required for the labour work are

also provided under this scheme. Dairy farming has also been introduced under the scheme. Dairy farmers who have more than two cattle can be given employment and wage through the scheme. Cleaning of drainage and streets on a regular basis is included in the scheme. The number of households provided employment from 2016-17 to 2019-20 is shown in Table 13.11.

Table 13.11 *Number of households provided employment under Ayyankali Urban Employment Guarantee Scheme from 2016-17 to 2019-20, Kerala* in number

Year	Persondays created	No. of households provided employment
2016 - 17	3,84,000	13,064
2017 -18	8,46,432	28,797
2018-19	16,68,195	85,943
2019-20	26,80,660	1,04,652
2020-21	28,05,126	75,125

Source: Urban Affairs Department, Government of Kerala

Deendayal Antyodaya Yojana–National Urban Livelihood Mission (DAY-NULM)

DAY-NULM for urban areas is a centrally sponsored scheme with 60 per cent of funding by Central Government and 40 per cent by State Government. The scheme started in 2015 is implemented in all the urban local governments in the State. The progress of different components of the scheme from 2015-16 to 2020 -21 is as follows. Under the 'shelter to the urban homeless' component of the scheme, 3,195 persons were identified to be homeless and 22 shelter homes made functional. Further, under the support to urban street vendors component of the scheme, 24,643 street vendors were identified. Identity cards were issued to 13509 street vendors. Under the component, employment through skill training and placement, 21,081 candidates have been enrolled and out of these 15,648 candidates were certified and 10,045 candidates got placement. Skill training has been imparted to the unemployed urban poor youth in 74 trades across the sectors such as cyber security, accounting, health care, automation, plastic technology, electronics, electrical, ayurveda nursing, hospitality, telecom, and food processing. Under the self-employment programme of DAY-NULM, 3398 individual micro-enterprises and 494 group enterprises were established. Under the "social mobilisation and institution development" component of DAY-NULM, opportunities are given to set up micro enterprises. Through this, 16,784 NHGs were formed, and 3068 Area Development Societies (ADSs) are supported with revolving fund and 19 city livelihood centres sanctioned.

As part of DAY-NULM, specific interventions were made for micro enterprises for marketing their goods and services such as identifying nano markets, displaying products of micro enterprises units in the web portal, setting up food kiosks, and food fests. A society called 'Human Arm' consisting of girls skilled under DAY-NULM was formed. Annual turnover of the society during 2019-20 and 2020-21, September 30 were Rs 1.62 crore and Rs 1.07 crore respectively and currently employs 258 candidates. The women employees are drawing a monthly salary of Rs 14,321 and they have the benefits of PF and ESI. The society has extended its service to private hospital also.

Way Forward

1. Land use planning has to be complemented with spatial planning that is concerned also with economic development, transport, service provision, and ecosystem services.
2. In view of the increasing urbanisation, it is imperative to examine whether the institutional arrangements and the fund devolution to urban and rural local governments is adequate to ensure that the cities and towns meet the requirements of the people.
3. Adoption of modern accounting systems, improved practices of budgeting and planning, implementation of best practices, effective use of Ward Committees and other means of peoples' participation, and programme assistance under the existing schemes of Urban Affairs Department should be adopted for improving urban governance.
4. The State Government must set up a system for the serial collection of data on urban areas needed for urban planning. Statistical databases must also cover urban mapping using GIS technology.
6. A substantial increase in central allocation to the urban sector is required.
7. Regarding urban poverty, the programmes should be based on a proper assessment of all types of needs and vulnerabilities. Innovative areas of employment as developed in the State under the Kudumbasree programme can be emulated across the urban areas of the State. The scope of Ayyankali Urban Employment Scheme should be widened to provide adequate employment for new sections of workers.
9. The slum programmes need to be monitored closely at the State-level.

10. There is a need to increase the supply of affordable housing and support services under the LIFE Mission in urban areas. Building designs, especially in the case of apartments, need to be gender-sensitive and elderly-friendly, and should accommodate the requirements of persons with disabilities. The Credit Linked Subsidy Scheme of PMAY (Urban) has to be better utilised in the State. It needs more publicity and cooperation from the banking sector.
11. Rental markets will continue to play an important role in meeting the demand for urban housing and built-up space.
12. Migration and regional disparities are strongly interrelated, and the impact of internal migration on urbanisation has to be studied in depth.
13. Mass urban transport systems are required.
14. Avenues to provide rail-based urban transport system in certain corridors in million plus cities may be explored.
15. Policy designs are needed in order to help urban local bodies achieve the goal of universal coverage of effective, safe, hygienic and sustainable solid and liquid waste management.

Chapter 14
Kerala Beyond its Borders

The diaspora of a nation or region contributes to the development in its place of origin when it has confidence in the purpose and determination of the Government in the home territory. An effective, transparent and non-corrupt Government enhances the trust of the diaspora. Today in Kerala there is a Government of this nature and credibility. The State Government, for its part, believes in using the vast experience and knowledge of the non-resident Keralites (NRKs) for the development of the State and is also committed to ensuring that all necessary steps are taken to ensure safe migration, dignified living, and the successful rehabilitation of return migrants.

There are 21.22 lakh emigrants from Kerala living across the world (Kerala Migration Survey (KMS), 2018). Over 89 per cent of migrants live in the Gulf countries. The country of residence of emigrants from Kerala as estimated in KMS 2018 is shown in Table 14.1.

Policy Thrust in the 13th Plan

In the Approach Paper to the 13th Plan, the Government expressed its resolve to strengthen its engagement with the Kerala diaspora spread across the world. The 13th Plan proposed a major shift in the Government policy towards Non-Resident Keralites Affairs (NORKA), the department entrusted with the responsibility of welfare of non-resident Keralites, by substantially augmenting the Plan allocation to the department.

The aim of the 13th Plan included steps to provide legal aid to the needy among migrants, impart finishing skills to potential migrants through pre-emigration training, ensure speedy authentication of relevant certificates, and regulate the activities of intermediaries and service providers. The Plan envisaged structuring insurance and social security programmes to benefit migrants, and a comprehensive rehabilitation programme for migrant returnees.

Table 14.1 *Country of residence of emigrants from Kerala* in number and per cent

Destination country	Number of emigrants in 2018	Per cent of emigrants out of total emigrant
United Arab Emirates	8,30,254	39.1
Saudi Arabia	4,87,484	23
Oman	1,82,168	8.6
Kuwait	1,27,120	6
Bahrain	81,153	3.8
Qatar	1,85,573	8.7
Other west Asia	0	0
Sub-Total	18,93,752	89.2
USA	46,535	2.2
Canada	15,323	0.7
United Kingdom	38,023	1.8
Other Europe	0	0
Africa	5657	0.3
Singapore	12,485	0.6
Maldives	6243	0.3
Malaysia	11,350	0.5
Other South-East Asian countries	0	0
Australia and New Zealand	30,078	1.4
Other Countries	62,441	1.2
Total	21,21,887	100

Source: Kerala Migration Survey 2018

The 13th Plan also aimed to promote entrepreneurship by NRKs and seek investments by them in Kerala and promote business and cultural visits to and from Kerala by teams involving NRKs. The Plan also aimed to support global cultural festivals involving non-resident Keralites.

Major Initiatives and Achievements

In line with the objectives outlined in the 13th Plan, the Government through NORKA ROOTS, a public sector undertaking under the NORKA Department, has introduced several major initiatives since 2016 for the welfare of non-resident Keralites. Non-resident Keralites have been categorised into four groups

- Keralites who are working in foreign countries
- Returnees from foreign countries
- Keralites who are working in other States of India
- Keralites who are going to foreign countries for employment

The schemes and programmes of the Government focused not only on welfare issues, but also on providing skills, providing avenues of investment, conducting awareness campaigns on procedures of emigration, and most importantly, on the overall integration of NRKs with the State in social, cultural, and economic spheres.

Some of the major initiatives and achievements of the efforts of the Government from 2016 to 2020 are detailed below.

Enhancement of Plan allocation

The Government increased the Plan allocation to the Department of NORKA substantially, from Rs 28 crore in 2016-17 to Rs 140 crore in 2021-22. In the first year of the Plan, that is, 2017-18, the Plan allocation more than doubled to Rs 60 crore. The allocation was further enhanced to Rs 82.50 crore in 2017-18, Rs 80 crore in 2018-19, Rs 81 crore in 2019-20 and Rs 90 crore in 2020-21.

Engaging with the diaspora

Loka Kerala Sabha. One of the most important initiatives of the Government has been the formation of Loka Kerala Sabha, a platform for the cultural, socio-political, and economic integration of NRKs with their home State. The Loka Kerala Sabha was introduced to provide an inclusive democratic space in which non-resident Keralites are involved in the formulation of policies concerning the development of the State.

The first Loka Kerala Sabha (LKS) was held on January 12 and 13, 2018. The Government of Kerala constituted seven sector-specific Standing Committees to work on the suggestions that emerged in the Sabha. The following Standing Committees were constituted – Loka Kerala Sabha Administration and Kerala Development Fund Creation, NRK Investment and Security, Rehabilitation and Post-Return Income Generation Programmes, Quality and Prospects of Migration, Migrants' Law and Welfare of Migrant Women, Migration and Cultural Exchanges, and issues of the Keralite Diaspora within India.

These Standing Committees conducted meetings and furnished their reports along with 48 recommendations. The first meeting of the LKS Secretariat was held on September 30, 2018. After scrutinising the 48 recommendations of the Standing Committees, the LKS Secretariat grouped the vital suggestions into the following ten areas.

A. Investment

1 Formation of NRI Investment Company
2 Formation of NRI Co-operative Society
3 Formation of NRI bank
4 Formation of NRI Construction Company

B. Welfare

1. Formation of Women NRI Cell, and provide health insurance for returned emigrants
2. Formation of Migration Facilitation Centre, and Pre-embarkment Orientation Centre

C. Skill Development

1. Formation of the High-Power Committee (Skill enhancement)
2. Formation of International Migration Centre

D. Art and Culture

1. Conducting NRK Youth Festivals
2. Publication of journal for NRKs

Among the ten identified areas, action has been taken in the following areas.

1. Overseas Keralites Investment and Holding Limited with Chief Minister as Chairperson has been formed. 74 per cent of the shareholding of the company will be by NRKs. The Government of Kerala's equity share will be 26 per cent.
2. NRI Co-operative Society with headquarters in Thiruvananthapuram has started functioning.
3. An NRI Construction Company, a subsidiary company of NRI Investment Company, is being started for construction works including apartments, township projects, old age homes, roads, and bridges.
4. NRK Women Cell has been constituted in NORKA Roots to help in the safe emigration of women, for providing awareness, and for addressing grievances of women NRKs.
5. Proposal submitted to Government of India for

Migration Facilitation Centre in airports and Pre-embarkment Orientation Centre at passport offices.
6. Report on Skill development is under preparation.
7. International Migration Centre has been started in Centre for Development Studies, Thiruvananthapuram.
8. "Loka Malayalam," a journal for NRKs, has been started. The second Loka Kerala Sabha was held from January 1 to 3, 2020. The suggestions received from the sessions are under review.

The Loka Kerala Sabha played a vital role during the Covid-19 pandemic. The Chief Minister of Kerala held a video conference with LKS members and requested them to extend all possible help to non-resident Keralites in the adverse situation caused by the pandemic. NORKA International Help desk was set up with LKS Members, NORKA Roots Directors, and other organisation in UAE, Saudi Arabia, Oman, Bahrain, Qatar, Kuwait, USA, UK, Zambia, West Indies, Germany, Botswana, Norway, Ireland, and Canada.

Global Kerala cultural festival. The Government has initiated efforts to promote the Global Kerala Cultural Festival to provide non-resident Keralites with an opportunity to connect with their home State. This festival will serve as a platform for displaying the talent available in NRK communities.

Welfare scheme

Santhwana is a scheme for NRKs whose annual income is below Rs 1,50,000 and the scheme provides one-time assistance for marriage, medical treatment, and purchase of equipment for persons with disabilities. The scheme also assists the family in case of death of the NRK. Two changes were incorporated in the scheme recently. First, the annual income limit was enhanced from Rs 1,00,000 to Rs 1,50,000. Second, death occurring as a result of Covid-19 has been included under the purview of the scheme. From 2016 onwards, an amount of Rs 91.50 crore has been disbursed to more than 15,575 beneficiaries.

Skilling and employment

NORKA department project for return migrants (NDPREM). NDPREM is a rehabilitation package that aims to help returnee migrants who have worked abroad for at least two years to continue living a dignified life. Under this scheme, subsidy is extended for entrepreneurs having a seed capital of Rs 30 lakhs and upon prompt repayment, 15 per cent subsidy on capital and 3 per cent rebate on the interest of loan are offered for the first 4 years.

In the last four years, substantial changes were introduced to make the scheme more effective. The limit of the loan amount was enhanced from Rs 20 lakhs to Rs 30 lakhs, the number of partner banks was increased from 4 to 16 and the lock-in period for the capital subsidy was reduced from 4 to 3 years. The Centre for Management Development has been roped in to provide technical support to entrepreneurs. The scheme NDPREM is also included in the Chief Minister's Entrepreneurship Development Programme. From 2016 onwards, Rs 50.92 core has been disbursed to 3175 beneficiaries.

Skill upgradation and reintegration training for NRKs. Skill development and up-gradation training focusing on international labour markets are conducted by the Government through Government institutions. The Information and Communication Technology Academy of Kerala provides ICT skills to the youth. Training is provided to nurses for clearing different Government Licensing Examination of countries for obtaining jobs through the Nursing Institute for Career Enhancement. 75 per cent of the cost of the training is met by the Government and the rest by the beneficiary.

Job portal. Job portal of NORKA Roots serves as a database of people in need of jobs. The portal integrates job seekers and employers on a single platform thereby helping both people in need of jobs in finding employment and employers in finding suitable candidates.

Investment avenues

Pravasi Dividend Scheme. The Government introduced the Pravasi Dividend Scheme in 2019 through the NRK Welfare Board, to invite investment for the development of the State from the non-resident Keralites. Pravasi Dividend Scheme aims for ensuring the welfare of the NRKs and the returnees as well as garnering resources for the infrastructure development of the State. It is a long-term scheme where investors can invest between Rs 3 lakh to Rs 51 lakh and are guaranteed a 10 per cent dividend including Government share. 10 per cent dividend on the first three years is added to the deposit and a monthly dividend is made available to the investors from the fourth year. Dividends will be paid to the partner after the investor's term. Thereafter the nominee will be reimbursed for the investment along with the dividend for the first three years.

NORKA Business Facilitation Centre. NORKA Business Facilitation Centre is an initiative by the

Government of Kerala for offering comprehensive support services to NRKs and returnee emigrants on investment opportunities in Kerala. The objective of the Business Facilitation Centre is to attract investment from NRKs to the State. This Centre commenced functioning in 2019-20 and has facilitated in setting up more than 30 enterprises attracting an investment of Rs 110 crore and providing employment to 750 persons.

Support and awareness services

Pravasi Legal Aid Cell. Pravasi Legal Aid Cell is a support introduced to provide legal aid to NRKs who are languishing in the prisons of foreign countries especially in the Gulf Cooperation Council (GCC) for minor or petty offences. Ignorance of the Law of the Land and language problems are the major reasons for them ending up in prisons. The Government of Kerala has engaged 11 legal consultants in 6 GCC countries. Out of 110 cases received, 100 cases have been settled.

NORKA Global Contact Centre. The Government of Kerala has started an international toll-free 24-hour helpline for information dissemination and grievance redressal of NRKs. NRKs can contact this Centre 24x7 via live chat, email, and SMS. The Global Contact Centre was started on February 15, 2019, and in the last two years, more than 3 lakh NRKs from across 31 countries have used this service.

Other Schemes

NORKA Roots Director's scholarship scheme. The scheme started in 2019-20 is to assist children of NRKs who are economically weak to pursue higher education. 175 students have been provided scholarship under this scheme.

Online database. A web portal has been started to capture the number of NRKs in different parts of the world and the country. The online database also provides the number of return migrants to the State. The online database will provide a real-time assessment of the number of NRKs and will help the Government in formulating policies for their welfare and support.

Emergency Ambulance Service. NORKA Roots launched the Emergency Ambulance Service for the benefit of NRKs who are unwell or whose mortal remains have to be carried home. The NRKs who are unwell can travel to their home or nearest hospital by availing this facility. This 24x7 facility operated with the support of the Indian Medical Association is made available free of cost to NRKs. More than 700 beneficiaries have availed this facility.

Emergency Repatriation Fund. Emergency Repatriation Fund is used to meet the expenses of emergence evacuation of NRKs from countries where there is civil unrest or natural calamities. Non-Resident Keralites are evacuated from their places of work or residence, in collaboration with MEA, Government of India. The Fund is used for meeting the expenses of travel, accommodation in Kerala House, and other immediate expenses.

Other Services

The Government has streamlined other services such as Certificate Attestation, Recruitment Services, and Issue of Pravasi Identity Card. Certificate Attestation Services are facilitated in the Thiruvananthapuram, Ernakulam, and Kozhikode offices of NORKA. NORKA recruitment services have helped in providing doctors, nurses, medical technicians, petroleum engineers, and domestic workers to countries.

Covid-19 Pandemic and Measures undertaken by NORKA Department

It is estimated that more than 7 lakh NRKs have returned from abroad. Of these, more than 4.5 lakh have lost their jobs. The NORKA Department introduced the following measures in the wake of the pandemic.

Helpdesk in host countries and Covid response cell in NORKA Roots. NORKA Roots established Help Desks in 18 countries and Covid Response Cell in NORKA Roots Head Office in Thiruvananthapuram to understand the situation of migrants in host countries and to facilitate assistance to Covid patients.

Financial assistance for return emigrants. An amount of Rs 5000 has been provided to return emigrants as immediate assistance.

Medical assistance for Covid affected return emigrants. The return emigrants who tested positive for Covid-19 after reaching the State were provided Rs 10,000.

Bringing back NRKs. The State Government made significant efforts and interventions in bringing back NRKs at the time of lockdown.

Discount for cargo. The Government made arrangements for despatch of essential medicines through air cargo or courier service at a 25 per cent discount in the cost of transport.

Online consultation. The Government introduced facilities for online consultations with doctors.

Chapter 15

Learnings from Disaster: The Kerala Experience

In the last four and a half years, the Government of Kerala, under the leadership of Chief Minister Pinarayi Vijayan, has reset the benchmarks and raised the bar for disaster governance in India. It has contributed decisively to the global understanding of disaster management. Every year, after the first, of this Government's term in office has been marked by at least one notable disaster of natural origin. All of them, while of a different kind each year, have been significant in scale. However, with every such challenge, Kerala's society, under its current political leadership, has risen to the occasion in a manner that has not only been commended nationally and globally but has also encouraged serious scholarship and enquiry into the nature of this success. Kerala's response to the disasters has drawn the attention and appreciation of democratic and progressive public opinion, attention that was reflected in the ample and sustained media interest in Kerala in this regard.

A full account of these disasters and the manner of their management is not possible in the brief space available to us in this volume. Such an account would have to begin with the worst drought of a century faced by the State in 2017, take into account Cyclone Ockhi later the same year, the Nipah virus outbreak of 2018 summer, the record floods and landslides in 2018, followed by a similar situation in 2019 (though not of the same scale and extent), and the Covid-19 pandemic of 2020. However, this chapter, more briefly, contextualises Kerala's disaster management structures and experience with reference to the global and national scene. While providing some pointers to the reasons for Kerala's successes in disaster management, it also briefly indicates the important issues that the State might face in the future, with respect not only to the management of disasters but also to the all-important question of disaster risk mitigation.

Introduction and Background

Disasters have been known to humanity since its origins. While natural hazards or extreme climatic and geophysical events are intrinsic to nature, it is their impact on human society that transforms extreme geophysical events of natural origin into disasters. Despite their ubiquity in human history, disasters have emerged as a serious field of study in theory and practice only in the second half of the last century. By the end of the twentieth century, disaster management became a subject of increasing concern and attention across the world.

The global community took note of disasters through the multilateral processes of the United Nations with a series of UN-sponsored collaborative and cooperative initiatives beginning in the last decades of the twentieth century. The decade 1990-1999 was marked as the International Decade for Natural Disaster Reduction. Following this, the global community moved to formulating and recognising an International Strategy for Disaster Risk Reduction (ISDR), whose implementation as a movement across the world was sought to be coordinated and facilitated through a Secretariat, the UNISDR. The UNISDR promoted the implementation of the Hyogo Framework for Action 2005-2015 for international cooperation in disaster reduction, an outcome of the Second World Conference on Disaster Reduction held at Kobe, Japan in 2005. Subsequently renamed as the United Nations Office for International Disaster Risk Reduction (UNDRRR), it oversees the implementation of the next generation of international cooperation in disaster management based on the Sendai Framework for Disaster Risk Reduction, adopted by the Third World Conference on Disaster Risk Reduction in 2015 at Sendai, Japan. Together with the rising global preoccupation with environmental questions and issues, especially related to biodiversity and climate change, the importance of disaster risk reduction and disaster management have only become increasingly a key concern of the global community.

The increasing recognition of the importance of disasters as a fundamental part of the international agenda of sustainable development has also had its echo at the national-level with increasing attention devoted to disaster management and its formalisation within the work of Government in India, at the national-level and in the States. Managing disasters had, of course, always been a major concern of Government, and especially the purview of the revenue, police, and fire service departments. Command and control measures in immediate disaster management, especially on a larger scale, led at the Ministerial-level, either by the Prime Minister or Home Minister at the Centre or by the Chief Minister at the State-level, were also an integral part of disaster governance. However, such approaches lacked the necessary force for dealing with the increasing need for co-ordination in disaster management as well as integrating disaster risk reduction into the very process of development itself.

The most important landmark in the evolution of disaster governance in India has been the passage of the National Disaster Management Act, 2005, and the establishment of a framework for disaster management through the National Disaster Management Authority (NDMA) and corresponding bodies at the State-level (State Disaster Management Authority (SDMA)), extending to even District Disaster Management Authorities (DDMAs) in all districts in the country. The subsequent evolution of these disaster management authorities has been driven primarily by their need to cope with a number of disasters that have occurred in the country since then.

The structure of disaster governance has also been complemented by the evolution of national disaster finance, through changes undertaken in the background of the passage of the National Disaster Management Act, as well as the successive recommendations and guidelines of the various Finance Commissions that have since followed. Since 2010, the structure of disaster relief and rehabilitation finance is through the National Disaster Relief Fund (NDRF) and State Disaster Relief Funds (SDRFs). As noted in the authoritative Arthapedia.in, a portal managed by Indian Economic Service (IES) Officers, the financial assistance from SDRF/NDRF is for providing immediate relief and is not to provide compensation for loss/damage to properties/crops. In other words, NDRF amount can be spent only towards meeting the expenses for emergency response, relief, and rehabilitation. For projects exclusively for the purpose of mitigation, i.e, measures aimed at reducing the risk, impact or effect of a disaster or threatening disaster situation a separate fund called the National Disaster Mitigation Fund has to be constituted. This fund has still to come into existence and the Government of India has recently been of the view that existing programmes and schemes are adequate to take care of such disaster mitigation needs and that no separate fund is necessary. The hitherto existing National Calamity Contingency Fund (NCCF) was renamed as National Disaster Response Fund (NDRF) on September 28, 2010 with the enactment of the Disaster Management Act in 2005 and consequent changes in the design and structure of disaster management in India. The National Executive Committee (NEC) of the National Disaster Management Authority takes decisions on the expenses from National Disaster Response Fund, in accordance with the guidelines laid down by the Central Government in consultation with the National Authority.

Kerala has been at the forefront of the evolution of disaster management in the country. With an active SDMA, aware of its functions and utilised by the Government, alongside the other administrative and technical arms of Government, the institutional structure of disaster management in Kerala has undoubtedly made progress over the years. It may be added that it has rarely been put to the test as in the last few years, while its overall performance previously did not excite particular attention. However, it is the strengths of Kerala's society and polity that have provided the flesh, blood, and muscle over the bare skeleton of institutional structures that have distinguished Kerala's disaster response in the last four years.

The Kerala "Model" of Participatory Disaster Management

A key feature of the modern approach to global and national initiatives in disaster management is of course the emphasis on the importance of the participation by all sections of society in coping with and managing disasters, especially large-scale disasters. It is in this respect, in participatory disaster management, that Kerala has managed to decisively come ahead of other comparable experiences both nationally and globally. Kerala's long record of increasing citizen awareness of governance and the increasing desire of the common people for a participatory role in the same has been dealt with in a substantial manner elsewhere in this volume. But nowhere has the advance registered by Kerala in local government and the progressive decentralisation of governance manifested itself as decisively as in the case of recent disaster management.

Decentralisation and participatory governance cannot however function by themselves. Especially when disasters occur, a strong degree of command and control is also essential, particularly in situations of resource scarcity so common in developing societies. Balancing the two or developing a proper synergy between the dimension of participation and decentralisation on the one hand, and that of command and control on the other, by a wise political leadership is critical and clearly, this has been another ingredient of Kerala's success.

Kerala's human development advance and its network of social welfare and social safety arrangements have also been important ingredients to Kerala's success in disaster management. All the structures, institutions, and arrangements in the social welfare sector could be rapidly brought to bear on relief and rehabilitation. In the case of the Covid-19 pandemic, particular mention

must be made of course of the advance of the public health system and its structure in the State.

Where arrangements and improvisations had to be made on the fly, Government and society proved more than equal to the task, and lacunae, when they occurred, could soon be set right. Kerala society has demonstrated a remarkable capacity for innovation, from local social innovations to innovative Government response as well as technological innovations, especially using information technology, the latter brought to bear by a new generation of young Keralites both at home and among the diaspora.

The manner in which the communication worked effectively both horizontally and vertically across society need to be mentioned. Rarely has the country seen a Chief Minister, his Ministers, and senior-most officials communicate in such steady and calm fashion, not hiding or shielding from view the depth of the crisis, but yet communicating across to officials, civil society and the population what the state of affairs was and what needed to be done. While this has come to global attention during the Covid-19 pandemic, with many other leaders following similar strategies, this was a strategy perfected earlier by Shri Pinarayi Vijayan and his Government, in the face of other disasters as well. Horizontally too, communication in Kerala was rapid and effective, most notably seen in the vast mobilisation of assistance and relief within and outside Kerala, during the floods, handled by networks spanning all of society that were formed spontaneously and worked effectively. Communication has on the whole worked effectively during the pandemic as well, though the novel and intense nature of the challenge has proved trying to all societies across the world, irrespective of their-level of development.

The points made above need to be emphasised first because they not only provide valuable lessons to the rest of the country but also because a rational account of the strengths of Kerala society is important for going ahead and staying aware of the need to ensure the continued sustainability of these positive features and characteristics. At the same time, there is, no doubt, room for improvement and advance, and a serious account of how even Kerala's strengths functioned across different regions and social and economic strata needs to be developed. Alongside one must also seriously enquire whether, despite the overall positive performance, there were pockets of marginality and exclusion, and their extent, to which attention needs to be paid in the future.

The Challenge for the Future: Scientific Disaster Risk Mitigation

Kerala's challenges for the future in disaster management may perhaps be summed up succinctly in the term scientific disaster risk mitigation. The scope and scale of the disasters that the State has faced were no doubt in part determined by the severity of the climatic or biological extreme events that triggered them. However, the lack of disaster risk awareness compounding the relative lack of mitigation, based on sound scientific and technological principles, has been brought out starkly during the floods and landslides of 2018 and 2019. The presence of human activities and permanent structures in the flood plains of various waterways is only the tip of the iceberg of a general need for consistent disaster risk mitigation. The occurrence of landslides provides other such examples.

The role of science and technology in disaster risk awareness and mitigation is essential on several counts. One is of course the obvious short-term one of providing sound principles for determining when people are potentially in harm's way and ensuring that they are either protected adequately or taken out of the way of oncoming danger. The second and more challenging aspect, in a scientific sense, is determining the nature of potential harm as an ongoing and dynamic question, that can change both with continued development as well as the potentially serious impact of climate change. Dealing with the latter particularly involves the intersection of natural sciences and technology on the one hand with economic and social dynamics on the other.

Regrettably, on both these aspects, the argument that no development at all, or only minimal development, is the solution, is one that is heard frequently. This clearly cannot be valid in a country and a State where significant development deficits, especially in generating employment and livelihoods, based on productive activity, have to be overcome. Science and technology are indispensable to not only locating danger but also the solutions to disaster risk mitigation. A typical example of such argument's centres around the opposition to so-called "linear" development, a euphemism for roads, railway lines, electricity transmissions lines, and oil and gas pipelines. Unfortunately, a modern State with a modern economy cannot be built with a transportation infrastructure that is so weak that it takes hours to traverse one to two hundred kilometres. At the same time, instances repeatedly come to light of road construction in difficult terrain that skirts or altogether ignore basic rules of safe road construction.

A number of specific scientific and technological questions need to be studied with reference to the specific features of disasters in Kerala. Floods and landslides are two features that need urgent remedies. The landslides of 2019, in particular, point to surprising landslide proneness in zones that were not previously considered highly vulnerable. Evidently, both short-term and long-term studies are needed to deal with this problem. Coastal erosion is another serious challenge for Kerala, though it manifests as a slow-moving disaster rather than a sudden shock. The continuing challenge of coastal erosion, despite several decades of effort and the lively public debate on the issue in the State, suggests that there are key gaps in our knowledge of the processes and mechanisms that lead to such erosion. The current situation also suggests the need for serious scientific efforts ranging from data gathering in a much more intensive manner to more innovative and creative approaches to understand the particular features of such processes along the Kerala coast.

Such studies need to involve closely not only experts but also senior engineers and scientists in Government departments on whom falls the burden of turning these scientific outputs into engineering realities. Without critical awareness of disaster risk mitigation in the day-to-day engineering of both Government and the private sector, proposed solutions are unlikely to be implemented.

There is ample scope for closely involving the academic, science, technology, and engineering communities of Kerala for working on such problems. While such involvement may need serious efforts, training, further education, and general capacity-building it will provide ownership to the proposed solutions that will be lacking when proposed by outside experts working in relative isolation with only basic consultation with the local stakeholders. Expertise and inputs could also be sought on a global basis for assistance in developing local expertise and relevant solutions. Such expertise from outside Kerala is also essential to ensure that the scientific study of disasters in the State is not only carried out but also done with serious attention to enhancing the level of scientific rigour accessing the best available knowledge on a global scale. It is essential that some key themes in Kerala's needs in disaster management could be dealt with in a scientific mission or task force mode in the immediate future.

Scientific disaster risk mitigation is also essential for avoiding the enormous economic losses that follow such disasters. While participatory disaster management can help save lives and provide relief and rehabilitation with dignity, this alone cannot avoid the economic losses that follow. Kerala's economy has notably suffered from the two successive years of flood and landslides while recovery has been seriously hampered by the onset of the Covid-19 pandemic in the very next year. In the face of political headwinds that make resource mobilisation by the State Government difficult and the general difficulties associated with State finances (both dealt with elsewhere in this volume), the minimisation of disaster-related losses is essential.

The call for scientific disaster risk mitigation should not be construed as an assertion that the science and technology considerations would provide unique and deterministic solutions. In complex real-world problems, with multiple factors in play, solutions are quite unlikely to be unique though there may be some common features. The choice between such solutions needs to be also guided by considerations of economic, financial, and social factors keeping in mind the need for equitable sharing of any burden among sections of the population. Solutions to real-world problems will also need some learning by doing and the need to experiment with different innovative approaches to determine which provide the best sustainable alternatives.

Last but not least, the social and economic fault lines in society and their manifestation in politics and political decision making, are most evident in post-disaster recovery and rebuilding. Across the world, it has often been the experience that all too soon the unity and sense of unified purpose that is evoked while facing the disaster may dissipate, giving way to fractious debate and a scramble for coming out ahead in the race to recovery. There is regrettably no easy formula to deal with this political question that is as dependent on the correlation of political forces in society as in any other matter and, as always, it is the vigilance of democratic and progressive political opinion that keeps society on track. However, scientific soundness and rigour in the formulation of recovery, does provide an important reference point for dealing with such debates in the post-disaster recovery era.

Analysing the Flood Experience

Two important documents related to experiences have been published by the Kerala State Planning Board. The first, on the floods of 2018 and the response to floods, constituted the theme chapter of the *Economic Review* 2018. Secondly, in 2019, the Kerala State Planning Board commissioned a study headed by the Executive Vice-President of Kerala Council for Science, Technology, and Environment, a distinguished

hydrologist. The "Committee to examine the causes of repeated extreme heavy rainfall events, subsequent floods and landslides and to recommend appropriate policy responses" was a team of experts drawn from within and outside the State of Kerala.

The main points raised in the special chapter of the *Economic Review 2018* are as follows. The chapter notes that there is ample evidence to establish that the key to the floods of 2018 is the extreme heavy rainfalls that triggered the floods. Kerala received 2515.7 mm of rain in the southwest monsoon (June-September 2018), which was 23.34 per cent higher than the normal rainfall of 2039.6 mm. But the heavy rainfall, starting from August 8, became a 3-day long extremely heavy rainfall from August 15 to 17, 2018. This 3-day rainstorm delivered 40 per cent of the long-term average rainfall for the entire southwest monsoon. Such extreme rainfall events naturally lead to extreme floods. It also noted the fact that climate change is likely to exacerbate the occurrence of such events, though no such attribution could be made to these events per se. The Central Water Commission (CWC) (2018) also affirmed the critical role of extreme rainfall and that the opening of dams had minimal or no impact on the runoff of water. Kerala has 57 large dams with a total storage capacity of 5.806 billion cubic meters (BCM), which is equal to 7.4 per cent of the annual average runoff of all 44 rivers in Kerala. Only seven reservoirs have a live storage capacity of more than 0.20 BCM. Thus, dam management had only a negligible role to play in flood management following the extremely heavy rainfall event.

Eighty per cent (1259) of Kerala's villages were affected by the floods. Of the State's total population of 3.48 crore, more than 54 lakh people, about a sixth of its population, were directly affected by this extreme event, displacing approximately 14 lakh people and damaging 1,74,500 buildings. The Government established 12,253 relief camps, providing shelter to 34,15,937 affected people. Over 10 lakh people were evacuated and over 33,000 were rescued. The Government provided immediate relief of Rs 10,000 each to 6.87 lakh families and made psychological counselling services available to 40,000 flood victims by December 2018.

The floods had a critical impact on the State's economy. The damage to various sectors of Kerala's economy was heavy and was estimated at Rs 31,000 crore by the Post Disaster Needs Assessment (PDNA) of the UNDP. This worked out to approximately 5.02 per cent of 2016-17 GSDP at current prices (Rs 6,17,035 crore). The damage caused to infrastructural sectors such as power and transport, other economic sectors, and social sectors were separately assessed in the PDNA. (Table15.1). Flood and landslide-related losses put an additional strain on State finances, already facing stress because of the burden of committed expenditure and lower-than-expected growth rate of revenues.

Subsequently, with the recurrence of the floods in 2019, the Kerala State Planning Board appointed a "Committee to examine the causes of and appropriate policy responses to repeated extreme heavy rainfall events and subsequent floods and landslides." The Committee was chaired by Professor K P Sudheer, Ex-officio Principal Secretary, Science and Technology Department and Executive Vice President, Kerala State Council for Science, Technology, and Environment. The members of the Committee were leading scientists and experts of the country. Under its terms of reference, the committee was requested to write a quick assessment report that was to examine the causes of and recommend appropriate policy responses to the extreme rainfall events (EREs) and subsequent floods and landslides. The report was also to serve for developing emergency actions plans and disaster preparedness for the State of Kerala for such future events. The committee was to address specifically the following concerns while preparing the assessment report:

1. The reasons for the occurrence of such EREs and their major causative factors.
2. The capability and potential for accurate forecasting of such events with sufficient lead time.
3. Reviewing indicators and methods to locate areas prone to severe landslides during such EREs and remedial measures for minimising such hazards and their consequences;

Table 15.1 *Estimation of damages in Kerala consequent to floods in 2018* in Rs crore

Sector	Damage	Losses	Damage + Losses	Total Recovery Needs
Social	5,743	1,448	7,191	6,337
Productive	2,975	4,180	7,154	4,498
Cross cutting	0,561	16,159	26,718	30,715

Source: Post Disaster Needs Assessment Report, 2018

4. Reviewing current maps of areas prone to flood hazard during such EREs and remedial measures to minimise such hazards; and
5. To pay particular attention to the role of changing land use in these hazards.

The final report of this committee was submitted to the Planning Board in December 2019. Some of the key observations of the committee were as follows:

The committee noted that the proximate cause of the heavy rainfall events (2018 and 2019) was the development of deep depressions over the northwest Bay of Bengal and its neighbourhood, coupled with the influence of the local orographic gradient on the atmospheric circulation, variability in monsoon circulation caused by the transient synoptic-scale, and intra-seasonal propagating oscillations. It noted that no noticeable teleconnections of these EREs with El Nino Southern Oscillations (ENSO) and Indian Ocean Dipole (IOD) were observed. It also observed that there were important knowledge gaps however in the prediction of such events. While a number of predictive models were being used by various agencies worldwide for the prediction of EREs, and many of them are being used by the IMD in the Indian context, they do not capture the real mechanism of cloud formation and its impact on rainfall distribution and pattern during the onset and occurrence of EREs.

The report noted that the current rain gauge network in the State was not sufficient enough to capture the high spatial variability of rainfall because of the orographic barrier, and also in the context of the limited predictive capability of the rainfall forecast models. The report recommended a significant upgradation of the network density with the installation of 500 Automatic Rain Gauges (ARG)/ Automatic Weather Stations (AWS), with priority given to regions receiving high-intensity rainfall in short periods including slopes that have the potential for flash floods. In view of the temporal change in the size distribution and circulation pattern of the dust aerosols in the State that have an impact on changing rainfall patterns, the committee noted the need for further research as it indeed is an emerging area of research worldwide. The significance of forest fires across the Western Ghats on the aerosol concentration was also to be studied in this context.

In the committee's assessment, the triggering factor for the occurrence of landslides across Kerala during the EREs in August 2018 and 2019 was the oversaturation of the overburden. Idukki experienced the maximum number of landslides (977 including minor slides) in 2018, whereas Palakkad had the highest count in 2019 (18), followed by Malappuram (11), Wayanad (10) and Kozhikode (8). Generally, steep sloping areas having a slope of more than 33 per cent are more vulnerable to landslide, and the majority of the landslides in the State during the last two years occurred in these terrains. The Committee noted that anthropogenic activities intended for agricultural expansion and water conservation such as terracing, blocking/diversion of stormwater channels, and alteration of natural vegetation pattern have amplified the landslide susceptibility of these regions, especially at Kavalappara, Pathar and Puthumala. In addition, soil piping has acted as the triggering factor at a few locations, especially in Northern Kerala.

The committee also noted that landslides that occurred in the last two years have largely (~80 per cent) fallen in the high hazard zones already delineated by the NCESS. However, since there were a few slides in low hazard zones while some of the high hazard zones were unaffected, the refinement of the hazard zone mapping with the inclusion of additional causative factors is necessary. Mapping should be performed on a fine resolution (preferably at the cadastral scale). Landslide risk maps also needed to be developed at the cadastral-level, to be used for long term land use planning. The monitoring of ground movement also needed to be considered as part of long-term research activity. While the landslides of 2018 and 2019 were primarily triggered by the EREs, the major underlying reason for the vulnerability of most of them was the instability of the slopes caused by various anthropogenic activities. Therefore, preventive measures needed to focus on slope stabilisation, for which the committee provided detailed recommendations. A number of mitigating measures to be undertaken, and activities to be prohibited were also listed in the report.

Regarding flooding, the report noted that there are several natural and anthropogenic drivers of floods in Kerala, among which the prominent ones are: (1) high-intensity rainfall for a prolonged duration; (2) human interventions in the catchment areas, particularly in the floodplains and riparian zones; (3) unauthorised encroachments leading to reduction extent of natural areas and their impaired functionality; (4) reclamation of wetlands and lakes that acted as natural safeguards against floods due to urbanisation and development of infrastructure; (5) unexpected EREs and lack of exposure in handling such EREs through reservoir operation; and (6) decreased channel capacity due to sedimentation and aquatic vegetation. In particular, though, the floods experienced in the last two years have a large return period (occurring once in more than 100

years) and hence the preparedness for such events was low due to their very low probability of occurrence. The committee also particularly analysed flood inundation for various scenarios of different reservoir-levels and 24-hour 100-year rainfall for the Periyar river basin and developed possible flood inundation maps (which proved to be of value in 2020). Such studies however need to be undertaken on a larger scale in order to demarcate the flood-prone areas under different conditions in all the river basins in the State.

On the question of reservoirs and flood control, the report noted that the focus of reservoir management was the conservation of water for power generation or irrigation purposes and that flood control was not considered an integral part of reservoir management, except in a few locations after 2018. The committee noted that flood control as part of reservoir operation policy should be extended to all reservoirs in the State. Further, the authorities concerned should explore the possibility of providing some dynamic flood cushion in the conservation zone below the full reservoir-level for all the reservoirs. The committee also noted a number of other measures in some detail to deal with the challenge of flooding. Detailed observations and recommendations were also made by the committee to promote sustainable housing in hazard-prone zones.

The report in its executive summary and its main body provided detailed "Recommended Action Plans." Recommendations were made regarding overall policy, the scientific studies to be undertaken, land use management, management of water resources, guidelines for and regulation of construction, agriculture, dam/reservoir management, data management, social awareness, and governance issues. The Report demonstrates the kind of scientific input that is needed in this sphere.

Interested readers may note that both these documents, that is, the special chapter of the *Economic Review* of 2018 and the report of the Committee on floods and landslides are available on the website of the State Planning Board.

Chapter 16

Kerala's Response to Covid-19 Pandemic: A Major Socio-Economic Challenge

From January 30, 2020, when the first case of Covid-19 was reported in India in Kerala, the State Government adopted a multi-pronged strategy to deal with the pandemic. Kerala's response to the pandemic has received worldwide acclaim, and became a model in terms of management strategy, mitigation efforts, and relief measures.

Kerala's response to the Covid-19 has been multidimensional, and marked by a strong commitment to development and social justice. The hallmarks of the State's response included universal access to food, access to shelter, and low-cost or free medical care, and access to information. A strong public health infrastructure built under the Aardram Mission, information dissemination at the highest-level spearheaded by the daily press conferences of the Chief Minister, and provisioning of food and other means of subsistence, including cash support and shelter to the needy in the most difficult times, characterised the unique nature of Kerala's approach towards Covid-19 mitigation efforts.

Local governments led the efforts at the grassroots-level by spreading awareness about Covid-19 through campaigns such as "Break the Chain." They provided public sanitation facilities, instituted support services for persons in isolation, ensured the availability of essential items, prepared an inventory of healthcare facilities available at the local-level, and set up community kitchens across the State.

Covid-treatment, including testing and, more recently, vaccines, was made free in Government hospitals. At all times food was also provided free of cost to all patients. In addition, psychological support was provided to all Covid-positive patients and those in quarantine through dedicated psychological support teams.

The Health Department launched e-Sanjeevani telemedicine services in Kerala on June 10, 2020. They have been providing services in a centralised manner, and DISHA is the State hub managing the telemedicine activities for the State.

The Government of Kerala created a five-tier structure outside the health infrastructure – home quarantine, Domiciliary Care Centres, Covid First-Line Treatment Centres, Covid Second-Line Treatment Centres and designated Covid hospitals – to provide care and support to Covid patients. The Government of Kerala also appointed an Expert Committee with Dr B Ekbal, Member, State Planning Board, as Chair to advise the Government on Covid-19 control. The committee met every day from March 20, 2020 to March 20, 2021 (and has met once a week thereafter) and submits its findings and suggestions to the Government of Kerala.

The Government of Kerala was the first to announce a substantial programme, much ahead of other States and the Central Government, to address the anticipated economic impact of the Covid-19 pandemic in the form of a Rs 20,000 crore package. Of the Rs 20,000 crore economic package, Rs 1,320 crore was set aside to disburse welfare pensions in advance for two months in March 2020. Another Rs 100 crore was allocated to provide assistance of Rs 1000 each for families that were not eligible for welfare pensions. In the subsequent two months, Rs 2000 crore was disbursed as loans through the Kudumbashree scheme, with the State Government bearing the interest component. Another Rs 2,000 crore was set aside to provide jobs under the Employment Guarantee Scheme.

To compensate for the cooked mid-day meal which could not be provided to children under lockdown, it was decided to provide food security allowance (a food kit) directly to homes in accordance with the provisions contained in the National Food Security Act, 2013, and Mid-Day Meal Rules 2015. The food kit included rice and nine other grocery items. The kits were distributed through Supplyco stores in the State.

The Kerala State Planning Board initiated the prioritisation of Plan Schemes of 2020-21 by sequencing schemes already proposed in the Budget based on the immediate need and availability of resources. This exercise achieved the desired objective of fast-tracking expenditure by departments.

These were the highlights of the Kerala Government's Covid-19 response package. We now look at the response sector-wise and in greater detail.

