



**TRADABLE/
COMMERCIALY
POTENTIAL BIORESOURCES
OF KERALA AND
ECONOMIC VALUATION**





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Kerala State Biodiversity Board
Kailasam, T.C. 24 / 3219,
No. 43, Belhaven Gardens,
Kowdiar P.O., Thiruvananthapuram - 695 003



TRADABLE/ COMMERCIALLY POTENTIAL BIORESOURCES OF KERALA AND ECONOMIC VALUATION-(VOL 1)

Dr Prakash Nelliya, Subject expert, KSBB
Dr Preetha N, Senior Research Officer, KSBB

Editorial team

Dr George C. Thomas, Chairman, KSBB
Dr Satheeshkumar K, Board member, KSBB
Dr Swapna TS, Board member, KSBB
Dr K T Chandramohan, Board member KSBB
Shri Govindan KV, Board member, KSBB
Dr Santhoshkumar A V, Member Secretary, KSBB

Graphs: Ms Ajmi UR
Assisted by : Mr Aswin Surendran

Project

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Dr George C Thomas
Chairman



Executive Summary

Biodiversity is the natural capital base for a sustainable economy. A rich biodiversity can provide multiple bio-resources, which are extensively extracted by human beings all over the world and used for divergent purposes. Bioresources based industries are using genetic/biological resources (plants, animals, microorganisms and genetic materials) from the forests, agricultural land, wetlands and marine ecosystems, as inputs or raw-materials and manufacturing different consumer products. Bio-resources are the base for several industries (such as pharmaceuticals, agro-processing, textiles, fisheries, cosmetics, bio-technology etc.) contributing to the global economy and human welfare. Broadly, the global food and health securities depend on biodiversity. Further biodiversity or bio-resources is the source of employment and livelihood for millions of poor in developing countries like India. In this context, the conservation of biodiversity and the sustainable use and trade of biodiversity-derived products and services can provide countries valuable opportunities for economic development and improvement of livelihoods.

For effective implementation of the Access and Benefit Sharing (ABS) provisions of the Convention on Biological Diversity (CBD) each nation or the state requires a comprehensive understanding on their biological resources in their jurisdiction as well as its trade and commercial utilization. As a party in the CBD, India's initiatives in fulfilling its objectives (a) the conservation of biological diversity, (b) the sustainable use of its components and, (c) the fair and equitable sharing of benefits arising from the utilisation of genetic resources were appreciable. India ratified the Nagoya Protocol on Access and Benefit Sharing (ABS) on 12th October 2014, and implemented the protocol's provisions through well assigned legal and decentralized institutional measures.

India enacted the Biological Diversity Act in 2002 and notified the Rules (Biological Diversity Rules) in 2004 to give effect to the provisions of the Convention including those relating to ABS. For the implementation of various provisions of the BD Act, several notifications have been issued so far. The Guidelines on the Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations (2014) is a landmark, which prescribe the scheme of processing the applications, along with templates and terms for benefit sharing. The Biological Diversity Act is implemented through a three-tier institutional mechanism: The National Biodiversity Authority (NBA) at the national level; State Biodiversity Boards (SBBs) at the provincial (State Government) level; and the Biodiversity Management Committees (BMCs) to be set up by the elected bodies at the local level. While all the state Governments (28) have set up SBBs, setting up of BMCs is an ongoing process. So far, 2,76,690 BMCs have been constituted by the local bodies in the country (NBA, 2022).

Kerala State Biodiversity Board (KSBB) is an autonomous body of the State Government and falls under the provision of the Biological Diversity Act 2002, Rules 2004 and Kerala State Biological Diversity Rules 2008. KSBB is dedicated to conservation and sustainable utilisation of the rich bio resources of the State and fair and equitable sharing of benefits arising out of its commercial utilization. Even though the state registered significant progress in implementing its mandate especially the provisions of the Biological Diversity Act, the ABS agreements signed is limited. In this regard the ongoing project on "Database of tradable or commercially potential bio-resources and their economic valuation in Kerala", through the "Rebuild Kerala Initiative" is significant. Through this project, we came up with a comprehensive list of tradable bio-resources (plants, animals, micro-organisms etc.) of Kerala from its different biodiversity rich and fragile ecosystems such as: forests, agriculture, coastal and marine, and freshwater. Further we also attempted to explore the volume of extraction (quantity) of resources, market value (at its collection stage), trade potential and nature of trade, commercial utilization, products manufactured, export etc.



Estimation of the economic value as well as the examination of value addition of bio-resources will help in determining and realizing realistic estimates of benefits derivable from the accessed resources. Sectors such as: pharmaceutical, biotechnology, seed, crop protection, horticulture, cosmetic and personal care, fragrance and flavor, food and beverage industries etc. access resources and undertake research and develop commercial products from bio/genetic resources. Each of these sectors has different needs and access bio-resources in different ways and each sector has different profit margins.

The conceptual framework on the policy aspect of this project is structured in BioTrade initiative developed by the UNCTAD. The BioTrade emphasis on the collection, production, transformation and commercialization of goods and services derived from biodiversity in environmentally, socially and economically sustainable ways. No doubt that the current attempt on tradable bio-resources documentation and its economic valuation is strongly associated with the BioTrade concept, which contribute to reducing direct pressures on biodiversity and ecosystem services as well as to maintaining and improving human well-being. ABS and BioTrade will mutually benefit one another by promoting sustainable sourcing and use of local biological resources for trade at one end, and fair and equitable sharing of benefits to the communities and conservation of local biological diversity at the other end. The report presents a detailed analysis of biodiversity goods production statistics, overall market scenario and revenue of different sectors as agriculture, forest, marine and coastal, animal husbandry etc., export scenario, ABS potential and value chain with value addition at each stage of marketing and manufacturing of selected bio-resources. Further we emphasised on various constraints and opportunities in documentation of Tradable bio-resources and its economic valuation as well as key emerging policy issues.

A major predicament in implementing ABS at state level is the lack of traceability of collection source and the project aims to address this gap. Documentation of tradable bio-resources in a State is baseline information, which has multiple uses. It helps to understand the demand and supply scenario of each species /resources and promote sustainable consumption. Further, since bio-resources are renewable natural resources considering their increasing demand and trade, effective conservation measures can be designed based on solid knowledge base of BioTrade, even in a legally bound manner. This exercise (documentation) also will be beneficial to multiple stakeholders including: the providers (collectors and cultivators), of bio-resources, different types of traders involved in their business, wholesalers, industries that use bio-resources as raw-materials, and the government departments which are responsible in designing strategies on biodiversity conservation. Further, the documentation of tradable bio-resources is extremely useful for the enforcement agencies (NBA, SBBs, and Biodiversity Management Committees - BMCs) for implementing the Access and Benefit Sharing (ABS) principles prescribed under the BD Act.

This study has been conducted by taking into account the bio-resource value both at the ecosystem stage from which it is extracted and at the commercial stage where value addition and manufacturing is done. Bioresources, such as timber and non-timber forest products, fishes, agriculture produce and livestock produce were considered for valuation. Tourism from natural ecosystems was also considered as a recreational use value. At the value addition stage, bio-resource based MSMEs and large factories (full and partial) were both considered for estimating their value. Hence, it is apparent that only the bio-resources which have a certain value for tradability have been included in the study. Additionally, the export and import of bio-resources and bio-resources -based products were also evaluated to understand the extent of importance of these resources in external trade. The report also emphasized the need of a value chain (with value addition) of bioresources and a tentative estimation of the ABS in the State. The methodology followed included primary data collection through questionnaire surveys as well as secondary data analysis from various institutional and academic sources.

Timber is one of the predominant resources extracted from the forests and its value is huge. Kerala's timber (especially teak, irul, maruthu, vaka, venga, anjily, rosewood, mahagony, kambakam, thembavu,



venteak, jack, myla, unnam/chadachi, thanni, karimthakara, poovam, and kanjiram) has good market and huge quantity is supplied annually. In 2020-21, Rs 216.8 crore was collected towards revenue from the sale of timber alone which accounted for 91.6 per cent of the total forest revenue. The Marayoor sandalwood has a high demand even in international markets. Most of the Sandalwood is used to extract essential oils and other extracts used in perfumes, soaps, toiletries, as well as pharmaceutical products. It can also be observed that most of the highly valued sandalwood sourced from Marayoor in Kerala was bid for and bought by industries outside Kerala, showing an abysmal dearth of value-adding industries in Kerala. This signifies a huge potential for setting up of essential oil, perfume and pharmaceutical industries based on sandalwood in Kerala which can provide employment and contribute to the GDP. The prominent miscellaneous species of industrial wood other than teak include Mahogany (*Swietenia mahogaani*), Rosewood (*Dalbergia latifolia*), Maruthuu (*Terminalia arjuna*), Chadachi (*Grewia tiliaefolia*), Venteak (*Lagerstroemia microcarpa*), Venga (*Pterocarpus marsupium*), Anjili (*Artocarpus hirsutus*). Generally, the ABS potential of timber is significant and KSBB need to really absorb its possibilities. In the case of NBA, out of the total ABS amount collected so far, around 95% has been obtained from red sanders.

Table 1: Total Quantity and value of different bioresources of Kerala

Ecosystems / Sectors	Bioresources	Mode of Estimation	Quantity (M³/Kg)	Value (Rs. Crore)
Forest	Timber (27 Timber Depots)	Cumulative Annual Average (2015-2020)	26422.07 (M ³)	153.95
	Timber (KFDC)	Cumulative Annual Average: (2015-16 to 2019-20)	9684.30 (M ³)	5.90
	Timber (Marayoor Sandalwood)	Cumulative Annual Average (2015-2020)	72,991 (Kg)	49.75
	NTPF	Cumulative Average (2015-19)	826573.9 (Kg)	4.23
	Forest (Total)			
Land outside Forest	Timber (outside forest)	Annual total (2014-15)	22,56,219 (M ³)	1,981.34
Marine	Fish	Cumulative Average (2015-19)	518783 MT	8,316.66
Inland	Fish	Cumulative average (2015-19)	197086.2MT	3,840.71
Agriculture	crops	2018-19	5213126.3 MT	23,614.07
Livestock	Milk	Annual total (1919-20&2017-18)	24560.38 (Lakh Ltrs)	12,479.05
	Egg	Annual total (1919-20&2017-18)	218.00 (Crore Nos.)	1,309.50
	Meat	Annual total (1919-20&2017-18)	4690 (Lakh Kg.)	15,128.16
	Livestock (Total)			
GRAND TOTAL				66,883.11

Although the share of NWFP is very low in comparison to timber in terms of volume and value, providing support for converting the NWFP collected into semi processed value added products will generate additional income and employment to the local tribal communities. Ten most heavily collected species of NWFPs during the period 2015 to 2019 are cheenikka, choolpullu, kasthurimanjal, kurumthotti, vanthen, chunda, karimkuri, kalpasam, moovila and cheruvazhuthana. Kurumthotti (*Sida cordifolia*). Honey being one of the high value species support for stingless bee cultivation in forest fringe areas can be promoted. Other innovative livelihood generating programs need to be implemented utilizing the fund generated through ABS.