Kerala: Health System Response to Covid-19

Kerala has a strong primary health care system augmented by the three-tier local government system. Kerala also has a strong network of health workers and volunteers who are involved in ensuring the provision of comprehensive health care to all. Managing public health emergencies like floods, landslides, and outbreaks like the Nipah virus has further strengthened

Box 16.1
A New Model of Accountability

At 6 pm every day after March 2020, the people of Kerala routinely switched on their television screens to listen to the Chief Minister give them the very latest on the Covid-19 pandemic. Through the ups and downs of last year, as the Covid-19 pandemic spread sickness, fear and isolation in the homes and hearts of the people of Kerala, the daily briefing by Chief Minister Pinarayi Vijayan became something more than a daily update of facts and figures on the developing pandemic. Dressed in familiar white, flanked at a distance on either side by his senior colleagues, the Chief Minister, through this daily exercise, became something of a beacon of hope and reassurance during very uncertain times.

The daily press conference, held from 6 pm to 7 pm, redefined the concept of prime time television in Kerala. During that time-slot, the ratings of all Malayalam television news channels sky-rocketed. As more and more people tuned in, all media houses aired his every word. Not surprisingly, viewership soared.

The briefings followed a set pattern. First, an exhaustive update on the state of the pandemic. Nothing was held back, and what may perhaps have been missed in the routine part of the briefing was invariably dealt with in the following session of questions and answers with the media. Figures on infection rates, hospitalisations, quarantines, deaths, and district-wise and city-wise data were presented. This was followed by a report on the multi-sectoral response of the administration to the crisis on that particular day. Important announcements and future plans were relayed. Then came media time, during which the Chief Minister replied, with care and precision, to questions from Kerala's robustly adversarial media.

Every briefing usually saw the Chief Minister make at least one departure from the script. On one occasion, for example, it was about the unequal burden of the lockdown on women, which he followed up with an exhortation to men to share domestic work with the women of the family. On another evening he reminded Kerala society of its responsibility of caring for migrant workers (the term in use in Kerala for migrant workers is "guest" workers). He has spoken of the needs of care for domestic animals, and of the need to keep one's surroundings clean. On one occasion he reminded his audience of the special attention that children and the elderly deserve in society. He congratulated students of a particular school who offered their modest Vishu earnings to the Covid-19 fight, and has urged people to be understanding of the sacrifices made by those engaged in essential services. No issue of relevance was either too big or too small to be mentioned.

Reaching out thus to the people in times of adversity was not new for the Chief Minister. During the historic floods of 2018, he held press conferences daily, in fact holding them twice a day when needed. These press meets not only kept the people of the State updated on the rescue and relief efforts, but also helped alleviate their anxieties. During this period, the Chief Minister set new standards of leadership, accountability, crisis management, attention to administration detail, and care. In the monsoon disaster in 2019, when severe landslides occurred, Kerala's Chief Minister held daily press meets. He did the same in 2020 following the landslides in Idukki and Wayanad, and in the wake of the plane crash in Kozhikode on August 7, 2020.

Such interactions are in a sharp contrast to events in the rest of country, where national leaders refused to talk to the press, let alone respond to questions from them. The Chief Minister's initiatives with respect to press conferences were a recognition of the people's right to information during natural disasters and the Covid-19 crisis. They constitute a model of political accountability within a democratic system.

the health care system in the State. When information regarding the outbreak of coronavirus in Wuhan city of China was received, the health department activated its emergency response mechanism to prevent an outbreak within the State.

Soon after the declaration of the first Covid-19 case in the State, a detailed evaluation of all the health care facilities in the State in both Government and private sectors was done. Baseline data regarding the number of hospital beds, ICUs, and ventilators were collected and analysed. Total available beds were categorised into Plan A and Plan B, and any additional beds that could

be allocated by converting other facilities were allocated as Plan C. A detailed action plan on how to use these facilities was prepared at the State-level by conducting a series of meetings in all the districts. All confirmed and suspected cases were initially admitted to Plan A facilities.

Covid Care Centres (CCCs) were created for the quarantine of all international passengers, interstate travellers and contacts who did not have facilities for quarantining at home as per the guidelines. Covid Hospitals were designated for the management of symptomatic patients and Covid First Line Treatment Centres (CFLTCs) were designated for the management of asymptomatic Covid positive patients. As the caseload increased, CFLTCs also admitted patients with Category A symptoms. Covid Second Line Treatment Centres were also identified and made functional. At least two hospitals in each district were designated as Covid Hospitals for the treatment of symptomatic patients in the initial phase, and each Covid Hospital was linked to two adjacent CFLTCs.

Guidelines and Standard Operating Procedures were prepared for establishing and managing Covid Hospitals and CFLTCs. The guidelines for admission to these centres were revised from time to time. Checklists were prepared for monitoring Covid Hospitals and CFLTCs weekly. CFLTCs were supported by the local governments concerned. Provision of adequate staff and biomedical waste management were supported by local governments. Supervisory teams were sent from the State centre to all districts to monitor the functioning of all Covid hospitals and CFLTCs. The team did supportive supervision of all facilities using a checklist prepared at the State-level. Daily review with all hospital superintendents was done through video conferencing, and remedial action taken for any deficiencies or shortcomings. The guidelines and other related documents were published on the website www.dhs.kerala.gov.in to ensure transparency regarding the guidelines and Standard Operating Procedures used in Covid management.

Covid patients were admitted to these facilities as per the State guidelines. All Covid positive patients were admitted to the nearest Covid hospital or CFLTC. A nodal officer was assigned to each Covid care facility. Helpdesks functioned at all such facilities and Helpline numbers were provided to patients and carers. In addition, psychological support was provided to all the Covid positive patients and other persons in quarantine through dedicated psychological support teams.

In addition, infrastructure management teams at State and districts-levels closely monitored the functioning of all facilities providing Covid treatment. The management and supervision of all infrastructure-related matters were dealt with directly by a high-level Government Committee. Infrastructure management teams were created at State and district-levels to monitor the bed occupancy status on a daily basis, and to coordinate the allocation of additional beds or facilities. ICU and ventilator beds were also allocated for management of Covid-19 patients with severe symptoms. As on September 28, 2020, a total of 9125 beds were allocated in Covid hospitals. In addition there were 1429 beds in other Government hospitals, 35874 beds in CFLTCs and 4813 beds in other private hospitals (total beds in these private hospitals is 21768) for treatment of Covid-19.

Private sector engagement in Covid-19 management

A dedicated private hospital management team was constituted in the State and in district Control Rooms. From the beginning of Covid control activities, the private hospital engagement team was working in close liaison with the district private hospital engagement nodal officers, private hospital managements and the IMA. They enlisted all the private hospitals district-wise, and collected the details of the available facilities including bed strength, ICU facilities, ventilators, specialists available, dialysis facility and ambulances.

A series of online meetings with the representatives of private hospital organisations, namely, the Indian Medical Association, Kerala Private Hospital Association, Catholic Hospital Association of India (CHAI), Private Medical colleges Association and Qualified Private Medical Practitioners Association were held. The Chief Minister and Health Minister regularly conducted interactive sessions with the Private Hospital owners and management representatives. The Principal Secretary, State Mission Director (NHM) and Project Director (KSACS) also conducted multiple online meetings with the private hospital associations and discussed on Covid-19 case management in private hospitals, non-Covid case management, telemedicine facilities, mobile medical units and HR support. The private hospital associations agreed in principle to the Government rates for treatment of Covid-19 patients.

Infrastructure and material management

The Kerala Medical Services Corporation Limited (KMSCL), a fully owned company of Government of Kerala under the Department of Health and Family Welfare, is the central procurement agency for all

essential drugs, and for medical devices and equipment for the health care institutions under Government. The Corporation is a Special Purpose Vehicle and has been entrusted with the establishment of medical-based ancillary facilities such as Cath lab, dialysis centres, pathological labs, diagnostic centres, x-ray or scanning facilities, and ambulance services in the State. With the outbreak of Covid-19 in Kerala, the Department of Health took immediate action and a State Control Room was set up. The Rapid Response Team (RRT) became functional at the State headquarters and the KMSCL was entrusted with the task of material procurement, logistics and supply chain management. For the management of Covid-19, KMSCL had set up one Covid Cell in the headquarters under the leadership of the Managing Director with all department heads as members.

Tracking and testing strategy

As the initial cases were reported from persons who travelled from Wuhan to India, Kerala focused on persons who returned from China. The strategy of testing and tracking were modified when new epicentres of disease emerged in Europe, Iran and Gulf Co-operation Council (GCC). Kerala followed an aggressive strategy of quarantining and placing under observation all those who came from hotspots. Contact tracing of all Covid affected persons was conducted and they were placed under observation

Setting up of Covid First Level Treatment Centres (CFLTCs)

To manage the Covid-19 pandemic, Government identified certain hospitals and declared them as dedicated Covid hospitals for managing and providing treatment to patients tested positive. With the increase of cases, few more hospitals were added to the grid. It was later decided that patients with mild symptoms would be separated from critical patients. Hence the concept of Covid First Level Treatment Centre (CFLTC) was introduced. A treatment protocol to shift the patients from CFLTCs to Covid hospitals and vice versa was formulated to reduce the burden of hospitals. CFLTCs were set up in places other than hospitals like hostels, and auditoriums which were converted into general wards. Each CFLTC was associated with a Covid hospital.

Arrival of Non Resident Keralites

In the last week of June 2020, the Government of India gave permission for the return of expatriates from various foreign countries.

The Government of Kerala intended to bring back all the stranded Keralites safely into Kerala. All returnees had to undergo screening at arrival airports as per the protocols set by Health Department, Government of Kerala. All returnees, including asymptomatic persons who did not have proof of having undergone necessary tests, were made to take rapid antibody tests on arrival at the airport by the Government of Kerala.

Ambulance network

KMSCL has played the most critical role in the ambulance services by managing the Kaniv-108 ambulances to mobilise the Covid-19 suspects or patients from their households and exit points to the isolation facilities. Total number of 316 ambulance vehicles are available in these categories and number of vehicle used for Covid-19 are 293.

Psychosocial support during Covid-19 outbreak in Kerala – "You are not alone; we are with you"

The Government of Kerala recognised the need for psychosocial support to the people, given the context of lockdown and measures such as isolation and quarantine undertaken to address the spread of Covid-19. Government of Kerala decided to provide psychosocial support to the persons in quarantine or isolation and their family members. On February 4, 2020, Psychosocial Support (PSS) Teams were constituted by the Government in all districts under the District Mental Health Programme (DMHPs). Psychiatrists, psychiatric social workers, clinical psychologists, social workers and counsellors started working in the entire State under DMHPs. Psychosocial helplines were arranged in all districts in addition to the DISHA Helpline Number for the entire State.

As the number of persons in quarantine began to increase drastically, counsellors from Integrated Child Development Services (ICDS), Integrated Counselling and Testing Centre (ICTC), and National Health Mission (NHM) were given training and pooled under the PSS Teams in districts. As of now 1327 personnel are working in the entire State to provide psychosocial support. The prevalence of social stigma against Covid-19 patients were mostly because of the spread of fake information, social isolation, and social media harassment. Measures were taken to create awareness and in case of social media harassment, information was sent to the media cell of control rooms. A six-minute video on relaxation techniques was prepared and sent to persons in need. An awareness leaflet on better communication and stress management was prepared and given to staff of isolation wards. The same was also provided to the training team to be included in the training module of isolation ward staff.

Psychosocial support and counselling calls were made regularly to patients undergoing treatment, children with special needs, guest labourers, elderly people living alone and health workers. As the number of alcohol-withdrawal cases began to increase, community de-addiction guidelines were prepared with the aim of treating such cases at the primary care-level. A panel of psychiatrists was set up in all districts to help primary care medical officers in community-based de-addiction.

As on October 10, 2020, 14.44 lakh persons in quarantine or isolation had been given psychosocial support and counselling calls. Among the psychological issues noted were stress, anxiety, stigma, and insomnia. Social needs like food, medicine, medical consultations, and other essential items were met through ICDS, Youth Welfare Board and local governments. A module on stress management and motivation enhancement among health personnel was sent to districts for conducting online classes to frontline doctors, nurses, health workers and control room personnel.

As suicides started getting reported among school children while starting online classes, counselling was extended to all school children. Phone numbers of the parents of anxious or worried children were provided to PSS teams for psychological intervention calls. DISHA Helpline numbers were circulated among children to call in case of any need. As of October 10, 2020, 3,47,105 children were given reassurance calls, and where needed, treatment.

Capacity building

In a herculean effort, the entire personnel of the entire health management system were trained in Covid-19 precaution activity.

The Directorate of Health Services and the National Health Mission joined hands with all departments in the State and with private organisations. Three types of training were designed and conducted: sensitisation programmes, skill training, and motivational and stress management training.

Covid-19 management – volunteer and elderly care

A community-level coordination committee comprising local government, community volunteers, Kudumbashree, and Women and Child Development Department was organised in all districts to conduct daily calls and visits to the homes of the elderly. There are three lakh volunteers involved in elderly and palliative care activities in the field.

Activity report on mass media campaign for Covid-19 awareness

A series of mass media campaigns were conducted for Covid-19 awareness from the beginning of 2020. The Health Minister's video requesting all people coming from Covid-affected countries to follow Government regulations was widely disseminated through television channels, FM radio stations, print and social media.

A Special Booklet named "Karuthal" with awareness content on Covid and non-Covid diseases was printed and disseminated. In order to intensify the social media campaigns, a comprehensive whatsapp chatbot was implemented where people could get important messages and contact details by saving an official mobile number in their phone. A Special Postal cover was issued with Covid awareness content with the help of the postal department. A special campaign was also conducted through "Victers" channel after the Government started online classes through the channel.

Hoardings with Covid-19 awareness content was placed all over Kerala, and messages were placed on Jan Shatabdi trains and vehicles of the Department of Health and Family Welfare. A special campaign was conducted through the online media handles of mainstream media and important awareness messages were also published in popular magazines as well. A series of awareness videos, were produced and disseminated through all the platforms. A special interactive session with the Chief Minister was conducted every day for media persons as well as for common people to clear doubts about the pandemic and its status, to be carried live on Government social media handles.

e-Sanjeevani – telemedicine platform

When social distancing is among the major measures used to fight against Covid-19 pandemic, tele-health is stepping-up as a key technology for safe and efficient communications. Indeed, the World Health Organisation identified telemedicine among essential services in "Strengthening the Health Systems Response to Covid-19" policy.

In Kerala, the Health Department launched e-Sanjeevani telemedicine services in Kerala on June 10, 2020, with DISHA as the State hub for managing the telemedicine activities for the State. e-Sanjeevani has taken 368 doctors, including specialists, on board. They provide services for an average of 500 persons per day from all across the State. The average time for a consultation is 10 minutes 40 seconds, and the average patient wait time to get connected to a doctor is 3 minutes 54 seconds. e-sanjeevani has general OPD services as well as speciality OPD services. By providing these services, the rush in the outpatient department was reduced and the delivery of services ensured to the general public at their door step.

Government of Kerala dashboard

Covid-19 data are made available to the public through the Government of Kerala dashboard available in the web address www.dashboard.kerala.gov.in. This dashboard is updated daily and gives data on the number of Covid-19 cases (active and recovered), total number of deaths, district-wise distribution of cases, district-wise distribution of person under hospital-quarantine and home-quarantine, daily hospitalisations, number of samples sent and tested, with results and so on. It also shows the hotspots across the State, volunteer distribution, distribution of volunteer support groups, and details of psychosocial support.

Economic Response

The pandemic and subsequent lockdown had a devastating impact on the State's economy. The national lockdown that started on March 25, 2020 and extended till May 31, 2020, brought the economic activities to a stand-still. The lockdown continued in specific areas based on the number of cases. Most of the productive sectors bore the brunt of the lockdown, while some sectors like agriculture, banking, and public administration were largely unscathed. Covid hit different sectors of the State's economy differently.

In the quick loss assessment report brought out by State Planning Board, Government of Kerala in May, 2020 for the first quarter of 2020-21, the total lockdown in April was expected to bring about 80 per cent loss in Gross Value Added (GVA), and the subsequent two months were expected to have about 15 per cent and 10 per cent losses. Along with these assumptions, and considering that the State's economy would have grown at the same rate as in 2019-20 but for the lockdown, a loss of Rs 80,000 crore was anticipated in the first quarter. The loss in sectors such as agriculture, animal husbandry, fisheries, industry, labour, tourism, and Information Technology were also assessed.

The loss assessment report for April to June, 2020 that was brought out later by the State Planning Board identified that the first quarter GVA of 2020-21 shrunk around 26 per cent of last year's first quarter GVA. The loss in GVA during Q2 of 2020-21 compared to the same quarter of last year was estimated to be 18.5 per cent.

Kerala's economic interventions

The Government of Kerala undertook various initiatives to arrest the impact of Covid-19 on the State's economy and lives of people. These include infusion of money into the economy through direct and indirect support, ensuring food and shelter for the needy, generating employment opportunities, increasing production of agriculture and industrial sector, and support to non-resident Keralites who returned home from abroad as well from other States. The Government disseminated information about the speed of the pandemic and the containment strategies adopted by it.

Rs 20,000 crore Covid-19 package

The Government of Kerala came out with Rs 20,000 economic package to tide over the crisis, much earlier than other States and the Central Government. This sum was infused into the State's economy on an emergency basis.

The details of the disbursements under this package were spelt out in the beginning of this chapter.

To this we must add the allocation of Rs 500 crore to meet the additional expenses in the public health sector to roll out Covid-19 care facilities. To provide food grain through the public distribution system, the Government further allocated Rs 100 crore. Besides, an allocation of Rs 50 crore was made to provide meals at just Rs 20, as part of the Hunger Free Kerala project. To roll out this, the Government set up 1,000 food stalls in April itself.

Further, the State Government allocated Rs 14,000 crore to clear all pending payments of the State Government to institutions and individuals.

Apart from the emergency direct infusion of cash into the economy, relaxations in norms and bill payments were given to ensure that people have additional cash at disposal. The Fitness fee for auto rickshaws and taxis was relaxed. A relaxation of one month was provided in the quarterly taxes of stage carriages and contract carriages. These concessions amounted to Rs 23.60 crore. The Government also allowed delayed payment of electricity and water bills for one month without any fines. Entertainment tax on movie theatres was waived.

Discussions were held with organisations of traders and businessmen to ensure adequate availability of essential materials during the lockdown. Online facilities were set up to ensure delivery of essential articles, including vegetables and pulses, to families during the lockdown. Voluntary services of organisations assisted people in need. Books were made available to those in quarantine with the assistance of publishing houses. Sufficient internet bandwidth was ensured, following discussions with service providers.

A meeting of the State Level Bankers Committee (SLBC) was called to persuade banks to not undertake any loan recovery proceedings during the economic turmoil caused by the pandemic and to provide financial relief.

The Government took measures to channelise the scarce resources at its disposal to address the most important needs of the economy. The schemes in the Plan of 2020-21 were sequenced in order of priority so that the resources could be utilised effectively.

Food security

Kerala devised a special scheme to ensure that food was available to all. "Subhiksha Keralam" is a massive people's campaign to achieve self-sufficiency in food production. The programme aims to increase farmers' income, attract youngsters to farming and rehabilitate return migrants, thus giving new life to agriculture in the State.

As per the Plan, paddy is to be cultivated in 5000 hectares, vegetables and plantain in 7000 hectares each, tubers in 5000 hectares, and lentils and small grains in 500 hectares each. A total of 25,000 hectares of fallow land is being measured for cultivation under the leadership of the Local Self Governments, with the guidance of the Department of Agriculture and the cooperation of the general public. Kitchen gardens are to be encouraged in all households, with the Government providing seeds and saplings. A chain of cold storage facilities is envisaged to ensure that the produce is preserved after harvesting. The State is preparing to adequately market the increased production, so that producers get a good price.

The major departments involved in the programme are Agriculture and Farmers Welfare, Animal Husbandry, Dairy Development, Fisheries. Co-operation, Water Resources, Industries and LSG to provide credit, marketing and irrigation support.

The measures for ensuring assistance and relief to the agriculture sector during the lockdown period started much earlier. A total quantity of 386,944 tons of paddy was harvested in Kerala till the first week of April 2020, of which 1,64,951 tonne was procured by Kerala State Civil Supplies Corporation Limited (SupplyCo).

The Department of Agriculture, Vegetable and Fruit Promotion Council Keralam (VKPCK), and HortiCorp intervened in the marketing of vegetables. The Farmers Retail Outlets (FRO) set up locally (one each in every panchayat, two each in municipalities, and five each in corporations) enabled farmers to sell their products locally to consumers. The online marketing strategy adopted by the Government agencies helped in the direct sale of products like mango, pineapple, banana, papaya and vegetables to the city dwellers. Moreover, the inter-district movement of surplus produce was also organised. Six hundred paddy threshers were arranged by the department in Palakkad, Kuttanad and Kole areas.

From March 23, 2020 till April 15, 2020, HortiCorp procured 1200 MT of fruits and vegetables from farmers within and outside the State. Online sale of fruits and vegetables was arranged through online food delivery platforms in Thiruvananthapuram, Kottayam, Ernakulam, Thrissur and Kannur districts. HortiCorp and VFPCK made efforts to procure pineapple from the production sites and sell it online. Supply of fruits and vegetables was also arranged to different community kitchens, residents' associations, guest worker camps, and other agencies throughout the State. Sale of fruits and vegetables to consumers also took place through the 100 own-stalls and around 200 franchised outlets of HortiCorp.

Tea

The procurement of the tea by the Government of Kerala for supply through the public distribution system lifted prices of the commodity and provided certain relief to the stakeholders. SupplyCo purchased about 2.5 lakh kg for distribution under PDS as a part of the food kits of essential items being distributed during the lockdown period.

Animal Husbandry

Kerala Livestock Development Board (KLDB) continued the supply of frozen semen, liquid nitrogen, and other artificial insemination (AI) inputs to all centres in the State during the lockdown period, even when the production suffered mainly because of the shortage of liquid nitrogen, which arrives from Pondicherry. The limited quantities of liquid nitrogen received were used to save the frozen semen doses already in stock. Under the Covid Relief Cattle Feed Subsidy Scheme, 2.95 lakh sacks of cattle feed were given to 1.82 lakh dairy farmers with a Government subsidy of Rs 400 per sack. Government of Kerala funded Rs 11.83 crore of the entire cost of Rs 39.68 crore.

The reduction in milk consumption during the lockdown and the restriction led to the reduction in the sales of the milk but the production and procurement remained relatively high. This necessitated the conversion of surplus milk into milk powder. Nearly 1.2 to 1.25 lakh litres per day of milk was sent for conversion to Tamil Nadu. However, the Government of Tamil Nadu refused to procure milk from Kerala.

After discussions between the Kerala and Tamil Nadu Governments, on an emergency basis, Tamil Nadu agreed to procure 50,000 litres of milk for conversion per day. To avoid wastage of the surplus milk

and ensure nutrition to the vulnerable sections of the society, the Government of Kerala decided to distribute milk and milk products through Anganwadis, guest labour camps, community kitchens, ConsumerFed, and the Civil Supplies Cooperation through Milma.

To give an impetus to the animal husbandry sector, the Government has proposed to set up 10,000 cross breed cattle units. In all local government bodies 8000 dairy units are to be set up. Of these, 200 of them will be mechanised with Government support. Farmers were provided assistance in procuring milking machines as well. Value addition of dairy products – like cheese and curd – will be augmented. Domestic poultry farms and piggeries are to be encouraged and assisted.

Fisheries

With the imposition of the lockdown, all fishing harbours and fish landing centres in the State were closed down. Mechanised fishing boats were not allowed to operate and fish auctions were prohibited. The traditional way of fishing was, however, permitted. Traditional fishermen were allowed to go out to fish but were asked to not auction their products, as social distancing measures were difficult to implement. Instead, purchase and sales of marine fish were conducted at a price fixed by the Government. The Harbour Management Societies were entrusted to fix the prices of different fish. In the fishing harbours and landing centres, a token system was introduced to avoid crowds. A mobile application was also developed for the online marketing of fish. The Government issued orders exempting aquaculture activities, fish farms and hatcheries and movement of feed, seed, and aquaculture essentials from lockdown restrictions.

Salt water ponds were planned to be set up in 3,000 hectares for farming the Pearl Spot variety of fish. Besides, 5,000 units are to be set up for joint salt water fish farming so that production can be increased by 5,000 tons. Around 5,000 plastic ponds costing Rs 1 lakh per unit were planned to be set up. Plans were made to set up mobile aqua labs in all 14 districts to ensure quality and disease control. The Government of Kerala hopes to create 23,000 jobs in fisheries alone.

Securing industries

Kerala's economy has taken a hit due to the Covid-19 and the subsequent lockdown. Tackling this situation is not easy. The 'Vyavasaya Bhadratha' scheme is formulated as a comprehensive plan for that purpose. It is being implemented by the Department of Industry. As a part of this, Rs 3,434 crore will be provided to small and medium enterprises (SMEs) by way of additional capital infusion and interest subvention. There are 1.56 lakh small enterprises in Kerala, 70 per cent of the total enterprises in the State. The sector also employs 40 lakh workers.

Margin money assistance and interest concession for additional credit will be provided to existing micro, small and medium enterprises (MSME). A one-time settlement of loan arrears will be implemented by KSIDC and KINFRA. Six-month extensions will be given to these enterprises for the repayment of interest. Three months' rent will be waived in standard design factories under the Department of Industry. Entrepreneurs who use public facilities in industrial parks will be exempted from rent for three months. Interest subsidy will be granted for MSMEs and manufacturing industries. Interest rate on loans taken for diversification and development will be discounted by six per cent for six months.

Special loans will be provided for working capital and asset creation for the businesses that already have a KSIDC loan. Three-month moratoriums were announced on interest and capital to all operating units under KSIDC. After the moratorium, the loan can be repaid without penalty. The fine for delayed payment to entrepreneurs who have taken loans from KSIDC will be waived off completely for six months. KSIDC will provide loans of up to Rs 50 lakh to MSMEs. The repayment period will be extended to entrepreneurs who take up space in the industrial parks of KSIDC and KINFRA. The lease premium will be reduced in advance. By way of giving special attention to the enterprises owned by members of the disadvantaged sections, women, Scheduled Caste (SC), Schedulted Tribes (ST), and young entrepreneurs will be given 25 per cent margin money.

The Government has also implemented a string of relief measures and provided various incentives to IT firms which are based in the State-run IT Parks. Rent has been waived or a moratorium has been granted on payment of rent for the months of April, May and June, depending on the area under lease, for companies based in the State's IT Parks. Surcharge on rent has been waived for six months, from April to September. Annual rent escalation of five per cent has been waived for 2020-21, in Government owned buildings within IT Parks. Subsidies have been announced on electricity tariffs in IT Parks as well. Additional time of six months has been granted for commencement and completion of construction works in land under the IT Parks, over and above the deadline as per agreement.

The Kerala State Coir Corporation used to provide

two months for exporters to make payments for the goods they procured from the Corporation. As a part of measures to address the economic issues due to the Covid-19 pandemic, this has been extended to four months. Similarly, buyers who entered into MoU at Coir Kerala Fest have been provided 20 per cent discount (on the products they purchase). The benefit initially offered for three months till December 2019, has been extended for six months till June 2020. A relief package has been announced, and 1.37 lakh coir workers were provided relief of Rs 1,000 per worker. Further, income support assistance is being provided to coir workers.

Public sector enterprises

The Government of Kerala mobilised its resources to produce hand sanitisers. Kerala Drugs and Pharmaceutical Limited, a public sector company under the Government of Kerala, started mass production of hand sanitiser to ensure the availability of the sanitisers at the onset of the Covid-19 pandemic.

Attracting investments

Every challenge brings an opportunity along with it. Overcoming challenges also have to do with utilising the opportunities that emerge alongside. In recent years, Kerala has displayed a flair for emerging out of the rubble. In India's battle against Covid-19, Kerala has emerged as a forerunner. The fact that amidst all these challenges, the entire Government machinery and society as a whole – including voluntary organisations – have been in perfect sync makes the State stand out as a safe and secure destination for investments.

The Government of Kerala has decided to grant all major industrial licenses and permits within one week of application, with the condition that entrepreneurs will complete due procedures within a year. Multi-Modal Logistics Centres are sought to be established in Thiruvananthapuram, Ernakulam, Kozhikode, and Kannur connecting the airport, port, railways, and roads in these cities. Once this plan materialises, Kerala could emerge as a major player in international trade and commerce. Logistics parks are to be set up in different parts of the State to take advantage of the opportunities in export and import. Azheekal Port is being equipped to handle large volumes of cargo.

Value addition of agricultural products are to be encouraged and land will be leased out to industries in the sector, at the Mega Food Park, Palakkad. A Coconut Park with emphasis on value addition is to be established in north Kerala. A star rating system is to be introduced which will grade industries as Gold, Silver and Bronze based on the quantum of investment made and employment generated, so that the Government can ascertain benefits accrued and concessions to be made. An Investment Advisory Committee consisting of investors, policy makers and industry leaders, is being set up to assist the Chief Minister in making Kerala a preferred investment destination. With these measures, Kerala is striving to create employment as well as entrepreneurial opportunities for Keralites including return migrants, in a period when the economy as a whole is contracting.

Tourism

The State Government has announced one-time financial assistance of Rs 10,000 to 328 tourist guides who are rendered jobless because of the pandemic and a one-time maintenance grant of Rs 80,000 to Rs 1.20 lakh to houseboats based on the number of rooms in them.

Relief was also provided to homestays, which have been moved from the commercial category to the residential category. This allows the facility some relief in the house tax amount to be remitted to the local bodies. Administrative sanction of Rs 32.80 lakh had been given to assist approved tourist guides at the regional, local, State, and national-levels. After construction works were allowed, there was a concerted effort to complete the infrastructure creation project at major tourism spots.

Transport

With the onset of the Covid-19 induced lockdown, Kerala State Road Transport Corporation (KSRTC) actively intervened to assist Keralites stranded in other parts of the country. It conducted special services to transport 400 persons, including students stranded in various parts of Karnataka (Gulbarga, Mangalore, Mysore and Bangalore) to different parts of Kerala. Similar special services were conducted to help the students stranded in Theni and Madurai in Tamil Nadu.

KSRTC also provided bus services from Palakkad and Thrissur Depots to transport persons who came by train from outside Kerala, including migrant labourers, to isolation centres at Palakkad and Thrissur. Special services were provided at airports for travel needs of those persons coming from abroad.

The special service of KSRTC was used extensively for the transfer of the sick and non-infected persons to the isolation centres and other camps in different parts of the State. Special services were also undertaken as per the directions of the District Collectors for the travel of health sector officials.

Though lockdown was partially relaxed with effect from May 3, 2020, the public transport system was allowed to function only from May 20, 2020. To ensure that the people have adequate transportation facilities available to them, the KSRTC started to operate a limited number of services as per the direction of the Government by complying the Covid-19 protocol. From June 9, 2020, KSRTC gradually started to operate more services.

Power

Ever since the start of the spread of the pandemic in the State, Kerala State Electricity Board Limited (KSEB) has switched its priorities. Providing service connections for Covid-19 mitigation facilities being set up by the Government and maintaining uninterrupted supply to all its consumers took precedence over all others. A contingency plan was put in place to ensure essential staff in operation and maintenance wings. Standby teams were constituted including contract workforce or retired employees.

While strengthening the Centralised Call centre, KSEB also decided not to disconnect the supply on the grounds of non-payment of the electricity charges, till further orders. Grace periods were allowed and interest for delayed payment was waived during the grace period. Domestic consumers were allowed to make part-payments of their bills. Non-domestic consumers who were billed based on average consumption were given an option to remit 70 per cent of the bill amount. High Tension (HT) and Extra High Tension (EHT) consumers were also allowed to remit their electricity bills for March and April, 2020 up to May 16, 2020, without claiming interest for delayed payment.

KSEB has decided to absorb the transaction charges for online payment of electricity bills through payment gateways from April 20, 2020, to July 31, 2020. Those who were using an online facility for the first time for remitting their electricity bills were offered five per cent cash back (subject to a maximum of Rs100 per bill) between May 4, 2020, and December 31, 2020. KSEB also waived the application fee for new service connection applications submitted online for one year.

As per the directives of the Government of Kerala, a rebate of 25 per cent on the fixed charge was allowed to industrial and commercial consumers and private hospitals for March, April, and May 2020 (during lockdown period). Industrial and commercial consumers and private hospitals were also given the option to defer the payment of balance fixed charge (75 per cent) of these months (March to May), up to December 2020, without levying interest during the deferred period.

Labour welfare

The Government of Kerala came out with a scheme to provide 68,02,984 workers with membership in 16 different Labour Welfare Boards with Rs 943.20 crore as immediate assistance to address the financial problems faced by labourers during the lockdown. All registered labourers were provided Rs 1000 as relief fund. Welfare Boards with better fiscal standing have sanctioned more funds. Welfare pension for four months, including April, was sanctioned in a lump sum. Government sanctioned over Rs 58 crore to almost four lakh labour welfare society members registered with societies under various Government departments.

Members of Abkari Workers Welfare Board were provided Rs 5,000 as financial aid and Rs 10,000 as interest loan. Under the Motor Vehicle Workers' Welfare Board, bus workers were provided Rs 5,000, goods vehicle workers Rs 3,500, and taxi workers Rs 2,500. Auto rickshaw and tractor workers and automobile workshop workers were provided Rs 2,000 and Rs 1,000 respectively. Members of the Toddy Workers' Welfare Fund Board were provided Rs 5,000 assistance and Rs 10,000 as an interest-free loan. Construction workers and farmers, who are members of their respective welfare boards, were provided Rs 1,000. Beauticians (approximately 40,000) who are part of the Welfare Fund Boards were provided Rs 1000.

The Kerala Dairy Farmers Welfare Fund Board distributed pensions to dairy farmers. Special relief scheme for the farmers who had to pour out milk from March 1, 2020, to March 20, 2020, at Rs 1.00 per litre of milk poured and a maximum of Rs 1000 per farmer has been distributed. An allowance of Rs 10,000 each for Covid-affected farmers and Rs 2,000 for farmers who are under quarantine is also being distributed

Civil Supplies

Ensuring that the people have enough food materials and no one is going hungry remained a priority of the Government of Kerala throughout the lockdown period, and after. The Government of Kerala provided kits with 17 items to all ration card holding households in the State in April in the wake of the Covid-19 lockdown. (Table 16.1)

A total of 84,48,016 ration cards were provided with the Athijeevana kit. The scheme-wise distribution of Athijeevana kit is given in Table 16.2.

Athijeevana kit was provided in April as a one-time provision.

In addition, Government of Kerala provided an Onam kit in August 2020 containing 11 items – sugar (one kg), green gram (500 g), jaggery (one kg), chilli powder (100 g), coriander powder (100 g), turmeric powder (100 g), sambar powder (100 g), coconut oil (500 ml), pappad (one packet), vermicelli or payasam ada (one packet) and broken wheat (one kg).

From September 2020 onwards the Government of Kerala started providing grocery kits containing eight items – chickpeas (750 g), sugar (one kg), atta (one kg), coconut oil (500 ml), chilli powder (100 g), salt (one kg), green gram (750 g), dal (250 g). Eight-item kit will be distributed each month from September 2020 to December 2020 to all ration cardholders.

Table 16.1 *Details of items in Athijeevana kit*

Items	Quantity
Sugar	1 kg
Tea	250 g
Beans	1 kg
Chickpea	1 kg
Coconut Oil	500 g
Atta	2 kg
Cornflour	1 kg
Chilli Powder	100 g
Coriander Powder	100 g
Dal	250 g
Turmeric powder	100 g
Fenugreek	100 g
Mustard	100 g
Soap	2 numbers
Sunflower Oil	1 litre
Urad Dal	1 kg

Monthly rations distributed from April to September 2020, in million tonnes (MT), is given in the Table 16.3.

A total of 11,10,583.67 MT of rice, 1,36,688.68 MT of wheat, and 36,766.09 MT of atta was distributed to the ration card holder from April to September 2020. According to the 2011 census 78,53,754 was the number of households in Kerala, there are 88,80,695 ration card holding households in Kerala as on September 30, 2020.

Students

As part of the measures taken to contain the spread of Covid-19 pandemic, schools were closed on March 10, 2020. To compensate for the cooked mid-day meal which could not be provided to children under the prevailing circumstances, it was decided to provide food security allowance as per provisions contained in National Food Security Act, 2013 and Mid-Day Meal Rules, 2015.

As on August 19, 2020, Food Security Allowance was given to eligible students, from pre-primary classes to 8th standard. The allowance comprises of the entitled quantity of food grains and the cooking cost due to the child. Food Security allowance was sanctioned for 39 days in April and May 2020 and 15 working days in March, which were lost because of the lockdown. Kits were distributed during June to July.

Food kit contained rice and nine other grocery

Table 16.2 *Scheme-wise distribution of athijeevana kit*

District	AAY	PHH	NPNS	NPS	Total
Thiruvananthapuram	62,452	3,88,642	2,57,896	2,01,728	9,10,718
Kollam	48,114	2,84,307	1,88,121	1,98,597	7,19,139
Pathanamthitta	23,523	1,02,728	1,07,499	92,843	3,26,593
Alappuzha	40,426	2,39,843	1,51,610	1,37,890	5,69,769
Kottayam	35,048	1,63,808	1,68,879	1,27,555	4,95,290
Idukki	32,359	1,21,137	64,015	67,436	2,84,947
Ernakulam	37,361	2,50,017	2,57,694	2,71,583	8,16,655
Thrissur	52,388	2,80,858	2,13,181	2,60,751	8,07,178
Palakkad	47,571	3,05,880	1,85,192	1,81,107	7,19,750
Malappuram	52,934	3,78,198	2,01,057	2,97,807	9,29,996
Kozhikode	38,768	2,80,884	1,99,174	2,24,917	7,43,743
Wayanad	49,652	66,737	44,806	51,585	2,12,780
Kannur	35,514	1,64,628	1,89,298	2,16,458	6,05,898
Kasaragod	30,323	1,01,648	74,934	98,655	3,05,560
Total	5,86,433	31,29,315	23,03,356	24,28,912	84,48,016

Table 16.3 *Monthly rations distributed, April to September 2020* in million tonnes

Month	Total rice distributed (regular+PMGKAY+normal+ Special) to all ration cards (AAY, PHH, NPS, and NPNS)	Total wheat distributed (regular +PMGKAY) all eligible ration cards (AAY and PHH)	Total atta distributed all eligible ration cards (NPS and NPNS)	% of ration cards availed
April	2,17,025.69	15,709.55	5,698.45	98
May	1,97,881.78	15,536.44	4,572.01	97.3
June	1,92,711.02	15,414.23	7,377.94	90.1
July	1,55,475.33	29,733.28	6,904.21	89
August	1,90,253.63	30,502.33	6,436.24	96.1
September	1,57,236.22	29,792.84	5,777.24	84.7
Total	11,10,583.67	1,36,688.68	36,766.09	

items, which was distributed based on the feeding strength of the academic year 2019-20. The kit was distributed through SupplyCo stores. Details are given in the Table 16.4.

ICDS food supplements

Anganwadis were closed as a preventive measure with the outbreak of Covid-19. During the period from March 22, 2020, to September 30, 2020, 517841 children under three years and 4,44,175 children in the age group of 3-6 years are given food by Take Home Ration (THR) scheme as part of Supplementary Nutrition Programme. Accordingly, food items were provided to a total of 9,62,016 children in the above two categories. Anganwadi workers delivered THR at the doorsteps of all beneficiaries. Amrutham Nutrimix was given to children of 0 to three years and a kit consisting of rice, green gram, and broken wheat were provided (twice in a month) to children of age 3-6 years.

Migrant workers

Migrant labourers were also provided food and other provision during the lockdown period. Camps were set up to ensure better facilities for migrant workers. The camps that were set up for the migrant labourers, were of four types.

1. Camps run by district administration: The workers here were provided with cooked food through the community kitchen run by the Local Self Government Department with the aid of voluntary agencies and Kudumbashree using their own fund. Adequate provisions were distributed to those workers who were willing to cook their own food.
2. Camps run by employer or contractor: The workers in these camps were ensured with food and other amenities by their employer or contractor. The officials of the Labour Department oversaw the activities.
3. Shelters scattered in rented buildings or converted as camps: The workers here were provided with cooked food through community kitchen. Necessary provisions were disbursed to those workers who could cook on their own by the Labour department officials in coordination with the district administration.
4. Shelters scattered or workers not willing to join camps: The migrant workers sheltered here were provided with cooked food materials and other provisions by the Labour Department officials designated as camp coordinators.

Food was prepared in 1165 community kitchens which were started under 1034 Local Self Government Authorities and provided to 92,05,585 beneficiaries. Out of them, 4,34,280 were migrant workers.

Social welfare pensions

The present Government of Kerala streamlined the

Table 16.4 *Food kits to students*

Section	Items in the Kit
Kit A- Pre-Primary	1.2 kg of Rice + 9 items of grocery worth Rs 297.50
Kit B-Primary (Class 1 to 5)	4 kg of Rice +9 items of grocery worth Rs 299.50
Kit C- Upper Primary (Class 6 to 8)	6 kg of Rice +9 items of grocery worth Rs 399.50

distribution of the social welfare pensions and paid off the arrears. The pension was gradually increased from Rs 600 to Rs 1,300. The number of beneficiaries was also increased from 35 lakh to 58 lakh during this period. In the wake of Covid-19, the Government of Kerala increased the social welfare pension by Rs 100 to Rs 1,600 and distributed it on a monthly basis as well. These measures further strengthened our comprehensive social security net.

Kudumbashree

The role of the Kudumbashree in Kerala's Covid-19 fight is multi-sectoral and substantial. Kudumbashree effectively intervened to meet the demand for masks and sanitisers arising out of the fight against the pandemic. Kudumbashree units started the production of cloth masks from March 15, 2020 onwards and rapidly increased their production. Starting from March 18, 2020, Kudumbashree units also started producing sanitisers.

Kudumbashree in convergence with local governments started community kitchens to prepare food and to home deliver to those under home quarantine and for needy people. Joint Liability Groups also supplied their crops to the community kitchens.

The Government extended credit facility for employment generation by providing loans worth Rs 2,000 crore to self-help groups under Kudumbashree. Under this scheme, known as the Chief Minister's Helping Hand Loan Scheme (CMHLS), each unit was to receive Rs 5000, Rs 10,000, or Rs 20,000, based on their financial status. The interest of loan will be borne by the State Government. The tenure of the loan will be 36 months with an initial moratorium of six months.

Non-resident Keralites

The role played by non-resident Keralites in the growth of Kerala's economy has been well acknowledged. In fact, Kerala is quite often referred to as a remittance economy. In the light of the economic hurdles this pandemic has created, non-resident Keralites have returned to Kerala in large numbers. Right from ensuring their wellbeing while they were abroad amidst the Covid-19 outbreak, to arranging for their safe return to Kerala, the Government of Kerala has catered to their needs. A Covid Response Cell was set up in NORKA-ROOTS with 24x7 helplines to provide assistance to NRKs. Help desks were set up in 14 countries, across the Gulf, Europe, North America, Africa and South East Asia.

Box 16.2
Role of Kudumbashree during Covid-19

Kudumbashree created a three-tier WhatsApp group to spread awareness among the people which currently has 1.9 lakh groups with 22.5 lakh members. WhatsApp network was used for "Break the Chain" campaign and motivational campaign. NHG loan linkage programme initiated through Kudumbashree as NHGs represents 45 lakh families. Kudumbashree volunteers actively took part in the activities for material packing centres of local governments. Kudumbashree in convergence with Local Self-Governments started community kitchen to prepare food and it was delivered to those under home quarantine and for needy people.

Kudumbashree units started production of cloth masks from March 15, 2020 onwards and rapidly increased their production. From March 15, 2020 to April 7, 2020 it produced 18.5 lakh masks. Starting from March 18, 2020 till April 7, 2020 Kudumbashree units produced 4492.85 litres of sanitisers.

All elderly in the home quarantine were mapped by Kudumbashree and they are being called regularly through phone connecting them to the health or local body if needed. *Asraya* and *Snehitha* Calling Bell activities were strengthened In the context of the pandemic, *Snehitha* focussed on giving mental support to people who are quarantined, their family members, elderly, women and children who are in the threat of domestic violence, and also to the general public.

More than 16,268 Joint Liability Groups (JLGs) across the State voluntarily stood together for community kitchens and donated their products generously for the social cause. Rice, banana, vegetables and tubers were the important categories supplied as per local availability and requirements. The collection, transportation and distribution activities were organised and coordinated by respective district mission teams in rapport with the Local Self Government Institutions officials and peoples representatives.

The Chief Minister conducted video conferences on April 5, April 26, and May 23, 2020 with prominent pravasis and representatives of pravasi organisations to ascertain the situation on the ground and bring relevant issues to the notice of the Central Government. Letters were written both to the Prime Minister and the External Affairs Minister to arrange the safe return of those with expired visas and students whose educational institutions have been shut down owing to the pandemic. It was also requested that the Government of India should provide air fare for those who lost their jobs, those freed from jails, and labourers staying in camps. Priority was sought for those requiring immediate medical assistance, pregnant women and children, in returning to India. It was also requested that a rehabilitation package for return migrants should be announced, and that special schemes for their skill development should be administered.

On April 26, 2020, NORKA initiated registration for migrants who wished to return to India. A total of 5,55,074 pravasis registered and NOCs granted for 2423 chartered flights. A sum of Rs 57.50 crore was allotted to provide assistance to those who had returned with valid passports and job visas since January 1, 2020, and were unable to return because of the lockdown, at Rs 5000 per person. Similarly, for pravasis who came in after January 2020, and contracted Covid-19, a sum of Rs 10,000 was issued as medical assistance as part of the Santhwana Scheme. Online medical consultation was made available to pravasis through Quick Doctor and Doctor on Call. An agreement was reached with DHL for medicines to be shipped to pravasis in foreign countries on a discount.

A project called "Dream Kerala" has been formulated to reform the existing welfare programmes and to include new ideas, so that return migrants could be benefitted. Measures are underway to take stock of the skills and experience of return migrants as well, so that programmes could be devised accordingly for their rehabilitation.

To provide a livelihood for return emigrants by promoting self-employment ventures, the Norka Department has been providing interest-cum-capital subsidy loans of up to Rs 30 lakh under Norka Department Project for Return Emigrants (NDPREM). The Department proposes to enhance the loan limit from 30 lakh to 50 lakh and interest subsidy from three per cent to five per cent.

100 Days, 100 Projects

The Government of Kerala in September 2020 launched a "100 Days, 100 Projects" campaign. The aim was to complete 100 projects in the State in 100 days as part of an action plan to revive the economy. The campaign was to speed up projects which were delayed because of the pandemic.

As part of 100 days project, some of the major interventions included the following. The Government declared base price for vegetables. The Government continued its policy of ensuring food security so that no one in in the State should go hungry. As part of the 100 days programme, 1,16,440 jobs were created against a target of 50,000 jobs.

The Kerala Youth Leadership Academy was set up to provide leadership training to the youth of Kerala. Inauguration of 34 renovated school buildings, and

Box 16.3
Youth and Covid-19

Youth movements were pervasively present in the measures to combat the issues that rose out of Covid-19 and the associated lockdown. The volunteers of youth organisations cleaned the then yet-to-be completed Medical College hospital in Kasaragod so as to turn it into a Covid-19 speciality centre. The youth organisations took up the humanitarian act of cremating or burying the people who died because of the Covid-19 following the protocol in force at the time. The youth organisations also participated in the preparation, packing, and distribution of food from community kitchens. Kerala State Youth Welfare Board formed Kerala Voluntary Youth Action Force in every nook and corner of the State to provide a helping hand to people unable to venture outside their houses for buying essential items and medicines on account of the lockdown. The volunteers reached out to the people on the basis of the phone calls received from them. The local volunteers of the action force collected money and drew up the list of items needed including medicines. These items were bought from the nearby grocery, vegetable, or medical shops and delivered to the needy.

announcement of completion of hi-tech schools, and inauguration of 50 school buildings were done during this period.

Eighteen new buildings of district, and general, and taluk hospitals were inaugurated.

Sree Narayana Guru Open University, the first open university in the State, was inaugurated. The Vice Chancellor, Pro Vice Chancellor and Registrar of the University were appointed.

The milestones of the 100-day project included the inauguration of a single-window system in Ease of Doing Business, the completion of 50,000 houses as part of the Life Mission, the announcement of complete solid waste management status to 589 local governments, the implementation of Integrated Local Governance Management System (ILGMS) in 150 Local Self Government Institutions, comprehensive rehabilitation of expatriates and inauguration of Skill Depository, announcement of second Kuttanad Package, removal of sediments at Thottapalli and facilitation of water flow, initiation of 3 electricity substations at Kuttanad, administrative sanction to start Kuttanad brand rice at Alappuzha, inauguration of construction of Alappuzha-Changanassery semi-elevated road, and launching of Wayanad tunnel by Konkan Rail Corporation. Other important achievements in 100 days included the State-level inauguration of the Rs 200 crore Coastal Protection Project, the inauguration of the Jaljeevan Mission State Level Project, the inauguration of the Kochi Metro Rail from Thaikudam to Pettah and the completion of the GAIL Pipeline Project.

A second phase of the 100-days action plan was announced shortly after the local body elections.

With all these measures, even while fighting Covid-19 on the one hand, the Government hopes to reinvigorate various sectors such as education, health, agriculture, industry, irrigation, electricity, sports, culture, local government, and traditional sectors such as coir and cashew on the other. The Government strives to move forward with its commitment to development and social justice even in the midst of this pandemic, so as to realise a new Kerala.

Chapter 17
Human Resources: Unleashing the Potential

Introduction

Kerala has the potential to be India's skilled-labour hub.

The State's skilled professional workers have been the preferred choice of employers in India as well as other parts of the world.

The Government of Kerala recognises that skill training and development play a crucial role in promoting economic growth. A relative abundance of educated and skilled workers, a long history of entrepreneurship, and exposure to the wider world are our strengths. As global manufacturing becomes more automated and knowledge-intensive, Kerala's strengths with respect to school and higher education make it better equipped than most other States to deal with the new challenge.

Kerala's economy has transformed from a slow growth, predominantly rural economy in the 1960s into a fast-growing and services-oriented economy since the late 1980s. Today Kerala is one of the leading States in India in terms of per capita income, with the average income per person in the State being approximately 1.5 times the Indian average (in 2019-20). Nevertheless, the impact of economic growth on employment creation has been mixed.

The creation of employment opportunities in the formal sectors of the economy has not been fast enough, especially so in comparison with the rising supply of workers from the State. There has been a continuing stream of migration of skilled workers, particularly nurses, engineers, and other professionals from Kerala to other parts of the world. At the same time, inward migration of workers from other Indian States to Kerala has also been increasing steadily. Migrant workers have a significant presence now in many areas of Kerala's economy, in particular in sectors such as construction, which demand unskilled labour.

Factors affecting both the supply of and demand for labour have undergone significant changes in Kerala over the decades. The supply of labour in Kerala has been influenced mainly by the changes in the demographic structure. At the same time, advances in the State in social development, improvements in social security benefits, and empowerment of workers have been influencing the supply decisions of workers. The major demand side factors have been the acceleration in economic growth and the structural shift of the economy to a service-oriented economy.

For the first time, in 2017-18, there was a larger share of regular wage workers than casual wage workers in the work force. The industrial structure of employment in Kerala displays a maturing of structural transformation in employment as well, with more workers entering non-farm sectors. Women, though they continue to be highly concentrated within a few sectors, are diversifying to non-traditional sectors. The share of organised sector employment increased in both rural and urban areas among men and women. There are signs of movement towards higher skills among men and women in both sectors. However, such movement to non-conventional sectors is slow, and a fifth of the total employment still continues to be in elementary occupations. The change in the educational composition of workers in the sectors seems to suggest that the overall productivity growth in the economy was indeed driven by two factors, namely, changes in sectoral growth and increasing skill component in high productivity sectors. This indicates that education and skills play a very important role in productivity growth in the economy.

Features of Kerala's Labour Force

Changes in Demographic Structure

On the demographic front, Kerala has successfully transitioned from high birth and death rates to low birth and death rates. A sharp decline in fertility and the birth rates in the State occurred from the middle of the twentieth century. The decline in fertility rate in Kerala has been much faster than in the rest of India. In 1981, populations in the age group of 15-59 (also referred to as working age) years as proportions of the total populations of Kerala and India were 57.9 per cent and 53.9 per cent, respectively. Over the next two decades, the proportion of the working-age population (in total population) increased sharply in Kerala. In 2001, the proportion of the working-age population was 63.4 per cent in Kerala compared to 57 per cent in India as a whole.[17]

However, the rate of growth of the working-age population in Kerala slowed down after 2001. Between 2001 and 2011, the proportion of the working-age population (in total population) increased marginally in Kerala from 63.4 per cent to 63.9 per cent, whereas the corresponding increase was from 57.0 per cent to 60.3 per cent (or by 3.3 percentage points) in the

[17]Thomas and Jayesh (2019).

Table 17.1 *Proportion of population in different age groups, Kerala and India, 1981 to 2011* in per cent

Age groups	1981	1991	2001	2011
Kerala				
0-14	35.0	29.7	26.1	23.4
15-29	30.3	30.2	27.5	23.6
30-59	27.2	31	35.9	40.3
60+	7.5	8.8	10.5	12.6
Total	100	100	100	100
India				
0-14	39.5	37.2	35.3	30.8
15-29	25.9	26.6	26.6	27.5
30-59	28	28.9	30.4	32.8
60+	6.5	6.8	7.4	8.6
Total	100	100	100	100

Source: Census of India, various years (Thomas and Jayesh 2019)

country as whole. It appears that Kerala has already reached a stage at which it can benefit only marginally from the so-called demographic dividend. In contrast, the size of the working-age population is set to increase sharply in many other Indian States, especially in the northern and eastern parts of the country, including Uttar Pradesh and Bihar (Thomas and Jayesh 2019).

Labour Force Participation Rates

The labour participation rate indicates the proportion of the population that is economically active, which include the employed as well as those unemployed but actively seeking jobs. The proportion of the population that is employed is denoted by workforce participation rate or worker population ratio. Persons who are not economically active comprise those who are too young or too old to work, students, rentiers, recipients of pensions or remittances, the disabled, as well as persons attending to "domestic duties." It must be noted here that national labour force surveys have serious problems in terms of underestimation of women's employment.

According to the Periodic Labour Force Survey (PLFS), in 2017-18 labour force participation rates (or those in the labour force as proportions of the population aged 15 years and above) of males in rural and urban areas of Kerala were 71.1 per cent and 68.9 per cent, respectively. These proportions were lower than the corresponding labour force participation rates among men in the country as whole (Table 17.2).

Labour force participation rates (LFPR) among females (aged 15 years and above) were 25.9 per cent and 27.3 per cent, respectively, in rural and urban Kerala in 2017-18 (Table 17.2). Although low, it is important to note that female labour force participation rates in Kerala are higher than the corresponding rates in the country as a whole, particularly in urban areas. In fact, Kerala has among the highest rates of female labour force participation in urban areas in the country. In 2011-12, while labour force participation among women in urban Kerala was 22.2 per cent, the corresponding rates were only 10.9 per cent in Delhi, 13.5 per cent in Gujarat, 17.2 per cent in Karnataka, and 15.5 per cent in India as a whole (as per the usual principal and subsidiary status of workers) (Thomas and Jayesh 2019). To repeat an earlier caveat, national labour force surveys underestimate women's employment and labour force participation.

The LFPR in Kerala declined between 2011-12 and 2017-18 as did the share of part-time workers. The possible factors behind the declining share of labour force in the working-age population in the 2010s are increasing enrolment of persons aged 15 years and above in colleges and other higher education institutions, early retirement of persons in the older age groups, and withdrawal of working age women from the labour market. At the same time, trends from Kerala also point towards a growing preference for regular jobs and the declining importance of subsidiary workers (who are engaged in the labour market as part-time workers or on a temporary or seasonal basis). To sum up, while the overall labour force participation rates have declined,

Table 17.2 *Labour force participation rates (UPSS) for persons aged 15 and above in Kerala, 2011-12 and 2017-18* in per cent

	Rural male		Rural female		Urban male		Urban female		All persons	
	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18
Kerala	77.3	71.1	33.4	25.9	75.1	68.9	28.0	27.3	52.6	46.5
India	81.3	76.4	35.8	24.6	76.4	74.5	20.5	20.4	55.9	49.8

Source: National Sample Survey on Employment and Unemployment, 2011-12 and Periodic Labour Force Survey, 2017-18.

those who remain in the labour market are able to find more regular jobs.

In 2017-18, workforce participation rates (WPRs) or workers as a proportion of population (aged 15-59 years) were 74.3 per cent and 72.2 per cent respectively among men in rural and urban areas of Kerala. These proportions were lower than corresponding proportions among men in rural and urban areas of the country as a whole by one to two percentage points. In the case of women (aged 15 to 59 years), workforce participation rates in Kerala were marginally below the national average in rural areas but significantly above the national average in urban areas.

Importantly, the trend towards casualisation has been arrested: between 2011-12 and 2017-18, casual wage employment (as a proportion of all principal status workers, 15 years and above) declined from 37 per cent to 30 per cent, while regular employment increased from 28 per cent to 35 per cent. This welcome change in employment is mainly due to increasing regular wage employment among women both in rural and urban areas. For men also, regular wage employment increased in rural areas (Table 17.3).

An analysis of unemployment rates across age groups shows that the problem is the most acute in the age group of 15-29 years. Unemployment among the educated has been a serious area of concern in Kerala. It is essential that the future of Kerala's development path move closely with the future of the young and the educated in the State.

Sectoral Shares in Employment and Output

The sector-wise distribution of employment in Kerala indicates a maturing of structural transformation in employment in the State. In 2017-18, employment in the primary sector was only 18 per cent of the total employment in Kerala, while the shares of secondary and tertiary sectors were 32 per cent and 50 per cent respectively. At the same time, however, when compared with the transformation in the income structure, there is still a structural lag in employment transformation in the State. While the share of the primary sector in Kerala's GSDP declined from 14.4 per cent in 2011-12 to 9.5 per cent in 2017-18, the sector's share in employment remained stable at 18 per cent during the period. In the case of the tertiary sector, the share in GSDP increased from 57.5 per cent to 62.1 per cent even when the share in employment remained unchanged at 50 per cent during the period.

The above-referred changes in GSDP and employment shares have implications for changes in relative productivity of the different sectors. Between 2011-12 and 2017-18, the relative productivity of the primary sector declined from 0.72 to 0.51 while that of

Table 17.3 *Usual Principal Status (UPS) workers by type of work (15 and above) in Kerala, 2011-12 and 2017-18*

Employment Status/Year	Rural male		Rural female		Urban male		Urban female		All persons	
	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18
Self-employed	37.8	40.0	29.8	25.4	36.3	40.1	28.6	20.7	35.2	36.0
Regular worker	15.9	24.9	30.1	46.6	32.2	31.7	53.5	63.8	27.9	34.5
Casual worker	46.3	35.1	40.1	28.0	31.6	28.2	17.9	15.5	36.9	29.5
Total	100	100	100	100	100	100	100	100	100	100

Source: National Sample Survey on Employment and Unemployment, 2011-12 and Periodic Labour Force Survey, 2017-18.

Table 17.4 *Sectoral shares in employment and output*

Sector	Share in Employment (in %)		Share in GSDP (in %)		Relative Productivity		Change in employment Share (in percentage points)	Change in GDP share (in percentage points)
	2011-12	2017-18	2011-12	2017-18	2011-12	2017-18		
Primary	18.1	18.2	14.4	9.5	0.79	0.52	0.1	-4.9
Secondary	32.5	31.8	28.2	28.4	0.86	0.89	-0.7	0.2
Tertiary	49.4	50	57.5	62.1	1.16	1.24	0.6	4.7
All sectors	100	100	100	100	1.00	1.00	0	0

Source: National Sample Survey on Employment and Unemployment, 2011-12 and Periodic Labour Force Survey, 2017-18.

the service sector increased from 1.1 to 1.24, pointing towards an uneven transformation of the economy. With the slower transformation in employment structure compared to GSDP structure, the gainers in the structural changes in Kerala are persons associated with the service sector.

Industrial Distribution of Workers

The shift of the labour force away from agriculture and other primary sector activities proceeded at a much faster pace in Kerala than in the rest of India. In 2017-18, according to PLFS data, the proportion of the workforce engaged in agriculture and allied activities was 20.3 per cent in Kerala while the corresponding proportion was 42 per cent in India as a whole.

The major sectors providing employment in Kerala are agriculture, construction, and trade, restaurants in the case of rural men, and agriculture and community and personal services in the case of rural women. Between 2011-12 and 2017-18, with respect to shares in rural female employment, manufacturing and agriculture declined while trade, restaurants, and community and social services became more prominent. For urban men construction, trade restaurants, and transport storage are the more dominant industries while for urban women, community, social and personal services and manufacturing are the dominant industries.

In terms of industrial distribution of workers, the women workers are highly concentrated in a few sectors compared to men. In 2017-18, the top three industries accounted for 71 per cent and 72 per cent of the women workers in rural and urban areas respectively. For men this concentration is much lower at 63 per cent in rural and 56 per cent in urban areas. Even though industry-wise concentration of employment is lower for men than for women, the share of the top three industries continue to remain the same in the case of men during 2011-12 to 2017-18. In the case of women, there has been a decline in the share of the top three industries in both rural and urban areas. Thus it can be inferred that although women's employment is highly concentrated in a few sectors this condition is slowly changing. It is of significance to note that the shift from agriculture to other sectors had been mainly concentrated among the rural women.

Wages in Kerala

Kerala has among the highest-levels of wages for casual male and casual female workers, whether in the rural or urban areas (Papola and Kannan 2017; Abraham 2007). As per the India Wage Report prepared by International Labour Organisation (ILO 2018), the States with the consistent highest casual wages in both rural and urban areas are Kerala, Jammu and Kashmir, Punjab and Haryana.

The average wage rate in Kerala at all quarters is higher than that of India, both in urban and rural areas, as per PLFS. The most important fact is that existing wages in Kerala for casual workers is around 65 per cent higher than that of India (Table 17.5). Although the wages of women in Kerala are lower than that of men, wage rates for women in Kerala is 50 per cent more than that of their counterparts at all India-level.

In Kerala, casual and regular wage employment provided higher daily earnings compared to the earnings received by self-employed workers. On the other hand, at the national-level, (daily) earnings received by the self-employed are higher than the daily wage earnings of casual workers in the case of rural men. This is the reason for the persistence of self-employment in the Indian economy. Relatively low earnings by the self-employed could be the reason for the low and declining share of self-employment in rural Kerala.

The high-level of wages can also be gauged from the

Table 17.5 *Average daily wages and earnings of workers in Kerala and India, 2018-19* in Rupees

Category of workers		Rural			Urban			All		
		Male	Female	Persons	Male	Female	Persons	Male	Female	Persons
Regular wage labour	Kerala	658	398	572	744	581	678	703	508	631
	India	460	286	422	652	522	622	572	428	540
Casual wage labour	Kerala	732	388	697	680	372	648	711	382	677
	India	297	199	279	368	244	352	310	204	291
Self employed	Kerala	444	135	392	514	207	459	473	166	420
	India	320	145	297	552	228	506	376	167	348

Source: Periodic Labour Force Survey, 2017-18

data relating to the average daily wages of carpenters and masons, which has registered a nearly fourfold increase from 2004 to 2016. Similarly, in the case of unskilled agricultural workers, the daily wages for male and female workers have registered a threefold increase from 2004 to 2014.

Formal and informal labour

According to official statistics (National Commission For Enterprises in the Unorganised Sector), the labour market in Kerala, just as in the rest of the country, continues to be dominated by informal workers. The share of informal workers among rural men in the 2017-18 in Kerala was 87 per cent. The figures for Kerala are not strictly comparable with those for the rest of India as workers classified as "informal" workers in Kerala have access to a variety of social security benefits.

An alternative source of data shows a different picture. The share of employment in the organised sector, defined in terms of the Factories Act and the Shops and Establishments Act, has risen between 2011-12 and 2017-18 in both rural and urban areas across both men and females. Notably, it is female employment that has gained massively during this period with increase in both rural and urban areas.

Employment in the organised sector in Kerala has been driven by the public and the private sectors in equal measure. About half of the organised sector employment is in the Government sector. However, as per the *Economic Review of Kerala* (2017) the total organised sector employment declined from 12.26 lakhs in 2000 to 11.85 lakhs in 2016. This decline is largely due to a fall in the size of public sector employment, while there has been a rise in private sector employment. This is reflective of the trends at the national-level with a growing role for the private sector.

The decline in public sector employment is part of a larger phenomenon at the national-level. Fiscal disciplining imposed on the State Governments through the Fiscal Responsibilities and Budget Maintenance Act 2003 (FRBM Act 2003) has reduced the fiscal space for all the States. In this context, it is interesting to note that the share of employment in the private sector has been increasing in Kerala, particularly so in the case of women.

Building a Skilled Labour Force

The State's industrial policy and information technology policy envisages rapid increase in investment in different sectors. This calls for the highest-levels of skill development and training to be made available to the youth of Kerala for participation in the process of structural transformation of Kerala's economy.

Skill Convergence in Kerala

For institutional strengthening at the national, state and district-level, the Kerala Academy for Skills Excellence (KASE) has been designated as the State Skill Development Mission (SSDM). Various departments have their own skilling programmes, a fact that highlights the need for convergence across departments at the State-level.

Additional Skills Acquisition Programme

The Additional Skill Acquisition Programme (ASAP), part of the State Skill Development Project (SSDP), was launched in 2012 jointly by the Higher and General Education Departments. It aims at tackling problems of educated unemployment by introducing market-relevant foundation training, vocational training and career counselling alongside the general curriculum at the higher secondary and undergraduate-levels. ASAP has delivered skill training in the State to 2,01,409 students from more than 1100 higher secondary schools and arts and science colleges.

Regular skill training programmes of ASAP. The regular mode of training includes foundation skill

Table 17.6 *Physical achievements of DDU-GKY, 2019-20 and 2020-21* in number

Name of the scheme	Components	Physical achievements (in number)	
		2019-20	2020-21 (up to September 30, 2020
DDU-GKY	Persons trained	13,113	125
	Persons appointed	9,957	120

Source: Kudumbashree Mission

training of 100 hours of communicative English and 80 hours of basic IT skills. This is followed by an assessment and certification by the language proficiency test of the British Council (APTIS) with a fee structure determined by the State Government.

ASAP has set up selected schools and colleges as specialised training centres called Skill Development Centres (SDC) where skill training classes are carried out. Currently, foundation classes are conducted in 121 SDCs.

Skill training programmes for Kudumbashree and SC/ST

Kudumbashree, the State poverty eradication mission, was formed with the objective of poverty eradication through the empowerment of women. As a part of skill development among women, this agency conducts training programmes at the state-level. It is also the nodal agency of the centrally-sponsored programme called Deendhayal Antyodaya Yojana-National Rural Livelihood Mission (DAY-NRLM) (Table 17.6).

SC/ST skill-based training programmes. For people of the Scheduled Castes and Scheduled Tribes, the details of skill-based training programmes are given in Table 17.7.

Industrial Training Department

The Industrial Training Department functions under the Labour and Skills Department, Government of Kerala. It is the state-level nodal agency for implementing the various skill development activities of Director General of Training, Ministry of Skill Development and Entrepreneurship, Government of India. The Department implements two major schemes introduced by the Directorate General of Employment and Training (DGE&T), namely, the Craftsman Training Scheme and Apprenticeship Training Scheme.

Industrial Training Institutes

There are 99 Industrial Training Institutes (ITI) under the Industrial Training Department. Private ITIs are also functioning in the State. There are a total of 35,772 seats in these ITIs; 30 per cent of seats are reserved for women candidates. There are 14 ITIs for women in the Government sector in Kerala.

India Skills Kerala, 2018 and 2019

India Skills Kerala 2018 evoked an enthusiastic response: 7422 participants registered for district-level competitions and the finals. The winners represented Kerala at the national competition held from October 2 to 5, 2018 in New Delhi. Winners of India Skills Kerala 2018 also represented India in various international skill competitions, including Euro Skills 2019, Asia Skills 2019, Hi Tech Russia 2019 and World Skills Australia 2019. Inspired by the resounding success of Skills Kerala 2018, the Department held India Skills Kerala 2019 in February 2020 at Swapnanagari, Kozhikode.

ISO Certification

Thirty-four Industrial Training Institutes have been awarded ISO certification.

Technical Exchange Programme

Department introduced Technical Exchange Programme

Table 17.7 *Skill trainings for persons belonging to Scheduled Castes and Scheduled Tribes, 2016-17 to 2020-21*

Year	No. of skill training conducted		No. of persons attended	Placement	
	No. of agencies	No. of courses		India	Abroad
2016-17	3	5	457	288	1
2017-18	4	8	1430	1393	
2018-19	6	14	870	659	10
2019-20	11	22	1148	306	11
2020-21 (as on September 30, 2020)	4	4	1450		
Total	28	53	5355	2646	22

Source: SC/ST Departments, Government of Kerala

for ITI trainees. The main objective of the scheme is to give training to trainees in training institutes abroad. In 2018-19, 46 trainees in various trades were selected to participate in a training programme conducted by ITE Education Service Singapore.

Naipunya Karmasena

The Naipunya Karmasena was formed by the Department to help solve electrical, plumbing, and carpentry problems that emerged following the flood. Naipunya Karmasena was made a permanent feature in 2020-21.

Placement Cell

A total of 2139 trainees were placed in employment through the placement cell in 2019-20.

International Skill Training and Employability Programme (i-STEP)

Considering the peculiar demographic characteristics of the State of Kerala, unique skilling models have been adopted by KASE with industry tie-ups and placement linkages. KASE associates with industrial partners or prospective employers or entrepreneurs through the i-STEP (International Skill Training and Employability Programme), a single window initiative to associate with the skill development mission of Government of Kerala. i-STEP is open to any sector of industry where the skill gap is identified by the stakeholders. Project proposals, with the aim of imparting employability skill and 60 per cent assured placements, can be submitted for consideration under i-STEP initiative of KASE.

Models under i-STEP are

1) Centres of excellence (CoE),
2) Accreditation of skill training courses, and
3) Skill training programme

Centres of excellence

KASE has set up centres of excellence in nursing (Nursing Institute for Career Enhancement: NICE), security skills (Centre for Advanced Training in Security: CATS), oil and rigs (Enlighten Skill Training Programme for Oil and Rig: ESPOIR), teaching, water and waste water treatment (School of Water Technology: SWAT), and construction (Indian Institute of Infrastructure and Construction: IIIC).

Accreditation

Reputed skill training institutions can associate with KASE by receiving accreditation so as to enhance their reach and acceptance in attracting suitable candidates. The institutions with which KASE is associated include the Hedge School of Applied Economics, Kochi; Induscan Petroleum, Nilambur, Malappuram; SMEC Automation Private Limited, Kochi; Dhanwanthari Educational and Charitable Society, Idukki, Atheos Institute of Skills Excellence, Palakkad; Intercad Systems Private Limited, Thiruvananthapuram; Blitz Academy, Kochi; Sports and Management Research Institute, Thiruvananthapuram; and Thoughts Academy, Thiruvananthapuram

Skill Training Programmes

Kaushal Kendras. KASE has set up Kaushal Kendras across Kerala as rural skill hub. Their objective is to train rural candidates in a range of subjects, including digital literacy, communication skills, quantitative and analytical aptitude, and financial literacy.

Kaushal Kendras offer courses in basic and intermediate English, quantitative aptitude and analytical reasoning, digital literacy and computer skills, and basic electrical training. Kaushal Kendras have been established in Kollam, Kozhikode, and Palakkad districts.

Kerala State Institute of Design (KSID). The Kerala State Institute of Design (KSID) was established as a unit of KASE for the purpose of creating a vibrant design community in Kerala through partnership between artisans, professional designers and the general public. It is supported by the National Institute of Design (NID) Ahmedabad.

Employability centres. The Government of Kerala, through the Directorate of Employment and Training and KASE has set up 10 employability centres in the districts of Ernakulam, Kannur, Kozhikode, Kollam, Palakkad, Kottayam, Alappuzha, Thrissur, Malappuram, and Kasaragod.

Career Development Centres

In association with National Employment Service Department, KASE is in the process of setting up Career Development Centres/Mini Employability Centres (CDC/MEC) across Kerala.

Protection of Labour Rights

Kerala has a long tradition of protection of labour rights and trade union activity. In Kerala, the active role of trade unions in politics ensures that legitimate claims to rights are enacted as laws and policies of the State.

The Labour Department, established in 1946, is the Government body that is entrusted with ensuring smooth industrial relations. The Labour Department conducts inspections of establishments under various labour laws such as the Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979, Building and Other Construction Workers (Regulation of Employment and Conditions

of Service) Act, 1996, Kerala Shops and Commercial Establishment Act, 1960, Maternity Benefit Act 1961, Payment of Bonus Act 1965, and Payment of Wages Act 1936.

The Enforcement Wing of the Department of Labour is responsible for maintaining a worker-friendly environment and ensuring that workers receive the benefits they are legally entitled to. For ensuring that workers get weekly leave, overtime pay, minimum wages, seating facility and other benefits, special drives are conducted at the State-level and squad inspections at the district-level. In addition, the wage protection system has been implemented to ensure minimum wages to workers in the unorganised sector and to ensure transparency in the distribution of wages. The Wage Protection System (WPS)/e-payment is a flagship programme of Labour Department of Kerala, introduced in 2015, which aims to disburse wages through banks, and also to monitor such disbursements to ensure the payment of minimum wages and above.

The Labour Department is responsible for maintaining cordial industrial relations. The industrial disputes are settled mainly through the intervention of the conciliation officers through the process of conciliation. If conciliation fails, the dispute is referred to adjudication by Labour Courts/Industrial Tribunals. The Deputy Labour Officer (DLO) is also the conciliation officer for the Kerala Head Load Workers Act, 1978.

The Government of Kerala constitutes the Industrial Relations Committees to maintain industrial peace and harmony. At present there are 11 IRCs functioning for different sectors, including the motor transport industry, cashew industry, toddy tapping industry, coir industry, private hospitals, textile industry, plantations, and the newspaper industry

The present Government introduced the following items of labour legislation during its tenure:

- The Minimum Wages Act (Kerala Amendment) Act, 2017

  This amendment, inter alia, increased the penalty on non-payment of minimum wages to employees from Rs 500 to Rs 1 lakh.
- Amendment of Kerala Minimum Wages Rules, 1958

  A part of e-payment of wages for workers in non-banking financial institutions, textile shops, jewelleries, private hospitals, IT sector, self-financing education institutions, and the construction sector are made through banks. Such disbursements are monitored to ensure the payment of minimum wages. The Government of Kerala introduced a provision to maintain a register of employment and wages in such cases.
- Kerala Shops and Commercial Establishment (Amendment) Act, 2018 introduced provisions for ensuring the following:

i) Sitting facilities: In every shop and establishment suitable arrangements for sitting shall be provided for employees.

ii) Consent from women employees on working hours: An employer may employ women employees between 9 pm and 6 am after obtaining the consent of such women employees and ensuring that no female employee is employed between those hours other than in groups consisting of at least 5 employees having a minimum of 2 female employees and adequate protection of their dignity, honour and safety protection from sexual harassment, and facility for transportation from the shop or establishment to the doorstep of their residence.

iii) Constituted internal compliance committee for female employees.

iv) Increased penalties on violations of provisions under sitting facilities and also introduced penalty for obstructing the inspector.

v) Introduced provision for mandating eight hours working time for sales promotion employees.

vi) Introduced auto renewal facility which ensures the applicant could automatically download their renewal approvals by online on payment of prescribed fees.

- Maternity Benefit (Amendment) Act, 2017

i) Extension of maternity benefits: Introduced maternity leave from 12 weeks to 26 weeks and mandated to employees in both public and private sector. Provided that the maximum period entitled to maternity benefit by a woman having two or more than two surviving children shall be twelve weeks of which not more than six weeks shall precede the date of her expected delivery.

ii) Every establishment which are having fifty or more employees shall have the facility of crèche within such distance as may be prescribed, either separately or along with common facilities.

iii) Maternity benefit to private educational institutions: Government of Kerala introduced maternity benefits to employees in private educational institutions including unaided schools and colleges.

- The Industrial Dispute (Kerala Amendment) Act, 2017

  Sales promotion employees were brought under the Act.

- Amendment of Kerala Contract Labour (Regulation And Abolition) Rules, 1974
- Amendment of Kerala Inter-State Migrant Workmen (Regulation Of Employment And Conditions Of Service) Rules, 1983
- The Kerala Investment Promotion and Facilitation Act, 2018
- Kerala Shops and Commercial Establishments (Amendment) Ordinance, 2020
- Payment of Wages Act Amendment

Support to Workers During the Covid-19 Lockdown

Labour Welfare Boards announced ex-gratia financial assistance to workers during the lockdown. Apart from direct financial assistance, some of the Boards have also offered interest-free loans.

Bonus was paid to all members of the Head Load Workers Welfare Board before April 14, 2020. An amount of Rs 30 crore was spent for 243,504 members.

The Construction Welfare Board gave Rs 1000 to all members who had completed two years and renewed their membership in 2018. There were about 15 lakh such members and an amount of Rs 200 crore was spent. The Motor Workers Welfare Fund Board provided financial assistance.

The Abkari Workers Welfare Board disbursed up to Rs 5000 each to bar workers as assistance, and up to Rs 10,000 each as an interest-free loan. An amount of Rs 1000 each was distributed to all members working in hospitals, petrol pumps, and gas agencies, and to self-employed persons by Kerala Shops and Commercial Establishments Labour Welfare Board. An amount of Rs 10,000 each was paid to Covid-affected members, and Rs 5000 each to members in isolation.

The Kerala Agricultural Workers Welfare Fund Board paid an amount of Rs 7500 each to its registered members who tested positive for Covid-19, and Rs 1000 each was paid to members who were in isolation for Covid-19.

Social Protection to Informal Sector Workers

Workers in the unorganised sector need higher wages and higher returns to self-employment. The Kerala Welfare Fund Act was enacted in 1975. Under its provisions, welfare funds were established through a tripartite arrangement of the State, employers and employees. Workers (and self-employed persons) belonging to various sectors were covered under welfare schemes that provide basic pensions and money for contingencies. At present, 24 such Welfare Fund Boards are functional, providing social security cover to workers.

Labour Welfare Activities

The Labour Department plays a key role in implementing labour welfare activities. There are 16 Welfare Fund Boards functioning under Labour Department and providing welfare amenities to the respective sector of labour. Other boards function under various departments, including the agriculture and industry departments. The number of workers registered under the Welfare Fund Board of the Labour Department is about 8,050,319 and those with the other departments is about 1,177,723.

All welfare funds are run under a tripartite system with the employers, employees and Government contributing to the fund. If there are no employers then the worker would be contributing a minimum amount to the fund. The welfare funds provide for various contingent social securities such as life course events, emergencies and old age pension.

Apart from the Welfare Fund Boards there are programmes implemented by the Labour Department for welfare of the unorganised sector workers.

These apart, schemes relevant to the migrant workers are also being implemented. The welfare fund model has been accepted by the Central Government that has extended a similar model through the Unorganised Workers Social Security Act 2008 of the Government of India.

Welfare funds and social security are of crucial importance for workers. The direct benefit is the security workers receive. Social security also enhances the reservation wage of workers and helps them bargain better in the labour market.

Social Security System for Workers in Kerala

Employees State Insurance (ESI)

Employees State Insurance (ESI) scheme of the Government of India aims at providing assistance to employees in case of sickness, maternity, disablement and death due to employment injury and to provide medical care to insured persons and their families. The comprehensive social security provisions are based on the ESI Act 1948. This scheme covers all employees working in non-seasonal factories running on power that employ 10 or more persons, and factories not using power that employ 20 or more persons. It also includes those working in shops, hotels, restaurants, cinemas, road motor transport undertakings and newspaper establishments. Each insured employee and their employer is required to contribute a certain per cent of their wages to the ESIC every month. The ceiling wage rates are revised from time to time. The ESI

Box 17.1
Welfare Fund Boards under Labour Department of Kerala

1. Kerala Bamboo Kattuvalli and Pandanus Leaf Workers Welfare Fund Board
2. Kerala Handloom Workers Welfare Fund Board
3. Kerala Beedi and Cigar Workers Welfare Fund Board
4. Kerala Agricultural Workers Welfare Fund Board
5. Kerala Jewellery Workers Welfare Fund Board
6. Kerala Motor Transport Workers' Welfare Fund Scheme
7. Kerala Tailoring Workers Welfare Fund Board
8. Kerala Labour Welfare Fund Board
9. Kerala Toddy Worker's Welfare Fund Board
10. Kerala Abkari Workers Welfare Fund Board
11. Kerala State Unorganised Workers Social Security Board
12. Kerala Small Plantation Workers Welfare Fund Board
13. Kerala Head-Load Workers Welfare Board
14. The Kerala Building and Other Construction Workers' Welfare Board
15. Kerala Cashew Workers Relief and Welfare Fund Board
16. Kerala Shops and Commercial Establishments Workers' Welfare Fund Board

Scheme is a self-financing health insurance scheme and the contributions are raised from covered employees and their employers as a fixed per cent of wages. The payments are to be made on a monthly basis.

Social Protection to Informal Workers in Kerala

Several other welfare schemes are in force in the State. They include the Unorganised Daily Waged Employees Distress Relief Fund, the Tree Climbers Disability Pension Scheme, Maternity Allowances to Workers in the Unorganised Sector, the Estate Workers Distress Relief Fund, and income support to workers in traditional sector activities. Government assistance provided through such schemes for the last five years is given in Table 17.8. More than Rs 100 crore was spent by the Government for informal-sector workers through plan schemes under Labour Department (this amount does not include payments through workers' Welfare Boards or Kudumbashree).

Government Interventions During the Covid-19 Pandemic

Many Labour Welfare Boards announced ex-gratia financial assistance to workers. Apart from direct financial assistance, some Boards also offered workers interest-free loans.

1. Head-load workers: Rs 30 crore was set apart for the distribution of bonus. There are 243,504 members registered in the board and bonus was given to all members.
2. Construction workers: Rs 200 crore was set apart for financial support.
3. Motor Thozhilali Welfare Fund Board (total members 954,242): Financial assistance varied from Rs 5000 to Rs 1000 each for different categories of workers.
4. Abkari Thozhilali Welfare Board paid Rs 5000 as assistance and an interest-free loan of up to Rs 10,000 to each worker.
5. Kerala Shops and Commercial Establishments Thozhilali Welfare Board provided an amount of Rs 1000 each to workers in hospitals, petrol pumps, gas agencies and self-employed persons and Rs 5000 each to members who were affected by Covid-19 and in isolation.
6. Kerala Agricultural Workers Welfare Fund Board paid Rs 7500 each to Covid-19 affected members and Rs 1000 each to workers who were in isolation.
7. Handloom Workers Welfare Fund Board paid Rs 750 each to all its members.
8. Kerala Beedi and Cigar Workers Welfare Fund Board: An amount of Rs 2 crore to income support Scheme was set apart.

Apart from these, the Government took steps to ensure food for all amidst the complete lockdown. The free food kit distribution through ration shops continued even after lockdown. The Government put up shelter homes for the homeless. All the social security pensions were distributed two months in advance to around 54

Table 17.8 *Social Security Schemes for informal sector workers under Labour Department* in Rs lakh

Name of the scheme	2016-17		2017-18		2018-19		2019-20		2020-21	
	Outlay	Expen-diture	Outlay	Expen-diture	Outlay	Expen-diture	Outlay	Expen-diture	Outlay	Expen-diture
Income support to workers in traditional sector activities	6500	6500	6500	5900.84	7000	7000	8000	6400	7500	7500
The unorganised workers social security scheme	5	5	5	5	50	50	50	50	50	50
Social protection for unorganised sector workers	0	0	458	456.04	500	487.19	500	482.88	450	442.61
Self-employment scheme for the registered unemployed widows/deserted/ divorced/unmarried women and unwedded mother (SARANYA)	1600	1600	1600	1811.91	1720	1720	1820	1820	1700	1682.3
Rehabilitation and welfare of differently abled registrants of employment (Kaivalya)	0	168.01	100	100	55	55	210	210	300	26.28
Total	8105	8273.01	8663	8273.79	9325	9312.19	10580	8962.88	10000	9701.19

Source: Plan Space

lakh people. The revival package of interest-free loan distribution of Rs 2000 crore through Kudumbashree also largely benefitted informal workers. Welfare Fund Board assistance, social security pensions, food kits and revival package of interest free loans were mainly intended to ensure the social security of informal sector workers and other vulnerable sections of the society who lost livelihoods during the lockdown.

Migrant Workers and Kerala Economy

Large numbers of migrant workers from other States come to Kerala every year. Migrant workers in Kerala are referred to as "guest workers," that is, guests of the people of Kerala.

We do not have accurate national data on the number of migrant workers in Kerala. According to Census data, the number of other State migrants in Kerala increased from 4.5 lakh to about 6.5 lakh (about a two-lakh increase) between 2001 and 2011 (See Parida and Raman, 2020). This implies an annual growth rate of 4.5 per cent. The studies of Narayana and Venkiteswaran (2013) and Parida and Raman (2020) indicate that the stock of other-State migrants was much higher. While Narayana and Venkiteswaran (2013), based on a survey of railway passengers, estimated a population of 25 lakh domestic migrants, Parida and Raman (2020), based on a sample survey, suggested a figure of about 30 lakh in 2017-18.

Parida and Raman (2020) noted that the share of migrants reporting long-duration migration had declined, with a corresponding rise in the share of short-duration and temporary seasonal migration for construction work and in other jobs in the labour-intensive manufacturing and informal service sectors in Kerala. While the number and share of migrants from neighbouring States like Tamil Nadu, Karnataka, and Maharashtra has been declining, domestic migration from West Bengal (41 per cent), Assam (31 per cent), Uttar Pradesh (13 per cent), Bihar (four per cent), Odisha (four per cent) and Jharkhand (2.5 per cent) has been rising sharply in these years. The migrants from these backward States normally come to Kerala seasonally for employment, earn some surplus and go

back to their home States. As they visit their native States three to four times a year, national-level surveys like the Census and NSS fail to capture their migrant status due to definitional issues.

Migrant workers contribute significantly to the development of various sectors of the economy. They are mostly engaged in unskilled and semi-skilled work in sectors like agriculture, brick manufacture, masonry work, and as electricians, plumbers, and the like. A large number of migrant workers work in steel factories, mainly in Ernakulum, Kozhikode and Kannur districts. A large number of them are concentrated in plywood factories, particularly in the Perumbavoor area.

Given the important role these migrant workers play in driving the process of economic growth in Kerala, special attention should be given to encourage and protect them. Kerala is probably the first State in India to introduce welfare schemes for migrant workers.

Aawaz

Aawaz is a health insurance scheme for migrant workers aimed at providing claims against accidental death (Rs 2,00,000) disability due to accident (Rs 1,00,000), treatment benefit to the patients (Rs 25,000) with an objective of registering them and providing healthcare. An estimated population of 15 lakh individuals in Kerala will be covered under the scheme. The process of identifying the beneficiaries is carried out through an online portal. This scheme started on November 1, 2017.

Enrolment in the scheme is based on proof of identity such as the Aadhar Card. About 5,09,363 migrant workers are registered under the scheme. Of them 483,085 are male, 26,191 are female, and 87 are transgender persons.

Apna Ghar Project

The Apna Ghar Project of Bhavanam Foundation Kerala (BFK) was envisaged to provide good quality hostel accommodation on a rental basis to inter-state migrant workers in Kerala. The project is proposed to be implemented in areas where there is a significant need for such accommodation for inter-state migrant workers. The BFK has implemented various schemes under the Apna Ghar project in different locations across Kerala. For example, the Apna Ghar Project, Palakkad can accommodate 640 persons. It was commissioned in 2017-18. In addition, BFK is in the process of implementing three more schemes, namely the Apna Ghar Project, Ramanattukara scheme (Kozhikode District), Apna Ghar Project, Kalamassery scheme (Ernakulum District), and Apna Ghar Project, Champazhanthy scheme (Thiruvananthapuram District). The Government also intends to announce a scheme for affordable rental housing for migrant workers and the urban poor. The plan is to convert Government-funded housing in cities into Affordable Rental Housing Complexes (ARHCs) in PPP mode.

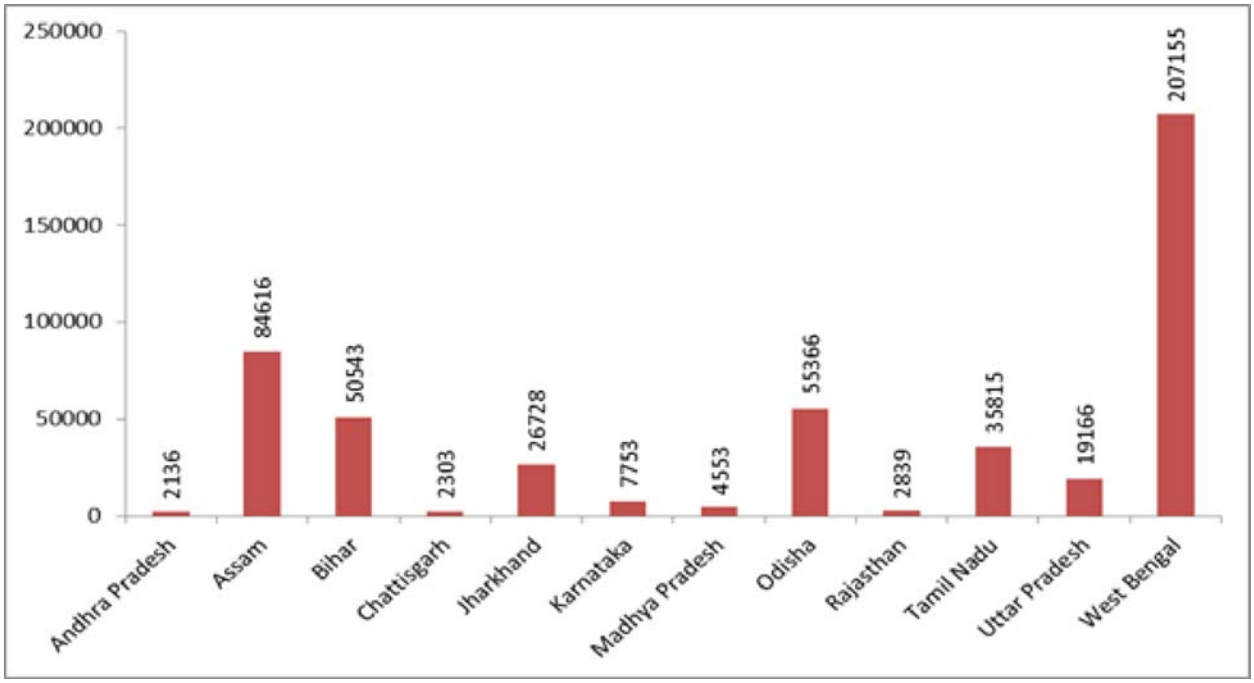

Figure 17.1 *Distribution of registered migrant workers from other States/Union Territories in the districts of Kerala (as on August 31, 2020) as per Aawaz registration*

Literacy Programme for Migrant Labourers (Changathi)

Thousands of migrant workers from the northern States were initiated into the world of letters as part of an ambitious literacy programme, called "Changathi," of the Kerala State Literacy Mission Authority (KSLMA). The programme aims to teach the migrant labourers to read and write Malayalam and Hindi within four months. The programme was launched at Perumbavoor in Ernakulam District, which has the largest concentration of migrant workers in the State. A survey was conducted in 27 wards of Perumbavoor recently, and 400 beneficiaries had been identified for the education programme in the initial phase. A grand welcome ceremony named *Praveshanolsavam* on the lines of the welcome ceremony held at schools on the opening day was held to encourage migrant workers join the literacy programme. Though migrant workers have been playing a key role in many sectors in the State, they are still facing exclusion in society. Mission introduced this programme aiming to end this social exclusion by teaching them Malayalam, orient them to the culture of the State, apart from introducing them to the social and cultural features of the State, and creating legal and health-related awareness.