Compared to the annual quantity of timber auctioned from the forest area by KFD (26,422.07 m³) and from plantations by KFDC (9684.30 m³), the annual quantity of timber sourced from TOF was a mammoth total of 22,56,219.00 m³. The value of timber sourced from TOF was also comparatively very high compared to timber from other sources, necessitating further studies in this area.

Fish is one of the common and major bio-resources from the marine and fresh water ecosystems in Kerala. Apart from the domestic use, both the inland and marine fisheries resources from Kerala are substantially going to other States in India as well as exporting to different countries. Marine sector is a major source of revenue to the state and the marine landings during 2019-20 was estimated at 475368 MT at a value of Rs 837295.6 lakh. The following table provides the summary of the bioresources value from different ecosystems.

The total annual value of the bioresources at their origin is Rs. 66,883.11 crore, which indicates the magnitude of the contribution of biodiversity (in the form of bioresources) in the State. The bioresources coming from the forests, marine, and freshwater ecosystems (those are common properties) are purely the gift of nature. But the resources coming from the private lands are predominantly through cultivation (agriculture produces, tree garden, etc.) and culture (aquaculture and livestock - cattle and poultry). In these resources case, even if the cost of cultivation and culture come in to the picture, nature plays a significant role. Broadly, bioresources are the basic raw-materials for manufacturing different consumer products having a huge demand in domestic and international markets.

Since, biodiversity has recreational value (which is considered as direct use value of the biodiversity like bioresources) the tourism related value - revenue of tourism was also estimated which comes to **Rs. 39,197 crores.**

Table 2: Total value of Biodiversity/Ecosystem attributed Tourism

S. No	Mode of Estimation	Source / Type	Value (Rs. Crore)
1	Annual total (1919)	Revenue from General Tourism (Direct and Indirect) (87% of total tourism value of Rs.45,01,100 Lakhs)	39,160
2	Annual total (1919)	Revenue from Ecotourism	37
Total			39,197

In brief, the contribution of Kerala's biodiversity in the form of biological resources and tourism (direct use-values) is significant. Besides, the State's biodiversity / ecosystems also provide a number of non-marketed services, but their valuation is not under the scope of the RKI project.

In the industrial sector of Kerala, bioresources based industries play a major role at the Micro, Small and Medium Enterprises (MSMEs) as well as the big factories (which are assessed fully and partially.).



The following table provides the number and annual turnover of these manufacturing units. There are 52,388 bioresources based manufacturing (industrial) units in the State, which generate an annual turnover to the tune of Rs. 1,04,014 Crore. There is no doubt that a substantial share of the bioresources used by these industrial units, as raw-materials, originates from Kerala. Further our research / study clearly revealed that the bioresources originated from Kerala are used by the industrial units in other States as well as abroad.

Table 3 : Bioresources based industries in Kerala

Type of Industries	No of Units	Annual Turnover (Rs. in Crore)
MSMEs	47541	24,011.94
Factories		
(a) Fully bioresource based	3540	43,861.35
(b) Partially bioresource based	1307	36,141.22
Total	52,388	1,04,014.51

We also estimated the export, import and balance of trade of bioresources as well as bioresources based products of Kerala through its major sea ports. Here, there is no guarantee that all the bioresources (bioresources based products) exported through Kerala's ports originated / were manufactured from Kerala, but from other parts of the country too (Kerala's bioresources are exported through other ports in India also). Similarly, the bioresources (bioresources based products) imported through Kerala ports are not used / consumed in Kerala. It is very clear that the annual export value of bioresources as well as bioresources based products from Kerala through its major sea ports is (Rs 21,760 crore)-- far higher than the annual bioresources as well as bioresources based products import value (Rs. 4,414 crore). The balance of trade of Rs. 17,347 crore indicated the richness of Kerala's bio-wealth.

The state exports fish products worth approximately rupees 5020.0 crores (2019-20) accounting for roughly three per cent of the state revenue. Kerala's export share of marine products to major markets like Japan, USA, European Union (EU), China, South East Asia and Middle East during 2010-2020. The EU is the main destination of marine products from Kerala ports with 36.14% quantity and 39.45% total value of marine products exported when compared to other destinations. Shrimp is the most important item in the export of marine products from Kerala. Over the last decade, the export of shrimp from Kerala significantly increased both in quantity (20.30% in 2010 to 36.32% in 2020) and total value 32.73% in 2010 to 51.68% in 2020). The cuttle fish occupies second position after shrimp in terms of total value of exported items from Kerala and even though the total value of the cuttle fish exported declined (24.06% in 2010 to 16.04% in 2020), its quantity exported remained the same over years (16.55% in 2010 to 16.38% in 2020). The analysis of marine products export trend from Kerala's ports showed that it has significantly increased over the last 25 years (1995- 2020) in both quantity (14.39% during 1995-2000 to 27.81% during 2015-2020) and total value (7.54% during 1995-2000 to 42.66% during 2015 to 2020).

Table 4 Bioresources or bioresources based products export and import (Annual average: 2019-20 &2020-21)

Export Value	Import Value	Balance of Trade
Rs 21,760 Crore	Rs. 4,414 Crore	Rs. 17,347 Crore



The tentative ABS potential of the State was worked out, based on the norms prescribed in the 'Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014'. The criteria were: (a) turnover / output value of the bioresources based manufacturing sectors in the State as well as (b) the value of bioresources use as input (raw-material) in manufacturing. The estimated ABS through the turnover / output value of the bioresources based manufacturing sectors in the State is Rs. 357.68 crore. However, bioresources value based estimate is relatively low as Rs. 105.99 crores.

Table 5 : ABS potential from bio-resource based Manufacturing (Industrial Units)

S No	Bio-resource based Manufacturing	ABS Amount (Rs. crore)
1	MSMEs	48.02
2	Large factories	309.66
	Total	357.68

Table 6 : Bioresources value based ABS potential of Kerala

S No	Bioresources	ABS potential (Rs. Crore)
	MSMEs	48.02
1	Timber	13.19
2	NTFPs	0.06
3	Marine Fishery	20.79
4	Inland Fishery	9.60
5	Agriculture	35.42
6	Livestock	26.93
	Total	105.99

Biodiversity / ecosystem wise different categories of Tradable and ABS Potential bioresources list in Kerala was also drafted worked out based on the available secondary data. However, this list should be further revised on the light of Biological Diversity Act and the magnitude of bioresources commercialization with the help of an expert committee. Ultimately, KSBB may come up with an Ordinance of 'Tradable and ABS Potential bioresources' separately, which will really uplift the ABS process in Kerala as well as become a model to other States in India.

Table 7 : Tradable and ABS potential bioresources in Kerala

Ecosystem	Type of Species / Bioresources	No of Species / Bioresources
Marine and Inland (bioresources)	Crustaceans	40
	Molluscs	17
	Fishes	101
	SPONGES (Emphasis on Bio-Active Compounds)	12
	Ascidian	1
	Sea Weeds	18
	Total	189
Forest (Floral Bioresources)	Medicinal Plants	398
Agriculture (bioresources)	Cultivated crops- Products from crops with GI registration	16
	Grand Total	603



Bio-economy consists of all economic activities (production, distribution / trade, consumption) of bio-resources based goods and services in a given geographical area. The components of bio-economy include: (a) technology approach, focusing on biotechnology applications in primary production, health, and industry; (b) status of biotechnologies and R&D expenditures; (c) the roles of R&D funding, human resources, intellectual property, and regulation in bio-economy, and (d) the possible developments that could influence emerging business models. The European Union & OECD came up with their approach on Bio-economy, which might be a torch bearer for a mission on Bio-economy for Kerala.

As Kerala is rich in biodiversity, the commercial potential of bio-resources is very high. Forest resources and medicinal plants, marine resources, agriculture / crops based entrepreneurs have high commercial significance. There is no doubt that Kerala is having high ABS potential and the concerned authorities need to identify it. The analysis carried out in the report with respect to bioresources collection (quantity and value) at its origin, its commercial utilization (manufacturing) with supply chain / value addition, trade, and the overall ABS potential signifies the importance as well as the need for conservation of the biodiversity / bio-wealth of Kerala and its sustainable utilization. Hence, the state should take appropriate policy measures.

In brief, in a developing State like Kerala, the fundamental objective of bio-economy would be the utilization of its bio-resources efficiently and preventing the loss of biodiversity or the ecosystem, which is the base for food and health security as well as options for many other economic developments. Further, biodiversity is the source for employment and livelihood for millions of poor people. It is important to consider these aspects on a priority basis and develop an appropriate management strategy with the stakeholders' participation. If this platform is stabilized, bio-economy will step-up towards sustainable development and a social system: harmony with nature.



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Acronyms / Abbreviations

ABS.....	Access and Benefit Sharing
APCOS.....	Anand Pattern Co-operative Societies
APEDA.....	Agricultural and Processed Food Products Export Development Authority
BD Act.....	Biological Diversity Act
BMC	Biodiversity Management Committees
CBD.....	Convention on Biological Diversity
CII	Confederation on Indian Industries
COP	Conferences of the Parties
DES.....	Directorate of Economics and Statistics
DGCIS.....	Directorate General of Commercial Intelligence and Statistics
DPIIT	Department for Promotion of Industry and Internal Trade
EDC	Eco- Development Committees
EEZ.....	Exclusive Economic Zone
FAO	Food and Agriculture Organization
FDI.....	Foreign Direct Investment
FDT.....	Forest Development Tax
GSDP	Gross State Domestic Product
GSVA.....	Gross State Value Added
IWST.....	Institute of Wood Science and Technology
KFD	Kerala Forest Department
KFDC.....	Kerala Forest Development Corporation
KSBB	Kerala State Biodiversity Board
KSDL.....	Karnataka Soaps and Detergents Limited
KSHDC	Karnataka State Handicrafts Development Corporation
M3	Cubic Meters
MAT.....	Mutually Agreed Terms
MEA	Millennium Ecosystem Assessment
MFP.....	Minor Forest Products
MoEF & CC.....	Ministry of Environment Forests and Climate Change
MPEDA.....	Marine Products Export Development Authority
MSMEs.....	Micro Small and Medium Enterprises
NWFP	Non Wood Forest Products
NBA.....	National Biodiversity Authority
NGOs.....	Non Governmental Organizations
NHGs	Neighborhood groups
NMPB	National Medicinal Plant Board
NTFPs	Non Timber Forest Products
PBR.....	Peoples Biodiversity Register
PIC.....	Prior Informed Consent
RKI	Rebuild Kerala Initiative
SBB.....	State Biodiversity Boards
SDG.....	Sustainable Development Goals
SEZ.....	Special Economic Zones
TEEB.....	The Economics of Ecosystems and Biodiversity
TEV.....	Total Economic Value
TK.....	Traditional Knowledge
UNCED.....	United Nations Conference on Environment and Development
UNCTAD.....	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
VSSs	<i>Vanasamrakshana Samitis</i>



1.1 BIODIVERSITY: SIGNIFICANCE AND CHALLENGES

Biological diversity (biodiversity) represents the variety of life on earth, which include species diversity (the numbers and kinds of living organisms), genetic diversity (genetic variations within species) and ecosystem diversity (the variety of habitats, biological communities and ecological processes). The services of ecological systems and the natural capital stocks that produce them are critical to the functioning of the earth's life-support system. Bio-diverse ecosystems provide vital services such as; the regulation of water flows and levels, protection against extreme weather conditions, the purification of air and water, the prevention of soil erosion, and opportunities for recreation and spiritual reflection. They contribute to human welfare, both directly and indirectly, and therefore represent a significant part of the total economic value of the planet.