"Hamari Malayalam": A text book exclusively for migrants

The study material has been prepared keeping in mind the working conditions of migrant workers and their interaction with the society. Titled "Hamari Malayalam" (Our Malayalam), the book has 25 chapters on various subjects, ranging from hygiene, health, and technology to the rights of workers. The book is designed not just to teach Malayalam but also basic lessons in sanitation, health, and social values.

Awareness programme for inter-State migrant (ISM) workers

Under the scheme, information regarding the various welfare schemes and statutory entitlements of ISM workers is disseminated across the State. It works in every district through the District Labour Offices.

Medical camp

Government-funded medical camps are conducted in each district of the State exclusively for the ISM workers.

Migrant-worker-friendly accommodation

This new Plan scheme of 2021-22 proposes to standardise the safety, sanitation, and cleanliness conditions in accommodation.

Covid-19 Pandemic and Interventions for Migrant Workers

When lockdown was declared in March 2020, migrant workers were among the worst-hit sections of the population. There were approximately five lakh migrant workers at the time of lockdown in Kerala. Consequently, 4,34,280 persons were identified by the Labour Department as inter-state migrant workers who had lost their jobs and incomes. They were sheltered in 21,556 camps set up in different parts of the State. Food, water, and recreational facilities were provided to them in the camps.

As a result of intervention by the Labour Department, no migrant worker was deprived of food, drinking water and other necessary physical amenities. The State set the best example by providing food to workers through community kitchens managed by Kudumbashree. Kerala took care of migrant workers by providing them with decent accommodation, health care and all their needs during lockdown period.

The Government of Kerala worked to transport migrant workers in a phased manner to their home destinations. By June 3, 2020, 102 trains had carried more than 1,38,870 workers to various home destinations. A detailed plan was made to send all migrant workers who wanted to go back to their homes and trains were scheduled accordingly.

The Labour Department opened helplines and call centres in all districts and a call centre at the Labour Commissionerate in order to address the problems of migrant workers. Multilingual personnel were deployed in call centres.

The "Kerala model" of migrant management has been lauded by many. Migrant workers in Kerala continue to have the benefits of a labour-welfare-oriented social system.

Way Forward

As mentioned at the start of this chapter, Kerala's strengths with respect to school and higher education make it uniquely placed to deal with new developments in skilled employment and knowledge-based employment.

The "Future of Work" debates and research point out the fast-changing nature of work as a result of the development of information and communications technology. Some of the areas in which Kerala has made a start in this respect are robotics, machine learning, artificial intelligence, and 3D printing. The Covid-19 pandemic and the evolving situation have added new dimensions to the Future of Work. While disruptions

in some sectors are evident, new opportunities and requirements are emerging in significant areas. We must make available the most modern skill training and development to prepare Kerala's youth for opportunities in skilled employment in these sectors.

Further, certain sectors such as IT-enabled services, transport, storage and communication, banking and insurance, construction sector, health care and medical equipment, food processing and tourism and hospitality have significant employment possibilities in Kerala. Continuous reskilling programmes are also required.

Skill training programmes should also be used as instruments of empowerment and social change. They should include, for instance, specialised training in emerging areas for women and young men and women of the scheduled tribes and scheduled castes.

The international experiences on successful employment policies and strategies indicate the role of the State in developing an integrated skill development policy framework and systems. Such a system recognises the linkages between education – higher secondary and tertiary – and industry and employers' needs.

The International Labour Organisation (ILO) in particular has delineated the three areas with respect to skilling, that is,

1) linking training to current labour market needs as well as anticipating and building competencies for the jobs of the future;
2) building quality apprenticeship systems and incorporating core skills into training for young people; and
3) expanding access to employment related training in order to equip women and men to work in the formal economy.

These areas are of significance to Kerala.

In the last five years, the Government of Kerala has undertaken various policies to equip its young population with skills in cutting-edge sectors to effectively create employment opportunities in the State. Conscious policy initiatives have been undertaken to promote, establish, monitor and regulate institutions and academies that are known for excellence in promoting modern skills and familiarity with technology that meets the demands of new industries in Kerala, other parts of India, and globally.

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Chapter 18
Scheduled Caste and Scheduled Tribes: Ensuring Inclusive Development

The struggle against caste and the criminal practices of untouchability and similar forms of social exclusion was an intrinsic part of the struggle for freedom and socio-economic development in Kerala. When the Government came to office in 2016, it took efforts to build on this historical legacy.

In the 13th Plan, the Government made a commitment that the planning process will work to protect the rights of the people of the Scheduled Castes (SC) and Scheduled Tribes (ST), and to expand the socio-economic achievements of all people of the Scheduled Castes and Scheduled Tribes in the State. It also ensured that the allocations to the Scheduled Caste Sub-Plan (SCSP) for the people of the Scheduled Castes, and the Tribal Sub-Plan (TSP) for the people of the Scheduled Tribes would exceed the share of the population of Scheduled Castes and Scheduled Tribes in the State.

Scheduled Castes

Scheduled Castes in Kerala

According to the Census of 2011, the Scheduled Caste population of Kerala is 30,39,573 persons constituting 9.10 per cent of the total population of the State. There are 53 communities among the Scheduled Castes. The proportion of none of the Scheduled Castes in the

Table 18.1 *Allocation of Scheduled Caste Sub-Plan funds to Scheduled Caste Development Department and local governments, Kerala, 2016-17 to 2020-21* in Rs crore

Year	Total State Plan outlay	SCSP funds from State Plan outlay	SCSP funds as per cent of total State Plan outlay	Department		Local governments	
				Department Outlay	Department outlay as per cent of SCSP funds	local govern-ments Outlay	local governments outlay as per cent of SCSP funds
2016-17	24000	2354.40	9.81	1315.50	55.87	1038.90	44.13
2017-18	26500	2599.65	9.81	1427.60	54.92	1172.05	45.08
2018-19	29150	2859.62	9.81	1570.36	54.91	1289.26	45.09
2019-20	30610	3002.84	9.81	1649.00	54.91	1353.84	45.09
2020-21	27610	2708.54	9.81	1487.39	54.91	1221.15	45.09
Total	137,870	13,525.05	9.81	7449.85	55.08	6075.2	44.92

Source: Annual Plans, Government of Kerala

Table 18. 2 *Outlay and Expenditure of Scheduled Caste Sub-Plan funds, Kerala, 2016-17 to 2020-21* in Rs crore

Year	SCSP Outlay	Department			Local governments		
		Outlay	Expenditure	% of expenditure	Outlay	Expenditure	% of expenditure
2016-17	2354.40	1315.50	1126.88	85.66	1038.90	726.02	69.88
2017-18	2599.70	1427.60	1275.27	89.33	1172.05	936.6	79.91
2018-19	2859.60	1570.36	1167.40	74.34	1289.26	1070.07	82.99
2019-20	3002.80	1649.00	674.64	40.91	1353.84	734.61	54.26
2020-21	2708.54	1221.15	881.77	72.21	1487.39	926.35	62.28
Total	13525.04	6075.2	4349.07	71.58	7449.85	5170.54	69.40

Note: 2019-20 and 2020-21 figures are from Planspace.
Source: Budget Document, Government of Kerala

population is highest in Palakkad district (13.29 per cent) followed by Thiruvananthapuram (12.27 per cent), Kollam (10.80 per cent), Thrissur (10.67 per cent), and Malappuram (10.14 per cent). These five districts together account for more than half (57.17 per cent) of the total Scheduled Caste population in the State.

Communities such as Vedar, Nayadi, Kalladi, Arundhathiar/Chakkiliar are identified as the vulnerable communities among Scheduled Castes and they are concentrated in Palakkad, Malappuram, Kollam, and Idukki districts. The people of these specific Scheduled Castes are 3.65 per cent of the total Scheduled Caste population in the State (Scheduled Caste Survey Report, 2008).

Allocation and expenditure of Scheduled Caste Sub-Plan (SCSP) funds, 2016-17 to 2020-21

Every year, the State Government earmarks a portion of the State Plan outlay as the Scheduled Caste Sub-Plan (SCSP) fund. Of this allocation, close to 55 per cent is allocated to the Scheduled Castes Development Department (SCDD) and 45 per cent is allocated to local governments for implementation of schemes under decentralised planning. The year-wise allocation of SCSP funds is given in Table 18.1.

From 2016-17 to 2020-21, Rs 13, 525.05 crore was earmarked as SCSP fund for the welfare of people of the Scheduled Castes, of which, Rs 7,449.85 crore was allocated to the Scheduled Castes Development Department and Rs 6, 075.20 crore to local governments. The percentage of SCSP flow from total State Plan outlay was 9.81 in this period, higher than the proportion of Scheduled Castes population (9.1 per cent as per 2011 Census).

The outlay and expenditure of SCSP funds from 2016-17 to 2020-21 is given in Table 18.2.

The expenditure by local governments increased from 70 per cent of the outlay in 2016-17 to 83 per cent in 2018-19. In 2019-20, expenditure by local governments in general was affected by treasury restrictions. The expenditure under Scheduled Castes Development Department also declined in 2018-19 and 2019-20. This was mainly because of duplication of schemes and lack of uniformity in rates of assistance of schemes implemented by the Department and LSGIs. Further, in 2018-19, there was a reduction in plan outlay to all sectors to meet flood related rehabilitation and restoration expenses. In 2019-20, the resource crunch faced by the State resulted in low expenditure by the Department. The expenditure-level of the Department with respect to revised outlay, however, was 92 per cent in 2018-19 and 75 per cent in 2019-20. Expenditure-levels improved in 2020-21.

Major interventions by the Government and achievements in the 13th Plan (2017-18 to 2021-22)

The main thrust of the 13th Plan in respect of the people of the Scheduled Castes and Tribes was in the following spheres:

1) Land, homesteads, and housing.
2) Education: to ensure full access to the best educational facilities at all levels: primary, secondary, and higher education and research.
3) Skill development: to prepare a new generation for modern employment, enabling them to seek employment in Kerala and elsewhere.
4) Employment: to ensure that places reserved for Scheduled Castes and Tribes are filled.
5) Food security

The major schemes and programmes by the Government and the progress made on each front are enumerated in the following section.

Land, homesteads, and housing. The Government provides financial assistance to persons belonging to Scheduled Castes for purchase of land and construction of house. From 2016-17 to 2020-21, Rs 94,997 lakh was earmarked for land purchase scheme and 81.12 per cent of expenditure was incurred in this programme. Rs 1,54,500 lakh was earmarked for construction of houses and more than 100 per cent expenditure was incurred. Details of outlay and expenditure incurred under this scheme from 2016-17 to 2020-21 are in Table 18.3.

In 2016-17 and 2017-18, houses were sanctioned directly by the Department. From 2018-19 onwards, construction of new houses was undertaken through the LIFE Mission. As per the estimates of the Mission, there were 75,355 houseless people belonging to the Scheduled Castes in Kerala. Of these 20,796 families owned land and the rest of them were landless. The Mission offered two options to the landless: to avail of assistance at Rs 2.25 lakh for three cents in gram panchayat, at Rs 4.5 lakh in municipalities, and at Rs 6.00 lakh in corporation limits to purchase land or to avail of dwelling units constructed by the Mission in 28 towns across the State.

The total houses sanctioned and constructed under schemes of the Department and LIFE Mission from 2016-17 to 2019-20 were 49,746 and 29,542 respectively.

Education. There are 85 nursery schools, nine model residential schools, 44 industrial training institutes, 87 pre-matric hostels, 17 post-matric hostels, four pre-

Table 18.3 *Outlay and expenditure for land and housing by Scheduled Caste Development Department, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Land			Housing		
	Outlay	Expenditure	% of expenditure	Outlay	Expenditure	% of expenditure
2016-17	17497	17573.61	100.44	26500	37362.4	140.99
2017-18	18000	17871.2	99.28	50000	56873	113.75
2018-19	22500	15468.05	68.75	38000	43660.2	114.9
2019-20	18500	16187.04	87.50	20000	13513.4	67.57
2020-21	18500	10287.25	55.60	20000	22344.77	111.72
Total	94997	77061.88	81.12	154500	173753.7	112.46

Source: Scheduled Caste Development Department, Government of Kerala

Table 18.4 *Houses sanctioned and completed for Scheduled Castes, Kerala, 2016-17 to 2019-20* in number

Year	Scheduled Caste Development Department		LIFE Phase 1 (incomplete houses)**		LIFE Phase 2 (beneficiaries with land)**	
	Sanctioned	Completed	Sanctioned	Completed	Sanctioned	Completed
2016-17	14906	11440	3893	3843	21807	7506
2017-18	8895	6670				
2018-19	245*	83				
2019-20	0	0				
Total	24046	18193	3893	3843	21807	7506

Note: * Construction of houses affected by the floods of 2018.
**Year-wise break up of houses constructed through LIFE Mission is not given.
Source: Scheduled Caste Development Department and LIFE Mission, Government of Kerala

examination training centres, a community college in Vadakkancherry, and a medical college in Palakkad functioning under the control of the Scheduled Castes Development Department. In addition to infrastructure facilities, the Government provides various types of educational assistance, such as primary education aid, lump sum grants, stipends, pre-matric and post-matric scholarships, and overseas scholarships for study abroad. Yearwise outlay and expenditure for education from 2016-17 to 2020-21 are in Table 18.5.

The major programmes and progress made in the field of education are as follows.

Revision of rate of educational assistance. The rates of assistance including lump sum grants, stipends, and scholarships given to students belonging to the Scheduled Castes for pre-matric, post-matric and professional courses were enhanced in 2019.

Assistance for studying abroad. A major achievement during the last four years is that 37 students belonging to the Scheduled Castes have been provided assistance to study in top ranked (first 500) universities in the world. The Department provides Rs 25 lakh per course to a student who gets admission in such universities.

Padanamuri. Another remarkable achievement for promoting education in this period was construction of study rooms, *Padanamuri,* in the houses of students belonging to the Scheduled Castes studying in high school and higher secondary classes in government or aided or special or technical schools. This facility was provided to students whose parents' annual income was lesser than Rs 1 lakh. The scheme provides Rs 2 lakh to each student to construct an additional room (120 square feet) in their house; the room is further equipped with facilities such as a table and chair, bookshelf, lights, and fan. The scheme was started in 2017-18. 24,543 study rooms have been sanctioned, out of which 15,762 have been completed.

Additional assistance to post-matric students. For encouraging post-matric education, a new scheme, called "Additional assistance to post matric students" was started in 2018-19. Under this scheme, the State Government provides assistance to the post-matric students who are not availing any scholarships from Government of India.

Table 18.5 *Outlay and expenditure for education by Scheduled Caste Development Department, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Outlay	Expenditure	% of expenditure
2016-17	38000	13190.55	34.71
2017-18	40410	23675.99	58.59
2018-19	40549	25178.93	62.10
2019-20	25000	10874.42	43.50
2020-21	24500	13367.38	54.56
Total	168459	85503.41	50.78

Source: Scheduled Caste Development Department, Government of Kerala

Other major physical achievements from 2016-17 to 2020-21,

1. 8,475 students were provided assistance to buy laptops and 1,506 MBBS students were provided assistance to purchase stethoscopes.
2. Entrance coaching was given to 2,617 students.
3. Career orientation programmes were conducted at the higher secondary-level in all districts.

Livelihood. For providing livelihood security to people of the Scheduled Castes, income-generating programmes such as self-employment schemes, assistance for seeking job abroad, and job oriented training programmes were undertaken under the scheme "Training, Employment and Human Resource Development." Self-employment assistance is given to individuals and self-help groups. One-third of the loan is given as a subsidy to undertake self-employment ventures. The year-wise outlay and expenditure for the scheme is in Table 18.6

The major physical achievements in the sphere of livelihoods are as follows.

Assistance for foreign employment who are seeking employment abroad. Financial assistance of Rs 1 lakh is given to students belonging to the Scheduled Castes within the age group 20-50 years and have an annual income limit of not more than Rs 2.50 lakh. Assistance is provided to meet the expenses of job visas, passports, and travel charges. In the last four years, 1,610 youth belonging to the Scheduled Caste have been placed in employment abroad. The rate of assistance was increased from Rs 50,000 to Rs 100,000 in 2016-17. Details of the number of persons who availed self-employment subsidy and assistance for seeking job abroad are given in Table 18.7.

Food Craft Institute, Palakkad. In 2018-19, a Food Craft Institute was started in Palakkad district by the Tourism Department in association with the Scheduled Castes and Scheduled Tribes Development Departments. It provides training in hotel management to students and jobs are ensured for the candidates in various institutions under the Tourism Department.

Handholding cell and mobile app. One of the major initiatives undertaken by the Department was the creation of a "Handholding Cell" for equipping youth belonging to Scheduled Castes through awareness programmes. A mobile app was created to provide information and guidelines about the activities of the Cell. Youth who register in this app get information regarding higher education, job opportunities, and the welfare schemes of the Department.

Table 18.6 *Outlay and expenditure for the "Training, employment, and human resource development" scheme of Scheduled Caste Development Department, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Outlay	Expenditure	% of expenditure
2016-17	4000	3313.61	82.84
2017-18	4000	3568.41	89.21
2018-19	4300	4193.17	97.52
2019-20	3800	3379.89	88.94
2020-21	5000	2979.65	59.59
Total	21,100	17,344.22	82.20

Source: Scheduled Caste Development Department, Government of Kerala

Table 18.7 *Number of persons availed who self-employment subsidy and assistance for seeking job abroad provided by Scheduled Caste Development Department, Kerala, 2016-17 to 2019-20*

Year	Number of persons	
	Self-employment subsidy	Assistance for seeking job abroad
2016-17	542	446
2017-18	406	446
2018-19	297	318
2019-20	207	1922*
Total	1452	3132

Note: * Includes numbers from previous years.
Source: Scheduled Caste Development Department, Government of Kerala

Online web portal of Gadhika products. In 2018-19, a new initiative, "Gadhika" on Amazon online portal was launched for marketing products made by entrepreneurs belong to the Scheduled Castes. A variety of handicrafts and traditional utensils – at present, nearly 20 items – are marketed through this online portal.

Healthcare. The Government started a separate healthcare scheme in 2018-19. Until 2018-19, healthcare programmes were implemented under the "Corpus Fund," which included allocations for several other purposes as well. Under the healthcare scheme, financial assistance for treatment was provided to beneficiaries. The number of persons benefitted by the scheme is given in Table 18. 8.

Table 18.8 *Number of persons benefited under healthcare scheme of Scheduled Caste Development Department, Kerala, 2016-17 to 2019-20*

Year	No. of persons who received treatment assistance
2016-17*	23073
2017-18*	24423
2018-19	30844
2019-20	15658
Total	93998

Note: * Scheme was included under "Corpus Fund" scheme
Source: Scheduled Caste Development Department, Government of Kerala

Infrastructure Development in Scheduled Castes Residential Settlements. For providing better infrastructure facilities in residential settlements, the "Ambedkar Village Development Scheme" was started in settlements where more than 30 families belonging to the Scheduled Castes live. Under this scheme, Rs 1.00 crore is provided to each settlement to undertake development activities, including the provision of drinking water, toilets and sanitation, waste management arrangements, road connectivity, electrification, the construction of land protection walls, irrigation, playgrounds, community halls, home renovation, financial support for income-generating activities, and assistance for protection and renovation of burial grounds. Development activities were completed in 50 villages between 2016-17 to 2019-20.

Social Development Programmes

Vinjanwadis. *Vinjanwadis* in Scheduled Caste residential settlements include facilities such as libraries, reading rooms, computers with internet facilities, newspapers, journals and periodicals, and necessary furniture. At present, there are 143 *Vinjanwadis* functioning in the State.

Special package for vulnerable communities. The major problems faced by the vulnerable communities among Scheduled Castes, such as Vedar, Nayadi, Kalladi and Arundhathiar/Chakkiliar, involve land, housing, drinking water, electricity, education, and job-oriented training. A special package was included in the State Plan in 2018-19 to address these issues. This package includes integrated settlement development, completion of spill over houses, *Samuhyapadanamuri*, training on skill development and employment, and special tuition. A new programme for providing assistance for the purchase of agricultural land (up to a maximum of Rs 10.00 lakh for purchasing a minimum of 25 cents of land) has also been introduced.

Revision in rate of marriage assistance. Marriage assistance of Rs 75,000 is given to the parents of girls belonging to the Scheduled Castes who have an annual income of less than Rs 1 lakh. In 2016-17, the rate of marriage assistance was enhanced from Rs 50,000 to 75,000. Yearwise details of outlay and expenditure and number of families benefited under the scheme are in Table 18.9.

Working women's hostels. In 2018-19, a new scheme was started for the construction of working women's hostels. In the first phase, construction of hostels in Thiruvananthapuram, Ernakulam, and Kozhikode

Table 18.9 *Outlay and expenditure for marriage assistance and number of families benefited from the assistance by Scheduled Caste Development Department, Kerala, 2016-17 to 2019-20* in Rs lakh and per cent

Year	Outlay (in Rs lakh)	Expenditure (in Rs lakh)	% of expenditure	No. of families availed assistance
2016-17	5000	5259.60	105.19	10523
2017-18	5500	5851.54	106.39	8921
2018-19	6500	5513.40	84.82	7291
2019-20	7000	6274.00	89.63	8677
2020-21	7000	6106.70	87.23	7011
Total	31000	29005.24	93.56	42423

Source: Scheduled Caste Development Department, Government of Kerala

districts was proposed. The construction work in Thiruvananthapuram district is nearly complete.

Valsalyanidhi. An insurance linked social security scheme *Valsalyanidhi* was started in 2017-18 for girl children belonging to the Scheduled Caste. Under this scheme, the Scheduled Castes Development Department deposits Rs 1,38,000 in the name of the child in a Life Insurance Company in 4 installments – Rs 30,000 as first installment, when the child attains 6 months, Rs 33,000 as a second installment when the child gets admission in primary school and attains 5 years, Rs 36,000 as a third installment on the child reaching the 5th standard or at the age of 10, and Rs 39,000 as a fourth installment on the completion of 10th standard. Rs 3,00,000 is assured at 18 years. Educational assistance of Rs 1000 is also given to the brother or sister of the girl child studying from 9th standard to 12th standard. At present, 4724 girls have been registered under this programme.

Floods. The heavy rainfall in August, 2018 and consequent floods significantly affected the houses of persons belonging to Scheduled Castes located in low lying areas; 2,632 houses completely collapsed and 11,223 houses partially collapsed. In 2018-19, assistance was given to re-build 245 houses that were damaged in floods. Financial assistance of Rs 5,000 was distributed to 83,872 flood-affected families belonging to the Scheduled Castes.

Cultural Programmes. The Scheduled Castes Development Department publishes a journal called *Padavukal*, which includes features and articles illustrating the status of people of the Scheduled Castes, stories, poems, and details of schemes implemented by the State and Central Government. Dr Ambedkar media award is given for the best report writer. In 2018-19, a literary workshop namely "Ranthal-2018" was organised to provide guidance to writers and 48 youth belonging to the Scheduled Castes participated in the programme.

Review of Government Interventions

The policy of the Government was to ensure that the basic need for decent housing is made available to all persons belong to the Scheduled Castes. The provision of this basic necessity was brought under the umbrella of the LIFE Mission, the major housing programme of the Government. Important interventions were also made in the field of education by creating *Padanamuris* and increasing the rates of financial assistance to students. A remarkable feature in the sphere of education was providing assistance to students to study in top ranked universities of the world. Health care received exclusive attention as it was made available through a separate scheme. The Government made significant efforts to improve the infrastructure in the Scheduled Castes residential settlements. The Government sought to balance its effort between welfare and income enhancement strategies. Livelihood creation was a key to this effort. Even in the midst of financial constraints, the Government maintained the share of funds of Scheduled Caste Sub Plan at 9.81 per cent.

Challenges and Way Ahead

Despite the significant advancement made in improving the lives of people of the Scheduled Castes, there are challenges that still need attention.

(i) Traditional residential settlements of persons belonging to Scheduled Caste are located in low–lying areas and frequently face damage from rainfall. This makes them vulnerable not only during floods but also in normal monsoon seasons. Scheduled Caste residential settlements therefore need to be located in areas that are habitable and safe from extreme rainfall events.

(ii) There are rates of dropping out in professional courses.
(iii) More access to opportunities for educated work seekers in public and private sectors is needed.
(iv) There is duplication in selection of beneficiaries and differences in the rate of assistance for same schemes implemented by Scheduled Castes Department and LSGIs.

Scheduled Tribes

Scheduled Tribes in Kerala

According to the Census of 2011, the number of persons belong to the Scheduled Tribe (ST) in Kerala is 4,84,839. They constitute 1.45 per cent of the total population of the State. The highest concentration of persons of the Scheduled Tribes is in Wayanad district (31.24 per cent), followed by Idukki (11.51 per cent), Palakkad (10.10 per cent), and Kasaragod (10.08 per cent). There are 1,07,965 tribal families residing in 4762 hamlets in Kerala. About 11 per cent (540) of the tribal habitats are situated within reserve forests and 20 per cent (948) are in the immediate vicinity of reserve forests.

There are five Particularly Vulnerable Groups (PVTGs) among Scheduled Tribes in the State – Kattunayakan, Kurumbas, Kadar, Koragas and Cholanaickan. There are 26,273 people belonging to PVTGs in Kerala. There are 6,771 households residing in 603 settlements. PVTGs constitute 6.17 per cent of the total Scheduled Tribe population in the State.

Allocation and Expenditure of TSP funds from State Plan, 2016-17 to 2020-21

As part of the Tribal Sub Plan, all States have to earmark an amount from the State Plan that is equal or more than proportionate to the Scheduled Tribe population in the State. Ever since the concept was introduced by Government of India, the funds that the State has allocated to the TSP has always been more than the proportion of the population of the Scheduled Tribes in the State (1.45 per cent as per Census 2011)

The allocation to TSP in the last five years has been consistent at 2.83 per cent of the State Plan (Table 18.10). The outlay is divided between the local governments and in Scheduled Tribe Development Department (STDD) as shown in Table 18.11.

Between 2016-17 and 2020-21 the Government has earmarked Rs 3907.54 crore for the welfare of people belonging to Scheduled Tribes. Of this Rs 2995.85 crore was allocated to STDD and Rs 911.69 crore was allocated to local governments. The year-wise outlay and expenditure for the implementation of schemes under the Scheduled Tribe Development Department and local governments from 2016-17 to 2020-21 are in Table 18.12**.**

The overall outlay of STDD includes the outlay on schemes implemented by Kerala Institute for Research Training and Development studies of Scheduled Castes and Scheduled Tribes (KIRTADS), the Rural Development Department and the High Court. The percentage of expenditure by STDD was more than 90 per cent in the first two years. It was 79 per cent in 2018-19. In 2018-19, there was a general reduction of 20 per cent in plan allocation in all sectors to meet the rehabilitation and restoration needs of the economy after the floods. Expenditure as a proportion of the revised outlay was, nevertheless more than 90 per cent. In 2019-20 as well, expenditure as proportion of the revised outlay, which was 86 per cent, was high.

The percentage expenditure by local governments shows an increasing trend in the first three years. In 2019-20, expenditure by the local governments was low because of treasury restrictions.

The year-wise outlay and expenditure of the Scheduled Tribe Development Department (excluding outlays for schemes related to Scheduled Tribes of Kerala Institute for Research, Training, and Development Studies of Scheduled Castes and Scheduled Tribes

Table 18.10 *Allocation to Tribal Sub-Plan, Kerala, 2016-17 to 2020-21* in Rs crore

Year	State Annual Plan	TSP Annual Plan in Kerala	TSP as % of State Plan
2016-17	24000	682.65	2.84
2017-18	26500	751.08	2.83
2018-19	29150	826.19	2.83
2019-20	30610	866.26	2.83
2020-21	27610	781.36	2.83
Total	137870	3907.54	2.83

Source: Annual Plans, Government of Kerala

Table 18.11 *Tribal Sub-Plan funds to Scheduled Tribe Development Department and local governments, Kerala, 2016-17 to 2020-21* in Rs crore

Year	TSP funds from State Plan	TSP funds to STDD and other Departments	% of TSP to STDD	TSP to local governments	% of TSP to local governments
2016-17	682.65	526.65	77.15	156.00	22.85
2017-18	751.08	575.08	76.57	176.00	23.43
2018-19	826.19	632.59	76.57	193.600	23.43
2019-20	866.26	663.27	76.57	202.99	23.43
2020-21	781.36	598.26	76.57	183.10	23.43
Total	3907.54	2995.85	76.67	911.69	23.33

Source: Annual Plans, Government of Kerala

Table 18.12 *Outlay and Expenditure of Tribal Sub-Plan funds, Kerala, 2016-17 to 2020-21,* in Rs crore and per cent

Year	STDD			Local Governments		
	Budget allocation	Expenditure	Expenditure (in %)	Budget allocation	Expenditure	Expenditure (in %)
2016-17	526.65	518.05	98.37	156	109.74	70.35
2017-18	575.08	533.75	92.81	176	135.76	77.14
2018-19	632.59	502.23	79.38	193.6	151.29	78.15
2019-20	663.27	428.46	64.60	202.99	110.55	54.46
2020-21	598.26	400.59	66.98	183.10	109.01	59.54
Total	2995.85	2383.08	402.14	911.69	616.35	339.64

Source: Scheduled Tribes Development Department, Government of Kerala

(KIRTADS), Rural Development Department and High Court) between 2016-17 to 2020-21 is in Table 18.13.

Major interventions by the Government and achievements in the 13th Plan (2017-18 to 2021-22)

The main thrust of the 13th Plan in respect of the people of the Scheduled Tribes is in the following spheres.

1. Land, homesteads, and housing
2. Education: to ensure full access to the best educational facilities at all-levels: primary, secondary, and higher education and research.
3. Skill development: to prepare a new generation for modern employment, enabling them to seek employment in Kerala and elsewhere.
4. Employment.: to ensure that places reserved for Scheduled Castes and Tribes are filled.
5. Food security.

Land, homesteads and housing. The Tribal Resettlement and Development Mission aims to provide land to landless tribes, housing, and other infrastructure facilities to the people of the Scheduled Tribes. It also implements livelihood schemes for resettled tribal families. Implementation of the Forest Rights Act (FRA) 2006 is also the mandate of the Mission.

(i) Forest Rights Act Implementation

The Forest Right Act, 2006 covers all districts in the State other than Kasaragod and Alappuzha. The Scheduled Tribe Development Department is the nodal agency for implementation of this Act. In collaboration with the Forest Department and Revenue Department, the individual rights, community rights and development rights of the Scheduled Tribes as prescribed under the Act are recognised and a Record of Rights has been issued. The major physical achievements under this Act from 2016-17 to 2020-21 are given below.

a. Individual Rights

- Individual applications received: 43398
- Applications passed by Sub-Divisional Level Committee: 28691
- Applications passed by District Level Committee: 27548

Table 18.13 *Outlay and expenditure of Scheduled Tribe Development Department*, 2016-17 to 2020--21* in Rs crore

Year	Outlay exclusively for ST Department	Expenditure of ST Department	Percentage of expenditure
2016-17	526.65	499.01	94.75
2017-18	575.08	482.39	83.88
2018-19**	497.85	458.58	92.11
2019-20	624.88	391.05	62.58
2020-21	580.98	343.54	59.20
Total	2805.44	2174.57	77.51

Note: * Excludes outlays for schemes related to Scheduled Tribes of following departments — Kerala Institute for Research, Training, and Development Studies of Scheduled Castes and Scheduled Tribes, Rural Development Department and High Court.

**Plan cut imposed. Hence the entire TSP allocation was not available for utilisation.

Source: Scheduled Tribes Development Department, Government of Kerala

Table 18.14 *Details of land distributed to people of the Scheduled Tribes in Kerala under various schemes, 2016-17 to 2020-21* in number and acre

Name of scheme	Number of beneficiaries	Extent of land (acre)
Land Purchase	468	261
Record of Rights (FRA)	1534	2045.39
Revenue Patta	99	9.9
Vested Forests	2708	1870.41
Land distribution of Muthanga land struggle	225	225
Alappuzha land acquisition	43	10.75
Land transferred from Irrigation Department	87	17.40
Panthapra at Ernakulam	67	134
Total	5231	4573.85

Source: Scheduled Tribes Development Department, Government of Kerala

- Total Individual Rights Title issued: 26479
- Total extent of land for which title issued: 35117.51 acre

b. Community Rights

- Individual applications received: 1012
- Applications passed by Sub- Divisional Level Committee: 505
- Applications passed by District Level Committee: 383
- Total Individual Rights Title issued: 174

c. Development Rights

- Individual Applications received: 784
- Claims passed by grama sabha and sent to Forest Department: 784
- Claims passed by Forest Department: 637
- Claims in which Development Rights are issued: 483

From 2016-17 to 2017-18, 4573.85 acres of land were distributed to 5231 landless tribals under various schemes. Most of the beneficiaries received vested forest land.

Housing. A major programme undertaken by the State Government is to provide housing to all families belonging to the Scheduled Tribes. A survey conducted by the Scheduled Tribes Development Department in 2019-20 estimated that about 16,070 tribal families possessing land were houseless and that 7,930 families were landless. The construction of new houses and housing complexes have been undertaken through the LIFE Mission from 2018-19 onwards. Financial assistance is provided from the State Plan and the local government Plan.

In 2016-17, 6,709 houses were sanctioned under various schemes of the Scheduled Tribes Development Department; of these 1895 houses have been completed. The remaining 4,814 houses are in various stages of completion.

In the first phase of the LIFE Mission, 12,049 houses were sanctioned; of them, 11,216 have been constructed. Under Phase II of LIFE Mission, 6,107 houses have been sanctioned, out of which 2001 have been constructed.

24,865 houses have been sanctioned and 14,035 houses have been constructed under the schemes of Department and LIFE Mission.

Between 2016-17 to 2020-21, Rs 40695.30 lakh was earmarked for housing sector and more than 100 per cent expenditure was incurred.

Education. Education was accorded the highest emphasis by the Scheduled Tribes Development Department. Thirty per cent of the total budget provision (plan and non-plan) was set apart for education. Major educational programmes of Scheduled Tribes Development Department include pre-matric and post-matric scholarships, Model Residential Schools and hostels, peripatetic education to primitive tribes, tutorial scheme, *Gotrasarathi, Gotrabandhu, Samuhyapadanamuri* and incentives and assistance to students. There are 13 nursery schools, 10 kindergarten, three Balavadi, one Vikasvadi, three Balavignan Kendrams, seven peripatetic education centres for Particularly Vulnerable Tribal Groups, 20 Model Residential Schools, 22 single teacher schools, 106 pre-matric hostels, nine post-matric hostels, 12 training centres, two Vocational Training Centres, and one Industrial Training Institute functioning under the Scheduled Tribes Development Department. The outlay and expenditure for education by the Department from 2016-17 to 2020-21 is given in Table 18.16**.**

From 2016-17 to 2020-21, Rs 86,436.00 lakh were earmarked for the promotion of education of students belonging to the Scheduled Tribes. Of this, 71.95 per cent was spent. The expenditure pattern in the first three years shows an increasing trend. The major programmes and progress made in the field of education are as follows.

Pre-matric and post-matric scholarships for ST Students.

The year-wise details of the number and allocation of scholarships are given in Table 18.17.

Rates of educational assistance enhanced. The amount paid by the Government as assistance including

Table 18.15 *Outlay and expenditure for housing for families belonging to the people of the Scheduled Tribes, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Outlay	Expenditure	% of expenditure
2016-17	5047.3	4629.36	91.72
2017-18	11508	11482.4	99.78
2018-19	12700	13781	108.51
2019-20	5720	7609.01	133.02
2020-21	5720	5494.13	96.05
Total	40695.30	44110.69	108.39

Source: Scheduled Tribes Development Department, Government of Kerala

Table 18.16 *Outlay and expenditure (Plan and non-Plan) for education by Scheduled Tribes Development Department, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Outlay	Expenditure	% of expenditure
2016-17	15530	12140.4	78.17
2017-18	17090	14333.2	83.87
2018-19	19606	15903.4	81.12
2019-20	17939.5	13364.2	74.50
2020-21	16270.50	6453.28	39.66
Total	86436.00	62194.48	71.95

Source: Scheduled Tribes Development Department, Government of Kerala

Table 18.17 *Number of students and expenditure under pre-matric and post-matric scholarships (Plan and non-Plan) for students belonging to the Scheduled Tribes, Kerala, 2016-17 to 2019-20* in Rs lakh

Year	No. of students	Plan expenditure	Non-Plan expenditure
2016-17	84482	3000.00	2280.00
2017-18	92145	3500.00	2280.00
2018-19	93359	3615.76	1842.26
2019-20	98602	4025.00	1501.00

Source: Scheduled Tribes Development Department, Government of Kerala

lump sum grants, stipends, and scholarships given to Scheduled Tribes, were enhanced in pre-matric, post-matric and professional courses in 2019.

Community Study centres in tribal hamlets (Samuhya Padanamuri). A significant initiative was the introduction of a new scheme, *Samuhya Padanamuri* in 2017-18. Under the scheme, community study centres equipped with computers with internet, television, furniture, and reading material were established in tribal hamlets throughout the State. An educated tribal youth from the same community is selected as a tutor and social worker. Over the last two years, 250 community study centres were began to function in settlements with Scheduled Tribe concentrations. These centres have helped in enhancing school retention, and improving the quality of education, and also has proved helpful in conducting online classes at the time of the Covid-19 pandemic.

Engaging Tribal Mentor Teachers in Primary Schools (Gotrabandhu). *Gotrabandhu* scheme was started in 2017-18 to solve learning difficulties faced by tribal children because of language issues. An educated tribal youth with knowledge in the local dialect and Malayalam is selected and trained to function as a mentor-teacher in primary schools. This has helped in improving school retention and ensuring 100 per cent enrolment of tribal children in schools. Under the scheme, 267 tribal mentor teachers were appointed, in various primary schools in Wayanad and Palakkad districts.

Tribal Girl Child Endowment scheme (Gotravalsalyanidhi). *Gotravalsalyanidhi* was started in 2017-18 girl children of the Scheduled Tribes from birth through various phases of her life. It is a long-term endowment scheme that attains maturity after the child attains 18 years of age and has passed the 10th standard. The insurance amount can be used for higher education. This scheme includes cash payouts for immunisation and school admission. Insurance against death and permanent disabilities is also included. 2088 girl children were insured under the scheme.

Other major achievements in education

1. 2,216 orphans were provided financial assistance
2. 1130 students in professional courses were provided laptops and the number of qualifying courses eligible for getting laptops was increased.
3. Assistance provided to 6,000 students under Ayyankali Memorial Talent Search development scheme.
4. Six new post-matric hostels were started in 2018-19 and 2019-20 to address the problem of dropping out at higher education-levels.
5. Special coaching was provided to children belonging to Scheduled Tribes for clearing NEET, KEAM and Civil Service Exams
6. Additional model residential schools were sanctioned in Kasaragod, Attappady and Wayanad and more science and commerce batches were sanctioned at higher secondary-levels.
7. All the Model Residential Schools under the Department were modernised with facilities such as science lab, computer lab, library, language lab and smart class room, modernised kitchen and multipurpose playground.
8. Majority of the pre-matric hostels were renovated and provided additional facilities.
9. State-level sports and arts festival were conducted exclusively for tribal children in model residential schools and hostels.

Livelihood

Millet village for Food Security. This is a new initiative intended to rejuvenate agriculture in Attappady. The scheme is jointly implemented by the Agriculture Department and Scheduled Tribes Development Department. Apart from the production of millets, pulses, oilseeds, vegetables and apiculture, it includes procurement, processing, packing, labelling, and marketing value- added finished products of millets. Products are marketed under the brand "Attappady Organic."

Attappady Tribal Apparel Park (ATAP). Attappady Tribal Apparel Park (ATAP) was started in 2017-18 to

provide employment to women belong to the Scheduled Tribes in Attappady Block in Palakkad District. Under the scheme, six months intensive training in making apparel was provided to 250 women, with three months on-the-job training in a factory. After the training was completed, a textile production unit engaging 200 women was established in Attappady. The unit stitches uniforms for children hostels and model residential schools run by the Scheduled Tribes Development Department. The unit is also engaged in producing masks in the wake of the Covid-19 pandemic.

Skilled workforce initiative for construction industry (Gotrajeevika). Another initiative for improving livelihood among tribes was the introduction of a new scheme called the "skilled workforce initiative for the construction industry" (*Gotrajeevika*) in 2017-18. The Department conducted an employment-generation programme for youth in all districts of the State. Training was given in masonry, carpentry, plumbing, wiring, and brick-making. In the first phase, 1,170 beneficiaries were given training and 53 self-help groups were formed in the construction sector. The beneficiaries of the scheme are now employed in the construction sector.

Agriculture income initiative for Scheduled Tribes. In 2019-20 a new scheme, "Agriculture Income Initiative for Scheduled Tribes," was started to rejuvenate and revamp existing agricultural farms in tribal areas. There are vast tracts of lands suitable for agriculture in these farms under the control of Scheduled Tribes Development Department and Agriculture Department in tribal areas. These farms include Aralam Tribal Rehabilitation and Development Mission (ATRDM) area in Kannur, Sugandhagiri, Cheengeri, Priyadarshini and other farms in Wayanad, Attapady Co-operative farming society in Palakkad among others.

Nutrition-sufficiency in food through agroecology in Attapady. For addressing nutrition deficiencies in Attapady Block, the Scheduled Tribes Development Department initiated a pilot project in 2019-20. This project is being implemented in 1,671 acres in 19 hamlets with a population of 1208 families. 16 field co-ordinators from the Scheduled Tribes were recruited to supervise the projects and to support the farmers. The scheme aims to introduce nutrition-sufficiency in food with the close participation of and management by Scheduled Tribe communities.

Kerala Tribal Plus and Revolving Fund of MGNREGS. In order to ensure the largest possible coverage of Scheduled Tribe workers under MGNREGS and ensure adequate livelihood to the people of Scheduled Tribes, the State Government enhanced the number of persondays of MGNREGS for all Scheduled Tribe families in the State from 100 to 200 days. The delay in payment of wages because of the delayed fund release from the Government of India was found as one of the major reasons for the tribal families dropping out from the scheme. The Department created a revolving fund scheme for the timely payment of wages. It is implemented in Attappady, Aralam and Wayanad. A corpus of Rs 2400 crore has been parked by the Department with the MGNREGS and the Kudumbashree Missions to implement the scheme. Under this programme, 68,960 Scheduled Tribe families gained 100 plus days person days between 2018 to 2021. Year-wise details are given in Table 18.18.

Table 18.18 *Number of tribal families who completed 100 days job under Mahatma Gandhi National Rural Employment Guarantee Scheme, Kerala. 2018-19 to 2020-21* in numbers

Year	Number of families availed 100 plus
2018-19	22674
2019-20	21270
2020-21	25016
Total	68960

Source: Scheduled Tribes Development Department, Government of Kerala

Career Guidance Programme, Skill Development and Placements. Department conducts career guidance camps and skill training for unemployed youth belonging to the Scheduled Tribes. Based on the feedback from the career guidance programmes and skill gap analysis, skill training was provided in different job-oriented technical courses. Trained youth were placed in both Government and private firms, including multinational companies abroad. Since 2016-17, 5658 jobless youth have been trained in various fields and provided employment in reputed firms.

Health. Major health care schemes implemented for the welfare of Scheduled Tribes include comprehensive tribal health care, assistance for sickle cell anaemia patients, *jananijanmaraksha* and financial assistance to tribal healers. There are four mid-wife centres, 16 mobile medical units, 17 Ayurveda dispensaries, one Ayurveda hospital and five outpatient clinics functioning under the Scheduled Tribe Development

Department. The comprehensive tribal health care programme is implemented through hospitals, health care institutions, tribal relief fund, health education programmes, and de-addiction campaigns in selected tribal hamlets. *Jananijanmaraksha* scheme addresses nutritional issues of mother and child. Under this scheme, Rs 2000 per month is given to the mother from the third month of pregnancy to the month in which the child turns one year old. Financial assistance of Rs 10,000 per year is also given to traditional tribal healers. Outlay and expenditure under health sector from 2016-17 to 2020-21 is given in Table 18.19.

Mobile Medical Clinics. In 2016-17 and 2017-18, the Department started 14 new mobile medical clinics (with GPS facility) to provide health services at the door steps of people of the Scheduled Tribes. The clinics have doctors, paramedics, and modern medical amenities. The mobile clinics are of immense help for the tribes living in remote areas. The services provided by the clinics include the following.

1. Antenatal services, injection tetanus, iron and folic acid tablets, basic laboratory tests and referral for other tests as may be required.
2. Identification and referral of complicated pregnancies.
3. Post natal check-up of women and children.
4. Identification of unimmunised children and their vaccination for missed doses or administration of Vitamin-A dose.
5. Screening of children for identification of malnutrition and their counseling and referral (where needed), de-worming.
6. Basic ENT and Ophthalmic check ups

Other achievements in health sector

1. 30,500 beneficiaries received Distress Relief fund.
2. Rate of assistance given to sickle cell anaemia patients enhanced from Rs 2000 to Rs 2500 and 720 patients received assistance.
3. Rate of assistance under the *Jananijanmaraksha* scheme was enhanced from Rs 1000 to Rs 2000 and assistance was given to 44,640 beneficiaries.
4. Under the food support programme, 88,000 families belonging to Scheduled Tribes throughout the State were provided food kits during the monsoon season.
5. 1,22,728 patients received treatment under comprehensive tribal health programmes.
6. Community kitchen in Attappady helped enhance the nutrition of the vulnerable population including pregnant and lactating mothers, children, adolescents, senior citizens, chronically ill tribes.

Table 18.20 P*atients who availed treatment under mobile medical clinics of Scheduled Tribes Development Department, Kerala, 2017-18 to 2020-21* in number

Year	Number of patients treated
2017-18	24,30,000
2018-19	12,80,000
2019-20	20,25,878
2020-21	1,03,432
Total	58,39,310

Source: Scheduled Tribes Development Department, Government of Kerala

Infrastructure Development

Ambedkar Settlement Development Scheme. In 2017-18, the Ambedkar Settlement Development Scheme was started to meet the immediate requirements for infrastructure facilities including water supply, sanitation facilities, and resettlement of Scheduled Tribe people living in difficult conditions, in order to promote economic activities and meet the basic minimum needs of women

Table 18.19 *Outlay and expenditure under health programmes of Scheduled Tribes Development Department, Kerala, 2016-20* in Rs lakh and per cent

Year	Outlay (in lakh Rs)	Expenditure (in lakh Rs)	Expenditure (in per cent)
2016-17	2650	2600.39	98.13
2017-18	5240	3957.62	75.53
2018-19	4281	4239.36	99.03
2019-20	4373.5	3281.19	75.02
2020-21	4373.50	3520.20	80.49
Total	20918.00	17598.76	84.13

Source: Scheduled Tribes Development Department, Government of Kerala

Table 18.21 *Outlay and Expenditure under Corpus Fund of Scheduled Tribes Development Department, Kerala, 2016-17 to 2020-21* in Rs lakh

Year	Outlay	Expenditure	Number of beneficiaries
2016-17	5057.69	4754.41	91588
2017-18	5079.00	5022.23	50000
2018-19	5600.00	4054.77	75000
2019-20	5800.00	3353.17	75000
2020-21	4000.00	3700.91	52000
Total	25536.69	20885.49	343588

Source: Scheduled Tribes Development Department, Government of Kerala

and children. 91 settlements were selected for infrastructure development. Work in 20 settlements is complete and the remaining works will be completed soon.

Critical Gap Filling scheme or Corpus Fund under TSP. After allocating TSP funds to various ongoing schemes, a portion of the balance funds is maintained as a pool to meet the requirement of various critical gap-filling programmes under TSP. This is a need-based scheme, which is operated on a project mode. While funds under this scheme can be used as a critical gap filler in any sector of the activity of the Scheduled Tribe Development, priority is given to programmes such as infrastructure development, self-employment and skill development, water supply, sanitation, projects for information, education, and communication, vocational training and facilitation centres, micro-enterprises and income generating activities, and admission of students belonging to Scheduled Tribes in international institutions.

Total electrification of Scheduled Tribe settlements in the State. All the settlements including the remote ones were electrified and those settlements where laying of underground and aerial cables were not possible, solar electrification was done.

Other major achievements

Socio–economic survey of tribals. The Scheduled Tribes Development Department initiated a socio-economic survey of tribals in 2018-19. This is one of the major initiatives taken by the Department to address a gap in the planning process, that is, availability of data for formulating plans.

The socio-economic survey is comprehensive and includes data on parameters such as population, education, healthcare, housing and other basic amenities, employment and unemployment, income, agricultural activities, other livelihood activities, drinking water facilities, electrification, health, and land ownership details. The survey information is based on information from individual households and settlements. In the settlement-based survey, general information regarding each settlement, details of Oorukoottams, Eco-Development Committees, Vana Samrakshana Samithi, and the occupation of tribal people inside forest areas were collected.

The survey covered 6881 settlements. The data will be updated every year. As one of the main objectives of the survey is to provide data for micro-level planning, the data are also compiled according to local bodies

Box 18.1
Attappady Alternative

Attappady Alternative is a brief report prepared by the Kerala State Planning Board. The report proposes short-and medium-term strategies for development and income growth among households in Attappady Block in Palakkad. Attappady is a tribal-dominated block in Palakkad district and a relatively less-developed region of the State. Of the total population of Attappady, 43 per cent are people of the Scheduled Tribes.

At the beginning of 2018, the State Planning Board initiated discussion of issues of under-development in Attappady and a review of existing reports on the subject. In February 2018, after the death of A. Madhu, a resident of Kadukumanna hamlet in Attappady and victim of a criminal attack, issues of underdevelopment and deprivation among people of the Scheduled Tribes in the area came back to public attention, and added urgency to the study.

This report (1) summarises the recommendations of diverse previous reports; (2) examines the allocation

to Plan schemes that are applicable to Attappady; (3) summarises certain recent policy announcements of the Government of Kerala; and (4) draws conclusions from a study of incomes conducted by the State Planning Board among selected households in the region.

The findings and recommendations of the Report are as follows.

The Plan schemes by Government dealt primarily with welfare measures and direct assistance. These have played an important role in bringing relief to the people of Attappady, and must continue. Nevertheless, the welfare approach to development in Attappady needs to be supplemented by an income-enhancement approach.

1. Finding: The most important correlate of household poverty was the remoteness of the village of residence.
Recommendation: The repair and modernisation of roads in Attappady is an urgent task.

2. Finding: Households with the most cultivable land are the poorest. The data indicate low coverage of schemes in agriculture and related activities.
Recommendation: The development strategy for agriculture in Attappady should be two-fold, one for the Attappady Farming Society, which controls 1,093 hectares of farmland, and another for household farming on homesteads.

The Attappady Farming Society has farms in four places. The details of the extent and crops cultivated in the farms are shown in the Table 18.22.

Table 18.22 *Attappady Farming Society, descriptive features of farm in hectare*

Units of Attappady Farming Society	Extent of land	Extent of land sown	Crops cultivated
Chindakki	283.44	283.44	Coffee, pepper, arecanut, and cardamom
Karuvara	141.47	141.47	
Pothupadi	377.8	377.8	
Varadamala	290	290	

As part of the Scheduled Tribe Development Department's initiative to promote income-bearing sustainable agriculture, it is currently implementing a scheme titled "Agriculture Income Initiative for Scheduled Tribes." The Annual Plan of 2019-20 proposed the promotion of high-value agriculture in farms in the Aralam Tribal Rehabilitation and Development Mission Area, Kannur, Cheengeri and neighbouring areas of Wayanad district, and Attappady in Palakkad district.

Modern agriculture should be promoted on homesteads. The Kerala Agricultural University should be asked to develop a menu of homestead-based farming alternatives for tribal farming families. An urgent and committed campaign to implement integrated programmes for the development of agriculture, animal resources, and fisheries must begin. Schemes to enhance incomes through forest and local produce must also be implemented.

3. Finding: No person covered by the survey worked in the modern industrial or services sectors. Only two households received remittances from family members in other places.
*Recommendatio*n: A strong programme of employment-linked skill development for Attappady must be designed and implemented so that youth in Attappady get modern sector employment. The report suggests that our industrial agencies design programmes of industrial promotion, particularly in small industry, for Attappady. The Government should encourage high-tech, environment- friendly industry in the region.

Challenges and Way Ahead

There continue to be problems of inequality – with respect to education, employment, income and health – between people of the Scheduled Tribes and the general population.

The path to socio-economic development of Scheduled Tribes lies in the transition from low income jobs to high income occupations, to modern means of production, access to higher education and research, high quality infrastructure, sustainable means of livelihood, skill training, modern agriculture and industrial production. We also need to address problems of absolute poverty among some families belonging to the Scheduled Tribes through family-based micro-interventions.

Chapter 19
Some Social Initiatives for Inclusion

Empowering Persons with Disabilities

The 13th Five-Year Plan committed the Government of Kerala to invest in social security for the income -poor, victims of social discrimination, transgender persons, persons with disabilities, the economically vulnerable, the unemployed, elderly, the hungry, and the sick. From 2018-19, programmes on empowering the elderly, persons with disabilities, and transgender persons came under the purview of the Directorate of Social Justice functioning as a separate Directorate in the Social Justice Department.

The UN Convention on the Rights of Persons with Disabilities (UNCRPD) 2013 is the first international legally binding instrument setting minimum standards for the rights of people with disabilities.[18] An estimated 15 per cent of the world's population live with some form of disability, of whom two to four per cent experience significant difficulties in functioning (WHO 2011). The global commitment for the 2030 Agenda for Sustainable Development recognises the promotion of the rights, perspectives, and well-being of persons with disabilities in line with the UNCRPD towards a more sustainable and inclusive world (UN 2019).[19] Disability was referenced in five goals related to education, growth and employment, inequality, accessibility of human settlements, and as well as data collection and monitoring of Sustainable Development Goals (SDGs).

Overview of Disability in Kerala

In 2015, the Kerala Social Security Mission (KSSM) conducted an exclusive survey of persons with disabilities in Kerala. It was one of the first surveys of its kind in India, covering 22 types of disabilities, excluding acid attack victims and Parkinson's disease (included in the Rights of Persons with Disabilities Act, 2016) and including kyphosis and epilepsy as separate disabilities.[20]

Demographic characteristics of persons with disabilities

The survey identified 7,93,937 persons with disabilities in Kerala constituting 2.3 per cent of the State's population, 55.3 per cent were male and 0.015 per cent were transgender persons. The highest percentage of persons with disabilities was from Malappuram District (12.2 per cent) and the lowest was from Wayanad and Idukki districts (2.9 per cent and 3.3 per cent respectively). Age-wise, almost 41 per cent were in the age group of 35-59 years and 16.5 per cent were children. Notably, more than half, almost 52 per cent of persons with disabilities did not have a disability certificate. Among those who had the disability certificate, 2.8 per cent had 1 to 40 per cent disability, 36.7 per cent had 40 to 79 per cent disability, and 8.6 per cent had 80 to 100 per cent disability. Among all the persons with disabilities, 51.5 per cent were married and 2.5 per cent were either divorced or separated from their spouses. Further, 0.8 per cent of persons with disabilities were bed-ridden.

About half the persons with disabilities either did not go to school or dropped out in primary school. In the working-age group, 20-59 years, about 37 per cent were employed and the majority were daily wage or temporary workers. Only 3.7 per cent were in the public sector (2.9 per cent were permanently employed).

Types of disabilities

The major disability identified among male, female, and transgender persons was locomotor disability (32.89 per cent) and the least prevalent were multiple sclerosis (0.06 per cent) and thalassemia (0.07 per cent). Multiple disabilities except deaf-blindness contributed 17.31 per cent while deaf-blindness was found in 0.11 per cent, mental illness in 12.72 per cent and intellectual disability in 8.68 per cent of the total number of persons with disabilities.

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[18]United Nations (2019A): Convention on the Rights of Persons with Disabilities https://www.un.org/development/desa/disabilities/resources/general-assembly/convention-on-the-rights-of-persons-with-disabilities-ares61106.html.

[19]United Nations (2019B): Sustainable Development Goals https://www.un.org/sustainabledevelopment/sustainable-development-goals/

[20]Based on Census 2011, Kerala had 761,843 persons with disabilities. Among them 171,630 had disability in movement (22.5 per cent), 115,513 had disability in seeing (15.2 per cent), and 105,366 had disability in hearing (13.80 per cent). There were 120,457 children with disabilities (15 per cent) and 414,788 persons with disabilities belonging to the age group of 30-59 years (54.4 per cent) (Census India, 2011).

Causes of disability

An interesting feature of the survey was that a higher proportion, 57 per cent of persons with disabilities, had acquired-disability as against congenital occurrence, and the factors that led to disability included childhood illness (12.0 per cent), burns (0.6 per cent), accidents (10.7 per cent), and head injury (2.0 per cent). Among all persons with disabilities, 42.9 per cent were born as disabled (disabilities including cerebral palsy, intellectual disability, autism spectrum disorder, locomotor disorder, hearing impairment, and multiple disability).

State Initiatives for Persons with Disabilities

Kerala is one of the leading States in the country when it comes to services offered to persons with disabilities (Newzhook 2019).[21] The State Planning Board shares the view that it is "the responsibility and duty of the Government and society to create an environment where the disabled can exercise equal rights, develop their talents, and live with dignity." During the 13th Five-Year Plan period, budget allocations for Persons with Disabilities have increased substantially.

Directorate of Social Justice

Through various organisations under the Social Justice Directorate — National Institute of Speech and Hearing (NISH), Kerala Social Security Mission (KSSM), Kerala State Handicapped Persons Welfare Corporation (KSHPWC), National Institute of Physical Medicine and Rehabilitation (NIPMR), and State Commissionerate of Persons with Disabilities (SCPwD) — the Government has implemented development programmes for persons with disabilities.

Awareness. Substantial emphasis has been put on generating greater awareness regarding persons with disabilities since 2017-18, particularly reducing stigma and prejudices attached with disability. "Amma Care" and "Amma Teacher" under State Commissionerate for Persons with Disability (SCPwD) and NISH Interactive Disability Awareness Seminars (NIDAS) are part of this effort. The Kerala State Physically Handicapped Persons Welfare Corporation (KSPHPWC) also implements disability awareness as part of the *Subhayathra* scheme. In addition, the Directorate of Social Justice (SJD) celebrates World Disability Day to promote awareness and understanding about the issue and mobilises support for giving rights to persons with disabilities.

Life Cycle Approach. The scheme *Anuyatra,* started in 2017-18, a rights-based life cycle approach in disability management implemented by KSSM, is designed as an umbrella programme. It is crafted in line with the Rights of Persons with Disabilities Act, 2016 to revamp the earlier State Initiatives on Disabilities. This includes preventive initiatives, early screening, early intervention through District Early Intervention Centres (DEICs) and other health and social sector institutions, education support through special anganwadis, buds schools, model child rehabilitation centres, special schools, inclusive education, vocational training, community-based rehabilitation, and assisted living projects among others. While schools admit students with disabilities, appropriate mechanisms have to be put in place to make them inclusive. Teachers, in general, need to be sensitised to the needs of such students. Special education training needs to be made more practice-based like nursing training attached to hospitals. Special attention should be given to cognitive disability. Diversity in cognitive disability should be emphasised. Individual care-plan formulation and follow-up is another major initiative. This requires convergence of services, resources, and institutions. Every year 5 to 6 lakh children benefit from this scheme (*Economic Review* 2016 to 2019).

Spectrum project, a component of *Anuyathra,* initiated during the 13th Five-Year Plan is aimed at early detection of autism, parental empowering programme, and skill development of the autism-affected children. Autism centres are established at six medical colleges with the service of a physiotherapist, clinical psychologist, occupational therapist, speech therapist, and other specialised doctors. National Institute of Physical Medicine and Rehabilitation (NIPMR) serves as a regional autism rehabilitation and research centre. Another component of *Anuyathra* is the life approach campaign in hearing disability management named *Kathoram*. Cochlear implantation and auditory-verbal habilitation of children 0-5 years are done under *Sruthitharangam*.

An innovative project under *Anuyathra* that was initiated in 2017 to increase awareness is M-Power, implemented by the KSSM, under which 23 children with intellectually disability were trained in magic at the Magic Academy. After three months of training, the children performed faultlessly in front of Dr Hamid

[21]Newzhook, 2019. https://newzhook.com/story/kerala-government-gets-award-for-empowering-disabled-people-gets-mixed-reviews-from-activists/

Ansari, then Vice-President of India, who launched M-Power in June 2017. They were envisaged as brand ambassadors of the campaign for spreading awareness about persons with disabilities.

Rehabilitation schemes. *Athijeevanam* is an umbrella scheme for the development and rehabilitation of persons with disabilities implemented in the 13th Plan. The Dementia Home provides for the rehabilitation of 15 to 23 dementia patients every year. *Pratheeksha* scheme is for the rehabilitation of intellectually disabled persons. A Central scheme, Deendayal Disabled Rehabilitation Scheme (DDRS), provided financial assistance to voluntary organisations for the rehabilitation of persons with disabilities. However, funds from the Centre have stopped and the State Government has stepped in to fund the scheme. In addition, there are 15 welfare institutions, (including vocational training centres) under the aegis of the Social Justice Department (SJD) for the care, protection, and rehabilitation of disabled and senior citizens (*Economic Review*, 2019).

Disability certificate. A disability certificate is necessary to access benefits accorded under the Rights of Persons with Disabilities Act (2016) in India. As a component of ANUYATHRA, Disability Cards are distributed through Disability Certification Camps.

Scholarships/educational support. There are seven schemes to support students with a disability, from school-level to degree or post-graduation or professional or technical training. Some of these are *Vidyakiranam, Vidyajyothi, Vijayamritham, and Sahachari.* As part of promoting inclusive education, a new scheme was designed for honouring the National Service Scheme (NSS) and National Cadet Corps (NCC) units of schools that support persons with disabilities children.

Employment and skill training. In the 13th Plan, attempts have been made to enhance the provision for self-employment of persons with disabilities. The 100 days programme of the Government includes self-employment loans to 7749 persons registered with the Employment Exchanges (of whom 2,708 are women beneficiaries). It is a collaborative project of KSHPWC and Labour Department under the *Kaivalya* scheme of the latter. Financial assistance is given to lottery agents with disabilities as a subsidy. There is another scheme that gives financial assistance to five blind and orthopedically handicapped advocates per year. *Swasraya* is a scheme that provides financial assistance to 100 to 300 single mothers of persons with physical or intellectual disabilities to help them find self-employment.

As a follow-up to the magic training to children with intellectual disabilities, employment was provided to six of them in the Magic Planet to perform magic. In association with KSSM, City Corporation, and Kerala Development and Innovation Strategic Council (K-DISC), Magic Planet has set up a Different Arts Centre (DAC) on the campus, a proud initiative of the Government. The centre is functioning as a platform to engage and empower 100 children with autistic disorders (M-Power incubator) by showcasing their talents in music, dance, painting, and skills in various musical instruments. Art therapy could play a significant role in bringing positive changes among such children.

Technological support. The Young Innovators Programme (YIP) of 2019, part of K-DISC's societal advancement component, has a module called Innovation by Youth with Disabilities (I-YwD) to identify and promote youth with different abilities. The programme is organised jointly with the United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Score Foundation, Disability Arts International, and National Institute of Speech and Hearing (NISH).

Financial assistance. Distress relief fund for the disabled provides financial assistance for medical treatment, including surgery, to persons who become handicapped from accidents, and for any other purpose which is not covered by existing schemes. The *Pariraksha* scheme provides financial assistance for persons with disabilities who are in a crisis or are facing emergencies. Around 1000 persons with disabilities are benefiting from this scheme every year. The scheme *Parinayam* provides marriage assistance to girls with physical disabilities and the daughters of parents with physical disabilities. The scheme has been revamped to provide assistance to those who marry persons with disabilities (500 to 800 beneficiaries per year).

Accessibility/assistive devices. *Matru Jyothi* is a financial assistance scheme for visually impaired mothers. The scheme provides assistive devices to 50 to 100 persons with disabilities every year. *Barrier-Free Kerala* is another project which aims to make Kerala a disabled-friendly State. *Subhayathra* and *Thanal* are the other two schemes of KSPHPWC. These schemes provide free distribution of aids, appliances, and modern equipment such as high-tech limb, electric wheelchair,

laptop with voice enhanced software, powered bed, and other modern equipment for specific needs of people with disability.

Social assistance. *Aswasakiranam* scheme provides an amount of Rs 525 as assistance to caregivers, primarily women, of bedridden persons with physical or intellectual disabilities.

Other financial assistance. The KSSM runs two schemes (1) *Samaswasam*, which provides financial assistance to persons with haemophilia and sickle cell anaemia and (2) *Thalolam*, which provided free treatment to children below the age of 18 suffering from cerebral palsy, brittle bone disease, haemophilia, thalassemia, sickle cell anaemia, orthopaedic deformities, neurodevelopmental disabilities, congenital anomalies, and accident cases (needing surgical intervention). An average of 13,000 to 20,000 children benefit from this scheme every year.

Institutions and programmes for persons with disability

The burden of disability can be minimised through proper interventions. The following are the institutions under SJD providing interventions to persons with disabilities.

National Institute of Speech and Hearing (NISH). NISH is a premier institute in the area of disability for disability studies and rehabilitation sciences. It also provides an excellent environment for the pursuit of higher studies for persons with disabilities.

National Institute of Physical Medicine and Rehabilitation (NIPMR). NIPMR is dedicated to the early identification, intervention, and rehabilitation of children and adults with multiple disabilities, cerebral palsy, stroke, and other associated disorders. In the 13th Plan, it has been completely revamped and has emerged as a Centre of Excellence in addressing disabilities.

Kerala State Physically Handicapped Persons Welfare Corporation (KSPHPWC). Established in 1979, its activities have grown over the years with a special impetus in the 13th Plan. From an outlay of Rs 4.15 crore in 2016-17, it was enhanced to Rs 9 crore in 2017-18 and since then, hovered between Rs 12 to 13 crore up to 2020-21.

Community Disability Management and Rehabilitation Programme (CDMRP). It is an extension centre of the Department of Psychology, the University of Calicut (supported by the Social Justice Department). The centre aims to provide comprehensive, evidence-based, and community-based services towards prevention, early intervention, management and rehabilitation of children with developmental disabilities.

Institute of Mental Health and Neurosciences (IMHANS): IMHANS provides comprehensive and multidisciplinary mental health care to children with developmental disabilities and psychiatric disorders. It has four adult psychiatry units. They also provide psychosocial support for Tribal Population in Wayanad District.

Initiatives of Other Departments/Institutions

Department of Health and Family Welfare

Screening. Through *Salabham* (comprehensive newborn screening programme), all babies born in Government hospitals are subjected to comprehensive screening. During the 13th Plan, this facility was extended to all Government hospitals. Some private hospitals are also doing the screening.

Rehabilitation programmes. A fourth limb fitting centre is being set up at the district hospital, Palakkad, adding to the three existing facilities at General Hospital, Ernakulam, district hospitals at Kollam and Kannur. There are 11 Physical Medicine and Rehabilitation Units set up in major hospitals in 11 districts. For the rehabilitation of persons with locomotor disability, a Welfare Society for the Locomotor Disabled (together with SJD) was formed earlier in 2013-14. In the 13th Plan, assistance per beneficiary has been significantly

Table 19.1 *Beneficiaries of major institutes related to disabilities under the Social Justice Department, Government of Kerala* in number

Name of the Institution	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
NISH	7,298	8,246	7,129	30,212	18,238	*
NIPMR	*	*	16,186	25,943	28,113	*
CDMRP	*	10,038	27,437	31,699	34,734	6723

Note: Economic Review (2019, 2018, 2017 and 2016) for more details
**Data unavailable*
Source: Unpublished data collected from NIPMR, Annual Reports of NISH and CDMRP, and Department of Social Justice

increased to Rs 50,000 per person. A new initiative during this Plan is Day Care Centres for the mentally ill in remission under the Comprehensive Mental Health Scheme launched in 2017-18. The State Government has started 26 daycare homes and 506 cured mentally ill patients are being provided daycare.

Child Development Centre. Child Development Centre is an autonomous centre in early child care and education, adolescent care and education, premarital counselling, women's welfare, and other related fields to reduce childhood disability through novel scientific initiatives and create a generation of responsive parents.

Institute for Cognitive and Communicative Disorders and Neuro Sciences (ICCONS). ICCONS provides intervention and assessment for various disorders such as autism, learning disability, developmental language disorders, mental retardation, cerebral palsy, hearing impairment, adult stroke and related problems, parkinson's disease, dementia, aphasia, and other genetic and metabolic disorders affecting speech, language, and cognitive functions in children and adults. It also provides special education schools for children with cognitive language disorders.

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST). It provides treatment for Parkinson's disease, neurological disorders, and movement disorders. The Comprehensive Care Centre set up in collaboration with NISH in 2016 aims at a life cycle-approach for neurodevelopmental disorders such as autism, learning disability, cerebral palsy, intellectual disability and global development delay. Under the second phase of the project in 2018, a sensory park has been set up at NISH.

Department of General Education, Samagra Shiksha Abhiyan. The Individualised Education Programme (IEP) of the Department is for slow learners, modelled on resource room training in normal schools. If a child with a disability has difficulty coping in regular schools, then they are catered through special schools.

From the year 2018-19, Samagra Shiksha emphasises improving the quality of education for all students, including children with special needs, providing support for various student-oriented activities.

Special School Kalolsavam for children with special needs is also held by the Education Department.

State Institute for the Mentally Challenged (SIMC) is an autonomous society registered under the charitable society's registration act 1995, that provides training to persons with mental illness.

Department of Higher Education. CeDS (Centre of Excellence for Disability Studies*)* with a focus on innovations in rehabilitation technologies is established as a part of the LBS Centre for Science and Technology, Thiruvananthapuram.

The Additional Skill Acquisition Programme (ASAP) offers vocational skills training to facilitate the employment of disabled students at NISH, who failed to clear eligibility of the computers and fine arts course offered by NISH.

Inter-University Centre for Disability Studies (MG University) is working to develop higher-level professionals in the field of disability studies and to develop a holistic approach for the total rehabilitation of the disabled.

Department of Agriculture

Kerala Agricultural University, Vellayani has started a programme with the support of KSSM in 2018 to provide horticulture therapy to persons with disabilities, which uses plants and plant-related activities for physical, mental, and social well-being. In the year 2019-20, two programmes were conducted by the Department of Community Science, College of Agriculture funded by KSSM and the Department of Agriculture.

Local Self-Government Department (LSGD)

Scholarship. Using the Tribal Sub Plan (TSP) funds for the disabled, LSGD is providing scholarships to children with disabilities through Integrated Child Development Scheme, under the mandatorily required fund (five per cent for children, disabled, and transgenders).

Employment. Mahatma Gandhi National Rural Employment Guarantee Act 2005. Even though the scheme is not for persons with disabilities, as per the KSSM Disability Survey (2015), more than 66000 persons with disabilities are beneficiaries of this scheme.

Pension. Either intellectually disabled or physically disabled elderly destitute with more than 40 per cent disability are getting pension through Indira Gandhi National Disability Pension Scheme.

Kudumbashree Mission. Kudumbashree initiated a disability programme namely "BUDS" schools to overcome the labelling and stigmatisation towards children with intellectually disabilities and to provide special schools for various categories of children. There are 138 BUDS schools in the State. BUDS Rehabilitation Centres (BRCs) were started in rural areas to provide training, daycare, and health care to

persons with disabilities above 18 years with intellectual disability, cerebral palsy, autism, and multiple disability. There are 151 BRCs in Kerala.

Department of Women and Child Development

Education. For providing appropriate training and remedial therapy to pre-school children with disabilities, one Anganwadi in every Integrated Child Development Services project is designated as a special Anganwadi. At present, the project is implemented in Kozhikode District.

Department of Labour and Skills

Employment and Skill Development. In 2016, *Kaivalya* was introduced as a comprehensive scheme for achieving the goals of social inclusion and equality of opportunity for all citizens with disabilities. Special employment exchanges for disabled persons have been established at Thiruvananthapuram, Neyyattinkara, Kollam, Kottayam, Ernakulam, and Kozhikode.

Department of Sports

Scholarship. Kerala State Sports Council had implemented Dr APJ Abdul Kalam Scholarship for encouraging eminent sports players in the State. The scholarship was started in 2015-16 and 10 sports persons were selected and given scholarship. Six sports persons were given scholarship under this scheme in 2019-20 (*Economic Review*, 2019).

The pandemic Covid-19 scenario. On February 10, 2020, Kerala State Disaster Management Authority (KSDMA) in collaboration with NISH produced an Indian Sign Language (ISL) awareness video about Covid-19 and published it on social media. It was the first awareness video in ISL about the pandemic. Arrangements to repair batteries of assistive devices of persons with disabilities were made by KSDMA. Food was also distributed to persons with disabilities in need. In addition, press conferences of the Chief Minister, Shri Pinarayi Vijayan, about Covid-19 were interpreted in ISL with the help of NISH.

Suggestions for Disaster Risk Reduction (DRR).

1. Training regarding search, rescue, and evacuation of persons with disabilities should be provided to all rescue teams (fire force, police, volunteer groups, and others identified by KSDMA). Evacuation plans for persons with disabilities must be framed and incorporated into Disaster Risk Reduction (DRR) strategies and should include the supply of necessary equipment (Post-Disaster Needs Assessment,2019).
2. There is a need for tracking of persons with disabilities using GIS in each local government and disaster-prone area in order to minimise the risks of rescuing persons with disabilities.
3. There shall be measures taken up to set up disabled-friendly temporary shelters and buildings at the local government-level with the required facility for information and communication, health, and education that are accessible for persons with disabilities.
4. There is a necessity for introducing disability-inclusive climate resilience programmes and DRR strategies as a part of the implementation of the SDGs. The Sendai Framework for Disaster Risk Reduction 2015-2030 may be adopted for the same (UN, 2020)

Recognitions Received from 2016-2020

1. On the occasion of the International Day of Persons with Disabilities on December 3, 2019, the Ministry of Social Justice and Empowerment awarded Kerala the best State in promoting empowerment of persons with disabilities.
2. In 2018-19, the Kerala State Handicapped Persons Welfare Corporation received the award for best Channelising Agency of National Handicapped Finance and Development Corporation and also incentive for higher turnover.
3. In the World Hearing Forum of the World Health Organisation, Kerala also got selected to be a participant. The ENT Department of the Kozhikode Medical College has received membership in the World Hearing Forum.

Empowering Persons with Disabilities: A Vision for Kerala

Over the past decades, Kerala has been a pioneer in spearheading projects for persons with disabilities. However, there are still gaps to be filled. There are no special services, schemes, financial assistance, or pension for persons with disabilities with dwarfism, Parkinson's disease, muscular dystrophy, and multiple sclerosis. Programmes that benefit these patients should also be designed and implemented in line with the Rights of Persons with Disabilities Act, 2016. There are major gaps with respect to accessibility, in terms of necessary infrastructure support for persons with disabilities, and lack of registry. There is neither an integrated system that combines the activities of different departments nor enough records of persons with disabilities availing services from the State. In addition, what comes out very clearly, is that multiple departments are providing the same type of service. The larger goal at achieving independent living for persons with disabilities within

the shortest possible time should be the target, within which all major gaps would be addressed, as envisaged in the Rights of Persons with Disabilities Act, 2016.

As an initial move, the State Government may start with the following activities**:**

Integrated multi-departmental initiative

The need for a cell that can coordinate various activities for persons with disabilities in the departments such as Social Justice, Health, Education, Labour, and LSGD. This cell shall also oversee the implementation of disability rights.

State disability registry

The existing disability census done by KSSM in 2015 can be converted to a digital registry of the State. This can make disability data live and dynamic. This live data shall be helpful in introducing an online Individual Care Plan (ICP) which can be used for implementing a life cycle approach for persons with disabilities. In addition, there is a need for an online registry that contains the details of the children in all gynaecology and obstetrics department and the paediatric department of every hospital where radiological screening is positive for congenital anomaly. Doctors from the Government and private sectors should be trained on recent developments and research on the identification of birth deficits and necessary steps to be taken for a healthy delivery.

A possible suggestion is to introduce the Unique Disability ID in collaboration with a bank so that the persons with disabilities can use it as an ATM card, in the model of a universal card for persons with disabilities.

Early detection

Early screening, detection, intervention, and allied services for rehabilitation that include vocational training, skill development, and parental empowerment are accepted as the most effective method in disability management, especially among children.

Kerala is a State in which immunisation programmes have been successfully implemented in the past decades. According to Joy *et al*. (2019), among the children aged 12–23 months, 89 per cent were fully immunised, 10 per cent were partially immunised, and one per cent remain unimmunised in Kerala.[22] The programme can be extended to monitor development delays, if any, using simple developmental screening tools such as the Development of Observation Card (DOC) or Trivandrum Developmental Screening Chart (TDSC).

The early intervention network in the State starting from early screening facility at delivery hospitals up to the apex centres in early intervention needs to be strengthened. Establishing, strengthening, and institutionalising an organised network of systems and institutions for prevention, early intervention, disability management, vocational training, skill development and social rehabilitation including parental empowerment shall be the strategy. A convergence of services and bringing local governments to the forefront of disability management shall be the approach.

Community-Based Rehabilitation (CBR)

The geographical mapping of persons with disability should be done in order to implement successful community-based rehabilitation at the local government-level. Currently, Kerala does not have a strategy to reach out to all persons with disability.

There is a huge lacuna of rehabilitation professionals and clinicians in the country to cater to the multiple needs of persons with disabilities. There is an urgent need for improving the quality of healthcare clinicians and rehabilitation professionals working with persons with disabilities by ensuring adequate numbers of persons with disabilities-professional ratio and updating the knowledge by the rehabilitation professionals/clinicians through continuous professional development.

Research should be encouraged to develop diagnostic and screening tests for various disabilities. Centres such as NISH and NIPMR should collaborate to develop model intervention programmes through research and should develop training modules for teachers and parents in video, audio, and text format. In addition, there is a need for developing a Physical Education Department for training and equipping the persons with disabilities with the vision of participation in Paralympics.

Assisted living

Assisted living is an area that is being debated on a number of platforms. "What happens after me?" is the eternal worry among the parents of persons with disabilities. Assisted living is a shift from institutionalisation to a concept of independent living in the community, which is a reflection of new ideas that are emerging. There is a need for conducting future research in this area by visiting the structure of retirement homes in Kerala and by focusing on improved infrastructure, assisted living technologies,

[22]Joy,TM, George,S, Paul N, Renjin, BA, Rakesh PS, and Sreedevi, A (2019): "Assessment of Vaccine Coverage and Associated Factors among Children in Urban Agglomerations of Kochi, Kerala, India", *Journal of Family Medicine and Primary Care,* 8(1), 91-96.

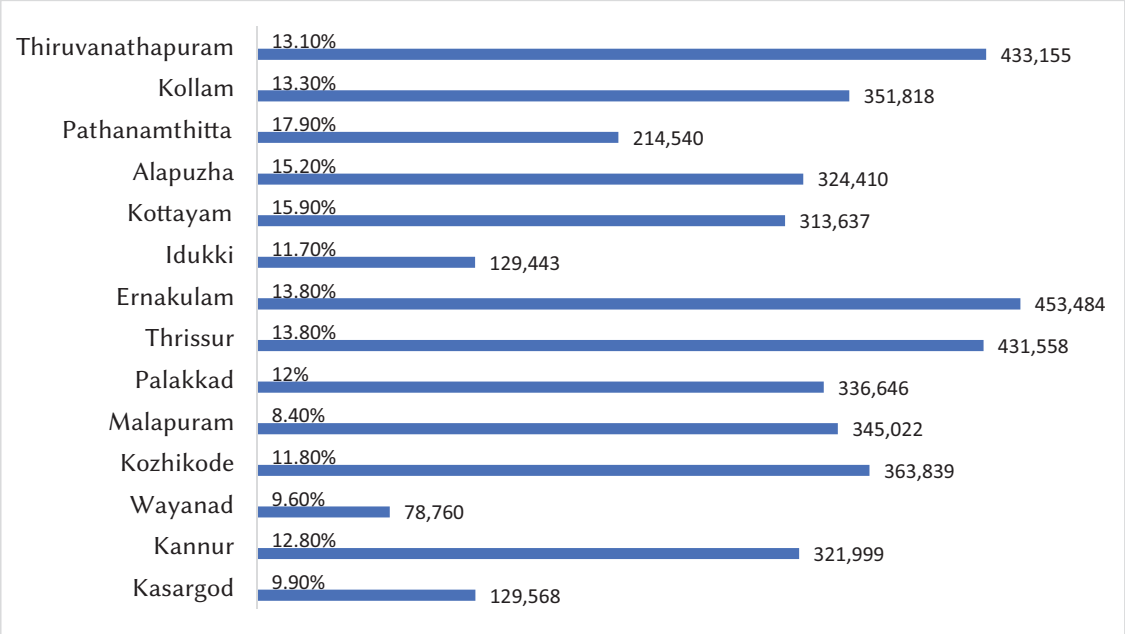

Figure 19.1 *Number of elderly in a district and percentage of elderly to the total district population, Kerala*
Source: Census, 2011

skill development, and employment opportunities. The report of the expert committee (constituted by the State Planning Board jointly with the Education and Social Justice Department) on assisted living with a model programme proposed should be reviewed by the Government.

Accessibility

There is a need for promoting disabled-friendly public infrastructure, including living spaces, transport, information, and communication to ensure the participation of persons with disabilities in education, employment, and social life. There should be guaranteed access to bank loans and micro-finance for start-up businesses at interest rates that take into account the additional costs related to disabilities (UN, 2020).

Empowering the Elderly

The World Health Organisation has declared 2020-2030 *The Decade of Healthy Ageing*. The issues that it has raised are particularly relevant to Kerala where high-levels of social development have resulted in low fertility rates, declining mortality, and increasing longevity. The proportion of elderly in the State has increased from 10.5 per cent in 2001 to 12.6 per cent in 2011 and is projected to rise to 23 per cent by 2025, closer to current rates in OECD countries.[23] The elderly must not merely live longer, but must be able to lead secure, dignified and productive lives. The Maintenance and Welfare of Parents and Senior Citizens Act, 2007 was enacted in December 2007, to ensure need-based maintenance for parents and senior citizens and their welfare. Kerala has so far completed all the consequential steps under the Act, and it is being implemented in the State. Moreover, a strong social protection system is essential for the elderly population, if the State (and India), are to meet the 2030 agenda set by the Sustainable Development Goals (SDGs).

Demographic Profile of the State

According to the Census of 2011, there are 42 lakh people who are above 60 years of age in Kerala. Of these, 22 lakhs were females and 20 lakhs were males. Figure 19.1 shows the distribution of 60+ at the district-level in numbers and as a percentage of the district population. By 2025, the proportion of the population above 60 is projected to be 23 per cent.

Pathanamthitta District has the highest proportion of the elderly, followed by Kottayam and Alappuzha. Twenty six per cent of elderly men and eight per cent of elderly women participate in the labour market.[24] According to the same report, workforce participation declines with age, but amongst those above 80 years

[23]Census of India 2011, Population Projections for India and States 2011 – 2036, Report of the Technical Group on Population Projections, November 2019, National Commission on Population, Ministry Of Health and Family Welfare.
[24]UNFPA (2013).

of age, 8 per cent of men and 3 per cent of women continue to participate in the labour market. The report also finds that work participation rate is much higher among the poor and less educated elderly and among elderly belonging to Scheduled Castes and Scheduled Tribes than those belonging to the educated and wealthier groups. A large majority of the elderly workers are self-employed, a smaller number are engaged as casual labourers, and a small share work in salaried positions.

The ratio of the dependent population to that of the working age population is defined as the dependency ratio. It is an important indicator of the economic burden carried by each worker in the State (a measure of the pressure on the working population and normally expressed as a percentage). In Kerala, the dependency ratio was the highest in the country at 19.6 (18.6 for men, and 20.6 for women) (Elderly in India 2016, Ministry of Statistics and Programme Implementation, GOI).

There are also important gender issues among the elderly. While 88 per cent of men above 60 are literate, only 72 per cent of women are so. A larger percentage of women are fully dependent on others (70 per cent in rural and 64 per cent in urban) than men (43 per cent in rural and 37 per cent in urban).[25] Among senior citizens, while only 8.8 per cent of the men are widowers, about 57 per cent of the women are widows. Women outlive men by an average of 6 years, thereby the problems confronting them are exacerbated.

A 2020 survey conducted by the Government of Kerala, where about 40.23 lakhs of elders responded, provides a most recent picture of the elderly in the State.[26] Amongst the elderly respondents, 89 per cent self-reported their health status to be satisfactory while only 11 per cent considered it to be unsatisfactory. As many as 83 per cent of the respondents reported that they have medication for at least two weeks, and 95 per cent felt they were getting a balanced diet. A similar number (95 per cent) did not need to rely on community kitchens for their diet. Most importantly, 99 per cent of the respondents were aware of preventive measures for Covid-19.

While only a small number of elderly participate in the labour market, a much larger number make meaningful and significant contributions to household resources. While the percentage that contributes financially is relatively low, those who contribute to various household chores is significant (Table 19.1), and these remain invisible. In 2020, a quick survey of working mothers of anganwadi children in two anganwadi centres each in Southern, Central and North Kerala, on how they managed work and child care before and after Covid-19, showed that all the mothers who were working (constituting roughly half of the number of AW children) had parents or in-laws staying with them or near them.[27] The contribution of the elderly in terms of household help and care work should be strongly recognised.

Ageing and its Implications for the State

Population ageing reflects the achievements of the State in improving the health status of people. These demographic changes, however, pose some challenges for the State, its families and the elderly, as the number of elderly is on the rise, especially owing to the good health services in the State. This requires responsive and pre-emptive policies and measures to prepare the State for meeting the SDG 2030 agenda for social protection to support elders who are disadvantaged to live a life of dignity.

The implications of a rapidly ageing population will need to be met both at the macro (national)-level and at micro (household)-level. At the macro-level, it will increase the costs of an ageing population; while at the same time decrease the revenue through lower tax base and tax revenue. This shift will necessitate regular transfers to the elderly, with a higher proportion of taxes and social insurance contributions needed to pay social pensions and healthcare, in the highly budget-constrained context. At the micro-level, families have been, and to a great extent, continue to be, the primary source of care for the elderly. However, with migration, increased mobility, economic development and changing family patterns, the responsibility of elderly care is becoming a challenge. While the better off among the elderly can pay for market services, the poor are deeply vulnerable, and increasingly turn to the State for succour.

Health-related issues

The morbidity rate of Kerala's elderly is high at an estimated 65 per cent (NSSO survey 2015), with increasing health expenditures. A 2017 study found

[25]http://mospi.nic.in/sites/default/files/publication_reports/ElderlyinIndia_2016.pdf

[26]Survey on Health Status of the Senior Citizens in Kerala conducted by Women and Development Department, Government of Kerala, April 2020.

[27]Findings of an unpublished quick study done by Social Services Division in the Planning Board in May 2020. Information on Anaganwdies supplied by Department of Women and Children, Governmentof Kerala.

Table 19.2 *Age-wise participation of elderly in various activities, Kerala* in per cent

Activities	Age Group			Total
	60-69	70-79	80+	
Care of Grandchildren	75.9	73.9	54.4	72.7
Cooking/cleaning	70	47.5	23.5	57.9
Shopping for Household	67.2	38.2	17.1	52.9
Payment of Bills	53.7	31.2	11.2	42.1
Advice to Children	89.6	82.4	61.8	84.1
Settling Disputes	91.2	81.8	56.1	84.2

Source: The Status of Elderly in Kerala 2011 from the survey 'Building a Knowledge Base on Population Ageing in India (BKPAI)' by The United Nations Population Fund (UNFPA), December 2013

Table 19.3 *Percentage distribution of elderly by annual personal income by sex, Kerala 2011*

Income (in Rupees)	Men	Women	Total
No income	25.3	50	39.6
≤12, 000	27.2	35.7	32.2
12,001–24,000	6.6	2.3	4.1
24,001–50,000	11.2	4.4	7.3
50,001 +	27.1	6.6	15.2
Don't know/NA	2.6	1	1.7
Total	100	100	100
Mean	45,815	10,871	25,404
Number of Elderly	567	798	1,365

Source: The Status of Elderly in Kerala 2011 from the survey ''Building a Knowledge Base on Population Ageing in India (BKPAI)'' by The United Nations Population Fund (UNFAP), December 2013

that 35.5 per cent of the elderly participants in the study had acute health problems for the previous one month.[28] Further, 81 per cent reported having at least one chronic problem ailment, and 72 per cent had more than one chronic problem. According to the self-reported economic status, 42.2 per cent said they have a monthly income below Rs 1000. Of them 69 per cent said their income was inadequate to meet their expenses, and 50 per cent depended on family members for their expenses. The main social problems identified were abuse by family members (32 per cent), and quarrels with family members and neighbours (27 per cent).

The projected prevalence of dementia among elderly aged 65 years and above in Kerala was 1.5 lakh in 2011, according to the latest Dementia-India Report of Alzheimer's and Related Disorders Society of India (ARDSI). More women suffer from dementia than men, and they are at a greater disadvantage since they are likely to be more under the authority of their relatives or care-givers, and are often isolated with restricted mobility. This leads to other issues including depression and amnesia.