Biological resources are the major sources or input factor for developing modern drugs, botanical medicines, new seed varieties, ornamental horticultural products, crop protection products, biotechnologies (in fields other than healthcare and agriculture), healthcare and agricultural products, and personal care and cosmetic products. These products and manufacturing industries played a significant role in enhancing human welfare and the economy.

However, biodiversity faces multiple challenges from various factors that include: habitat fragmentation, degradation and loss, over-exploitation of resources, shrinking genetic diversity, spread of invasive alien species, declining forest resource base, climate change and desertification, and impacts, of various development projects including pollution. The loss of biodiversity constitutes a concern for human welfare, especially for the well-being of the poorest, since it acts as a major livelihood option for them. If local people are ensured a fair price for the bioresources they will play an active role in ensuring sustainable harvesting in their locality. Untapped potential exists for strong forward linkage to processing and backward linkage to cultivation of these plants, especially since the manufacturers of the traditional medicines are hampered by a lack of stable supply of raw materials. In the absence of such linkages, many of the important medicinal plants are facing extinction from their natural habitats. The forest dwellers, who are the primary collectors of wild medicinal plants, are becoming marginalized and they over-harvest the resources, heightening the problem of extinction.

1.2 CONVENTION ON BIOLOGICAL DIVERSITY (CBD)

The concerns over the indiscriminate exploitation of biodiversity, due to the increasing demand for the biological resources and the problem of biopiracy, inter alia, have led to the adoption of the Convention on Biological Diversity (CBD), an international treaty to sustain the rich diversity of life on Earth, at the Rio-Earth summit in 1992.

The three Rio Conventions – Biodiversity (Convention on Biological Diversity), Climate Change (United Nations Framework Convention on Climate Change) and Desertification (United Nations Convention to Combat Desertification) - derive directly from The United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit, or Rio Summit. The Conferences of the Parties (COP) to each Rio Convention has stressed upon the need for enhanced collaboration among the



conventions, in order to enhance synergy and reduce duplication of activities. Globally, 196 countries became members of Convention on Biological Diversity (CBD), and India signed the agreement in 1994. The CBD aims to put in place a comprehensive international regime for the sustainable management of biological resource through its three pillars: the conservation of biological diversity, sustainable use of its components for the benefit of present and future generations and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

The CBD affirms the sovereign rights of the countries over their biological resources. Article 15 of CBD calls for the Parties to establish systems and procedures for access to genetic resources and fair and equitable sharing of the benefits, arising out of the utilization of genetic resources and a number of countries are on various stages of implementing a regulatory framework. The governments of member countries of CBD have to take initiative to document, preserve and maintain such knowledge and practices for promoting their wider application and equitable sharing of benefits derived from their utilization. They are required to develop National biodiversity strategies and action plans, and to integrate these into broader national plans for environment and development.

India has been a Party to the Convention on Biological Diversity (CBD) since 1994. India is also a party to the Nagoya protocol whereby the benefits arising out of the commercial utilization of bioresources need to be shared with the providers of the bioresources (Access and Benefit Sharing, ABS)

1.3 THE BIOLOGICAL DIVERSITY ACT 2002 AND RULES 2004

India enacted the Biological Diversity Act in 2002 and notified the Rules (Biological Diversity Rules) in 2004 to give effect to the provisions of the Convention relating to Conservation of biodiversity, sustainable utilization and Access to Bio-resources and Benefit Sharing. India ratified the Nagoya Protocol on Access and Benefit Sharing (ABS) on 12th October 2014, and is implementing the protocol's provisions through well assigned legal and decentralized institutional measures.

The Act extends to the whole of India and reaffirms the sovereign rights of the state over its biological resources. Access and Benefit Sharing has its basic principles within the CBD and aims to ensure that Prior Informed Consent (PIC) for access is provided, Mutually Agreed Terms (MAT) are negotiated and Accrued Benefits are shared equitably and fairly.

Pursuant to the adoption and ratification of the Nagoya Protocol in 2014 the Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations 2014 were notified under the Act of 2002. The Guidelines clarified and elaborated ABS provisions of the Act and a legal framework for the mode of benefit sharing under different scenarios were put in place in India. The providers of biological resources are also the agents of value addition to the resources, as they are involved in the development and marketing of the final 'bio'-product for consumption. Hence it is elementary that any profit accrued from commercial utilization should benefit the local community also.

The Biological Diversity Act is being implemented in India through a three tier decentralized system comprising of the National Biodiversity Authority (NBA) functioning at National level, the State Biodiversity Boards (SBBs) at provisional level and the Biodiversity Management Committees (BMCs) constituted at all three tiers of Local Self Government i.e. the Grama Panchayats, Municipalities, Corporations, Block and District level.

Kerala State Biodiversity Board and its Functions

Kerala State Biodiversity Board (KSBB) is an autonomous body of the State Government and comes under the Kerala State Environment Department. With the Head Quarters at Thiruvananthapuram the Board falls under the provision of the Biological Diversity Act 2002, Rules 2004 and Kerala State Biological



Diversity Rules 2008. Kerala Biological Diversity Rules 2008 were constituted in exercise of the powers conferred by section 63 of the Biological Diversity Act 2002 vide S.R.O No 602/2008. KSBB is dedicated to conservation and sustainable utilisation of bio resources of the State and fair and equitable sharing of benefits arising out of utilization of bio resources.



Biodiversity management is a multi-layered process and involvement of local communities in conservation planning is at the core of biodiversity conservation initiatives of KSBB, one of the first states in the country to constitute BMC at all three tiers of local governance and to complete the preparation of Peoples Biodiversity Register (PBR). The major responsibilities of BMC include:

- BMCs are constituted for the purpose of promoting conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of landraces, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and documentation of knowledge relating to biological diversity.
- Preparation of People’s Biodiversity Registers and periodic updating of the same are also the duties of BMCs. The People’s Biodiversity Register (PBR) must include information about flora and fauna of the locality and associated knowledge.
- BMCs may levy charges by way of collecting fees from any person accessing the



- biological resource for commercial purposes from their territorial jurisdiction.
- BMC ought to be consulted by NBA & SBB, while granting approvals for obtaining biological resources or associated knowledge.

The KSBB made substantial achievements with respect to its mandates and it includes:

1

Biodiversity Conservation

- The State Biodiversity Strategies and Action Plan and finance plan for 2022-32 has been prepared through an extensive consultation process with different stakeholders. The Action Plan has identified measurable indicators and composite indicators and responsible agencies along with time frame and frequency of monitoring through a participatory process.
- BMCs were constituted at all three tier systems of local governance i.e, Panchayats, Municipalities and Corporations and at Block and District level, which covers the entire geographical area of the State.
- PBR completed in all Panchayats, Municipalities and Corporations. Marine PBR of two coastal districts with emphasis on marine species and its diversity, traditional knowledge of fishing community and strategies for conservation and sustainable use of marine bio-resources prepared
- KSBB in association with NIC has developed a work flow based system which facilitates LSG to collect, disseminate biodiversity data and generate PBR electronically. The software for PBR digitization developed by KSBB was adopted by National Biodiversity Authority at national level and digitization of PBR ongoing
- In Kerala to promote conservation of locally important areas, a government order authorizing BMC to declare biodiversity rich areas in their locality as Local Biodiversity Heritage Site (BHS) was issued. Guidelines for declaration of local BHS prepared and 9 local BHS has been declared by the respective BMCs in different districts of Kerala.
- Asramom mangrove areas at Kollam has been declared as Biodiversity Heritage Site. A five year Management Plan for the same prepared with budget and linkages with schemes of line departments and will be implemented by BMC along with Kollam Corporation.
- Regular training to BMC being conducted at district, block and local level. Trainers training workshop conducted in association with KILA for building capacity of BMC. Total 65 master trainers @ 4- 5 per district were trained. 104 Block level BMC capacity building workshops conducted during which 850 BMCs were trained by Master trainers
- Two BMC Meenangadi, Wayanad District and Eraviperoor, Pathanamthitta District received the India- UNDP award instituted by MOEF and UNDP for Best BMC during 2018.
- Kerala Biodiversity Museum was set up at Vallakkadavu in Thiruvananthapuram as a state-of-art centre to impart biodiversity education and awareness with the aid of advanced electronic and digital technology. The Museum is functioning well and is attracting large number of visitors.
- KSBB has constituted Biodiversity Clubs in educational institutions of Kerala.

2

Institutional strengthening

- Range Forest Officers from the Forest department were designated as Biodiversity Nodal Officers for strengthening BMCs to function as Environmental watch groups and for enforcing Biodiversity Act, and awareness conducted in three different batches.
- The Police department vide Executive directive No 2/2020 /PHQ dated 03/02/2020 has authorized that if any police officers have reasonable grounds to believe that an offence has been committed under the provisions of the Act they shall verify the facts by



spot inspection and inform the concerned forest officers to take necessary action and awareness program conducted to border police officers.

- A GO regarding establishment and utilization of Kerala Biodiversity Fund has been issued.

- A State level Steering Committee for Biodiversity was formed under the Chairmanship of the Chief Secretary vide the G.O. Rt. No.60/2018/Env. dated 11.05.2018 for interdepartmental coordination in matters related to biodiversity.