Similarly, Kerala is reported to have a high prevalence rate of late-life depression with some studies estimating it could be as high as 55 per cent.[29] This has important public health implications for Kerala that need to be addressed at the primary basic health care facility.

Poverty and economic insecurity

Poverty and economic insecurity are issues for a sizeable group of the elderly. The high dependency ratio in the State combined with the low participation of elderly in the labour markets results in low economic security for elderly men, and more particularly for elderly women in the State (Table 19.3). They depend on family sources, and this affects the quality of health care received. The better-off elderly appears to have more faith in private hospitals and spend out-of-pocket on health expenses

[28]2017. A Study on Health, Social and Economic Problems of Elderly Population in an Urban Setting Kerala. Dr Mini S S, Dr Anuja U, Journal of Medical Science And clinical Research. https://dx.doi.org/10.18535/jmscr/v5i5.69

[29]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4623644/ (2015)

for effective treatment; those belonging to poor and marginalised groups prefer Government hospitals.

A large number of the elderly depend on social security pensions provided by the Government.

Overall well-being

Kerala has been praised for its high sex ratio and the longer lives that women live, but this also means that women predominate among the elderly. The sex ratio among the elderly (60+) was 1382, with the highest sex ratio in the age group 80 years and above at 1656 elderly women for 1000 elderly men (UNFPA *et al.* 2013). Women in the latter group need special attention.

Issues for the elderly are the neglect, abuse, and disrespect they face, despite legislation to protect them.

The Government and NGOs provide old age homes for the elderly in Kerala. The State has the largest number of old age homes (around 600) in India but their standards of care are highly uneven. Most of them are managed on custodial lines and take care of only the food and lodging of residents. It is important that such homes be modernised and made resident-friendly.[30] The availability of reliable care workers is another significant concern. Currently, there are multiple service providers who supply care workers in a market, which is unregulated or without any oversight. Lack of sufficient data on the elderly is another constraint for policy makers. When it comes to planning, data is available on people belonging to the elderly age group; however, it is scattered and panchayats do not take this data into consideration while designing their programmes.[31]

Achievements – What has the Government Done So Far?

The Government has recognised this responsibility and has developed various programmes to help the elderly poor. The Government has a two-pronged strategy. While the programmes help to address the vulnerabilities that the elderly population faces, they also ensure that the elderly live better and healthier lives.

The programmes and schemes for senior citizens implemented through the Social Justice Department support old age homes, day care centres, and mobile medicare units. The Department also acts as the nodal agency for the effective implementation of the Maintenance and Welfare of Parents and Senior Citizens Act, 2007 in the State. Accordingly, maintenance tribunals are functioning for checking elder abuse and redressing the petitions of senior citizens in all the districts with RDOs as the Presiding Officers and District Collectors as Appellate Tribunal authorities. More recently many of the responsibilities are shared by local governments.

Social pensions and transfers to provide security to the elders

Pensions for elderly are the most widespread form of social assistance in the world, and a key element of the Sustainable Development Goal 1.3. Today, the State pays non-contributory pensions to approximately 48 lakh beneficiaries under five categories, this has almost doubled from 27.6 lakh beneficiaries in 2014-2015.[32]

The State offers the following five types of welfare pensions to eligible persons above the age of 60 and having

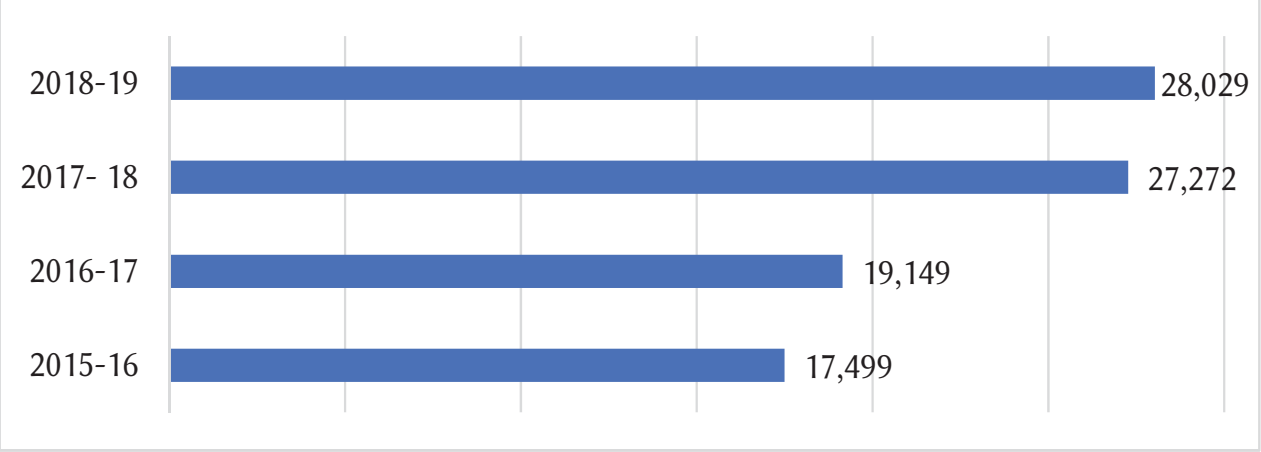

Figure 19.2 *Residents in old age homes in Kerala, 2015-16 to 2018-19* in number

[30]Report of the Working Group on Social Protection and Welfare, Thirteenth Five-Year Plan (2017-2022), Kerala State Planning Board Government of Kerala.

[31]Shri Vijayanand, Former Chief Secretary, Government of Kerala, at a Kudambashree hosted conference.

[32]https://saiindia.gov.in/sites/default/files/audit_report_files/Kerala%20_Report%20_6%20_2016%20_PA%20_of%20

a family annual income of less than ten thousand rupees.

1. Agricultural pension (Rs 1200 per month) to a person who is a member of the Kerala Agricultural Workers Welfare Fund.
2. Old age pension: The Indira Gandhi national old-age pension scheme (Rs 1500 per month) to a destitute person.
3. Indira Gandhi national disability pension scheme for "mentally challenged" (Rs 1200 per month), Indira Gandhi national disability pension scheme where physical disability is more than 80 per cent (Rs 1300 per month).
4. Pension for unmarried women above 50 years (Rs 1200 per month) and
5. Indira Gandhi national widow pension scheme (Rs 1200 per month).[33]

As a part of decentralisation, the implementation of these pensions has been transferred from the Revenue Department to local governments, which are entrusted with the task of receiving the application, processing, granting and distributing the pension.

Other transfers under some specific programmes are described below.

1. Aswasakiranam. This scheme provides financial support to bedridden and intellectually disabled patients, their families and primary caregivers. A monthly assistance of Rs 525 is being provided under the scheme to caregivers of all bedridden patients who need a full-time care. At present, about 1,30,000 beneficiaries are receiving assistance of which about 42,000 are reported to be elderly, many being women.

2. Snehapoorvam**.** This is a new initiative that provides financial support to orphans or those who have lost one parent and are living with the support of their family. Elderly grandparents, who are often the caregivers, receive financial assistance for the education of such children, ranging from Rs 300 per month (for primary school goers) to Rs 1000 per month (for undergraduate students). The burden of childcare frequently falls on old women and hence this scheme has special significance for them.[34]

Welfare homes for the elderly

In Kerala, 16 government old age homes are functioning under the Social Justice Department, of which 11 homes have been transferred to local governments. Under the Orphanages and Other Charitable Homes Act, 1960, 620 old age homes are registered in Kerala. The number of persons in old age homes (under Social Justice Department and Registered Welfare Institutions) has increased significantly between 2015 and 2019 (Figure 19. 2).

Health care

Snehitha, a "calling bell" scheme is a recent innovation. Around 25,000 elderly neighbourhood groups have been formed under the aegis of Kudumbashree for elderly living alone.

Kerala implemented Prime Minister's Jan Arogya Yojana/Karunya Arogya Suraksha Padhathi (KASP) from April 2019 onwards. Within a span of only five months, 100 per cent of the families were enrolled, and at least one member of each family had received the KASP card. As of now, more than 55 lakh e-cards have been generated. After the first round of enrolment, the team focused on left out families to achieve 100 per cent family enrolment (Table 19.4). These enrolment drives include tribals, destitutes, and residents of old age homes and orphanages**.** The National Health Authority has highlighted Kerala as one of the States with best practices and innovations.

Table 19.4 *Details* of *Karunya Arogya Suraksha Padhathi beneficiaries, Kerala*

Number of PM-JAY eligible families as per SECC/RSBY data	2,187,933
Number of PM-JAY additional families covered by the State	19,40,393
Number of candidates above 50	14,35.897

Note: State Health Agency (SHA) does not capture the data of people above 60. The specific data is available on request only with National Health Authority, Delhi.

Source: https://pmjay.gov.in/kerala_profile, and the State Health Agency (SHA), Kerala

Vayomithram programme was initiated through Kerala Social Security Mission in six municipal corporations and 85 municipalities and one block of all the 14 Districts. In 2019-20, 2,69,416 persons benefitted. A help desk provides general support and information. This project is being extended to all block panchayats in the State. A new initiative *Ayurmithram* under this programme aims to provide ayurvedic care to the elderly.

Vayoamrutham is implemented through Social Justice Department with the support of Department of Indian System of Medicine in government old age

[33]Social%20_Security%20_Pension%20_Schemes.pdf
These numbers were obtained from the Government webpage.
[34]Data is not captured segregated by age.

Table 19.5 *District-wise details of palliative care units in Kerala*

District	Government run palliative care clinics	Community based palliative care clinics	No of beneficiaries above 60 Age
Thiruvananthapuram	123	13	14000
Kollam	103	21	13119
Pathanamthitta	NA	NA	NA
Kottayam	109	20	8743
Alappuzha	97	10	10340
Idukki	72	6	6870
Ernakulam	154	35	10000
Palakkad	125	10	7356
Thrissur	134	32	12000
Malappuram	138	92	11652
Kozhikode	81	65	7500
Wayanad	38	18	2990
Kannur	94	50	6510
Kasaragod	54	15	4050
Total	1322	387	115130

Source: Information obtained on phone from each centre

homes. In 2018-19, 786 residents of Government old age homes were provided with ayurveda treatment.

Mandahasam, started in 2018-19, aims to give free sets of teeth for senior citizens under Below Poverty Line category. The Social Justice Department has a list of dental colleges and dental treatment centres from where the beneficiaries could avail treatment. The beneficiaries are entitled for a financial assistance of up to Rs 5000. The number of beneficiaries covered under this scheme in 2018-2019 was 1301.

Well-being of the elderly

Sayamprabha, another initiative by the Social Justice Department in collaboration with local governments, provides daycare facilities and other welfare activities which include yoga classes, and meditation classes. There are 82 daycare centres running as *Sayamprabha* Homes of which two centres are functioning as Model *Sayamprabha* Homes (Multi Service Day Care Centre for Elderly). These day care facilities offer opportunities for senior citizens to mingle with their own age group.

The second innings home project intends to turn Government old age homes into second innings homes as model state of the art, multi-service community age care to improve the quality of life of senior citizens by providing basic amenities like shelter, food, medical care and entertainment. The pilot project started in Kannur district by developing a Government old age home as a model second innings home.

Kerala Police Janamaithri Suraksha*:* Initiated in 2008 with 20 select police stations, *Janamaithri* has now expanded to 248 stations across the 14 Districts. It is a unique concept of community policing whereby the State joins hands with the citizens in crime prevention. One component of this scheme is the protection of senior citizens. The police help to monitor senior citizens by interacting with them on the phone, visiting them regularly, organising field visits and advising them on their personal problems. Recently, they have also initiated *Prashanthi* a helpline exclusively for old age citizens. The main aim of the project is to provide psychological assistance, the purchase of groceries, medicines, apply for vehicle pass and hospital facilities to the needy during the Covid-19 pandemic. The number of elderly who got benefits under this helpline within three months of its implementation is 2097.

Based on the concept "Neighborhood Network in Palliative care," Kerala has an extensive network of community-owned palliative care programs, mostly availed of by very old persons during the final stages of their lives. There is no central repository maintained

for the number of units and beneficiaries. The number of community owned palliative care clinics in Kerala is 387 (Table 19.5). In addition, as per the Palliative Care Policy issued by Government of Kerala, 2008, palliative care is integrated into primary health care services.[35]

Vayo Souhruda gram panchayat. This is a scheme implemented by the Social Justice Department of Kerala under the State Old Age Policy, 2013 for transforming all panchayats in the State into old-age friendly panchayats. The *Vayo Souhruda* panchayat project is being implemented with the assistance of the Centre for Gerontological Studies (CGS), a voluntary organisation located in Thiruvananthapuram. A project for elderly is also under implementation in Alappad.

Subsidised Fares for Travel on Government Transport. The Kerala State Road Transport Corporation (KSRTC) offers reservation; rail travel has concessionary rates for senior citizens.[36]

A Vision for Kerala 2050

These pressing challenges of today, exacerbated by the Covid-19 crisis, cannot be met by merely expanding the present systems, infrastructure and facilities. There is need for a new forward-looking approach and vision, one that will perceive elders not just as a vulnerable group who need protection, but also as a group with great potential to contribute to the socio-economic development of the community.

Framework for a new elderly policy

First, a major activity will be a complete mapping of people of above 60 years of age in the State, with the LSGDs, WCD (anganwadi workers), SJD, Health Department (ASHA workers) converging to undertake this mapping.

Second, the elderly are not a homogeneous group but have varied needs and problems so further age categories will be needed, as also by gender, and other characteristics such as SC/ST population and disability.

Current policy can be revised to include an institutional framework to address the challenges of rapid population ageing. The policy should establish a clear rights-based conceptual framework, vision, purpose, and outcomes, enabling the elderly to live healthy, empowered, and valued lives, supported by a care system that provides a basic standard set of quality services to the elderly on an equitable basis and per need.

The potential of elders to contribute to society is significant.[37] The policy should be based on the principle that the elderly can and should contribute to the development of society. Consultation with the elderly and other stakeholders is essential.

It is proposed that the policy be based on a three-tier system with home-based care as the first option, community-based care second, and institution-based care as the last option. Local governments should explore and encourage suitable models of assisted living facilities that will allow the elderly to live independently but with limited supervision and care, coordinate services by outside health care providers; and monitor resident activities to help ensure their health, safety, and well-being. Such assistance can include the administration or supervision of medical needs, and provision of personal care services.

Local governments will play a central role in implementing the policy. The policy should take a multi-sectoral approach with strong engagement from diverse sectors and different-levels of Government as noted in WHO's global strategy and action plan on ageing and health. It will tie together the various responsibilities for elderly care shared by different tiers and sectors of Government into a cohesive and consolidated vision. Strong partnerships are essential; not only for the different Government institutions but also a clear role for community-based organisations, NGOs, and the private sector.

A basic set of standard multi-sectoral services should be made available to the elderly at different stages. Their needs differ as they grow older, and the policy should ensure different packages that will meet the varying needs. The policy should ensure coordination between aged care and medical care, essential to prevent

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[35]There can be common patients in community owned and Government run palliative care clinics. The data is captured from the Palliative Care Project- State Resource Centre and Coordinating Unit, National Health Mission

[36]https://economictimes.indiatimes.com/wealth/plan/here-are-all-the-benefits-available-to-senior-citizens/ticleshow/58655579.cms

[37]In the United Kingdom, the contributions of older persons through taxation, consumer spending and other economically valuable activities such as social care provision and volunteering were estimated to be worth nearly GBP 40 billion in 2010, which is more than expenditure on them through pensions, welfare and health care combined, and this number is set to rise to GBP 77 billion by 2030 (Cook 2011). https://www.un.org/development/desa/ageing/wp-content/uploads/sites/24/2017/07/UNDP_AARP_HelpAge_International_AgeingOlderpersons-and-2030-Agenda-2.pdf

duplication and provide a continuum of services. The policy should guide on how to form effective partnerships and contractual/partnership arrangements with hospitals and stakeholders for service provision, training, and technical support.

Significant capacity strengthening would be needed to translate the more complex cross-sectoral aged care system into a reality. Through a need assessment, the Government should identify the capacity gaps in knowledge and skills, and define a basic service package, and training and human resource development to develop necessary capacity and knowledge for those engaged in the management, delivery and monitoring of aged care services.

The policy should take special note of issues related to women and people from disadvantaged communities**.** Women constitute the majority of the elderly. Elderly from tribal and SC backgrounds are particularly disadvantaged economically and socially. There should be a clear focus on these groups and any action plans should be responsive to their needs and priorities. The policy should pay special attention to the needs and problems of the very old (80 and above years of age).

The Government should also consider how to create sufficient fiscal space to meet the burgeoning social security payments that will be needed for the elderly. Innovative measures will need to be considered and planned to ensure security for the elders.

Chapter 20
Gender and Development

Gender and Employment

Studies have shown that the gains made through social and human development, political empowerment, and institutional reforms have had profound effects on Kerala's labour market, not least by enhancing wage rates in the State.

As in other parts of India, there are gender-based differences in the labour market, with women over-represented in the informal labour market. At the same time, a unique and distinguishing feature of the labour market in Kerala is the unionisation of workers in unorganised sectors – including the major traditional industry, coir, and subsequently other traditional sectors, such as cashew and agriculture – in which the proportion of women workers is very high. We find that the average wage rate for a woman worker in the State, though lower than the male wage rate, has been above the all India wage for a long time. The existence of Welfare Fund Boards, another unique feature of the labour market in Kerala, ensures some social security benefits to women workers registered with the Boards.

This section focuses on salient aspects of female employment in Kerala.

Work Force Participation Rates in Kerala

Workforce participation rates, as per the official labour force survey, have been lower in Kerala than at the all India-level, particularly in rural areas. However, Kerala has always had one of the highest (among States) rates of female work force participation in urban areas. This fact needs to be highlighted, since it reflects the benefits of higher literacy-levels in Kerala. In 2018-19, for persons aged 15 and above, the female work participation rate in Kerala was 25.4 per cent (26.4 per cent in rural areas and 24.1 per cent in urban areas). The all India female work participation rate was lower, 23.3 per cent. The all India urban female work participation rate was even lower (18.4 per cent).

It is well known that official labour statistics undercount women workers, but even so, it is clear that women workers as a proportion of all women in Kerala is above the Indian average.

Educational Level of Women Workers

Work participation by educational-level shows that the likelihood of getting a job is higher if the level of education is higher. For example, among graduates, 30 per cent of women in Kerala were in the work force as compared to 21 per cent at the national-level.

With more educated women and more women entering the workforce the main challenge is, of course, unemployment. The unemployment rate is higher for women in Kerala than the Indian average, reflecting the fact that more women seek employment in the State.

Industrial Distribution of Workers

Historically, the pattern of female employment has been more diversified (even in rural areas) in Kerala than elsewhere in India. A remarkable feature of the female workforce in Kerala is the high share of a select number of service sector activities in which wages per worker are high and require skilled and educated workers (Thomas 2018).The proportion of women employed in public administration education, health, information services (all part of community, social and personal services), and finance and business, are very high, almost double that of all India figures and higher than States such as Gujarat and Karnataka (*ibid.*).

Table 20.1 *Worker Population Ratio according to usual status (usual principal status plus subsidiary status)* for persons aged 15 and above *2018-19, Kerala and all India* in per cent

	Kerala								
	Rural			Urban			Total		
15 and above	Male	Female	Person	Male	Female	Person	Male	Female	Person
(2018-19)	67.6	26.4	45.5	67.7	24.1	44.1	67.7	25.4	44.9
	All India								
	Rural		Urban				Total		
15 and above	Male	Female	Person	Male	Female	Person	Male	Female	Person
(2018-19)	72.2	25.5	48.9	68.6	18.4	43.9	71.0	23.3	47.3

Source: Periodic Labour Force Survey (PLFS), 2018-19

Table 20.2 *Worker Population Ratio according to usual status (usual principal status plus subsidiary status) in 2018-19 for 15 years and above of different general education-level for Kerala and all India* in per cent

	Kerala (Rural + Urban)	All India (Rural + Urban)
	2018-19	2018-19
Literate and up to primary	25.30	27.30
Middle	26.00	19.30
Secondary	22.30	14.50
Higher secondary	15.10	12.00
Diploma	33.70	34.10
Graduate	29.80	21.30
Post graduate and above	51.1	35.5

Source: Periodic Labour Force Survey (PLFS) 2018-19

Table 20.3 *Percentage distribution of female workers in usual status (usual principal status plus subsidiary status) by broad status in employment in 2017-18 and 2018-19*

	Kerala							
	2017-18				2018-19			
	Self-employment		Regular/Salaried	Casual	Self-employment		Regular/salaried	Casual
	OAE	Helper			OAE	Helper		
Rural female	21.23	9.23	41.34	28.15	25.60	8.50	33.6	32.2
Urban female	22.79	5.67	55.75	15.8	22.50	7.20	53.2	17.10
Overall female	21.92	7.71	47.52	22.86	24.3	7.9	42.3	25.5
	All India							
Rural female	19.03	38.70	10.52	31.76	21.8	37.9	11.0	29.30
Urban female	23.72	11.02	52.14	13.12	24.9	9.6	54.7	10.7
Overall female	20.21	31.71	21.03	27.05	22.5	30.9	21.9	24.7

Note: OAE- own account worker or employer
Source: Periodic Labour Force Survey (PLFS) 2018-19

Type of employment

Another useful characterisation is of the type or status of employment, that is, whether the worker is self-employed, engaged in regular salaried employment or as a casual worker. The situation of working women in Kerala is very distinct in this respect from the all India picture, with a significantly higher proportion of regular workers: 47.5 per cent of women workers were regular workers in 2017-18 (41.3 in rural and 55.8 in urban areas). For India the figures were 21.0 per cent (10.5 per cent in rural and 52.1 per cent in urban areas). This shows better (regular) employment for women workers in Kerala as compared to the national average.

There was a decline in female regular workers in Kerala in 2018-19, with a corresponding rise in self-employment and casual labour. This change was, of course, in the year of a major flood, when special emphasis was placed on NREGA and AUEGS and self-employment (particularly own account enterprises) promoted through micro/nano enterprises to assist in post-flood recovery.

Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

In Kerala over 90 per cent of the workers in National Rural Employment Guarantee Act (NREGA) are women. The spike in person days of employment generated in 2018-19 needs to be noted (Table 20.4); notified unskilled wage rate for this programme in 2017-18 was Rs 258 per day and was enhanced to Rs 271 from April 1, 2018 onwards. In the context of the pandemic, the unskilled wage rate has been increased further to Rs 291. The Government also initiated the

Table 20.4 *Status of MGNREGS employment provided in Kerala from 2016-17 to 2020-21*

Year	No. of active job cards (in lakh)	No. of households who have jobs (No. in lakh)	% of house holds who got jobs	Person days generated (No. in lakh)	Average days of employment provided to a household	No. of Families completed 100 days	% of household completed 100 days against total households employed
2016-17	20.31	14.52	71.49	684.62	46.97	1,13,186	7.76
2017-18	19.39	13.04	67.25	619.59	47.24	1,17,370	8.94
2018-19	20.20	14.78	73.19	975.25	65.97	4,41,480	29.80
2019-20	20.00	14.38	71.95	801.89	55.73	2,50,584	17.42
2020-21 (as on August 21, 2020)	19.09	11.19	58.64	272.17	24.31		

Source: MGNREGA database

process of geotagging all Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) assets, thereby enabling greater transparency and their better real time identification.

Special Initiatives Undertaken in the Aftermath of the Flood 2018

In the post-flood restoration efforts undertaken in the State, MGNREGS played a crucial role in rebuilding Kerala through renovation of the public assets and livelihood regeneration of vulnerable sections of the society. Government of India originally sanctioned funds to generate 5.5 crore person days in 2018-19. In order to overcome the flood situation, as per the request of the State Government, Government of India sanctioned additional funds to generate 7 crore person days under MGNREGS. At the end of the financial year 2018-19, 9.75 crore person days was actually ensured.

Initially, the State had got a sanction for additional 50 days of employment per household in seven heavily flood affected districts. Subsequently, an additional employment of 50 days has also been given in flood affected regions for 87 gram panchayats in six partially flood affected districts. In 2018-19, after the flood (from August 16, 2018 to March 31, 2019), employment has been provided to 12.02 lakh individuals from 10.31 lakh families, of which 6.12 lakh individuals from 4.83 lakh families were newly employed. After the flood, new job cards were issued to 82,605 families. As a result of providing 7.63 crore person days, Rs 2068.74 crore worth of employment was generated.

The flexible nature of MGNREGS makes it a scheme widely suitable for convergence with other schemes. Both the human power and material component provided by the scheme was utilised to complement other scheme to hasten the development potential of all types of projects. At the same time, this also addresses the problem of finding productive and asset creation works for MGNREGS beneficiaries. Keeping the above in mind, extensive plans have been formulated to bring in line departments into the planning process of MGNREGS. The scheme has been converged with LIFE Mission also to ensure maximum employment.

The scheme is also a part of "Subhiksha Keralam" programme and has contributed to soil-preparation, construction of cattle sheds and poultry sheds, renovation of ponds and water bodies and rainwater harvesting activities.

Ayyankali Urban Employment Guarantee Scheme (AUEGS)

A unique initiative of the State Government was the launch of the Ayyankali Urban Employment Guarantee Scheme in 2009-10, on the pattern of MGNREGS for rural areas. The Scheme provides employment guarantee to urban households (100 days of wage employment to every household willing to participate) so as enhance livelihood security in urban areas. Creation of durable community assets and strengthening the livelihood resource base of the urban poor is also envisaged under the scheme. The scheme mandates that at least 50 per cent of the beneficiaries shall be women.

Cleaning of drainage and streets on a regular basis is included in the Ayyankali scheme. The devastating floods of 2018 affected many urban local governments and thousands of urban people lost their livelihood. Thus, priority was given to the flood affected urban local governments for enhancing the average person

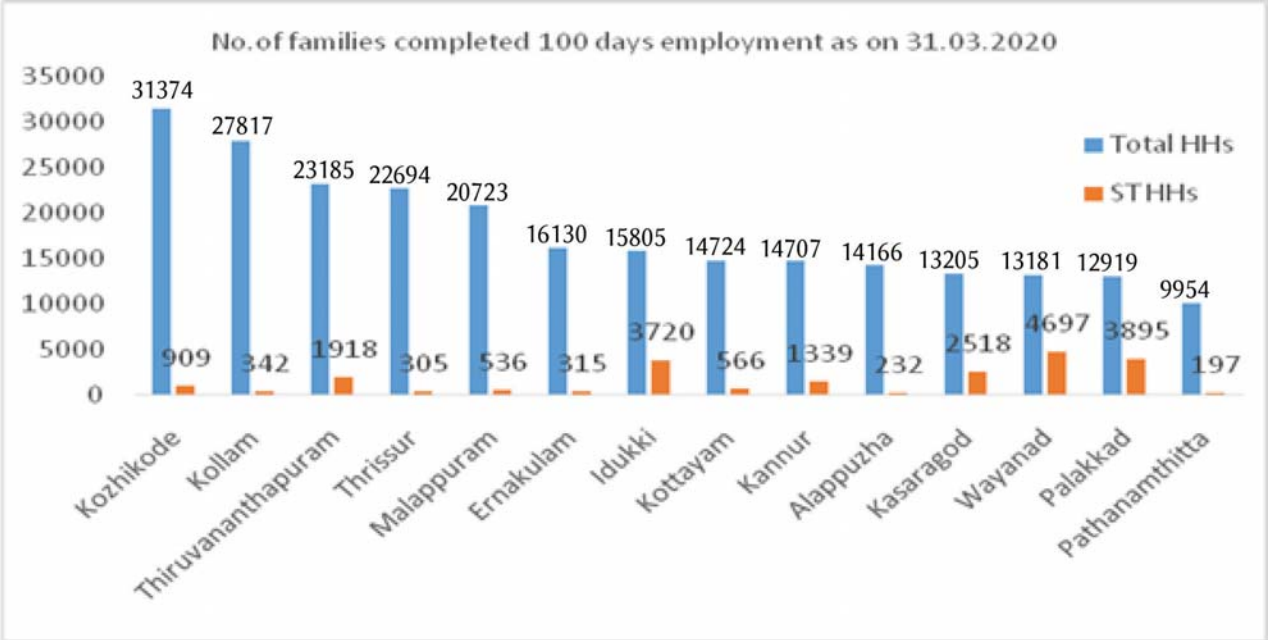

Figure 20.1 *Number of families completed 100 days of employment under MGNREGS as on March 31, 2020*
Source: Commissionerate of Rural Development, Government of Kerala

days of employment. Convergence of PMAY – LIFE with Ayyankali Urban Employment Guarantee Scheme has been ensured to create additional workdays. In order to provide maximum workdays and ensure smooth implementation of the scheme, essential tools and small machines are also provided under this scheme. Dairy farming has also been introduced under the scheme. Dairy farmers who have more than two cattle can be given employment and wage through the scheme as per stated norms.

In 2016-17, 5.06 lakh persondays were generated. In the financial year 2017-18, 8,46,432 person days were created. In the same year, 28797 households and 36288 women were provided employment and 251 families completed 100 days of employment. In 2018-19, the AEUGS created 16,68,195 person days of employment in various municipalities and corporations; 85,943 households and 80,735 women were provided employment and 1,225 families completed 100 days of employment.

Kudumbashree

In 2015-16, 39.87 lakh families were covered in Kudumbashree, as part of 2.58 lakh Neighbourhood Groups (NHGs). The coverage has grown and, now, Kudumbashree has a participation of 44.91 lakh women and 2,99,297 NHGs.

Resurgent Kerala Loan Scheme (RKLS)

The Government of Kerala introduced the "Resurgent Kerala Loan (RKL) Scheme", with the aim of providing interest free loans up to one lakh rupees per female-headed household to flood affected Kudumbashree members who were the beneficiaries of immediate flood relief of Rs 10,000 of the State Government. The interest rate on the loan of 9 per cent was borne by the Government. Up to August 2019, interest free loan of Rs 1,680.13 crore had been provided to 1.95 lakh people through 28,212 NHGs.

Chief Minister's Helping Hand Loan Scheme (Rs 2000 crore loan scheme)

In the wake of the pandemic, a new interest-free loan scheme was announced, the Chief Minister's "Sahayahastham" (Helping Hands), by the Government of Kerala. As on September 2020, 2,05,000 Neighbourhood Groups (NHGs) with 23 lakh members have benefited.

Micro Enterprises (ME)

The total number of Micro Enterprise (ME) Units in the State is 26,448. These include the following types of activities.;

- **Coir Defibring Units**. Five Kudumbashree coir defibring units were started at Kannur (2), Calicut, Kasaragod and Thrissur. Work is progressing at three more units in Kottayam, and Thiruvananthapuram.
- **Common Facility Centres**. Formation of 14 Common Facility Centres in Parassala, Punnalur and Padinjarathara.
- **Haritha Karma Sena**. Up to March 2019, 27988 Kudumbashree women from 888 LSGIs got

first-level training in waste management through Kudumbashree and Haritha Kerala Mission with fund assistance from Kerala Institute of Local Administration (KILA). As per the latest data Haritha Karma Sena units have been formed in 1033 LSGIs.

- **Scheduled Caste Department – Gavi livelihood Project.** A comprehensive tourism oriented livelihood programme for SC beneficiaries was initiated to establish five mini café units on the way from Pathanamthitta to Gavi and two tourist bus services to capture the tourism potential of Gavi.
- **Construction Labour.** In order to avail of the opportunities in the construction sector, Kudumbashree members interested in construction activities were identified, trained and registered in respective local governments and entrusted with construction projects of local governments. In 2019-20, 318 constructions groups (251 rural units and 67 urban units), with 2347 members were formed across the State and have been employed to construct 269 houses in convergence with various Departments like Scheduled Tribes Development Department along with the LIFE Mission and PMAY.
- **ARISE Skill Campaign.** As part of post-flood initiative for resurgent Kerala, Kudumbashree started a skill campaign called ARISE (Acquiring Resilience and Identity through Sustainable Employment) to provide skill training to 50,000 candidates in 10 selected areas. The ten fields are housekeeping, house maid services, plumbing, electronic repair, electrical work, day care, agriculture labour, sales, data entry, and laundry and ironing. As an after-flood intervention, ARISE technicians repaired 360 houses in August 2019. As on 2020, around 14,049 people were trained and 4883 candidates were positioned.
- **Joint Liability Groups (JLGs).** Kudumbashree started provision of interest subsidy and area incentive to Joint Liability Groups (JLGs) as well as subsidy to various agro based enterprises (medium and small scale value addition units and agri business ventures). The number of JLGs has increased to 71,572 as on September 1, 2020 (with 3.54 lakh Kudumbashree members) cultivating an area of approximately 50,000 ha, under lease land collective farming.
- **Kerala Chicken – Broiler Farms.** The main objective of the Kerala Chicken project is to ensure safe and clean birds to consumers at reasonable prices, and to provide a steady income for participants. This scheme aims to ensure a steady and non-fluctuating market price for broiler chicken. Kudumbashree Broiler Farmer's Producer Company Ltd (KBFPCL) has started four outlets in Ernakulam District and two in Thrissur District. In the Kerala Chicken project, Kudumbashree is going to establish 100 sales outlets in the State. In October 2020, 10 outlets were started as part of the Government's 100 days programme.
- **Aadugramam (Value Chain Programme).** The Aadugraamam project is an initiative to support goat-rearing so as to provide a regular source of income to Kudumbashree members. The programme will establish 14 Goat Producer Societies, one in each district.
- **Ksheerasagaram.** The Ksheerasagaram project is a cow rearing initiative which provides a capital subsidy to Kudumbashree groups to establish cow rearing units. 410 units have been established throughout the State.
- **Dairy Value Added Product Units.** A total of 27 value added units in dairy sector were started and the product is being marketed under the brand name Milky Latte. This will provide a steady income for Kudumbashree members and also ensure safe and clean dairy products to consumers.

Tribal Interventions

Tribal interventions by Kudumbashree ensured 96.8 per cent inclusion of members to its NHG fold, rigorously working for the empowerment of tribal families through continuous capacity building programme at the hamlet-level. Every programme reaches hamlets through community volunteers named as animators.

- **Self-reliant tribal NHGs.** The main objective of tribal intervention schemes undertaken by Kudumbashree is to set a stable platform for implementing development activities among 20 tribes. Here 2303 NHGs have been recognised as self-reliant NHGs as on September 11, 2020.
- **NHGs capacity building programme.** In this scheme, 1222 tribal NHGs have been selected for upgrading as best NHGs. Provision of all necessary capacity building training for these NHGs was completed in every district by March 31, 2019.
- **Corpus Fund to new NHGs and new JLGs.** The tribal special project facilitates the creation of ST NHGs as well as at Area Development Societies (ADS), if necessary, in areas where there are more than two tribal NHGs. The project provides a

corpus fund of Rs 10,000 to all newly formed ST NHGs.

- **Traditional micro-enterprise unit.** The promotion of traditional as well as modern livelihoods and enterprises is also envisaged. These units are designed to conduct tribal art/craft/ethnic food festivals both at district and State level so as to motivate new entrepreneurs.
- **Animal husbandry based livelihood programmes.** Support for income-generation through animal husbandry for 50 tribal vulnerable families has been envisaged. This includes goat-rearing and small poultry units both for individuals and groups.
- **Bridge Course (Gothragurukulam) and PSC/competitive exclusive programme (Gothramunnettam).** A "Bridge Course" is yet another innovative idea being implemented by Kudumbashree Mission in tribal hamlets of Attappady in order to support those who are weak in study and show inconsistent results at school. Altogether, 1081 children benefitted from this educational initiative as on September 11, 2020. Competitive exam-based crash courses are being provided to 2893 tribal students.
- **District initiative for tribals.** The District Mission will develop a separate plan for every tribal hamlet, and it will be implemented in connection with the District initiative programme.

Labour Department

Saranya. This is a self-employment scheme for the most vulnerable sections among women registered at the Employment Exchanges, including widows, divorced, deserted women, spinsters above the age of 30 and unwed mothers belonging to Scheduled Tribes. Under this scheme interest-free bank loans of up to Rs 50,000 with a 50 per cent subsidy (a maximum of Rs 25,000) is given for starting self-employment ventures. In 2017-18,3828 beneficiaries got this assistance; in 2018-19, there were 3546 beneficiaries. About 2200 women who have received training in activities they want to pursue will be provided with self-employment assistance under Saranya in the 100 days programme of the Government.

Kerala State Handicapped Persons Welfare Corporation

On the recommendation of the Corporation, various banks have sanctioned loans to 681 persons with disabilities for self-employment activities. Financial assistance of Rs 5000 each was given to 316 persons with disabilities and self-help groups (SHGs) for undertaking micro projects such as pickle-making, embroidery, making artificial ornaments, and curry powder units. Under the Kaivalya scheme of the Labour Department, financial assistance has been given to 7749 persons with disabilities, registered with the employment exchanges, for self-employment, and of them, 2708 are women beneficiaries.

Kerala State Women's Development Corporation (KSWDC)

The Corporation distributed self-employment loans to 6472 women under general category through Plan funds. Under the flagship programme on finishing schools, the Resource Enhancement Academy for Career Heights (REACH) at Thiruvananthapuram and Kannur imparted skill training to 2804 students. Entrepreneurship Development Programme (EDP) training was imparted at the panchayat-level (7 districts) to over 800 women.

KSWDC launched Vanamitra Kendra, a skill development centre for tribal women in Chakkittapara, Kozhikode, for developing sustainable livelihood for tribals. Training was imparted to 2683 tribal women in garment stitching, bamboo product making and advanced training in tailoring was given to four women from the group to set up a unit.

The increase in women's employment in some Departments like Police and Excise has been commendable. In 2017, 605 police constables were recruited (including a police battalion of women, commanded by a woman commandant) with another 154 women in 2018. In the Excise department 133 women were inducted for patrolling in 2018.

Table 20.5 shows the increase in formal employment in the Information Technology (IT) sector and Public Sector Undertakings (PSUs) in Kerala. Women have gained employment here too though the gender break-up of data is not available.

Summing up, with all these initiatives, there has been a real increase in female workers in the State, primarily in self-employment (own account enterprises) and casual labour, but also in in regular formal employment.

Gender Wage Gap

Using data from the Periodic Labour Force Survey (PLFS) of 2017-18, we examine gender gap in wages (Table 20.6). Some distinct features emerging from Table 20.6 are as follows:

- Earnings in each type of employment are higher for women (and men) in Kerala, in rural and urban areas, than the national average.

Table 20.5 *Employment generation in Information Technology (IT) sector and Public Sector Undertakings (PSUs) in Kerala* in number

IT parks/ startups	2017-18	2018-19	2019-20
Technopark	56,000	60,000	62,000
Infopark	37,000	40,000	47,000
Cyberpark	266	558	748
Startup Mission	10,000	15,000	25,000
PSUs	15,242	13,838	15,719

Source: Industries Department

Table 20.6 *Average daily wage for those aged 15 and above in employment by sector and sex, 2017-18*

Casual Employment							
	All India				Kerala		
Sector	Male	Female	Total	Sector	Male	Female	Total
Rural	265.2	172.3	243.9	Rural	533.9	284.7	478.9
Urban	320.5	200.7	302	Urban	506.3	288.7	477.5
Total	276.4	176.1	254.8	Total	522.5	285.8	478.3
Gender wage gap(F/M)		63.4				54.6	
Self employed							
	All India				Kerala		
Sector	Male	Female	Total	Sector	Male	Female	Total
Rural	260.1	59.5	221.6	Rural	440.6	168.6	397.9
Urban	478.8	179.2	434.4	Urban	545.2	270.2	506.9
Total	318.4	84.6	276.1	Total	489.9	212.8	448.6
Gender wage gap(F/M)		26.6				43.4	
Regular Salaried							
	All India				Kerala		
Sector	Male	Female	Total	Sector	Male	Female	Total
Rural	453.9	309	426.6	Rural	579.1	430	523.5
Urban	614.7	505.1	591.1	Urban	658.2	688.7	670.1
Total	554.4	439.2	530.8	Total	621	571.8	602.2
Gender wage gap (F/M)		79.2				92.1	

Note: Male (M), Female (F)
Source: Periodic Labour Force Survey (PLFS), 2017-18

- As expected, wages are higher for women in regular salaried employment relative to those in other types of employment.
- Nevertheless, there is a wage gap in Kerala, particularly among self-employed and those in casual employment.

As noted earlier, there has been a large increase in self-employed women in Kerala in 2018, especially as own-account workers and not helpers. Self- employed women in Kerala earn a much better wage than women at the all India-level, but there is need for more public support to reduce the gender wage gap.

Looking Ahead

The efforts of the Government to generate employment for women has indeed yielded positive outcomes in terms of a significant increase in female employment. There is urgent need to sustain this initiative and provide quality employment, given the fact of an educated workforce, with emphasis on new skilling programmes. It is worth emphasising here that skills involved in early childhood care, education of children, geriatric care or "soft skills" like communication are as

important as other types of professional skills.

There has been sizeable recruitment of women workers in formal employment in the Government sector – in the police force, health, education and public sector undertakings, and the next PLFS Round should reflect this.

Studies have shown that, internationally, women have been disproportionately affected by the pandemic. Existing gender inequalities in the labour market in terms of the work available, wages, and working conditions have been exacerbated. Women are employed in sectors that were hit particularly hard by the pandemic; these include retail trade, personal and hospitality services, tourism, and traditional industry. The increase in female employment must be sustained by State support and by ensuring equal participation of women in skilling and training programmes. Skill training programmes should be used as instruments of empowerment and social change.

Towards Gender Empowerment

Giving gender a central place in planning and development is important because discrimination against women is not solely a women's issue but an issue of social progress and transformation as a whole. The 13th Five-Year Plan introduces the approach to gender and development in some detail:

> Socio-political and economic advance among women in Kerala is not commensurate with the historic achievements of women in the spheres of education and health in the State. While the extraordinary historic gains of women in Kerala cannot be underestimated, there are still important spheres in which women's equality has not been achieved, and in which discrimination persists. Work participation rates among women are low, rates of unemployment are high, and gender differentials in the labour market persist across caste, income, and education categories. A substantial section of the women's labour force is concentrated in traditional occupations – coir work, cashew processing, bamboo-work, handlooms, and plantation-work, for example – that are now stagnant or in decline. The representation of women in elected bodies – Parliament, the Legislative Assembly – is low. The women's movement in Kerala has drawn attention to domestic violence and other crimes against women in Kerala. Progressive social forces have correctly emphasised the need for policy that enhances economic independence, independent participation in political and social life, and freedom in public spaces for women.

Education, health and income are necessary but not sufficient factors for women's full empowerment. Scholars urged that other, non-conventional indicators should be studied as well (Mukhopadhay 2005, UNDP, World Economic Forum's Global Gender Gap Report since 2006). Indicators have also been developed in connection with Sustainable Development Goal 5 (SDG 5) to track Gender Equality.

In the Section that follows we highlight some of the major State interventions to take stock of what has been achieved on gender equality and women's empowerment.

Highlighting Kerala's Interventions and Achievements for Empowering Women

Four major interventions need to be noted:

1) Gender aware planning at the local-level in the context of decentralised planning since 1996.
2) Setting up of Kudumbashree, a community organisation of Neighbourhood Groups (NHGs) of women in 1998 as part of the State Poverty Eradication Mission.
3) Setting up a separate Department of Women and Child Development in 2017 by bifurcating the Social Welfare Department.
4) Gender Budgeting in the 11th Five-Year Plan, more systematically developed in the 13th Plan.

These interventions did result in commendable achievements: (a) sensitised Government and society to the fact that Plan or Budgets impact differentially on men and women, and hence women's needs have to be built into the planning process; (b) made women more visible in public spaces; (c) enhanced female workforce participation rates; (d) created an enabling environment for women to work; (e) consciously planned for vulnerable/excluded women to empower them; (f) addressed the nutritional requirements of women and children; and (g) evolved innovative ways of addressing gender based violence (GBV) and rehabilitation of survivors.

Gender aware planning

The 93rd and 94th Constitutional Amendments heralding decentralised governance with one third of seats reserved for women provided an opportunity to address women's issues at the grassroots-level. Decentralisation in Kerala, taken up in a campaign mode, meant not only decentralisation of funds, functions and functionaries but also of planning, which has enabled Kerala to carve out a different approach to development which is much more people-centric.

Introduced in 1996 in the 9th Plan, after the local body elections in 1995, the attempt to integrate gender into planning at the local-level by (a) mandating that LSGIs should set apart 10 per cent of the devolved Plan funds for women specific projects (WCP); and (b) that

gender impact of all other schemes should be assessed, appears to be a first attempt in the country towards "gender aware planning." Despite its disappointing beginning in 1997-98, there was some improvement in the following years. Corrections were made and guidelines evolved for designing women's projects and the allocation pattern changed considerably in favour of better quality and more diversified projects. While decentralised governance certainly enlarged the choices and capability-levels of elected women representatives at the individual-level, overall plan performance at the local-level in relation to gender issues was uneven since a recognition of needs/interests remained largely at the level of rhetoric in policy making and was not translated into appropriate projects at the level of implementation.

However, renewed efforts were taken by setting up new guidelines for formulation/implementation of local plans in the second phase of decentralised planning (coinciding with the 13th Plan). Some new schemes have been initiated and some older schemes were revamped to become model projects now such as setting up of Gender Resource Centres, and rejuvenated Jagratha Samithis.