Major Projects

- A Red data book of Kerala incorporating threatened species of Kerala and their status is being prepared with the help of research institutes.
- Three new projects under the Rebuild Kerala Initiative, namely, on Pamba Riverine Biodiversity Rejuvenation through BMCs, Conservation of Agro biodiversity through BMCs, and Development of a database of tradable bioresources of Kerala, are ongoing.
- In Kerala after the devastating natural disasters of August 2018 Rapid Impact Assessment of flood/ landslides on Biodiversity focused on community perspectives of the effect on Biodiversity and Ecosystems was conducted. It is for the first time in India such an assessment of impact of natural disasters on Biodiversity was conducted at LSG level and it is a collaborative effort of BMC and Kerala State Biodiversity Board (KSBB). More importantly each of the 187 BMCs who involved had also outlined the major causes for such an impact as perceived by them and suggested strategies for biodiversity conservation at local level. Being a study conducted by local community all efforts has been made to incorporate practical approaches for prioritizing areas for biodiversity conservation which can be implemented at local level.
- Focused study on Impact of natural disasters on different aspects of Riverine biodiversity was also conducted through 28 institutions/ universities of Kerala
- A project for Conservation of Coastal sacred groves has been awarded from MoEFC, and data regarding coastal sacred groves and the management priorities prepared.
- A UNDP funded project on Munnar Landscape Project has been completed, and as part of this, a biodiversity documentation protocol for PBR updation has been developed.
- A FAO supported project for strengthening BMCs and identifying policy gaps in Agrobiodiversity was completed
- The crisis of biodiversity loss can be addressed seriously only if the values of biodiversity and ecosystem services are fully recognized. The valuation of bio resources will enable the preparation and implementation of management plans for sites with significant biodiversity, protect threatened species and habitats, and restore seriously degraded sites. For this purpose a project for valuation of Ecosystem in Marine protected area- Kadalundi-Vallikunnu Community Reserve of Kerala was done in association with CMFRI.
- A comprehensive study of sacred groves of Kerala was conducted as per the direction of the Kerala Legislature Committee on Environment and report submitted to Government. A total of 7058 sacred groves were reported in the state. Alapuzha reported maximum number of sacred groves whereas Idukki reported the minimum. The size of the groves varied from 0.5cent to acres.
- KSBB has awarded 16 Doctoral and 2 Post-Doctoral Fellowships



2.1 INTRODUCTION

Bio-resources-based industries are using genetic/biological resources (plants, animals, micro-organisms and genetic materials) from the forests, agriculture, wetlands and marine ecosystems, as inputs or raw-materials and manufacturing different consumer products and acquiring benefits. For the successful operation of Access and Benefit Sharing (ABS), as the first step, all the stakeholders need a clear understanding on the types of bio-resources available in different geographical areas and their economic potential. Further, proper knowledge about the level and nature of each resource's extraction and its trade is required. This could facilitate in enforcing the effective ABS mechanism and conservation and sustainable utilization of biodiversity. In this regard, a systematic documentation of the tradable bio-resources in the state focusing on different administrative units is a prerequisite for ABS and designing effective conservation measures including the Local Biodiversity Strategy and Action Plan.

The valuation of biodiversity goods (bio-resources) derived from different ecosystems with the help of an appropriate methodology, is a fundamental step towards operationalizing the “Access and Benefit Sharing (ABS)” principle. Tradable bio-resources documentation along with its economic valuation and supply chain is a background attempt / information for implementing the BioTrade Initiative introduced by the United Nations Conference on Trade and Development (UNCTAD), which aims to contribute to the conservation and sustainable use of biodiversity through the promotion of trade and investment in BioTrade products and services

BioTrade refers to the collection, production, transformation and commercialization of goods and services derived from biodiversity in environmentally, socially and economically sustainable ways. BioTrade can contribute to reducing direct pressures on biodiversity and ecosystem services worldwide, as well as to maintaining and improving human well-being, BioTrade is being recognized as an incentive to conserve biodiversity while at the same time addressing poverty alleviation and supporting sustainable livelihoods in developing countries through effective implementation of the ABS provisions of the CBD. ABS and BioTrade will mutually benefit one another by promoting sustainable sourcing and use of local biological resources for trade at one end, and fair and equitable share of benefits to the communities and conservation of local biological diversity at other end.

From the ABS perspective the distinction between the ‘exchange value’ and ‘use value’ and their integration is the concern. Exchange value, is the relative price of a good or service in the market. But the use value or utility of a good or service, can be very different from the market price. For example, the market price of water may be very low, but their use value is extremely high. The reverse is the case for diamonds, where market price is extremely high but the use value may be low. Similarly, the

market value of genetic/bio-resources is generally insignificant, but its use value to the bio-prospecting industries is significant. Unfortunately, this fact is not rightly understood by the owners/providers of the resources, but restricted within the domain of science and technology or bio-prospectors - users of the bio-resources (Nelliyat and Meenakumari, 2018).

Generally, different disciplines define and use value in different ways. In economics, value or utility are unambiguously anthropogenic and a subjective phenomenon. For marketed goods and services, it is humans who reveal value, in terms of their so-called willingness-to-pay, by the process of exchange. Similarly, utility is derived by humans. But other disciplines may assign different interpretations to value or importance, which may or may not be linked to values ascribed by human beings. For example, anthropology may infer value for biodiversity from cultural norms and practices that are in some sense non-negotiable (sacred groves). Theologians and ethicists may base importance on moral or spiritual criteria that are neither observable nor measurable (but nevertheless strong motives), and may also point out that the predominant role of humans in utilitarian thinking displaces intrinsic value and the right of other species to exist. Ecologists will be interested in the importance of attributes or functions of a system to maintain ecosystem resilience. This is an objective criterion, that is, irrespective of its relevance to humans (CBD, 2007).

In brief, biodiversity has been viewed by the public from different perspectives; hence, its value may arrive at different disciplinary angles, which makes valuation more complex. However, for ABS purposes one should look at the value of biodiversity/bio-resources from realistic perspectives in an objective manner, considering their commercial potential and significance. But, practically a pure objective approach in bio-resources valuation is difficult. The present trend of indiscriminate extraction of bio-resources in huge volumes may affect their renewability and stock, which has vast ecological, social, spiritual, and religious implications.

Environmental economics has extended the demand theory to the ecosystem/biodiversity goods and services that are not traded in markets. As they are not traded in markets, their value is not captured in the form of market prices. The reason is that many ecosystem goods and services bear characteristics of “public goods”, where nobody can be excluded from their use. For this reason, markets cannot spontaneously develop for public goods, and the value of these public goods will therefore not be reflected in a market price (CBD, 2007). Hence, the development of valuation methods that can elicit the “hidden” value of non-marketed natural resources such as biodiversity goods and services is the primary responsibility of environmental economists.

For ABS, the emphasis is not directly on the biodiversity services, but only on the goods coming out of the ecosystem/biodiversity. For example, the ABS negotiation is not with square kilometres of forest and its services (such as climatic control, nutrient cycle, hydrological functions etc.), but with the goods (like medicinal plants, timber, fruits, grains, fish etc.) coming out from the forests. Here, the ABS philosophy propagates that among the benefits derived from the commercial use of medicinal plants, a portion has to be shared to the local community; it acts as an incentive to them in the conservation and sustainable use of the medicinal plants.

Further, the question arises how genetic resource valuation differs from the traditional kinds of ecosystem/biodiversity goods valuation or physical valuation of bio-resources. Traditionally, variations in the “genetic value” from the bio-resources value were not distinguished, and the genetic resources value depended primarily on the physical “quality” of the particular material (bio-resources) being exchanged. For example, the value of one kilo of grapes is much higher when the grapes are of the type, quality and condition that enable them to be used to produce champagne, and much lower when they can only be sold for consumption as “table grapes.” However, this distinct value will not reflect in the market, if the above information asymmetry exists, and it is the real fact in most of the genetic or biological resources trade or exchange.



In most countries, biodiversity and genetic resources and associated traditional knowledge are considered to be public goods, managed under the oversight of the national government as the sovereign right of the nation. However, historically communities are collecting the resources with their users' rights and providing to the users (bio-prospectors) without understanding their potential. Here, the government as a legal custodian of their resources needs to play a significant role, particularly the resources coming out from common area such as the forests and oceans. Consequently, some mechanism is necessary to assure the negotiating government official, that he is getting a fair value for a public resource which he is sworn to preserve and use in the best interests of the country and its citizens.

In the absence of the valuation of genetic resources, parties in ABS transactions may be compelled to accept inappropriate (too high or too low) payment as the user's benefit-sharing obligation. However, transparency about prices and financial terms will enable the development of professional appraisal standards, which can ease contractual negotiations. It has been noted that the "current form of contractual approach is leading to a low value of individual transactions and not to the full valuation of environmental services provided by biodiversity" (Morten and Tomme 2007). Perhaps the most important dilemma in genetic resources is that, public goods are disposed of through private contracts, where equity and CBD objectives will not be supported by commercial practices. Private negotiations (for public good) rarely, if ever, reflect the interests, needs and values of the society or community. In this respect, it is important to examine the lacuna in the existing valuation procedures of the bio-resources and a paradigm shift in the bio-resources valuation for ABS.

In brief, it is very clear that the valuation of genetic/bio resources for operationalizing the ABS is extremely complex. As ABS mechanism is a new concept/idea the existing value theory is not emphasised it at all. Hence, valuation of bio-resources with ABS perspectives is a process, which needs to be accomplished. The attempt carried out through this project is a first of its kind, where we find out the current market value of bio-resources which are predominantly in trade and market from the different ecosystems (forests, marine, freshwater, agriculture) of the state of Kerala. We also calculated the value of bio-resources based products manufactured in the state by different industries and/ entrepreneurs as well as the export value of key bio-resources and bio-resources based products of the state.

2.2 TOTAL ECONOMIC VALUE: AN IDEAL FRAMEWORK FOR BIODIVERSITY/ ECOSYSTEM VALUATION

According to Pisupati (2013), lack of valuation is the underlying cause for the observed degradation of ecosystems and loss of biodiversity. Ecosystems, their goods and services and biodiversity are often systematically under-valued. The reason for this is their site-specific nature and perceived short-term gains as against private goods that are valued due to ownership rights, potential future value and integration into formal economic equations. Sectoral policies, lack of methods to value public goods and/or understanding of how to protect such goods, often pose serious challenges to policy makers to recognize public goods and integrate their preservation into policy making. This is the fundamental challenge in operationalizing the ABS mechanism in biodiversity goods, since they are predominantly public goods.

Total Economic Value (TEV) is one of the most widely used conceptual frameworks for understanding any biodiversity/ecosystem's overall significance. TEV broadly consists of **Use Values and Non-Use Values**.

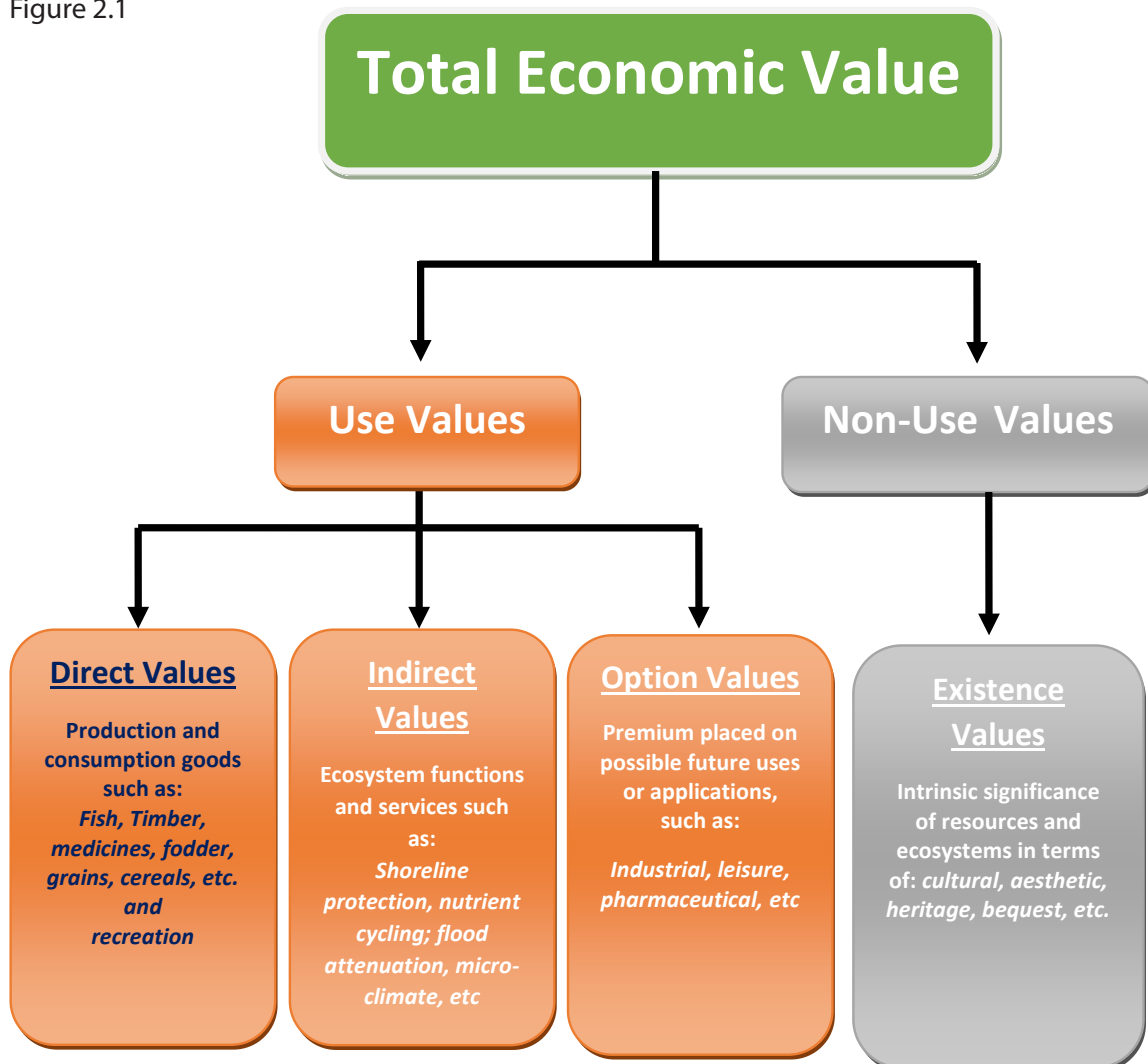
Use Values:

A use value is a value (in the form of commodities and services) arising from an actual use made of a given resource. This might be the use of a biodiversity hot spot, like the forest for timber and non-timber products, or of a wetland for recreation or fishing, and so on. Use values of biodiversity include: (a) Direct Values, (b) Indirect Values and (c) Option Values



1. **Direct Values:** Direct values are the benefits derived from the use of biodiversity / ecosystem goods either for direct consumption or production of other commodities. For example, fish and other marine resources such as seaweed, grass, medicinal plants, corals, wood, shells, etc. available in the marine / coastal ecosystems are used by humans either for direct consumption or for manufacturing different consumer products or both. Besides, people are directly enjoying (using) the scenic beauty and recreational potential of the beaches. Similarly, forest ecosystem provides goods such as timber, non-timber forest products etc. along with tourism potential.
2. **Indirect Values:** Indirect values include various benefits provided by ecosystem functions and services. Coastal ecosystems are providing ecosystem services, such as shoreline protection, nutrient cycling, climate control, flood control, etc. Forest ecosystem are providing services, such as hydrological services, carbon sequester, nutrient cycling, climate control, flood control, etc. Sometimes these services of ecosystem more valuable than the goods they provide.
3. **Option Values:** Option values are the premium placed on maintaining biodiversity good or service for possible future use.

Figure 2.1



Source: IUCN, 2007



Non-use Values

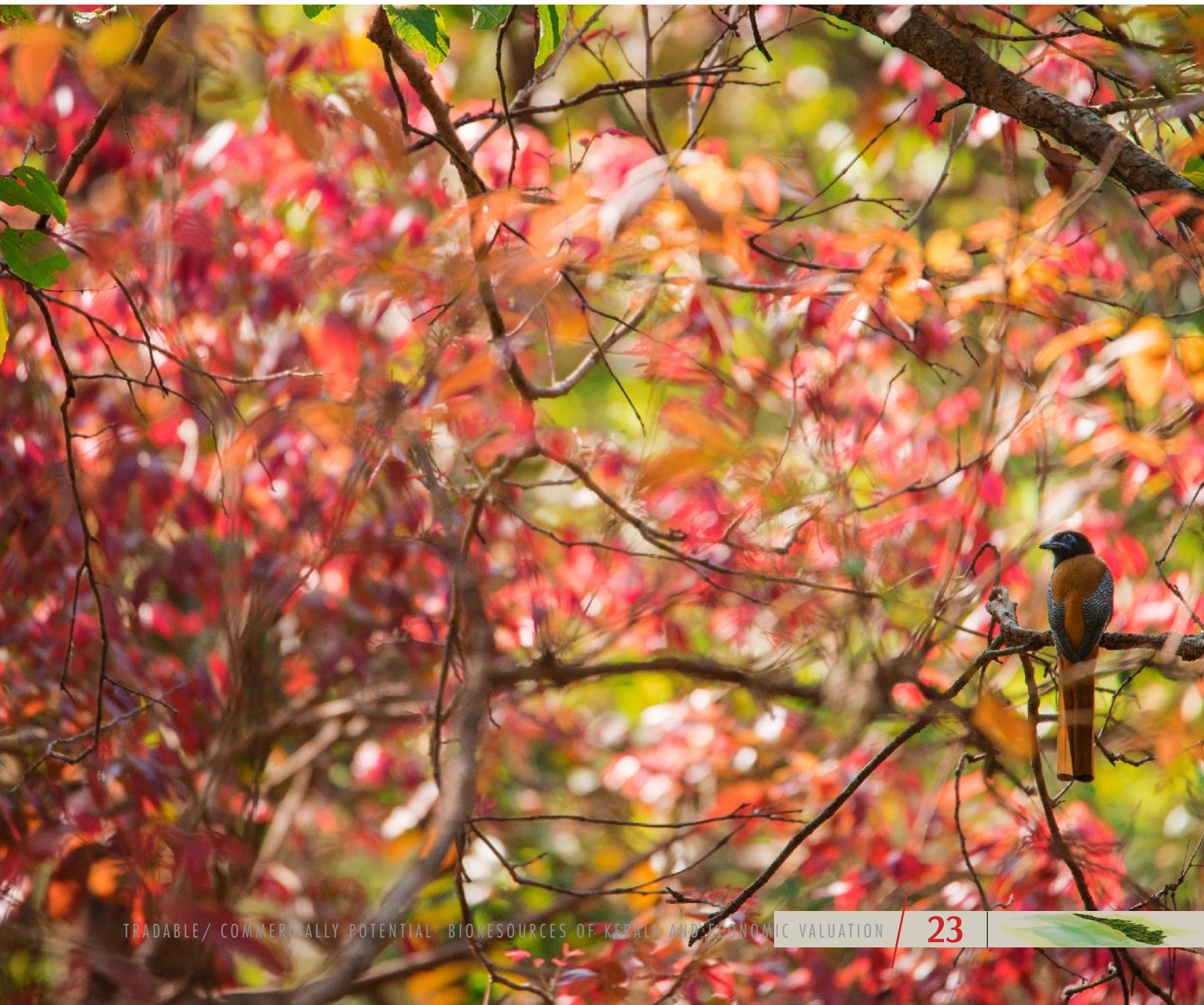
Non-use values are more problematic in definition and estimation since these are non-marketed services of biodiversity or an ecosystem. Ecosystems / biodiversity have different non-use values, which include: Existence Value, Bequest Value and Intrinsic Value.

1. Existence Value:- Existence values are satisfaction from just knowing that a species or ecosystem is present. For example; the mere existence of a unique species of mangrove or medicinal plant in a geographical area of the coast/forest gives some value to the people who belong there.
2. Bequest Value - Bequest value is the willingness to pay to ensure that future generations inherit a particular environmental asset.
3. Intrinsic Value - Intrinsic value is the value of a species or ecosystem in its own right, independent of any value placed on it by humans (Pearce and Dominic, 1994).

Thus, the Total Economic Value (TEV) is calculated using the formula:

$$TEV = UV + NUV = (DUV + IUV + OV) + (EV + BV+IV)$$

From the ABS perspective, we are not doing the TEV estimation of a particular ecosystem, but only the direct use value of the ecosystem / biodiversity goods, in the form of bio-resources/genetic resources, that have market potential and business scope.



2.3 METHODOLOGY FOR VALUATION OF BIODIVERSITY GOODS AND SERVICES

Generally, the valuation of the non-marketed services of biodiversity / ecosystem is a challenge. However, environmental economists widely attempted to value the ecosystem services through the generation of the hypothetical markets; and as per the estimation done by Costanza et al, (1997), the current economic value of 17 ecosystem services for 16 biomes for the entire biosphere, was in the range of US\$16–54 trillion (1012) per year, with an average of US\$ 33 trillion per year. However, the global gross national product is around US\$ 18 trillion per year.

Environmental Economists have succeeded in developing methodologies for valuing ecosystems (MEA 2003, and TEEB 2010). A wide range of valuation techniques and methods have been developed, particularly during the last two decades; they include:

- Market prices
- Replacement costs
- Damage cost avoided
- Production function
- Hedonic price method
- Travel cost method
- Contingent valuation method
- Choice experiments
- Participatory environmental valuation and
- Benefits transfer.



For biodiversity goods point of view, which is also the concern of ABS, the market price approach is the widely accepted valuation methods, even if it has some limitations. Market Prices approach looks at the market price of biodiversity / ecosystem goods and services. Here, one should observe the existing market price of different ecosystem resources.