It is interesting to note that three projects started some years ago, have now become model projects. These are (1) Vanitha library, a project under the women component Plan of Balussery gram panchayat, Kozhikode district, which started as "A Space for Women" in 2000; (2) Vanitha canteen, a project under the Women Component Plan of Vaikkom Block Panchayat, Kottayam district started in the 9th Plan; and (3) Distribution of menstrual cups, a project under the women component Plan of Vazhoor gram panchayat, Kottayam district, started in 2007-2008.

At present, there are 1200 local governments, which include 941 gram panchayats, 152 block panchayats, 14 district panchayats, 87 municipalities and 6 corporations. While the reservation for women is now 50 per cent in Kerala, it is so also in decision making positions, presidents/vice presidents/chairpersons/vice chairpersons/mayor/deputy mayors. Women elected to Panchayati raj institutions in Kerala constitute more than 50 per cent, in fact 54 per cent, of all elected representative, while it was 46 per cent nationally. In the elections to local bodies, held in December 2020, 11,837 women were elected to the five tiers of the panchayat structure (Table 20.7). The difference in these elections is that many of the candidates were young. The youngest person to get elected to the prestigious post of Mayor of Thiruvananthapuram was 21-year old Arya Rajendran, a second year student in the local college, setting several new firsts in Kerala and the country.

Kudumbashree

Kudumbashree, a community organisation of Neighbourhood Groups (NHGs) of women set up in 1998 as the State Poverty Eradication Mission functioning under the Local Self Government Department has become a world model for economic, social and political empowerment of women. Its growth

Table 20.7 *Women elected representatives in local governments, Kerala, 2020* in numbers

District	Grama panchayat	Block panchayat	District Panchayat	Municipality	Corporation
Thiruvananthapuram	710	83	14	84	54
Kollam	677	83	14	76	31
Pathanamthitta	461	60	9	79	
Alappuzha	650	85	12	126	
Kottayam	636	78	11	108	
Idukki	421	55	7	39	
Ernakulam	704	103	15	224	41
Thrissur	798	114	12	148	31
Palakkad	805	101	16	129	
Malappuram	947	117	17	252	
Kozhikode	658	91	14	140	42
Wayanad	224	29	9	52	
Kannur	636	79	12	152	29
Kasaragod	330	42	9	52	
Total	8657	1120	171	1661	228

has been phenomenal, bringing together women from all spheres of life in rural and urban areas, and has helped women to come out of the kitchen into the public sphere. Starting initially with thrift and loan activities, the NHGs focused strongly on empowering women through income generation activities and seeking micro-credit, besides engaging in a range of other ;activities such as health, nutrition, agriculture, and social development. In the year 2015-16, 39.87 lakh families were covered under 2.58 lakh of NHGs. As of now, Kudumbashree has a participation of 44.91 lakh women and 2.99 lakh NHGs. It also converges with Panchayati Raj institutions in several schemes.

During the last four years of the Government, concerted efforts, both quantitative and qualitative, were taken to expand its area of operation to include elderly, disabled and transgenders; to capture the employment opportunities arising in the State; and also to work out business models to make enterprises self-sustaining.

In this section we provide information on Kudumbashree's thrift and credit activities, while micro-enterprises in agriculture and non-agricultural activities are discussed in the Section on Employment.

Thrift and credit activities. Up to 2015-16, the thrift amount was Rs 2932 crore and the internal lending was 12,134 crore. As of 2019-20, the total thrift collections by NHGs in the State comes to Rs 4,982 crore and the internal lending generated is to the tune of Rs 20,047 crore. The total amount which has been mobilised under linkage loans (cumulative) comes to Rs 19,460 crore for 2,83,406 NHGs.

Interest Subsidy. The Government of Kerala had launched a new interest subsidy scheme in the year 2016-17 and NHGs are eligible for interest subvention to avail the loan facility at an interest rate of 4 per cent on credit up to Rs 3 lakh. An amount of Rs 84.47 crore was disbursed to 1,61,551 NHGs as interest subsidy till September, 2020.

Matching Grant. Matching Grant at an amount of 10 per cent of the savings of the linked NHGs has been provided subject to a maximum of Rs 5,000 per NHG. A total of 41,125 NHGs received matching grant till August 2020.

Revolving Fund. Rs 50,000 is provided to all Area Development Societies (ADS) to support livelihood activities in the field. Revolving Fund distributed to 386 ADSs till March 31, 2019.

Revival of Insurance Scheme. Under the Kudumbashree Sthree Suraksha Yojana (KSSBY) Insurance scheme, 5.3 lakh Kudumbashree members have been enrolled.

Kudumbashree gender development programme

Besides economic empowerment, Kudumbashree promotes social development of women through their participation in various ways in decision making processes and programmes to tackle atrocities against women.

Snehitha Gender Help Desk. This is one supportive activity which works in all 14 districts to provide support and rehabilitation service to distressed women and children. There are 647 Gender Resource Centres working across Kerala as on January 10, 2020. Other activities of training, research, leisure are also organised in these centres. Gender sensitisation training was given to 1064 CDS chairpersons till 2020.

Rangasree. This is a programme to train selected women from Kudumbashree in theatre with the aim of establishing community theatres in every CDS of the State. It also aims to disseminate messages of social justice, equality, and sustainable development through drama. As of now there are 14 Rangasree units in the State.

Some critics argue that the vast network and collectivity of women mobilised by Kudumbashree could have enabled women to lay claims to rights and resources. However, it must be remembered that these interventions, starting with decentralisation, played an extremely critical role of pulling the women out of the households into the public sphere, mobilised them, building their individual capabilities and enhancing their choices. A larger transformatory change, it could be argued, needs a larger, concerted, sustained effort by State and civil society.

It is in this context that the setting up of a separate Women and Child Development Department and the more systematic approach to Gender Responsive Budgeting at the State-level in the 13th Plan (initiated in the 11th Plan), should be viewed as the third and fourth turning points in approaches to gender equality and women's empowerment in Government policy making in Kerala.

Setting up of the Department of Women and Child Development

One significant achievement of the Left Government was the setting up of the Department of Women and Child Development (WCD) in June 2017, (as promised in the Election Manifesto) bifurcating the Social Justice Department to give a more focussed thrust to activities aimed at social assistance and empowerment of women and children. With the appointment of district-level

officers, the WCD directorate started functioning a few months later, implementing both State and central schemes. It is an umbrella structure that includes the State Women's Commission, State Women's Development Corporation, State Commission for Protection of Child Rights, Gender Park, Nirbhaya project, women and children homes, ICDS, Anganwadis. A large part of its working is concerned with running of 44 welfare institutions for the care, protection and rehabilitation of women and children (16 for women and 28 for children); NGOs and voluntary organisations also play a major role in providing institutional care to the vulnerable population.

The programmes of the department seek to empower women and enable them to contribute as equal partners in development. Within less than three years of its functioning the department has initiated several programmes to address issues with respect to women and children as they emerged over the period, especially focussed on prevention of gender-based violence (GBV), child abuse, innovative programmes for rehabilitation of survivors, gender awareness creation, good parenting, care and assistance to very vulnerable women like street dwellers, widows, female-headed families for meeting unexpected financial crises (Athijeevika), vocational training of women residing in welfare institutions to make them self-reliant.

Mapping progress of WCD since 2016-17

1) A website www.wcd.kerala.gov.in has been launched to create awareness among the general public about the schemes implemented by the Department of Women and Child Development and to monitor the activities of the Department.
2) A Kerala Women's Portal was launched on International Women's Day in 2020, which deals with social, economic, cultural, historical and contemporary affairs of women.
3) *Sadhairyam munnottu,* a comprehensive programme on creating a gender conscious society for the safety of women has been revamped. A major initiative in the context of *Navothana Keralam* and an emphatic statement against blind beliefs regarding menstruation as a polluting phenomenon, was a programme inaugurated on December 10, 2018 (Human Rights Day) by the Chief Minister of Kerala, in the presence of Minister of Health, Social Justice and Women and Child Development on the theme "Women, Menstruation and Women's Rights"; to be continued as a longer term programme for sensitising people to menstruation being a normal, biological phenomenon.
4) Another very innovative programme was "*Pothu idam entethum*" a walk at night programme held on Nirbhaya Day (December 29th) in the State to boost the confidence of women, removing fear of going outdoors at night and ensure the role of society in accepting public space as belonging to all. It got a huge spontaneous response from women and was conducted in 600 centres across the State but had to be stopped due to Covid-19.
5) As part of legislative support to women and children, 14 District Child Protection Officers are working under Integrated Child Protection Scheme (ICPS) scheme for implementing Protection of Children from Sexual Offences Act (2012).
6) *Karuthal*, a survey based project to find children in distress, and *Kaval*, a scheme to provide psychological and social assistance to children, are being run effectively. Classes are conducted for concerned departments related to children such as Police, Child Protection Units, ICDS functionaries, CWCs and Advocates - for giving awareness of the law against sexual abuse.
7) A very innovative programme to check child abuse was *Karuthal Sparsham-Nammal Kai Korkaam,* to provide classes on responsible parenting.
8) District Collectors have been instructed to form internal complaint committees in all institutions, and local complaint cells in the unorganised sectors for ending sexual harassment at workplaces. Workshops were conducted at four major centres in the State to study the implementation of the 2013 Prevention of Sexual Harassment Act.
9) Women Protection Officers are working in all districts for implementing Protection of Women from Domestic Violence Act 2005. Social Justice Department is implementing *Kaithangu* scheme as a pilot project in 350 wards of 70 panchayats selected from the 14 districts by forming a task force to fight against violence. *Sradha* project is being implemented in collaboration with the Social Welfare Board to do likewise. A campaign was launched to ban dowry; goal is to eliminate dowry completely within five years and was launched on social media targeting the youth.
10) *Sakhi One Stop Centres* under WCD have been started in all districts for helping women who are the victims of violence in the family, public places, and work places. 24*7 services are provided in these One Stop Centres to the survivors
11) *Aswasanidhi* scheme is implemented for giving

immediate financial assistance for women and children who survived sexual or acid or other violence.

12) To promote gender awareness in girls from adolescence onwards, Women's Development Corporation has already set up women cells in 70 colleges. About 15,000 students are currently covered under the scheme.
13) The 181 Women Helpline, a 24-hour centralised scheme for women security, has been implemented since 2017 under the auspices of the Women Development Corporation. So far, the helpline has received over two lakh calls. Of those, 90,000 calls were serviced. 60,000 cases were settled.
14) The Women Development Corporation has set up 58 'She' toilets in different parts of the State to provide clean and safe toilet facilities to women travellers. A scheme has been envisaged for Fresh Up Centres to provide clean toilet facilities and breastfeeding during travel and first two centres will be opened in Angamaly and Changanassery.
15) "*Bodhyam*" a comprehensive programme for gender sensitisation of police was launched in 2019 by the Women's Development Corporation as a pilot project for 135 police personnel, followed up by another 484 numbers and in 2020, it is being continued online with 2320 police personnel, men and women having undergone the training.
16) An integrated skill development programme for 50 tribal families started in 2018 and 18 women have formed a group for Tailoring, supported by WDC.
17) Most recently, an advanced training programme for nurses was conducted to help find employment abroad, together with ODEPC and Centre for Management Development. Batch of 30 students and 180 will be trained before end of 2020-21.
18) In 2019, Women's Commission conducted 185 seminars and legal workshops, 29 training programmes for members of Jagratha Samithis and 114 adalaths, and 29 pre-marital counselling sessions. It responds strongly to all violations against women's dignity, self- respect and safety. Action is being taken for forming Jagratha Samithis under the leadership of Women's Commi-ssion in all panchayats; workshops were also conducted focusing on the needs and objectives of Jagratha Samithies to the ICDS workers.
19) The Gender Park is an initiative under the Women and Child Development Department. Recently the UN Women has proposed a partnership with Gender Park to function as a South Asian hub and to become a premier convergence point for all gender related activities in the region. It is now poised to start functioning with the launch of the International Women's Trade Centre in early 2021 on its campus, together with a library and museum.

As can be seen from the above, the WCD has placed substantial emphasis on policy and programmes that address major gender concerns in Kerala, reducing crimes against women, providing freedom in public spaces for women and, protecting children through novel schemes. Figure 20.2 shows that there was a decline in crimes against women in 2017 and 2018; data for 2019 and 2020 are still to come.

Gender and Child Budgeting since 2017-18

Gender Budget is not a separate Budget for women but is a methodology to assist Governments to integrate a gender perspective into the Budget, recognising the economic significance of women's unpaid household and care work and the need for public investment in these activities to enable women to be an integral part of the development process.

It seeks to break down the usual Budget through a well-established methodology, across schemes/ programmes to make women visible in each sector, recognising their contribution and emphasising the need to consider their needs/interests in the overall determination of development policy. The main weakness of efforts to implement the Gender Budgeting (GB) methodology on real Budgets in India, has been its limited ability to estimate the flow of budgetary resources to women due to non-availability of gender disaggregated data.

Kerala's achievement in Gender Budgeting lies in its attempt to address these lacunae through a more pragmatic and doable approach to GB. Certain essential steps to initiate and sustain the process were laid out: (a) First, the need for a strong Government commitment to GB, so it becomes an integral part of planning/ budgeting. In the case of Kerala it was announced in the Finance Minister's speech in the first Budget of the 11th and 13th Five-Year Plans; (b) Second, the need to identify thrust areas for women's development first, which guides the process of formulation of schemes, and then ensuring that funds are made available; (c) Third, creating awareness on the significance of gender across Departments, even those which are apparently "gender unrelated". Hence the focus on 100 per cent women's schemes in the 11th Plan (Part A of Gender Budget) which could be easily identifiable in several Infrastructure Departments, like Power, Transport,

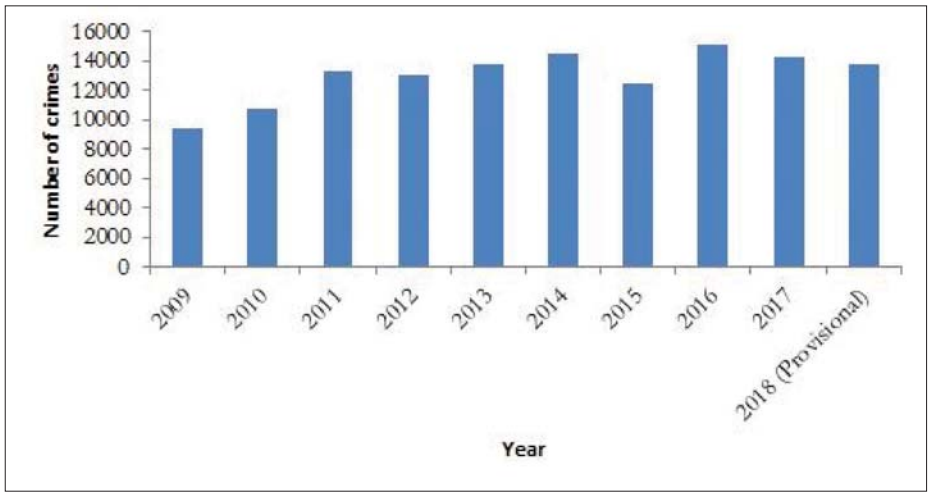

Figure 20.2 *Total crimes against women in Kerala*
Source: State Crime Records Bureau, Kerala

Ports, PWD, Civil Supplies, Excise, which have rarely come under the ambit of GB. (Kerala's GB attempt in Infrastructure sectors is given as a Box in the 11th Five-Year Plan of Government of India); (d) Fourth, larger resources flows to composite schemes which benefit both women and men, with a method of separating the allocations by gender; (e) Fifth, the need to provide explanatory notes at the end of Part B explaining the rationale of taking those allocations for women (Kerala was the first State to evolve a methodology for disaggregating composite schemes (Subrat Das 2019).

Hence in the 13th Plan, Kerala has been able to develop a doable framework for gender budgeting, the overall thrust of which is on making Planning and Budgeting gender sensitive through (a) outlays allocated for 90-100 per cent women specific schemes (Part A of Gender Budget Statement); and (b) schemes in which women's share is specified or identifiable based on gender disaggregated beneficiary data, and is less than the above (Part B).

The thrust areas identified as priorities were (a) skill development, employment generation, livelihood security for women, in particular for vulnerable women. Since child care and lack of other basic amenities (accommodation, travel, safety/security) hold women back from working outside the home, emphasis was also put on enhancing the reach of creche-cum-day care centres, home-stays for elderly, hostels and means of travel for women; and (b) Prevention of gender-based violence, redressal and rehabilitation in the context of continuing violence in the State (relating to targets 5.2, 5.4 and 5.5, 5a, 5b,5c of the SDGs).

While the Budget in 2017-18 had recommended at least 10 per cent of total State Plan outlay to be spent on schemes benefitting women, the allocations for women was 11.4 per cent that year (4.5 per cent in Part A and 6.9 per cent in Part B) which increased to 14.6 per cent in 2018-19 (5.7 in Part A and 8.9 per cent in Part B) both in women specific schemes and in composite schemes, to 16.9 per cent in 2019-20 (6.2 per cent in Part A and 10.7 per cent in Part B) and to 18.4 per cent in 2020-21(7.3 per cent in Part A and 11.1 per cent in Part B). The attempt in Kerala's Gender Budgeting has been to make women visible across sectors in the Plan.

Despite the unprecedented floods/landslides in August 2018, 2019 and pandemic in 2020, the percentage allocations for women in the Gender Budgets of the last three years did not decline given the critical role women played in livelihood revival/ rebuilding Kerala programme. The Gender Budget in 2020-21, like the last two years, focussed on women's employment with a big thrust in particular on entrepreneurship, which has seen rapid growth in recent years but has not been systematically mapped. Startups, and nano-micro enterprises under IT and Industries sector, the special livelihood development package of Kudumbashree, self-employment programme of Kerala State Women's Development Corporation, SHGs of other organisations, have all played a major role in this activity. Prominent among livelihood programmes also, is the large expansion envisaged in NREGA employment to quickly restore livelihoods to women, a substantial increase in Ayyankali urban employment scheme, and revival of livelihoods of women in the small/medium cashew factories.

A large infrastructure project for women to be known as International Women's Trade Centre (WTC) will be set up at the Kozhikode campus of the Gender Park,

which will be a platform for women to safely start and expand enterprises, and market their products globally. Money has also been allocated for rehabilitation of returnee migrants for sustainable livelihoods.

Second is the emphasis on *Navothanam Kerala* (Kerala Renaissance) the new, major initiative of the Government of Kerala in the form of a massive campaign for creating a gender conscious society, launched on a pan-Kerala scale with the Vanitha Mathil on January 1, 2019. One new scheme in the 2019-20 Gender Budgt was the inclusion of a textbook module in schools on the Constitution, learning about women's and children's rights and historical struggles of women against obscurantist practices, called *Naitikam*, implemented by SCERT. This is supported by other programmes on gender awareness mentioned in the section on WCDD - a major initiative this year titled "Year of Women Safety 2020" to be implemented by the Police Department; also a very well received and effective scheme of the Police department is self-defence training, based on Krav Maga, (a self defence system developed for security forces in Israel) started almost one and a half years ago in which almost 15 lakh girls have been trained in schools, colleges, Kudumbashree units, offices, residents associations etc.; awareness campaign against illegal migration by NORKA Department. Other novel schemes were to give girls and women greater access to public spaces, encouraging them in sports, swimming, rock climbing, (to be better prepared for disasters), art and culture. A major idea in the field of art and culture is partial funding/support for two feature films to be made by women proposed by KSFDC.

The third focus in the GBs is on our continuing attempt of providing an enabling environment for women to come out of their homes to work: enhanced allocations for anganvadis, creche-cum-day care centres, day care homes for the senior citizens, palliative care and mobile medical units to provide care for them at home, and providing facilities to SHGs to take care of adult girls and boys with intellectual disabilities.

Last but not the least is funding. With the decline in allocations in almost all schemes for women at the national-level, the burden on the State is astounding.

Some Observations and Way Forward

It needs to be noted that Kerala is one of the top States in achieving gender equality. The NITI Aayog's SDG India Index 2019 places Kerala as one among the topmost States in its progress towards UN Sustainable Development Goals, including eradication of poverty and inequality (NITI Aayog 2019). What is interesting is that in SDG 5, which is on gender equality and so fundamental to many other SDG targets, Kerala is listed as one of the top States in India.

Nonetheless, much remains to be done in terms of changing the unequal gender relations which still characterises the work structure at home and outside. Violence persists. However, the attempts in recent Covid-19 times, of women trying to break their shackles as expressed in the digital spheres and in changing modes of assembly that seem to bring new registers to the social and historical processes of collective-formation, and generate new forays and modes for women to assert themselves and exercise agency (see Meena Pillai op cit) has resulted in an empowerment not easy to capture in quantitative terms. The evidence suggests that women are gaining greater autonomy to assert themselves and in that sense greater empowerment.

Our objective in the next 20 to 25 years is further improvements in the targets mentioned in Goal 5, especially under 5.2 (eliminate all forms of violence against all women and girls in public and private spheres, including trafficking, sexual and other types of exploitation); 5.4 (recognise and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family), and 5.5 (Ensure women's full and effective participation and equal leadership at all levels of decision making in political, economic and public life).

Policy towards Transgender Persons

Transgender persons face discrimination and are excluded in important ways from full participation in the political and socio-economic spheres. After the Supreme Court judgement of 2014, Kerala was the first State in India to declare a Transgender Persons' Policy. It did so in 2015. The policy was preceded by a socio-economic survey of the community conducted by the Social Justice Department. The survey sought information on all aspects of their social and personal life. It reveals that much remains to be done for transgender persons to achieve a life of well-being and dignity; widespread and intense conservatism denies equal status to the interests and demands of transgender persons.

The policy of the Government of Kerala emphasises the rights of transgender persons, including self-identifying as man, a woman or transgender person as Stated in the Judgement. The policy was launched at an international conference on Gender Equality in November 2015. Twelve transgender leaders from inside and outside the State participated, affirming the Government's commitment to a gender-just society.

Based on the findings of the survey, the Policy provided a road map for ensuring certain basic rights to transgender persons, namely, the right to equality, freedom of expression, right to dignity and life without violence, right to employment and right to equal access to education, training and health services. It recommended the establishment of a State-level Transgender Justice Board and District-level transgender persons Justice Boards that can register transgender persons and issue identification cards. The Department of Social Justice has established these Boards in 2016-17.

State Initiatives for Transgender Persons in the 13th Five-Year Plan

In March to April 2017, a Government notification sanctioned membership of a transgender person to the State Board (and later to the District-Level Committees).

Kerala is one of the few States that has a separate allocation for transgender persons in the Budget. In the revised budget of 2016-17, the Government introduced a monthly pension for transgender persons above 60 years old. The Social Justice Department was able to provide scholarships to a few transgender students, and it conducted district-level workshops for assessing livelihood training and other matters relating to mainstreaming of transgender persons. Right from the formulation of the first Gender and Child Budget in 2017-18, a separate allocation has been made for transgender persons in the Gender Budget (Part A): Rs 3 crore in the first year; Rs 4 crore in 2018-19; Rs 5 crore in 2019-20 and at the same-level, Rs 5 crore in 2020-21 and 2021-22.

Some of the major schemes for transgender persons introduced were:

- A Transgender persons' helpline (24x7) and crisis management centre with the help of accredited NGOs working in the field.
- Financial assistance for education (school drop outs being high), vocational training and self-employment; and financial support for writing competitive exams.
- Sex Re-assignment Surgery (SRS) in Government hospitals based on medical advice (amount for SRS surgery increased to Rs 2 lakh in 2019 and further to Rs 5 lakh by 2020).
- Sensitising the public, especially parents and family members, teaching and non-teaching staff and student community of educational institutions, officers of the Health Department, Local Self Government Department (LSGD), Education and Labour Department to the right to equality of transgender persons.
- An attempt was made in the 2018-19 Budget to mainstream them through integrating their needs into education, and providing shelter homes with the help of the State Literacy Mission Authority (*Samanvaya scheme).*
- In 2018-19, the transgender person Cell in the Directorate was set up for design, coordination and implementation of various activities for the transgender persons giving them a voice in their own planning.
- Since then, all the schemes under SJD came under a comprehensive umbrella scheme- *Mazhavillu.* Some other Departments like Health, Homeopathy, Cooperation, Local Bodies, Kerala State Women's Development Corporation, select Correctional Homes (a separate Prison block) also introduced schemes for transgender persons. Increased emphasis was placed on hastening the issuing of ID cards, and providing shelter homes.
- A transgender persons' arts festival was organised; Marriage assistance was provided to transgender persons.
- Transgender persons are included as a priority category in the LIFE Housing Mission project.
- The SCERT, under a scheme called *Naitikam,* to create awareness on Constitutional Rights among school children, prepared posters to generate awareness on transgenders in schools.
- In September 2020, under the Chief Minister's Entrepreneurship Development Programme, the first amount of Rs 75,000 was given to a transgender person by the Finance Minister.
- A landmark achievement in mid-2017 was a three-year agreement between Kochi Metro and Kudumbashree to run the metro service. Of the 618 staff recruited for the 16 metro stations and the Aluva depot, 23 were transgender persons. Of the 23 individuals, only 14 of them stayed on. Others went for pursuing post-graduation and for some other jobs; the number is now 11.
- From 2017-18, some local governments have been allocating funds to meet felt needs of the transgender persons, for training and support to skill development and self-employment schemes: Haritha Karmasena programmes and a Canteen event management group. Beautician course is much coveted among transgender persons. In 2019-20 there was a large increase in the number of local bodies responding to the needs of Transgender persons.

Covid-19 pandemic and impact on transgender persons

The transgender community whose livelihood is almost entirely dependent on daily wages and gig jobs, including begging, and paid sex work, lost livelihood opportunities because of the pandemic and consequent lockdown which left them even more vulnerable, with no regular income, no ways to find food and shelter, a complete halt to community life and gatherings, and a pause in health and follow-up treatment. The Social Justice Department extended help in terms of food kits and shelter; even those without documents to prove their identity were allotted food kits; psycho-social counselling was also provided.

Looking ahead

It can be seen from the above that after the Transgender 2015 Policy came into force and the Transgender Board at the State and Committees at district-level were set up, the current Government has implemented a number of innovative programmes recognising basic rights of transgender persons, addressing issues of stigmatisation, discrimination, right to equality, right to a life of dignity without violence, right to health and education, training, employment and shelter. These rights-based considerations will continue to underlie the Government's policy in this sphere.

A major problem is the absence of a sound estimate on number of Transgender persons in the State, a lacunae very much recognised by the Government. The figure of 25,000 persons estimated by the Transgender Policy (2015) has to be revisited. Substantial efforts have been made by the Cell and the Directorate to draw out Transgender persons for access to their entitlements.

Way forward

The rights of the transgender persons

- Civil rights of the transgender persons must be emphasised. They should not be devoid of basic rights like the right to self-identification; right to acquiring a ration card, passport, or obtaining property because of their gender.

Social awareness.

- Another approach to upliftment of TGs is by providing benefits to the family. The anganwadis can identify mothers with transgender children.
- Workshops for sensitisation purposes should be designed creatively not only in the educational institutions but also in the police stations.
- The content in the media should be more gender-sensitive. The Press Council of India should design guidelines to certify the sensitive and respectful treatment of the problem.
- In public spaces, like cinema halls or transportation services, more visual representation of the transgender persons should be given as part of the awareness programme.

Health

- Training healthcare providers to understand the needs of transgender persons and respond effectively.
- Create outreach health services for transgender persons who are unable to leave their homes, due to discrimination or exclusion.

Education

- School curriculum should be mandated to include sex education.
- Vocational training and personality development should be given to the identified transgender children from schools.
- Provide guidance and training for teachers and counsellors on how to deal sensitively with students who are questioning their sexual orientation and/or gender identity.
- Adopt a zero-tolerance policy towards homophobic, biphobic and transphobic bullying.
- Make sure that all teaching curricula are transgender persons-inclusive and profile positive role models.

Employment

- We must reach a better understanding of how transgender persons are discriminated against economically, ensure private sector development projects are designed to address their economic needs, and support transgender persons to set up their own businesses.
- Gender Park (under WCD), with its emphasis on addressing the issues of non-heterosexual identities, could play a major role in supporting research and training regarding transgender persons.
- Reservation in teaching jobs should be given in all aided and unaided schools to have an inclusive approach in the field of education.

Shelter

- Support and train local government and housing associations to take account of the specific needs of young transgender persons.
- Provide specialist services, such as safe houses, for transgender persons at risk of homelessness, particularly young people and the elderly.
- Provide affordable and non-discriminatory housing options for transgender persons.

Chapter 21
Overcoming Fiscal Constraints to Growth

> Even a cursory glance at the State List in the Seventh Schedule of the Constitution shows that, in the allocation of duties between the Centre and the States, fundamental tasks of enhancing human development, income growth, livelihoods, and protecting and sustaining the environment are entrusted to the States. However, although these major tasks of nation-building are the duty of the States, the resources to finance them are substantially controlled by the Centre . . . The present situation is not because of the action or inaction of the States but is directly the consequence of Central Government policy . . . There is thus a great asymmetry in India's federal system. The Centre's capacity to mobilise resources is far greater than that of the States, but the latter are required to undertake development expenditures that far exceed their revenue generating capabilities.
>
> Chief Minister Pinarayi Vijayan (2018)

The focus of this chapter is on the fiscal constraints to economic growth in Kerala. In this context, this section covers the following areas.

1. Trend in various fiscal indicators of Kerala economy from 2010-11 to 2020-21.
2. Major fiscal constraints faced by the State.
3. Policy initiatives to overcome the fiscal constraints in the State.

Trends in Major Fiscal Indicators

This section presents the trends in various fiscal indicators of State finances from 2010-11 to 2020-21.

Trends in receipts

Revenue and capital are the two streams of receipts of the State Governments and the Union. Revenue receipts of the State consists of own tax revenues, non-tax revenues, State's share of Union taxes, and Grants-in-aid from the Government of India. Capital receipts comprise mainly debt receipts and also include miscellaneous capital receipts such as proceeds from disinvestments, and recoveries of loans and advances. The trend in receipts from 2010-11 to 2020-21(RE) are shown in Table 21.1.

Total revenue receipts of Kerala as percentage of GSDP have not witnessed any upward trend except for a brief period between 2016 and 2018. Details of revenue receipts in the State from 2010-11 to 2020-21 are shown in Table 21.2.

An analysis of the three major components of State revenues, that is, State's own tax revenue, State non-tax revenue, and Central transfers shows that the annual State's own tax revenue growth declined from 23 per cent in 2010-11 to (-)10 per cent in 2020-21 (RE). The growth rate achieved in 2010-11 and 2011-12

Table 21.1 *Trend in total receipts, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Revenue receipts	Capital receipts	Total receipts	Growth rate of total receipts (in %)	GSDP (at current prices)	Receipts-GSDP ratio (in %)
2010-11	30,991	7807	38,798	14	3,24,513	12
2011-12	38,010	12,284	50,294	30	3,64,048	14
2012-13	44,137	15,685	59,822	19	4,12,313	15
2013-14	49,177	17,050	66,227	11	4,65,041	14
2014-15	57,950	18,719	76,669	16	5,12,564	15
2015-16	69,033	17,965	86,998	13	5,61,994	15
2016-17	75,612	26,763	1,02,374	18	6,34,886	16
2017-18	83,020	27,221	1,10,241	8	7,01,588	16
2018-19	92,855	27,215	1,20,070	9	7,90,302	15
2019-20	90,225	24,160	1,14,385	-5	8,54,689	13
2020-21 (RE)	93,115	35,268	1,28,383	12	8,22,023	16

Note: RE is revised estimate.

Source: Budget in Brief, 2021-22, Government of Kerala.

Table 21.2 *Trend in revenue receipts, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Own tax revenue	Own non- tax revenue	Central transfers	Total receipts	Growth in own tax revenue (in per cent)	GSDP (at current prices)	Revenue receipts-GSDP ratio (in %)
2010-11	21,722	1931	7338	30,991	23	3,24,513	10
2011-12	25,719	2592	9700	38,011	18	3,64,048	10
2012-13	30,077	4198	9862	44,137	17	4,12,313	11
2013-14	31,995	5575	11,607	49,177	6	4,65,041	11
2014-15	35,233	7284	15,434	57,951	10	5,12,564	11
2015-16	38,995	8425	21,612	69,033	11	5,61,994	12
2016-17	42,176	9700	23,735	75,612	8	6,34,886	12
2017-18	46,460	11,200	25,361	83,020	10	7,01,588	12
2018-19	50,644	11,783	30,427	92,855	9	7,90,302	12
2019-20	50,323	12,265	27,636	90,225	-1	8,54,689	11
2020-21 (RE)	45,272	9121	38,722	93,115	-10	8,22,023	11

Note: RE is revised estimate.
Source: Budget in Brief, 2021-22, Government of Kerala.

could not be continued. There was a decline in growth rate in 2013-14 and that has continued over the years except for few years where growth rate touched 10 per cent. It needs to be taken note that the efforts taken by the State Government to raise the growth rate of own tax revenues since 2016-17 has not met with success. This was because of reasons which were beyond the control of the State Government. Factors such as the demonetisation of Rs 500 and Rs 1000 notes in 2016-17, floods in 2018 and 2019, implementation issues in GST and unprecedented economic downturn following the Covid-19 pandemic affected the revenue from own tax sources.

As regards the growth rate of revenue receipts, including Central transfers, there has been high growth in 2014-15 and 2015-16. In 2014-15, the growth in revenue receipts was mainly because of the rise in share of Central grants caused by a change in procedure of routing Central share in centrally sponsored schemes (CSS) through the State Budgets instead of directly to implementing agencies. Similarly, in 2015-16, the growth of 19 per cent in total receipts and the marginal increase in the revenue-GSDP ratio was because of the initial transfers from the 14th Finance Commission.

(i) State's Own Tax Revenue. The main sources of State's own tax revenue (SOTR) are State goods and services tax, sales tax on petroleum and alcoholic liquor on human consumption, stamps and registration fees, State excise duties, motor vehicle tax and land revenue.

(ii) State's Own Non-Tax Revenue. The major sources of non-tax revenue are from general services, economic services and social services, interest receipts, dividends and profits. Net receipts under State lotteries are the major source of non-tax revenue of the State. It constitutes around 75 per cent of total non-tax revenue. Other main sources of State's own non-tax revenue are sale proceeds of forest produces and receipts in the form of fees and fines from various social developmental services. Details of non-tax revenue in the State from 2010-11 to 2020-21 are shown in Table 21.3.

The buoyancy in the growth of State's own non-tax revenue between 2011-15 was because of the increased collection from lotteries. However, after 2018, the sale of lotteries is stagnating. Regarding non-tax revenue mobilisation, the major concerns facing Kerala are the small contribution by way of dividends and profits from State public sector enterprises and the fact that the bulk of economic and social services are provided free to the people. The Government has taken a decision to increase non-tax revenues from services at 5 per cent per annum in order to mobilise resources from non-tax revenues.

(iii) Central resource transfers. The major components of Central devolution are share of taxes and grants as

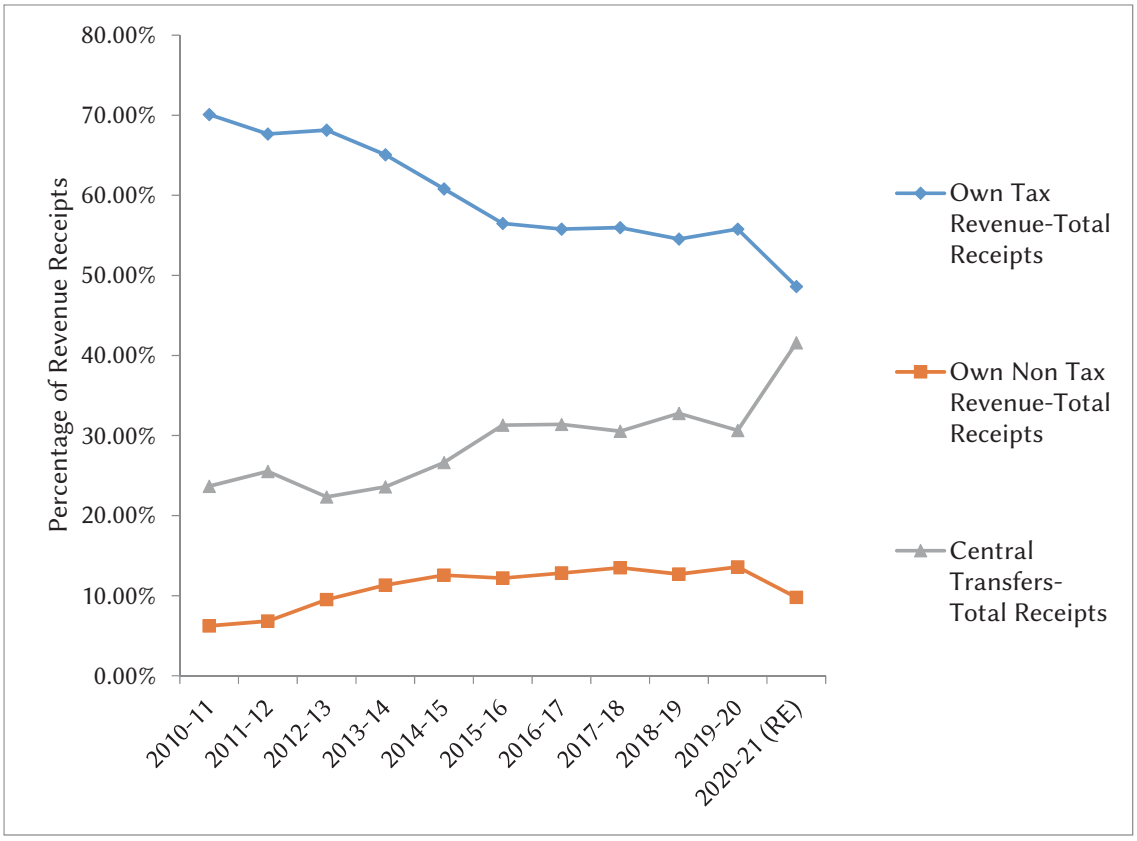

Figure 21.1 *Proportion of components of revenue receipts to total receipts, Kerala, 2010-11 to 2020-21* in per cent

Note: RE is revised estimate

Source: Budget in Brief, 2021-22, Government of Kerala

recommended by the Finance Commissions (FC) and grants disbursed by the Centre. Resource transfers from Centre and its trends are shown in Table 21.4 and 21.5.

The share of Central taxes and duties with grant-in-aid and other receipt from Centre shows a fluctuating trend. Major reasons for the fluctuations in Central transfers are as follows.

1. Changes in funding pattern of centrally sponsored schemes since 2015-16. In schemes where earlier 25 per cent of cost was met by State, now 40 per cent of the cost is borne by the State.
2. The spikes in 2010-11 and 2015-16 are attributed to the recommendations of the 13th and 14th Finance Commissions. The 13th Finance Commission increased the share by 1.5 per cent points to 32 per cent of the divisible tax pool. It also started direct transfer of grants to local bodies.
3. The 14th Finance Commission increased the devolution of taxes from 32 per cent to 42 per cent of the divisible tax pool. The State's share in the 14th Finance Commission increased from 2.34 per cent to 2.5 per cent in the horizontal devolution of

Table 21.3 *Trends in non-tax revenue, Kerala, 2010-11 to 2020-21* in Rupees crore

Year	Non-tax revenue	Growth rate (in %)
2010-11	1931	4
2011-12	2592	34
2012-13	4198	62
2013-14	5575	33
2014-15	7284	31
2015-16	8425	16
2016-17	9700	15
2017-18	11200	15
2018-19	11783	5
2019-20	12265	0
2020-21 (RE)	9121	0

Note: RE is revised estimate

Source: Budget in Brief, 2021-22, Government of Kerala

Table 21.4 *Resource transfers from Centre to Kerala, 2010-11 to 2020-21* in Rs crore

Year	Share in Central Taxes and Duties	Plan Grants	Grants from Finance Commission	Non-Plan Grants other than FC	Grant-in-aid and other receipts from Centre (2+3+4)	Total Transfers (1+5)
	1	2	3	4	5	6
2010-11	5142	1698	434	64	2197	7338
2011-12	5990	2276	1174	259	3709	9700
2012-13	6841	2364	601	57	3022	9863
2013-14	7469	2459	1568	111	4138	11,607
2014-15	7926	5524	1574	410	7508	15,434
2015-16	12,691	3744	5171	6	8921	21,612
2016-17	15,225	3260	4955	296	8510	23,735
2017-18	16,833	3409	3182	1937	8528	25,361
2018-19	19,038	3954	1646	5789	11,389	30,427
2019-20	16,401	3317	2343	5575	11,235	27,636
2020-21 (RE)	9844	3400	18,049	7429	28,878	38,722

Note: RE is revised estimate.
Source: Budget in Brief, 2021-22, Government of Kerala.

Table 21.5 *Trend in resource transfers from Centre to Kerala, 2010-11 to 2020-21* in Rs crore and in per cent

Year	Share in Central taxes and duties	Growth rate (in %)	Grant-in-aid and other receipts from Centre	Growth rate (in %)	Total transfers	Growth rate (in %)
2010-11	5142	17	2197	-2	7338	11
2011-12	5990	17	3709	69	9700	32
2012-13	6841	14	3022	-19	9862	2
2013-14	7469	9	4138	37	11,607	18
2014-15	7926	6	7508	81	15,434	33
2015-16	12,691	60	8921	19	21,612	40
2016-17	15,225	20	8510	-5	23,735	10
2017-18	16,833	11	8528	0	25,361	7
2018-19	19,038	13	11,389	34	30,427	20
2019-20	16,401	-14	11,235	-1	27,636	-9
2020-21 (RE)	9844	-40	28,878	157	38,722	40

Note: RE is revised estimate.
Source: Budget in Brief, 2021-22, Government of Kerala.

the tax pool. However, the share of FC transfers in total Central transfers to the States has shown a declining trend during the six year period 2015-16 to 2020-21(Table 21.6). Except 2020-21, the remaining five years were within the award period of the 14th FC. The 15th Finance Commission has decreased the State's share in divisible pool to 1.925 per cent. This clearly indicates that the degree of progressivity in Union transfers have come down.

Further, the share of cess and surcharges as a percentage of tax revenues of Central Government has increased since 2016-17 (Table 21.7). Cess and surcharge do not form part of the tax devolution to States, thus nullifying the positive impact created by

14th Finance Commission's allocation of 42 per cent to the States.

Table 21.6 *Share of Finance Commission transfers in total Central transfers to States, 2015-16 to 2020-21* in per cent

Year	Share of FC transfers in total Union transfers (in per cent)
2015-16	72.3
2016-17	73.1
2017-18	68.8
2018-19	70.5
2019-20 (RE)	62.5
2020-21 (BE)	64.6

Note: RE is revised estimate, BE is budget estimate
Source: 15th Finance Commission Report

Table 21.7 *Cess and Surcharges as percentage of Gross Tax Revenue of Union Government, 2011-12 to 2020-21* in per cent

Year	Surcharge and Cess as per cent of GTR
2011-12	10.4
2012-13	11.7
2013-14	12.4
2014-15	13.5
2015-16	12.2
2016-17	13.5
2017-18	13.9 (10.6)
2018-19	19.9 (15.6)
2019-20 (RE)	20.2 (15.7)
2020-21 (BE)	19.9(15.3)

Note: The figures in parentheses is excluding GST compensation cess : RE is revised estimate, BE is budget estimate
Source: 15th Finance Commission Report

4. Delay in receipt of GST compensation from Centre has substantially affected the revenue receipts of the State.

Capital Receipts of the State are mainly debt receipts. During the last ten years, the composition of debt in Kerala has shifted from high cost to low cost debt because of rise in share of market borrowings in total debt**.** The annual growth rate of debt decreased to the level of 10 per cent in 2019-20 from 18 per cent in 2016-17. Total outstanding debt of Kerala is given in Table 21.8.

Despite an increasing tendency in total debt-GSDP ratio during 2010-11 to 2015-16, Kerala has successfully contained the growth in debt-level through prudent debt management policies. Studies by IIM Kozhikode and Centre for Development Studies have maintained that the debt-levels of Kerala are sustainable with the real GSDP growth hovering well above the real rate of interest. This is mainly due to two reasons (i) the composition of borrowings and liabilities has shifted markedly towards market borrowings, which has a lower interest burden and (ii) the share of Central loans and that from small savings and provident funds have come down. The change in composition has helped in reducing the burden of interest payments and is a movement towards fiscal consolidation.

Trends in Government Expenditure

The total revenue expenditure comprises of developmental expenditure and non-developmental expenditure. Development expenditure indicates expenditure on social services and economic services. Expenditure on development fund and a portion of maintenance fund devolved to local governments are also taken as part of development expenditure. Non-developmental expenditure is expenditure on general services. Table 21.9 and Figure 21.2 shows the trend of developmental expenditure and non-developmental expenditure from 2010-11 to 2020-21 (RE).

It is observed that non-developmental expenditure, represented mainly by committed expenditures, namely, pensions, interest payments, subsidies and salaries, have a higher proportion in revenue expenditure than the share of developmental expenditure. The share of non-development expenditures has risen from 45.42 per cent of revenue expenditure in 2010-11 to 54.59 per cent in 2019-20. This indicates a deep-rooted fiscal constraint in our State finances.

The increased devolution to LSGs has helped maintain the consistency in development expenditure over the last decade. It is to be noted that substantial part of the grants-in-aid to local governments is utilised for development expenditure. Thus, the budgetary classification, in fact, underestimates the share of development expenditure to the extent that it is spent from such grants-in-aid.