However, the nature of the market existing at the collection points (such as the coast or forest gate) of different resources is the key, and the question is whether these imperfect markets can derive the real price of the resources? Hence, we need to re-examine the valuation process adopted for goods derived from the ecosystem, which is the major concern for ABS (Nelliyat, 2017). At present, environmental economists are assigning the values of ecosystem goods (genetic or bio-resources), based on their current exchange rate or price (multiplying the quantity of goods with the price) at their collection point, such as the forest gate or the nearby local market. The fact is that the existing market prices that are completely arbitrary, in the absence of well-functioning markets (Nelliyat and Pisupati, 2014). Such prices do not consider the true or actual value of these biodiversity goods (bio-resources). A considerable volume of bio-resources is in public land, like forests, wetlands and ocean, where the local communities are entitled to the users' rights.

In a developing country like India, generally bio-resources are collected or cultivated by the communities and transferred to the prospecting industries through traders. In reality, the provider (community) and trader of the resources are not aware about the bio-prospecting scope and the overall economic potential of the resources, which they supply to the user (industries). Since there are no proper markets for such resources at their collection point, along with a huge information asymmetry, the existing price for the bio-resources does not reveal its actual value. The actual value may be more than the existing market price (Nelliyat and Pisupati, 2014). In the case of bio-resources those derived from the common properties or government lands such as forests, ocean, and wetlands government has entitlements. However, in many cases (fish in the ocean, river and lakes, minor forest products etc.), Government is not coming forward and taking strong decision on the pricing of the resources, but it left to the communities, who collect resources historically. Ultimately, these precious resources are exchanged for meagre price or under value.



2.4 LINKAGES BETWEEN BIOTRADE CONCEPT AND THE TRADABLE BIO-RESOURCES DOCUMENTATION:

The BioTrade Initiative of the United Nations Conference on Trade and Development (UNCTAD) aims to contribute to the conservation and sustainable use of biodiversity through the promotion of trade and investment in BioTrade products and services. BioTrade implicit all activities related to the collection or production, transformation, and commercialization of goods and services derived from biodiversity (genetic resources, species, and ecosystems) under environmental, social and economic sustainability criteria. We observed that, biodiversity provides inputs and ingredients for a range of industries, including agriculture, cosmetics, pharmaceuticals, pulp and paper, horticulture, construction and waste treatment. BioTrade is trade in biological resources, such as plant material for use as ingredients or inputs for food, cosmetic or industrial products.

Unfortunately, these activities are often conducted without proper consideration of the conservation and sustainable use of biodiversity. On the other hand, BioTrade activities are characterized by respect for environmental, economic and social criteria. For example, BioTrade activities must maintain the characteristics of ecosystems and natural habitats of the species being collected or cultivated. Income should be generated and distributed at all levels and to all actors of the value chain UNCTAD (2017).

Biodiversity is the natural capital base for a sustainable economy. The conservation of biodiversity and the sustainable use and trade of biodiversity-derived products and services can provide countries valuable opportunities for economic development and improvement of livelihoods. BioTrade is when a product or service sourced from biodiversity is commercialized and traded in a way that respects people and nature. The BioTrade Principles and Criteria (P&C), developed United Nations Conference on Trade and Development UNCTAD, is a set of guidelines for businesses, governments and civil society wishing to support the conservation and sustainable use of biodiversity, as well as the fair and equitable sharing of benefits through trade. Today they are implemented and fostered by government organizations, business associations, NGOs, and companies in over 80 countries (UNCTAD, 2020).



The BioTrade Principles and Criteria include:

- Conservation of biodiversity
- Sustainable use of biodiversity
- Equitable sharing of benefits derived from the use of biodiversity
- Socio-economic sustainability
- Compliance with national and international legislation and agreements
- Respect for the rights of actors involved in BioTrade activities
- Clarity about land tenure, use, and access to natural resources and knowledge



To implement the BioTrade Principles and Criteria, UNCTAD adopted four different approaches, which are:

- The “value chain approach”, which involves actors from all parts of the value chain working together to achieve agreed goals.
- The “adaptive management approach”, which allows for corrective measures to be adopted on the basis of ongoing monitoring of impacts.
- The “ecosystem approach”, which takes a holistic approach to ecological and social issues and the interactions and processes that make up production systems.
- The “sustainable livelihoods approach”, which contributes to sustaining livelihoods, in particular of the poor and vulnerable populations.



3. PROJECT DESCRIPTION, CONTEXT AND IMPLEMENTATION ARRANGEMENTS

In India, biodiversity is the direct employment and livelihood option for millions of socially vulnerable (poor) communities, including farmers, fishermen, tribals and pastures. As a mega diverse country, India is rich in bio/genetic resources within its forests, coastal and marine (wetlands) and Agricultural ecosystems.

“ Biological resources are the major sources or input factor for developing modern drugs, botanical medicines, new seed varieties, ornamental horticultural products, crop protection products, biotechnologies (in fields other than healthcare and agriculture), healthcare and agricultural products, and personal care and cosmetic products. These products and manufacturing industries played a significant role in enhancing human welfare and the economy. ”

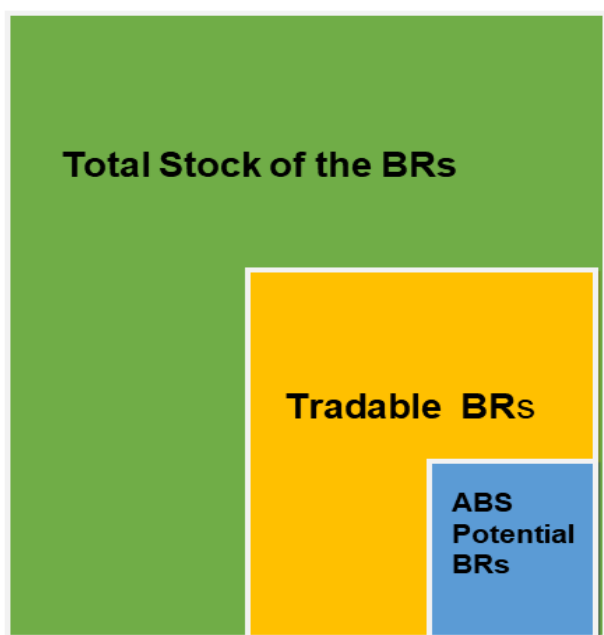
Since biodiversity or biological resources are unequally distributed in the world, their supply is restricted. On the other hand, their demand is escalating universally particularly in the globalized era. Broadly, biological resources business (collection, transfer, and exchange) is progressing at an alarming rate in biodiversity rich areas of the world. This business trends on biodiversity has led to the transformation of biodiversity more from a global public good to a regional / local public good or as state property and viewed as national sovereignty. In this context, the Convention on Biological Diversity (CBD) insisted their parties to follow ABS through legal and institutional arrangements for the conservation and sustainable use of their biodiversity.

“ Documentation of tradable bio-resources sourced from different ecosystems/ sectors such as forests (wild fruits, wild vegetables, medicinal plants, timber, honey, mushroom etc.) and aquatic and marine (fish, crabs, bivalves, sea grass, sea weeds, etc.), agriculture, horticulture, floriculture, livestock etc. is of immense significance. These resources, along with the associated traditional knowledge (TK), are the base for manufacturing different consumer products to enhance human wellbeing. Hence, the process of documentation of tradable bio-resources needs to be examined in the context of India's Biological Diversity Act (2002) and Access and Benefit Sharing (ABS). ”

Bio-resources-based industries are using genetic/biological resources (plants, animals, micro-organisms and genetic materials) from the forests, agriculture, wetlands and marine ecosystems, as inputs or raw-materials and manufacturing different consumer products and acquiring benefits. The BD Act and Rules have prioritised conservation and ABS of genetic resources and associated traditional knowledge (TK). The ABS arrangements can provide opportunities to the traditional communities, knowledge holders and the Biodiversity Management Committees (BMCs) to enhance and explore economical opportunities.

3.1 CONTEXT OF THE PROJECT

The project attempted in identifying and documenting the tradable and the ABS potential bio-resources in the State of Kerala from its total stock as indicated in the figure (Fig. 3.1). The total stock of the bio-resources available in the State may not come under the purview of trade or ABS (first box in Fig. 3.1). Some of the bio-resources don't have 'use value' and are not being used by humans for their own-consumption or other purposes. Hence, these resources are untouched from nature or not traded at all.



Normally, the tradable bio-resources (which are having demand) are a small part of the total stock of the bio-resources (second box in Fig. 3.1). The resources which have demand or those active in the trade may be in domestic and commercial (considering the economic potential of a particular resources) use. Hence, the tradable bio-resources documentation needs to capture both these sets of resources.

Even if the genetic / bio resources have 'use value' their entire utilization will not come under the domain of ABS. Generally, only the bio-resources used with commercial intention come under the purview of the ABS and it will be only a portion of the total tradable bio-resources (third box in Fig. 3.1). Further, India's Biological Diversity Act provides exemption for: human genetic material, 421 biological

resources notified as 'normally traded as commodities', and resources used by local communities (for self-consumption) and vaid and hakims (for practicing indigenous medicine).

However, in reality all the ABS potential bio-resources that exist in Kerala are not utilized fully or the current utilization of bio-resources for commercial purpose may be limited. Besides, most of the industries that use the bio-resources with commercial intent or come under the purview of ABS are not on board. Since the bio-resources' market is highly unorganized and imperfect, the availability of authentic information is always a constraint. Hence, documentation becomes an extremely difficult task. In this context, a systematic and scientific approach with innovative ideas and multi-stakeholders' participation is required for generating an authentic database on bio-resources, which are under trade, and investigating its supply chain (value additions) and ABS potentiality.

Kerala is a biodiversity rich state and harbour many economically important plants and animal, microbial species. But no systematic study has been undertaken in the State to assess the extent of capture, utilization and marketing of biological resources. Industrial sector in Kerala comprises medium and large industries, micro, small and medium enterprises (MSME) and traditional industries. The industries



of Kerala and Industrial growth potential are linked to the state economic infrastructure. Kerala, with all its limitations, is putting efforts for speedy Industrial Development in the state. The traditional industries of State as handloom, Cashew, Coir, Handicrafts, fish processing, fish culture and so on depend on bio-resources. The Ayurvedic sector, cosmetics, nutraceuticals, has their origin from a large number of bioresources - both cultivated and wild. But each bio-resource has to pass through an intricate chain of trader networks, till it reaches the ultimate user industry.

Government had approved the Rebuild Kerala Development Programme (RKDP) which constitutes the State's strategic road map for a Green and Resilient Kerala. It encompasses cross cutting and sector based recommendations on policy, regulatory and institutional actions as well as priority investment programmes that are critical for resilient and sustainable recovery and rebuilding of the state. The main challenges facing Kerala in regulating the unsustainable harvesting of bioresources and sharing the benefits of commercial utilization with the local community is the fact that the state had inadequate information on biological resources traded, volume of trade, sustainability of the resources, their actual and potential economic value, and the project funded by RKI aims to address these gaps.

Documentation of tradable bio-resources in a State is baseline information, which has multiple uses:

1. It helps to understand the demand and supply scenario of each species /resources and promote sustainable consumption.
2. Since bio-resources are renewable natural resources considering their increasing demand and trade, effective conservation measures can be designed based on solid knowledge base of bio trade, even in a legally bound manner.
3. This exercise (documentation) also will be beneficial to multiple stakeholders including: the providers (collectors and cultivators), of bio-resources, different types of traders involved in their business, wholesalers, industries that use bio-resources as raw-materials, and the government departments which are responsible in designing strategies on biodiversity conservation.
4. Further, the documentation of tradable bio-resources is extremely useful for the enforcement agencies (NBA, SBBs, and Biodiversity Management Committees - BMCs) for implementing the Access and Benefit Sharing (ABS) principles prescribed under the BD Act as bio-resources-based industries are using genetic/biological resources (plants, animals, microorganisms and genetic materials) from the forests, agriculture, wetlands and marine ecosystems, as inputs or raw-materials and manufacturing different consumer products and acquiring benefits.

3.2 OBJECTIVES

The major objective of project is identification of various bioresources being traded in the State, assessing its volume and economic potential as well as inventoring the bioresource based industries operating in the 14 districts of Kerala and aim to put in place an institutional framework for implementation of ABS in Kerala and regulation of unsustainable harvesting of bioresources. The main objectives are the following:

1. To estimate current utilization of biological resources (plants, animals, microorganisms in marine, freshwater and terrestrial ecosystems) by industries in Kerala and their threat status
2. To understand the stock, nature of availability, and markets potential of various bio-resources available in different geographical areas or ecosystems.
3. Estimate the volume and value of bio-resources as well as the bio-resources based products exported from Kerala.
4. To identify various local, regional, state level, national and international agencies involved undertaking bio-survey, bioresearch and commercial utilization of bioresources.
5. Identify the bio-resources which have current and future prospects for the ABS mechanism.
6. Document the supply chain (with value addition) of bio-resources at each stage of its commercialization (transaction, manufacturing and export).
7. To examine the current Central and State regulations and policies relevant to commercial utilization of bioresources along with the details on the implementing agencies and their role.
8. To propose species of commercial importance and of conservation value for notification under section 38 of Biodiversity Act in order to regulate collection
9. To propose necessary changes in the practices and regulatory mechanism in order to promote long-term sustainability of priority species



3.3 PROJECT INFORMATION

S No	Milestones	Date
1	Project Title	Development of Data Base Of Tradable/Commercially Potential Bioresources and their Economic Valuation in Kerala
2	Sanction Order No: Total Sanctioned Amount:	GO 9Rt) No 507/2019/P&EA dated 02.12.2019 Rs 1.00 crore
	I Instalment: Order No:	G.O(Rt)No.212/2020/ P&EA Dated 15.05.2020
	II Instalment: Order No:	G.O(Rt)No.224/2021/P&EA Dated 15.05.2021
	III Instalment: Order No:	G.O(Rt)No.394/2021/P&EA Dated 07.09.2021
3	Focal Area	Tradable Bio resources quantification and economic valuation
4	Date of hiring of Subject experts and program coordinators	01.11.2020
Major workshops and consultations		
5	Inception Workshop	17.11.2020
6	Training programs to project staff	16.11.2020 04.01.2021 15.02.2021
7	Training to NCC students and volunteers	28.12. 2020 18.01.2021.
8	Regional consultations with industries at Trivandrum, Thrissur and Kozhikode	16.03.2021 02.02.2021 18.02.2021 20.02.2021 20.04.2021 21.04.2021
9	State level workshop on Bioresources and commercial utilization: Trends, Market, Supply chain and sustainability	27.09.2021 - 30.09.2021
Major review meeting held		
10	Monthly review meeting	1 st week of each month
11	Midterm Review date	5.07.2021
12	Departmental monitoring committee meeting	09.12.2020
13	Expert Monitoring Committee	17.12.2020 23.07.2021 09.08.2021 15.09.2021.



3.4 STUDY AREA AND PLAN OF ACTIVITIES

The study area extends to all the districts of Kerala. As availability of bio-resources depends on geographical conditions, efforts will be made to capture the unique bio-resources found in different geographical regions apart from the common ones. All the industries/ traders using the wild as well as domesticated bio-resources need to be surveyed and linkages have to be established for the bio-resources which are being procured from the local bodies and vice versa. The major stakeholders include Industries utilizing bio-resources, government sectors including agriculture, fisheries; the private sector; and academia.

The following methodology was adopted for conducting the bio-resource assessment: a) Secondary Data Collection related to trade of bio-resources from government and related organisation/institutes, industries, universities, and NGOs which have worked specifically on bio-resources. b) Primary Data Collection c) Survey of industries along the supply chains. The detailed methodology for each sector is elaborated in individual sections.

3.5 MAJOR BIORESOURCES COVERED

Bio-resources / biological resources in this report means: plant, animals and micro-organisms or parts thereof, their genetic material and by-products (excluding value added products) with actual or potential use or value, but not human genetic material (The Biological Diversity Act, 2002). Since the types of bio-resources are very diverse, the entire gamut of tradable bio-resources will be broadly categorized into 1) Flora (Forest based bio resources and Bio resources (Wild/Cultivated) outside forest areas 2) Fauna (Aquatic fauna – marine, estuarine, freshwater and so on). For this project, no exclusion was made in terms of tradable bio-resources as defined in the Biological Diversity Act, 2002 and all bio-resources will be included within the scope of the study. Major resources to be covered under each category are mentioned in the individual sections

3.6 PROJECT IMPLEMENTATION ARRANGEMENTS

Structure of Project Team

The project was led by the four subject experts in the following field appointed for this purpose

- Flora (Forest based bio- resources)
- Flora (Bio resources (Wild/Cultivated) outside forest areas)
- Fauna (Aquatic bio-resources, and products)
- Economic valuation

The subject experts provided guidance to the team, setting the methodology of data collection, and geographical areas to be covered and all technical guidance for the project and setting monthly targets. The project was co-ordinated by an official from KSBB who was be responsible for day-to-day coordination with the project team and ensuring timely obtaining of required permissions/ other communications. The officer was also responsible for submitting fortnightly reports to RKI or any other reports as suggested by RKI and monitoring the daily working of project team

The field level activities was carried out by Program coordinators who have been appointed for this project and each person will be responsible for two districts. They will be responsible for all field activities as per the targets and submitting daily report and monthly report for the two districts and they will be responsible for allotting the work to the team in each district as per the directions from the Board.

In addition, Program coordinators was assisted by Asst Program coordinators who was appointed for a period of six months and Project staff of KSBB at districts.



The project team was also assisted by Volunteers / Interns from colleges in each district for a maximum period of one month.

Stakeholder / community participation

- 1. Government sector :** Extensive consultation with Kerala Forest Department, Industry & commerce, Department of Ayush, Agriculture department, Fisheries department, JNTBGRI, KFRI, CMFRI, CIFT, NIPHAT, ZSI, Kerala State Federation of SC/ST, Tribal Cooperative Marketing Development Federation of India (TRIFED), Drugs Controller, Matsyafed, Marine Products Export Development Authority (MPEDA), Kerala Forest development Corporation, District Industrial Centres, Kerala Agriculture University, ICAR- NBPGR, NBFGR, CIFT, Bamboo corporation, Malabar Botanic Garden Central Tuber Crop Research Institute, Central Plantation Crop Research Institute, Coconut Development Board, Spices Board, Tea Board of India, Coffee Board, Kerala Cashew Board, NABARD etc were held
- 2. Industry :** Ayurvedic manufacturing units, Ayurveda Medical Association, Ayurvedic Manufactures Association, Aquatic product based industries, Coir , Rubber industries and Other Industries
- 3.** For the collection of primary data, extensive field surveys (with a predesigned questionnaire) among the farmers who cultivate and manage agro-biodiversity, tribes who gather the resources from the forests and also have knowledge on sustainable extraction, fishermen engaged in fishing in inland water bodies and sea were done. Further, information was also collected from bio-resources traders, wholesalers, and industries that use bioresources as raw-materials in manufacturing.

The survey covered :

1. 250 raw drug dealers
2. 800 plant nurseries
3. 138 marine landing centres
4. 4000 fishermen
5. 150 industries
6. Community organizations: Forest development Agencies (Vana Samrakshana Samithies (VSSC). Eco Development Committees, EDC), Kudumbasree, Fishermen community, Farmer Producer Companies



3.7 STRATEGY AND METHODOLOGY

Bio-resources' details including their volume/quantity and value at their exchange, trade and commercial utilization segments are collected as indicated below:

1. Bio- Resources at their origin (collection / cultivation / culture)
2. Bio-resources under commercial utilization (use as raw-materials by industries) in Kerala
3. Bio-resources transferred (going out) from Kerala to other States of the country
4. Bio-resources exported from Kerala's ports
5. Bio-resources used by industries in Kerala as well as involved in trade.

The commercially significant flora and fauna (also micro-organisms) from different ecosystems of the State (forests, marine, inland water bodies – saline and fresh water – agriculture – including live stocks) were collected from secondary and primary sources. Information has collected by the Research team appointed at the Districts levels under the supervision of the concerned Subject Experts.



The methodology employed included both desk review (research) and empirical investigation. The key sources of data included Government / public (Directorate of Industries and Commerce, State Planning Board, Department of Statistics, District Industries Centre, Check posts. Port Authority, Customs Department, Forest Department, Fisheries Department, Agriculture Department, Animal Husbandry and Livestock Department, Tourism Department, BMC / PBRs) and private institutions, NGOs, producers, markets, different industries and business enterprises, Published reports etc.

Semi-structured interview and discussions were conducted with producers, local buyers and other value chain intermediaries to understand production and supply chains. Primary survey was done among fishermen, bidders, bio-resource suppliers and users etc. The database includes:

1. Crop : The economic information of crop includes: Area of cultivation, Production, Productivity, Farm Price, Value of product and Cost of cultivation of major crops
2. Livestock: Livestock information includes production of milk, meat, unit price and total value from the sector etc.
3. Forestry: The forest products are classified into two broad groups namely Timber and NTFPs. In both cases, the species wise data on quantity and value was collected from the Forest Department.
4. Fishing and aquaculture: Data pertaining to commercial fishing in ocean, coastal and offshore waters and inland waters were collected from the Fisheries Department.