Capital expenditure comprises of capital outlay and loans and advances. Capital outlay is the direct capital expenditure on general, social and economic services by the State. The trend in capital expenditure as a percentage of GSDP is shown in Table 21.10.

Table 21.8 *Total outstanding debt in Kerala, 2010-11 to 2020-21* in Rs crore

Year	Total debt	Growth rate (%)	Total debt as % of GSDP	GSDP at current prices
2010-11	75,055	13	23	3,24,513
2011-12	82,486	10	23	3,64,048
2012-13	1,03,561	26	25	4,12,313
2013-14	1,19,009	15	26	4,65,041
2014-15	1,35,440	14	26	5,12,564
2015-16	1,57,370	16	28	5,61,994
2016-17	1,86,454	18	29	6,34,886
2017-18	2,10,762	13	30	7,01,588
2018-19	2,35,631	12	30	7,90,302
2019-20	2,60,311	10	30	8,54,689
2020-21 (RE)	2,96,818	14	36	8,22,023

Note: RE is revised estimate.
Source: Budget in Brief, 2021-22, Government of Kerala.

Table 21.9 *Trend in revenue expenditure, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Development expenditure	Growth rate (in %)	Non- development expenditure	Growth rate (in %)	Total	Growth rate (in %)
2010-11	18,919	12	15,746	11	34,665	11
2011-12	25,070	33	20,975	33	46,045	33
2012-13	29,889	19	23,600	13	53,489	16
2013-14	32,921	10	30,197	28	63,118	18
2014-15	39,182	19	32,564	8	71,746	14
2015-16	41,763	7	36,927	13	78,689	10
2016-17	48,603	16	42,494	15	91,096	16
2017-18	52,980	9	46,969	11	99,948	10
2018-19	56,788	7	53,528	14	1,10,316	10
2019-20	47,550	-16	57,170	7	1,04,720	-5
2020-21(RE)	59,990	26	57,331	0	1,17,322	12

Note: RE is revised estimate.
Source: Budget in Brief, 2021-22, Government of Kerala.

The capital expenditure as percentage of GSDP was 1.88 per cent in 2010-11 and 1.35 per cent in 2020-21(RE). It indicates a fiscal challenge for Kerala. The share of capital expenditure and capital outlay in Kerala's total expenditure has witnessed a fluctuating trend during the last decade. As percentage of GSDP, capital outlay has decreased from 1.04 per cent in 2010-11 to 0.99 per cent in 2019-20 (Table 21.11).

However, it needs to be understood that the bulk of the capital expenditure over the last few years have been financed through Kerala Infrastructure Investment Fund Board (KIIFB). The budgetary estimates of capital expenditure are not an accurate estimate of actual fiscal allocations for asset creation within the Kerala economy.

Deficit Indicators

All the major deficit indicators including revenue deficit and fiscal deficit have shown slight changes over the last decade. Major deficit indicators from 2010-11 to 2020-21 (RE) is shown in Table 21.12 and in Figure 21.3.

Fiscal deficit as per cent of GSDP increased from 2.38 per cent in 2010-11 to 4.17 per cent in

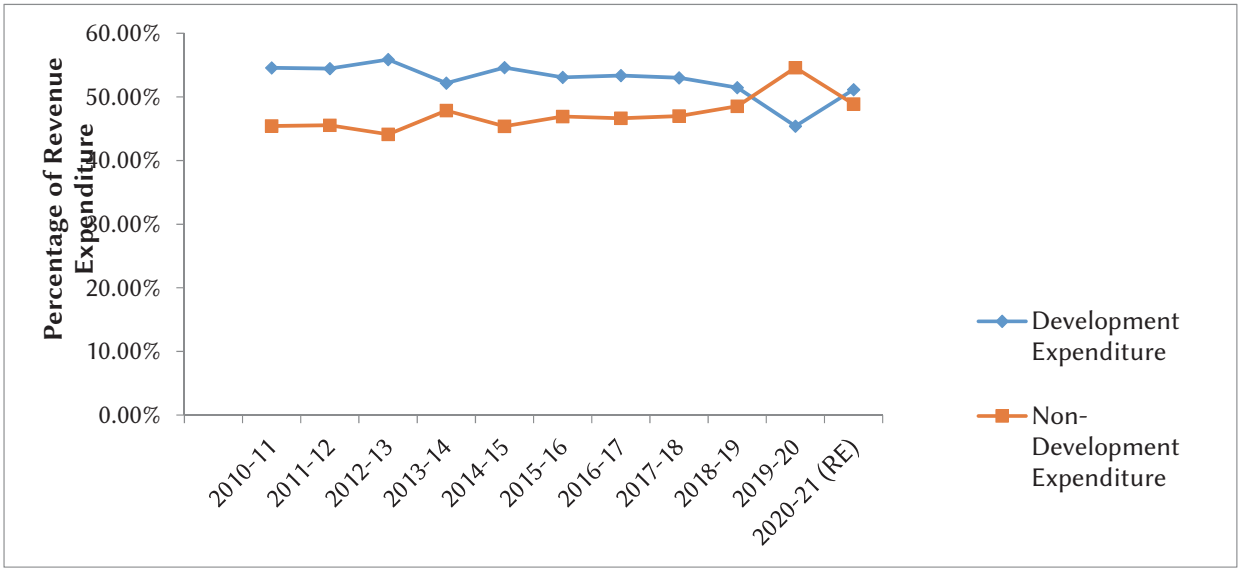

Figure 21.2 *Share of developmental and non-developmental expenditure in total expenditure, Kerala, 2010-11 to 2020-21* in per cent
Note: RE is revised estimate
Source: Budget in Brief, 2021-22, Government of Kerala

Table 21.10 *Trend in capital expenditure, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Capital expenditure	Growth rate (in %)	GSDP (current prices)	Capital expenditure as per cent of GSDP	Total expenditure	Capital expenditure as proportion to total expenditure
2010-11	6100	-23.74	3,24,513	1.88	40,765	14.96
2011-12	7745	26.95	3,64,048	2.13	53,789	14.40
2012-13	8544	10.32	4,12,313	2.07	62,032	13.77
2013-14	9003	5.38	4,65,041	1.94	72,122	12.48
2014-15	10,840	20.41	5,12,564	2.11	82,587	13.13
2015-16	14,403	32.86	5,61,994	2.56	93,093	15.47
2016-17	11,286	-21.64	63,4,886	1.78	1,02,383	11.02
2017-18	10,289	-8.83	7,01,588	1.47	1,10,238	9.33
2018-19	9753	-5.21	7,90,302	1.23	1,20,070	8.12
2019-20	9665	-0.91	8,54,689	1.13	1,14,385	8.45
2020-21 (RE)	11,061	14.44	8,22,023	1.35	1,28,383	8.62

Note: RE is revised estimate
Source: Budget in Brief, 2021-22, Government of Kerala

2016-17. The prudent fiscal consolidation policies by Government of Kerala even in the midst of consecutive floods and policy shocks such as demonetisation and GST has resulted in the fiscal deficit reducing to below 3 per cent of GSDP in 2019-20. It is noteworthy that the primary deficit which is a true indicator of current borrowings has shown a declining trend since 2016-17 and is below 1 per cent in 2019-20.

Plan Outlay and Expenditure

Consequent to the inception of National Institution for Transforming India (NITI Aayog) at the Centre, Government of India did away with the Five-Year Plans. The Government of Kerala, however, resolved to proceed with the Five-Year Plan and formulated the 13th Five-Year Plan (2017-22). Plan Outlay and Expenditure from 2010-11 onwards is shown below in

Table 21.11 *Trends in the capital outlay, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Capital Expenditure	Growth Rate (in %)	GSDP (current prices)	Capital Expenditure as per cent of GSDP	Total Expenditure	Capital Expenditure as proportion to total expenditure
2010-11	6100	-23.74	3,24,513	1.88	40,765	14.96
2011-12	7745	26.95	3,64,048	2.13	53,789	14.40
2012-13	8544	10.32	4,12,313	2.07	62,032	13.77
2013-14	9003	5.38	4,65,041	1.94	72,122	12.48
2014-15	10,840	20.41	5,12,564	2.11	82,587	13.13
2015-16	14,403	32.86	5,61,994	2.56	93,093	15.47
2016-17	11,286	-21.64	6,34,886	1.78	1,02,383	11.02
2017-18	10,289	-8.83	7,01,588	1.47	1,10,238	9.33
2018-19	9753	-5.21	7,90,302	1.23	1,20,070	8.12
2019-20	9665	-0.91	8,54,689	1.13	1,14,385	8.45
2020-21 (RE)	11,061	14.44	8,22,023	1.35	1,28,383	8.62

Note: RE is revised estimate
Source: Budget in Brief, 2021-22, Government of Kerala

Table 21.12 *Trends in major deficit indicators, Kerala, 2010-11 to 2020-21* in Rs crore

Year	Revenue Deficit		Fiscal Deficit		Primary Deficit		GSDP
	Amount	% to GSDP	Amount	% to GSDP	Amount	% to GSDP	(at current prices)
2010-11	3674	1.13	7730	2.38	2041	0.63	3,24,513
2011-12	8034	2.21	12,815	3.52	6521	1.79	3,64,048
2012-13	9351	2.27	15,002	3.64	7798	1.89	4,12,313
2013-14	11,309	2.43	16,944	3.64	8679	1.87	4,65,041
2014-15	13,796	2.69	18,642	3.64	8872	1.73	5,12,564
2015-16	9657	1.72	17,818	3.17	6708	1.19	5,61,994
2016-17	15,485	2.44	26,448	4.17	14,332	2.26	6,34,886
2017-18	16,928	2.41	26,837	3.83	11,718	1.67	7,01,588
2018-19	17,462	2.21	26,958	3.41	10,210	1.29	7,90,302
2019-20	14,495	1.70	23,837	2.79	4623	0.54	8,54,689
2020-21 (RE)	24,206	2.94	34,950	4.25	14,663	1.78	8,22,023

Note: RE is revised estimate
Source: Budget in Brief, 2021-22, Government of Kerala

Table 21.13.

In spite of the fiscal shocks faced by the State over the last few years, the State Plan outlay has registered a double-digit growth except for the years 2015-16, 2019-20, and 2020-21.The growth of State Plan outlay has been instrumental in rebuilding the Kerala economy through productive investments in social infrastructure such as health, education and physical infrastructures such as roads, water and sanitation. In times of crisis, the Plans were reoriented to create livelihoods for people, invest in infrastructure projects, and in rebuilding and reviving the economy. The

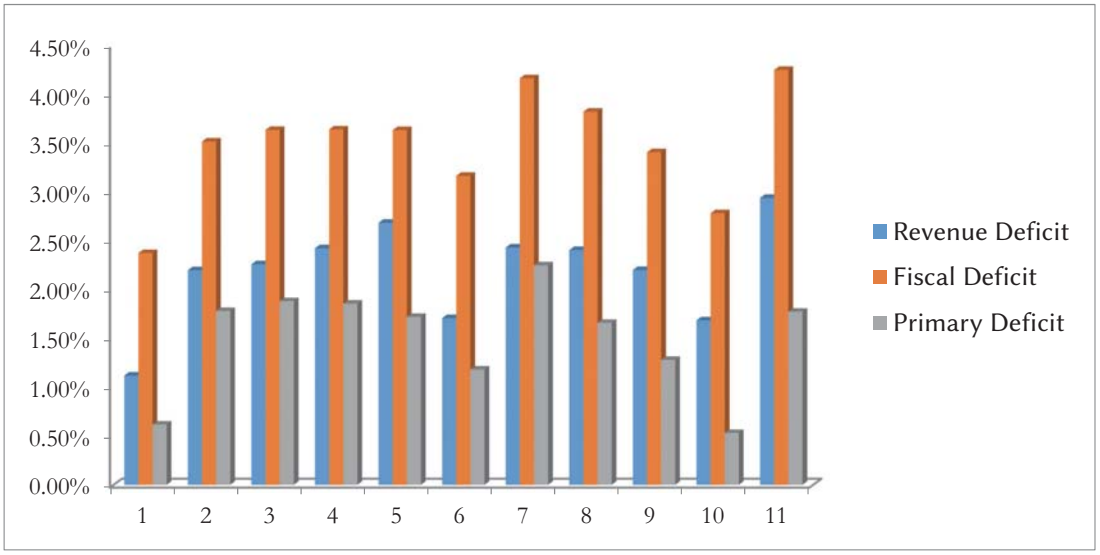

Figure 21.3 Trends in major deficit indicators, Kerala, 2010-11 to 2020-21 in per cent

Source: Budget in Brief, 2021-22, Government of Kerala

Table 21.13 *Trends in Plan outlay and expenditure, Kerala, 2010-11 to 2020-21* in Rs crore

Year	State Plan Outlay	Growth Rate	Expenditure	Expenditure as percentage of Outlay
2010-11	10,025	12	10,025	100
2011-12	12,010	20	11,759	98
2012-13	14,010	17	14,737	105
2013-14	17,000	21	14,901	88
2014-15	20,000	18	15,567	78
2015-16	20,000	0	21,311	107
2016-17	24,000	20	24,471	102
2017-18	26,500	10	29,897	113
2018-19	29,150	10	26,047	89
2019-20	30,610	5	24,452	80
2020-21	27,610	-10	18,190	66

Note: Expenditure for 2020-21is up to February 28, 2021 and is obtained from Planspace

Source: *Economic Review* 2020

consistently increasing devolution to local bodies against the background of constrained fiscal space has ensured the smooth functioning of the fiscal federalism architecture within the State.

Efforts for Fiscal Consolidation

The State Government has taken consistent efforts for fiscal consolidation by trying to improve tax collection and rationalising expenditure.

Improvements in tax collection

1. Improvements in tax administration and up gradation of technology such as e-filing, e-auditing and e-assessment has improved the tax base. Kerala imposed a cess of one per cent on GST for a specific period (which is permissible under Article 279A(4)(f) of the Constitution) for additional resource mobilisation. Kerala become the first State to levy calamity cess. Kerala Flood Cess is applicable from the August 1, 2019 onwards for a period of two years.
2. Revival of PSUs on a profitable path which has enhanced the revenue receipts of the State. Example the Kerala Minerals and Metals Limited clocked a net profit of Rs 163.29 crores in 2019 on a turnover of Rs 829.89 crores when compared to net profit of

Rs 3.24 crores on a turnover of Rs 653.91 crores in 2015-16

Rationalisation of expenditure

1. The grants-in-aid to local governments are now based on bills system instead of crediting the amounts which has improved the economy of expenditures.
2. Quality of expenditure is evident from the following achievements. Kerala topped the SDG India index consecutively in 2018 and 2019. In 2018, Kerala ranked first in SDGs relating to health, education, and gender equality. In 2019, Kerala was one of the top performers in the SDG goal relating to Industry, Innovation and Infrastructure. In the Performance of States in Health Outcomes Index released by NITI Aayog in June 2019, Kerala ranked at the top in terms of overall performance. Kerala topped the School Education Quality Index (SEQI) of Niti Aayog.
3. As part of fiscal consolidation and expenditure rationalisation, the Government has done away with the practice of use of Treasury Savings Bank (TSB) accounts by departments to draw funds and spend them later or in other words prevent them from lapsing at the end of the financial year. This has helped in expenditure rationalisation and maintaining deficit targets.
4. The Government has taken steps to implement the recommendations of expert committees appointed to rationalise public expenditures. These committees were appointed in the wake of Covid-19 pandemic.

Issues Affecting Fiscal Space of State

Centre-State relations in fiscal sphere

1. The implementation of GST as per the provisions of the 101st Constitutional Amendment Act since July 1, 2017 has limited the fiscal space of State to raise resources through taxes.

(i) The current GST slabs are 0 per cent, 5 per cent, 12 per cent, 18 per cent and 28 per cent. The standard tax rate on majority of goods which was 14.5 per cent under VAT regime has come down to 9 per cent (SGST component of 18 per cent GST). This has led to fall in tax revenue as 75 per cent of commodities in the pre-GST era were at 14.5 per cent under VAT.

(ii) Delay in receipt of GST compensation from the Central Government. In the wake of Covid-19 pandemic, Centre has described the revenue shortfall as an "act of god" and is shying away from its responsibility of augmenting State finances. Despite being burdened with huge arrears of GST compensation, Kerala is now pressurised to borrow from RBI or open market by Centre to bridge the GST revenue shortfall. According to the 15th Finance Commission, the estimated GST Compensation for the period from 2021-26 is around Rs 22,503 crores (Table 21.14).

Table 21.14 *Estimated GST compensation to Kerala, 2021-26* in Rs crore

2021-22	2022-23	2023-24	2024-25	2025-26
3408	3797	4157	4631	6510

Source: 15th Finance Commission Report

(iii) Late implementation of e-way bill has impacted the GST revenue collection of all States.

(iv) Equal apportionment of GST rates between the Union and States has led to a substantial erosion of tax base of States.

2. About 30 per cent of the total revenue of the State Government comes from loans or grants from the Central Government. This has been affected by the changes in funding pattern of centrally sponsored schemes since 2015-16. In schemes where 25 per cent of cost was met by State earlier, now 40 per cent of the cost is borne by the State.
3. Resource mobilisation constraints are further aggravated as the State is bound by the Fiscal Responsibility Act (FRA) under which it cannot borrow more than 3 per cent of its GSDP. In the wake of Covid-19 crisis, Centre has raised the net borrowing limit for State Governments from 3 per cent of the GSDP to 5 per cent to make available an additional Rs 18, 000 crores for borrowings. While 0.5 per cent of the extra borrowing window will be available to all States unconditionally, 1per cent will be made available in four equal tranches with each to clearly "specified, measurable and feasible reform actions." The balance 0.5 per cent can be accessed if milestones are completely achieved in at least three out of four reform areas. The four reforms areas are universalisation of "One Nation One Ration Card," ease of doing business, power distribution, and augmentation of urban local body revenues.

In the Union Budget 2021-22, States have been granted additional borrowing room of up to 4 per cent of Gross State Domestic Product (GSDP) for 2021-22, with an additional 0.5 per cent limit for those undertaking critical power sector reforms. States are expected to reach a fiscal deficit of 3 per cent of GSDP by 2023-24 as recommended by the 15th Finance Commission which will constrain the fiscal space available to the State.

Impact of Covid-19 pandemic and lockdown

The quick assessment report by the State Planning Board on the impact of Covid-19 and lockdown on Kerala economy had predicted the first quarter Gross Value Added (GVA) of 2020-21 to shrink to around 26 per cent of 2019-20 first quarter GVA. The loss in GVA in the second quarter of 2020-21 compared to the same quarter of the previous year is estimated to be 18.5 per cent. The economic crisis associated with the Covid-19 pandemic is unprecedented.

The Government took measures to channelise the scarce resources at its disposal to address the most important needs of the economy through the Rs 20,000 crore economic package. This has severely curtailed the public finances of the State owing to a surge in revenue expenditure necessitated by the pandemic. The Gulati Institute of Finance and Taxation (GIFT) report "Economic and Fiscal Shock of Covid-19 on Kerala" predicted that the shortfall in revenue receipts of the State in 2020-21 is likely to be around Rs 33,456 crores. Such a steep fall in the revenue receipts will adversely affect the plan and non-plan expenditures of the State.

Issues in generation of States' own revenue

The decline in the growth of major own tax revenue sources namely sales tax and VAT, State excise duties and motor vehicle tax, stamps and registration fees and motor vehicle tax over the years is a major fiscal challenge for Kerala. The own revenue mobilisation has remained below expected-levels in the State. Regarding non-tax revenue mobilisation, the major concerns facing Kerala are negligible contribution by way of dividends and profits from State public sector enterprises and consistently falling contribution from economic and social services.

By 2024-25, Kerala is expected to face three important issues: The tapering of revenue grants to zero, expiration of GST Compensation Cess and adherence to the fiscal deficit target of 3 per cent of GSDP. Hence, the State cannot afford any slippage in own-revenue mobilisation. Efforts to strengthen own resource generation must be accorded high priority in the fiscal sphere.

Quality of fiscal deficit

Though Kerala's gross fiscal deficit is not too high compared with other States in India, the quality of the fiscal deficit is a matter of concern. The revenue deficit to fiscal deficit ratio was 69.26 per cent according to the revised estimates of 2020-21. This indicates that a large portion of the fiscal deficit is channelised to fund committed revenue expenditures in the economy. The silver lining amidst the fiscal deficit conundrum is the consistent increase in capital outlay as per cent of capital expenditure from 55.14 per cent in 2010-11 to 84.90 per cent in 2020- 21 (RE).

Fifteenth Finance Commission

Finance Commission under Article 280 is a significant constitutional body which helps in rectifying the fiscal imbalances within the Indian quasi federal structure. However, even in the recommendations of the 15th Finance Commission, the worsening vertical fiscal imbalances remain unaddressed. Table 21.15 shows the criteria used by the 13th, 14th, and 15th Commissions to determine each State's share in Central taxes, and the weight assigned to each criterion.

Table 21.15 *Criteria for horizontal devolution of tax resources by Centre to States in the 13th, 14th, and 15th Finance Commission Reports* in per cent

Criteria	13th FC 2010-15	14th FC 2015-20	15th FC 2020-26
Population (1971)	25	17.5	-
Population (2011)	-	10	15
Income distance	47.5	50	45
Area	10	15	15
Forest cover	-	7.5	-
Forest and ecology	-	-	10
Demographic performance		-	12.5
Tax and fiscal effort	-	-	2.5
Fiscal discipline	17.5	-	-
Total	100	100	100

Source: 15th Finance Commission Report

The share of States in the Centre's taxes as per the vertical devolution recommended by 13th Finance Commission was 32 per cent for the five year period 2010-15. The 14th Finance Commission raised tax devolution from 32 per cent to 42 per cent of divisible pool for the period 2015-20. The 15th Finance Commission has recommended tax devolution of 41per cent for 2020-21. Population is one of the key criteria that have been used to determine how the funds are horizontally distributed amongst States. However, unlike the previous Commissions, the 15th FC has decided to use the 2011 Census as against the 1971 Census that was used by the previous nine Commissions for their calculations.

Based on the 1971 Census, Kerala has 3.93 per cent of country's population. Under 2011 census, the State has 2.80 per cent of India's population. Using the latest Census would penalise States such as Kerala for effective population control measures. In order, to offset the concerns of States with demographic achievements, the 15th FC has added a new determinant, demographic performance, assigning it a weight of 12.5 per cent. While calculating demographic performance, the formula takes the inverse of the fertility rate and multiplies this with the 1971 population thereby favouring the States with large population. Tax effort is introduced for the first time. Though it is a commendable variable, Kerala has no advantage as many of our sectors are in informal sector.

Income distance has been computed by taking the distance of each State from the State having highest per capita GSDP. In this case, Goa has the highest per capita GSDP followed by Sikkim. Since they are small and outlier States, the State with the third highest per capita GSDP, Haryana, has been taken as the benchmark to avoid distortions. Such distance has been scaled by the population (Census 2011) of each State and then the share of each State has been computed. However, scaling by the Census 2011 population leads to considerable erosion of the due share in the divisible pool.

The pattern of devolution of taxes shows centralisation of fiscal powers in the hands of Union Government and rejecting fiscal autonomy and independence of States guaranteed by the constitution.

KIIFB Model for Social and Infrastructure Development

The Kerala Infrastructure Investment Finance Board (KIIFB) is a statutory body constituted under the Kerala Infrastructure Investment Fund Act, 1999. In the new scenario wherein fiscal powers of the States have been severely curtailed with the FRBM Act, KIIFB is a financial innovation to raise funds for the need of State. Comprehensive modification of the Act and Scheme has been made through an amendment Ordinance in August 2016.

KIIFB has been restructured to act as the key Special Purpose Vehicle (SPV) for mobilising and channeling funds to various infrastructure projects. With new strategy and structure, KIIFB aims to dynamically mobilise funds for infrastructure development of Kerala. KIIFB draws on some major sources of Government revenue such as Motor Vehicle Tax (MVT) and Petroleum Cess. The issuance of masala bonds in London Stock Exchange market made it the first State Government-run arm to raise capital through a bond sale done outside India but denominated in Indian rupees. KIIFB has sanctioned many hallmark projects such as KFON, Transgrid 2.0, Coastal and Hill Highways which will have significant multiplier effects on the Kerala economy.

Policies for Overcoming Fiscal Constraints and Generating Growth

Strengthening the essence of fiscal federalism

1. In accordance with the true spirit of constitutional fiscal federalism, the share of the States in the Central divisible pool may be increased from 42 to 50 per cent.
2. Democratisation of the GST Council by giving States more voting powers in decision making and removing the effective veto enjoyed by the Centre in the GST Council.
3. Union Finance Commission may estimate the actual loss incurred by the State due to the implementation of GST and recommend appropriate compensation.
4. The criteria for horizontal devolution of taxes should treat population as a scientific indicator taking into account the demographic variations within each State.
5. The practice of shifting the financial burden of CSS to the States should be stopped.
6. Local governments should be given freedom to fix priority in spending the devolved funds. The funds may be used for improving the delivery of public services, infrastructure development, plans for local-level development, and strengthening administrative machinery.
7. Deficit targets and borrowing limit should be based on past trends and assessing the growth in fiscal requirement of the State.
8. Adequate freedom should be given to State Government to mobilise funds including borrowing from outside the budget for development purposes while ensuring legislative accountability for the same.

Revenue maximisation

1. To finance meaningful programmes which contribute to capital formation in the State, the Government should free up resources through a combination of cut in expenditure and expanding the revenue base.
2. Reduction in tax evasion through a broad base, low rates, limited exemptions, easy compliance and effective use of big data and technology.

3. Tapping of hitherto unexplored tax sources namely urban immovable property tax, entertainment tax and taxes and duties on electricity. It is necessary to create a database for new tax and non-tax sources with good revenue potential so that they can be adequately tapped.
4. Strengthen own tax revenue mobilisation in Kerala by improving the growth of major own tax revenue sources. For instance, e-stamping facility followed in many States such as Tamil Nadu and Karnataka can be introduced to prevent malpractices in land registrations.
5. Considering that revenue from the sale of State lotteries constitute a significant portion of Kerala's own non-tax revenue, enhancing the revenue from lottery may be explored.
6. Review, streamline and digitise the current tax administration with the goal of increasing efficiency, simplifying compliance and creating predictability and consistency in tax regime.
7. Revitalisation of PSUs would add substantial non-tax revenue in the form of dividends and profits.

Expenditure rationalisation

1. Efforts should be made to increase the share of capital expenditure within the budgetary allocations including in the social sector.
2. Within capital expenditure, focus must be on projects where social benefits exceed their economic costs. A well-defined scientific formula by accommodating the net present values of the cash flows must be devised for capital expenditure projects.
3. Timely and periodic monitoring of social welfare programmes by employing modern technology equivalent to the system of Public Financial Management System implemented by the Union Government.

Generating economic growth

1. Identify core sectors of growth potential in Kerala economy such as tourism, food processing, IT, pharmaceuticals, and research and development. Create micro-level regional supply and value chains to generate multiplier effects and employment opportunities.
2. Promote climate resilient infrastructure which can sustain critical economic activities to withstand the adverse effects of extreme weather events such as cyclones, floods, landslides amongst others.
3. Fiscal incentives to improve the ease of doing business.
4. Public Private Partnership model to be adopted in large scale infrastructure projects, where appropriate.
5. State Export Policy to be formulated with specific emphasis on improving the export infrastructure and diversification of goods and services. Sectors such as agriculture, food processing, and pharmaceuticals may be accorded priority status.
6. Tap the large market for arts and sports in Kerala. Incentivise organisation of mega sporting events and cultural events which would lead to generation of economic activity and tourist inflow which in turn will generate tax and non-tax revenues for the State.

Way Forward

Kerala's efforts at improving its finances through the fiscal consolidation path has been jolted by a series of policy setbacks beyond the control of State Government such as demonetisation, non-revenue neutral rate apportionment and implementation problems in GST. Besides, the Ockhi cyclone and the consecutive floods experienced in 2018 and 2019 not only devastated the revenue potential but inflicted heavy expenditure burden on State exchequer. The Covid-19 crisis aggravated the resource constraints of the State. The State has to incur huge expenditure to deal with the crisis and provide support to the people affected by the pandemic.

The relaxation in borrowing limits by increasing net borrowing limit for State Governments has offered a much-needed breathing space for extra-mobilisation of funds for the State. However, the conditions attached by Centre for availing the extra borrowings have invited criticism from States for violating the spirit of cooperative federalism. Cooperative federalism would be meaningful only when adequate fiscal support is forthcoming in times of distress.

Despite facing fiscal constraints, the State Government made every effort to stimulate development and address the needs of the people.

Chapter 22
Some Major Integrated Programmes

The LIFE Mission

The LIFE Mission is one of the components of the "Nava Kerala Mission," the Government of Kerala's flagship programme introduced in 2016 to build a new Kerala. The LIFE (Livelihood, Inclusion, and Financial Empowerment) Mission aims to provide secure housing and livelihoods by constructing houses for homeless and landless people in the State.

LIFE is a time-bound programme (2016-2021). It seeks to address the housing issue and to improve the quality of life of people in the State. In addition to housing, LIFE Mission also aims at financial empowerment and the provision of livelihood opportunities to the beneficiaries. The Mission seeks to do so by not only providing homes and allied facilities such as anganawadis, palliative care facilities, old age care, and health care but also by raising the standard of living through skill-building, job-based training, employment, and livelihood interventions.

The scheme provides financial assistance of Rs 4 lakh per beneficiary for the construction of a house. This financial assistance is made up of contributions from the State Plan and the local government Plan.

The Mission is being implemented in three phases.

1. In the first phase, the Mission addressed the issue of incomplete houses, whose construction was started under various housing schemes after 2000 but were not completed.
2. The second phase of the Mission provided financial assistance for constructing houses for people who had land but no houses.
3. The third phase of the Mission provides houses for persons who owned neither a house nor land.

Estimation of Beneficiaries

In 2017, LIFE Mission conducted a survey with the support of Kudumbasree to identify the number of persons to be covered. The total homeless households in the State are 5.12 lakh, which includes 1.84 lakh having their own land and 3.28 lakh having no land.

Progress of Mission

Between 2016 and 2021 (up to February 17, 2021) 2,52,025 houses were completed under different schemes included in the LIFE Mission. In the first two years, that is, between 2016-17 and 2017-18, the housing schemes of Departments such as Scheduled Caste, Scheduled Tribe, and Fisheries were implemented by the respective Departments. From 2018-19 onwards, these schemes were merged with LIFE.

Under Phase I, 54,115 unfinished houses were identified, of which 52,620 houses were completed by February 2021. Under Phase II (that of providing houses to houseless persons with land), 1,72,362 beneficiaries were identified and of this 1,02,485 beneficiaries were found eligible. Of these, houses for 87,630 beneficiaries have been completed. The remaining construction work is under progress. Phase III of the Mission emphasises building apartment housing complexes for beneficiaries who are both landless and homeless. In the category of landless homeless beneficiaries, 1,35,769 were identified by the Mission. Of them, 3547 beneficiaries have been provided housing facility as on February 17, 2021. The progress of work of the second and third phases of the Mission was affected by the Covid-19 pandemic.

As a pilot project, Bhavanam Foundation constructed a housing complex at Adimali gram panchayat in Idukki District. This complex was taken up by the LIFE Mission at a cost of Rs 24.82 crore. It is a seven-storey building and has 217 independent apartments, of which 163 are already occupied. Each apartment is of 460 square feet and has common facilities such as lift, washing area, compost plant, health sub-centre, Kudumbasree counselling centre, youth club, gender club, and crèche. The beneficiaries will be provided with various livelihood training programmes.

Under the Care Home project, the Cooperative Department has taken the initiative to construct another 14 apartment complexes across the State. Moreover, the LIFE Mission has identified another 56 locations in the State for construction of apartment complexes.

The total number of houses completed under LIFE Mission up to February 17, 2021 is given in Table 22.1 and expenditure details are given in Table 22.2.

Through the LIFE Mission, the Government sought to provide decent housing facilities to all houseless people in the State. Even though many housing schemes have been implemented in the past, they have not comprehensively addressed the needs of the houseless as has been done by LIFE Mission. By adopting a convergence approach, and by completing incomplete houses sanctioned in the past, LIFE Mission has made considerable progress in providing housing to the people in the State and in improving the quality of life of people in the State.

Subhiksha Keralam

In the early stages of the pandemic, when food supplies

Table 22.1 *Houses completed under LIFE Mission, 2016-17 to 2020-2021* in numbers

District	Phase 1	Phase 2	Phase 3	PMAY (U)	PMAY (R)	SC Dept.	ST Dept.	Fisheries Dept.	Total
Thiruvananthapuram	6,049	14,044	119	10,148	3,010	3,075	2	1,455	37,902
Kollam	3,617	7,893	222	5,130	1,410	1,629	3	770	20,674
Pathanamthitta	1,176	1,877	158	1,260	744	863	544	10	6,632
Alappuzha	2,728	8,927	74	3,864	737	793	10	548	17,681
Kottayam	1,102	4,075	270	1,862	604	1,047	13	78	9,051
Idukki	3,129	9,407	795	1,690	761	1,227	114	15	17,138
Ernakulam	1,059	5,393	173	8,190	781	947	9	314	16,866
Thrissur	2,997	4,778	452	6,386	1,557	1,824	22	117	18,133
Palakkad	7,604	11,613	338	5,062	1,953	2,263	115	13	28,961
Malappuram	2,727	5,856	341	8,129	2,401	2,553	29	481	22,517
Kozhikode	6,477	4,707	172	4,824	1,128	1,293	12	311	18,924
Wayanad	8,440	3,443	154	2,362	924	1,073	918	-	17,314
Kannur	2,644	2,344	154	3,988	694	777	279	197	11,077
Kasaragod	2,871	3,273	125	1,585	573	623	25	80	9,155
Total	52,620	87,630	3,547	64,480	17,277	19,987	2,095	4,389	2,52,025

Note: Data as on February 17, 2021
Source: LIFE Mission

Table 22.2 *Expenditure under LIFE Mission, 2016 to 2020-21* in Rs crore

Phase		Source of fund	Amount
First Phase		State share	105.00
		LSGI share/Department	577.12
		Total	682.12
Second Phase		HUDCO Loan	1,651.10
		LSGI share	1,439.47
		State share	761.20
		Total	3,851.77
		HUDCO Share	248.90
	Individual	State share	30.80
Third Phase		LSGI share	254.03
	Towers	State Share	49.96
		Total	583.69
		Grand Total	5,117.58

Note: Data as on February 17, 2021
Source: LIFE Mission.

to the State were affected, the State Government began the *Subhiksha Keralam* programme focusing on increasing food production by enhancing the area under cultivation and introducing new innovative technologies. The broad objectives of the programme are to attain self-reliance in food production, enhancing the incomes of farmers, employment generation, attracting youth and repatriates to agriculture, strengthening the animal resources and fisheries sectors, and promoting organic farming for safe to eat food. Fallow land cultivation, homestead cultivation, crop improvement activities for the existing cultivation, improved market facilities, interventions in post-harvest management and long term interventions are among the activities

included under *Subhiksha Keralam*. Food crops such as paddy, banana, vegetables, tubers, pulses, and millets are the crops targeted under the programme. Food security through increased production of milk, egg, broiler chicken, buffalo, pig, goat, and fish are also envisaged. Departments of Agriculture Development and Farmers Welfare, Local Self Government, Animal Husbandry, Co-operation, and Irrigation and Kerala Agricultural University are the departments and agencies involved in the programme.

The programmes in animal resources sector include livelihood support packages and projects such as Govardhini, the rural backyard goat development scheme under National Livestock Mission, commercial goat raising, goat satellite units, and fattening male calves. The induction of milch animals and heifers, fodder cultivation, milk incentive, subsidised cattle feed bags, cattle shed construction/renovation, farm mechanisation, insurance, and revolving fund are the programmes under dairy development.

Fish farms in *paduthakulams*, public water bodies, one-paddy-one-fish project in Kuttanad and kole lands, and biofloc fish farming are activities undertaken for increased fish production in the State under *Subhiksha Keralam*. In 2020-21, 2,041 biofloc units, 4259 *paduthakulam* units, 274 cage farming units, and 13,671 ha coverage under one-paddy-one-fish was achieved.

Under the *Subhiksha Keralam* project, fallow land cultivation of paddy, vegetables, fruits, tubers, pulses and millets has been completed in 19,711.89 ha and rain shelters have been established in a total area of 1,19,752 sq m. Integrated farming systems were established in 14,000 units and employment provided for 3684 non-resident Keralites and 7658 youth.

A Special Package for Post Flood Kuttanad

A package for the comprehensive development of Kuttanad region (Kuttanad Package II) was announced by the Chief Minister of Kerala on September 17, 2020. The package consists of various measures to be implemented through inter-departmental coordination. The package is to be implemented through State Plan, including the Rebuild Kerala Initiative, and Kerala Infrastructure Investment Fund Board. A holistic approach for the development of the Kuttanad regions was particularly necessary after the floods of 2018 and 2019. The report prepared by State Planning Board has covered various development issues concerned with the well-being and livelihood of the people of Kuttanad.

Water management of Kuttanad region is a core area of concern. The report focuses on innovative as well as conventional approaches that need to be adopted for improved water management practices in the region.

Hierarchical classification of water systems

1. Primary system comprising of the lower reaches of five rivers flowing to Kuttanad.
2. Secondary system with heavily entangled system of larger canals in the region.
3. Tertiary system with small and very small canals immediately adjacent to *padasekharams.*

Technique of compartmentalisation

By implementing compartmentalisation (dividing larger areas into smaller ones), the surface area vulnerable to flooding gets reduced, and it helps in reducing the flood damages.

Concept of "Room for River"

1. Room for Vembanad and Room for Pamba.
2. Allow maximum space for the natural flow of water so that higher water-levels could be effectively managed while flooding.
3. Preserving the existing surface area of Vembanad lake, the shrinkage of the lake being a reason for the acuteness of Kuttanad floods.

Provision of free flow of water by unblocking the water ways

1. Construction of strong outer bunds to *padasekharams*.
2. Declogging/desilting drainage channels/canals.
3. Scientific construction of bridges and approach roads.

Improving the efficiency of Thottappally spillway by

1. Widening the leading channel.
2. Preventing the formation of sand bar near sea that obstructs the flow of flood water through the sea mouth.

Completion of AC canal

1. Phase 2 (Onnamkara to Nedumudy)
2. Phase 3 (Nedumudy to Pallathuruthy)

Major Recommendations

Sector: Industry.

1. Establish an Integrated Rice Park in Alappuzha.

Sector: Power.

1. KSEB Sub station in Kuttanad.

Sector: Drinking water.

1. Enhance the capacity of Neerattupuram Water Treatment Plant to meet the needs of Kuttanad.

Sector: Sanitation.

1. Establishment of Septage Treatment Plant (STP) for improving sanitation in the region.

2. Expansion of CANALPY project to clean and reclaim the canals with suitable technological and social interventions.

Sector: Tourism.

1. Scaling up the activities of Responsible Tourism Mission with special focus on scientific waste management.
2. Preservation of Pathiramanal Islands to protect and promote the natural habitat.

Sector: Fisheries.

1. Adoption of Integrated Farming – integration of fisheries with agriculture/animal husbandry.
2. Setting up seed production centre and hatchery unit.
3. Provide credit facilities to women SHGs to improve the livelihood of fisher folk.

Sector: Animal husbandry.

1. Establishment of Duck Production and Research Centre by Kerala Veterinary and Animal Sciences University.
2. Construction of elevated cattle sheds to combat flood damages.

Sector: Agriculture.

1. Kuttanad to be declared as a Special Agricultural Zone thereby converging the services on agriculture, soil and plant health, pricing, market linkages, storage, and value addition.
2. Reformation of Registered Seed Growers Programme by ensuring production and timely supply of quality seeds.
3. Setting up a seed testing laboratory to monitor seed quality.
4. Soil Health Management – Creation of a data bank on soil analysis and application of nutrients based on soil test.
5. Adoption of Integrated Farming System approach for Sugarcane cultivation in Upper Kuttanad.
6. Sustain and strengthen the Pokkali rice cultivation and Koottumundakan system to conserve the ecological balance.
7. Dewatering in *padasekharams* require the replacement of petty and para systems and old motor pumps with low head, high discharge vertical axial flow propeller pump sets run by electric motors.

Sector: Water resources.

1. "Room for River" in Kuttanad (Phase I) to ensure the natural flow of water.
2. Adopting the technique of "Compartmentalisation" in the outer bund construction of *padasekharams* in Kuttanad area.
3. Improving the efficiency of Thottappally spillway to its designed capacity by deepening and widening the leading channel (Veeyapuram to Thottappally).
4. Completion of (Phase 2 and 3) of AC canal to its original width of 40 m.
5. Under the concept of "Room for Pamba" – construct three flood regulators at Kutiyathode, Cheruthana and Kunnumma.
6. Cleaning the water ways of Kuttanad (700 km).

Kasaragod Development Package

The projects mentioned in the Kasaragod Development Package began in 2013-14. An amount of Rs 623.63 crore was allocated in the State Budget for the implementation of Kasaragod Development Package up to 2020-21.

The major projects undertaken in the agriculture and allied sectors concern irrigation and water conservation. The total value of the projects for the sector is Rs 71.58 crore. In the education sector, infrastructure development in schools and colleges was given prime importance, with sectoral allocation of Rs 47.90 crore. In the health sector, projects such as the construction of the Kasaragod Medical College and related infrastructure development, and the upgradation of Primary Health Centres (PHC) and Community Health Centres (CHC) to Aardram standards are being implemented. The total outlay is Rs 99.44.crore.

Wayanad Package

The comprehensive development programme for Wayanad District envisaged to span 5 years focuses on crop development, tourism, poverty alleviation, the development of infrastructure and road networks, health facilities, and the "carbon-neutral" Wayanad project. The major thrust areas in agriculture are: the rejuvenation and development of pepper, tea, and coffee cultivation, branding Wayanad coffee, online marketing of agricultural products under a Wayanad organics brand, developing value-addition in jackfruit, and establishing a floriculture zone in the district. Strengthening of animal husbandry activities and expansion of Pookode Veterinary University are the major programmes in animal husbandry sector.

The other developmental activities covered by the package include upgrading the Mananthavadi district hospital to a Medical College, issues of human-wildlife interface, completing the Karapuzha Irrigation Project, watershed-based development activity, and soil and water conservation.

Idukki Package

Over the last two decades, the agrarian crisis, lack of alternative employment, and environmental issues have constrained the development of Idukki District. The

Table 22.3 *Financial progress of Kasaragod Development Package as on September 30, 2020* in Rs lakh

Financial Year	Budgeted Outlay	Administrative sanction amount	Expenditure
2013-14	2,500.00	2,790.67	2,309.55
2014-15	7,500.00	9,332.94	5,167.40
2015-16	8,500.00	9,751.49	4,676.00
2016-17	8,798.00	14,299.84	5,123.96
2017-18	9,000.00	7,629.72	2,053.07
2018-19	9,500.00	7,882.00	275.27
2019-20	9,065.00	8,958.70	2,102.91
2020-21	7,500.00	2,005.58	3,373.95
Total	62,363.00	62,650.94	25,082.11

Table 22.4 *Physical progress of Kasaragod Development Package as on September 30, 2020* in number

Financial Year	Project Sanctioned	Project Completed	Ongoing Projects
2013-14	28	28	0
2014-15	25	20	5
2015-16	80	70	10
2016-17	81	65	16
2017-18	64	40	24
2018-19	82	12	70
2019-20	50	1	49
2020-21	36	1	35
Total	446	238	208

Idukki development package envisages development programmes worth Rs 12,000 crore over next five years in the district. The main areas covered by the package are agriculture, animal husbandry, value-added processing industries, tourism, infrastructural facilities, poverty alleviation, and environmental protection.

Programmes in agriculture sector include fruit development, permanent storage facilities for cool season vegetables in Vattavada, Kanthalloor, and Marayoor, the establishment of mobile agro-clinics and pesticide residue testing labs and organic manure production units. The package will also support the establishment of farmer-producer companies for production, processing, branding, and marketing coffee and cocoa. It will support agri-based start-ups and small scale enterprises, the establishment of a mega food park, and cold storage facilities.

In Idukki, spice development programmes have been planned with particular emphasis on the rejuvenation and expansion of pepper gardens, promotion of spices such as nutmeg, ginger, turmeric, clove, and cinnamon, the construction of a Spices Park in Muttam, branding Idukki spices, and establishing supply chains to reach national and international market. Also planned are the establishment of a pesticide residue analysis lab and bio-input analysis lab for quality control of spices and bio-inputs.

Welfare schemes for plantation workers of the district include housing and drinking water project. The package includes cattle farming and dairy projects. Programmes for the development of fisheries sector in the district include homestead fish farming, biofloc fish farming, farming in natural ponds, and reservoir fish farming.

In the tourism sector, the resumption of the heritage train service, promotion of farm tourism, ayurveda tourism, hydel tourism, responsible tourism, and the development of tourism clusters and circuits with the objective of enhancing the revenue potential are the major thrust areas.

Other highlights of the package include the re-construction of the Pattiserry dam, the enhancement of basic infrastructure facilities in Government colleges, and the completion of the Idukki Medical College. The power generation system in the district will be strengthened through the establishment of new substations at Murukkasserri, Kumaly, Munnar, Marayoor, and through wind and solar energy sources. Programmes to alleviate human-animal conflict and tribal development programmes are also envisaged.

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