For each group, state wise and district wise details were collected for five years (2015-2020) and analyses were carried out. In order to take into account the impact of COVID 19 and natural disasters of 2018, the cumulative average were considered. For obtaining the species wise value (valuation) from different sectors, the following databases were considered;

Agricultural Crops

- The major crops evaluated includes Paddy, Spices, Sugar crops, Fresh fruits, Dry fruits, Tubers, Vegetables, Oil seeds, Fibre, Drugs, Narcotics Plantation Crops, Fodder, Medicinal plants
- Kerala State Agriculture Department is the principal source for agricultural statistics used for the estimation
- The estimates of Production, Farm Price and Value of Product are obtained from Agricultural Statistics 2018-19 and Price Statistics 2017.
- The data on export of Agricultural produce is obtained from DGCIS, APEDA and CII.
- The data on industries in food sector is obtained from MSME and District Industrial Centres

Livestock

- Milk products (include Indigenous cattle and buffalo and cross bred cattle and goat) collected from the Livestock Statistics.
- Meat group (includes Cattle, Buffalo, Pig, Goat, Poultry- desi fowl and duck and improved flow and duck. collected from the Livestock Statistics.
- The Livestock data was also derived from Economic Review 2019, Kerala State Planning Board.

Forest produce

- The data on production (yield) and value of industrial wood are collected by the Kerala State Forest department. The data on production of industrial wood generally relates to the quantities sold/auctioned at the depots.
- There is a considerable production of wood from social forests and other plantations in forests and outside forests or the forest fringe land. The available data from Kerala Forest Development Cooperation has been collected in this regard.



- The details of bidders were obtained through focussed interviews with Forest Officials or Depot Officer.(Format as in Annexure 1)
- Data of non-timber forest products collection as well as prices was obtained from Kerala State SC/ ST Federation.
- In addition to the production of industrial wood from Government forests, there would be (i) authorized (but unrecorded) and unauthorized removals of timber from reserved/protected forests and (ii) unrecorded production from private owned forests which is not considered under the scope of this study.

Wood outside Forest

- The data was compiled from a Report on Saw-mills of Kerala prepared by Directorate of Economics and Statistics, Government of Kerala.
- No latest data is available in this sector and this is one of the major data gaps in this study.
- Hence it is recommended that the Board may conduct further studies.

Fisheries (Marine and Inland)

- Kerala State Fisheries Department is the principal source of data for fishing sector.
- Data on marine product export is obtained from MPEDA and CII.
- For estimating value, the average annual auction prices of marine and inland fish (species-wise) collected by the department at the landing centres are used.

Eco-tourism

- • The data was compiled from published report of Kerala Tourism Statistics, 2019 and Kerala Forest Department.



Value/Supply Chain analysis

Considering the present condition of the bio-resources market; it is extremely difficult in tracing the bio-resources as most of their supply to the consumer industries is through the trade channel. Along this trade channel, the bio-resources could be exchanged several times, which should be captured. Through an amortised (remunerated) pricing technique, the real price of the bio-resources was estimated. The same approach is applicable in the case of bio-prospecting based research and development.

The following are the steps of the bottom-up approach (provider to the user) to understand the supply chain of bio-resources.

- ◆ Select a bio-resource (from the forest or agriculture or wetland ecosystems) which has high economic as well as ABS potential.
- ◆ Understand the status of the bio-resources (rare, endangered, threatened, endemic or abounded) and their potential.
- ◆ Examine the bio-resource's movement from its origin (local Community) to the end user (bio-resources based manufacturing company). In this regard, the movement of bio-resources from the collector/cultivators (community) to the local/village trader or SHGs (if any) to big traders (in the city) to wholesale marketers, then to bio-resources based manufacturing industry (which uses bio-resources as basic raw-materials) is explored in a systematic manner with the support of different stakeholders.
- ◆ Assessment of the bio-resources based manufacturing companies' production steps and R&D (if applicable) with complete cost details was done for understanding the value addition of the bio-resources.

3.8 PROGRESS MONITORING

The progress of the projects were regularly monitored by committees at different levels constituted for this purpose:

1. A consultative meeting regarding data sharing was conducted with officials of Departments of Forest and wildlife, Fisheries, Ayush - Indian system of medicine, Industries and commerce, Drug controlling Authority, Agriculture, Animal Husbandry, Dairy development, on 17/11/2020, under the chairmanship of Dr Usha Titis IAS, Principal Secretary, Department of Environment.
2. A Departmental monitoring committee has been established vide GO(Rt.) No. 87/2020/Envvt dated 23.10.2020 with Principal Secretary, Department of Environment, Chairman, KSBB, Dr C Bhaskaran, Chairman State Expert Appraisal Committee, and Dr K Satheesh Kumar, Board Member, KSBB. The committee reviews the achievement of the major milestones and the deliverables.
3. An expert monitoring committee with 10 members has been constituted with Dr R VVarma, Former Chairman, KSBB as Chairman to periodically review the progress of the work of project team
4. A daily reporting format and monthly reporting format for field staff has been prepared. The daily monitoring and monthly monitoring was conducted by the Senior Research Officer of KSBB. The project activities were reviewed monthly by Chairman KSBB and documented in Monthly progress report and in the Project monitoring tool of RKI.
5. A mid progress review of the projects was conducted



3.9 Outputs & Deliverables:



1. Database of bio-resources of commercial use a) Flora (Forest based bio resources b) Bio resources (Wild/Cultivated) outside forest areas) c) Fauna (aquatic wild / cultivated)
2. Data of Quantity of bio-resources used commercially and geographical location of collection as available
3. Database of various local, regional, state level, national and international agencies involved undertaking bio-survey, bioresearch and commercial utilization of bio-resources.
4. Database of Industries (both export and domestic market) in following sectors Ayurvedic, Cosmetic, Nutraceutical, Food processing, Bamboo and Cane industries, Aquatic products etc
5. Database of major traders/ Angadikada, fish markets
6. Threat status of major resources and demand and availability
7. Major ABS potential bio-resources of Kerala and its commercial utilization within the State and trading (exporting) to other States (Nations).
8. Supply chain (value addition) analysis of selected bio-resources representing major ecosystems of the State and identification of its true / real economic value
9. Estimation of the market value of selected categories of the products derived from bio-resources in the state.
10. Estimation of the sector specific ABS potential of the State.
11. Policy recommendations including Current Central and State regulations and suggest policy recommendations, Propose species for notification under section 38 of Biodiversity , Propose necessary policy changes to promote sustainability of priority species in each sector



Expected Outcomes vs Outputs and Results

Outcome	Output	Results achieved
<p>Enhanced knowledge base of sustainability of traded bioresources</p>	<ul style="list-style-type: none"> • Documentation of floral and aquatic faunal bioresources which are traded/ commercially utilized and their threat status • Documentation of volume of trade/ volume of use in commercial sectors/ industries • Documentation of the manner of utilization of bioresource, eg direct use, value added product, resources used in industrial production 	<ul style="list-style-type: none"> • Commercially used/ potential bioresources in Forest, Agriculture and Horticulture, Plantation and Agroforestry, Marine and Inland identified • Volume of trade in the above sectors during 2015-2020 identified • Major Value added products and by products identified
<p>Identification of the nature of trade, bioresources based industries, market within Kerala or export, or both</p>	<ul style="list-style-type: none"> • Database of Industries (both export and domestic market) in following sectors Ayurvedic, Cosmetic, Nutraceutical, Food processing, Traditional industries, Aquatic products etc with key economic/trade indicators in the state developed • Database of major traders in raw drugs/ornamental plants/ spices etc • Data of bioresources export and import and balance of trade 	<ul style="list-style-type: none"> • Checklist of industries in Ayurveda, herbal cosmetics, Food, Traditional industries as Coir, Cashew, Aquatic resources etc compiled • Export and import data of Food products, Marine products, Textiles and fabrics, Rubber and rubber products, Wood and wood products, Essential oils, Medicinal and other pharmaceutical products, Ayush and herbal products, Floriculture products, Tobacco, Leather and leather products, and Others (12 categories) compiled for past two years
<p>Enhanced knowledge of bio-resource value both at the ecosystem stage from which it is extracted and at the commercial stage where value addition and manufacturing is done.</p>	<ul style="list-style-type: none"> • Economic valuation of bioresources sourced from forest, agricultural sector, animal husbandry, marine and inland • Economic valuation of industries fully dependent / partially dependent on Biodiversity • Supply chain (value addition) analysis of selected bio-resources representing major ecosystems of the State and identification of its true/real economic value 	<ul style="list-style-type: none"> • Total Value of bioresources from Forest, Agriculture, Livestock, Marine and Inland calculated for last 5 years • Economic indicators of fully bioresource based and partially bioresource based industries such as fixed capital, total output and input, value added, net income and profit/loss of each type of factory (based on product manufactures) analysed • Supply chain analysis of Honey completed in detail. Supply chain of different resources as timber and other forest produce as NWFP conducted.
<p>Develop mechanism to implement the Biological Diversity</p>	<ul style="list-style-type: none"> • Major ABS potential bio-resources of Kerala and its commercial utilization within the State and trading (exporting) to other States 	<ul style="list-style-type: none"> • ABS potential of Kerala estimated based on purchase price form industries



<p>Act, 2002 and Access and Benefit Sharing Provisions.</p>	<ul style="list-style-type: none"> • Estimation of the ABS potential of High value bio-resources', such as sandalwood • Estimation of the sector specific ABS potential of the State. 	<ul style="list-style-type: none"> • ABS potential of Kerala estimated based on ex factory sale value of industries. • Sector specific ABS potential estimated.
<p>Institutional mechanism for regulation of unsustainable harvesting of bioreources</p>	<p>Identification of species of commercial importance and of conservation value for notification under section 38 of Biodiversity</p>	<p>Species for regulation of collection proposed based on volume of extraction and identified threat status</p>
<p>Bringing out necessary changes in the practices and regulatory mechanism in order to promote long-term sustainability of priority species</p>	<p>Policy recommendations that support biodiversity conservation sector wise</p>	<p>Policy recommendations that supported biodiversity conservation sector wise incorporated in the individual report</p>
<p>Strengthened awareness about commercial potentials in biodiversity business.</p>	<p>Best practises identified Promotion of Bioresources based livelihood</p>	<p>Best practises identified in different areas Start up initiatives proposed in selected sectors</p>



The report is presented as five volumes

- 1. Tradable/ Commercially Potential Bioresources of Kerala and Economic Valuation**
- 2. Tradable/ Commercially Potential Aquatic Faunal Bioresources of Kerala**
- 3. Tradable/ Commercially Potential Floral Bioresources of Kerala**
- 4. Case Studies Of Sustainable Use Of Biodiversity**
- 5. Checklists of Bioreources and Bioreources Based Manufacturing Companies**

”

The project on “Database of tradable or commercially potential bio-resources and their economic valuation in Kerala”, through the “Rebuild Kerala Initiative” has generated significant volume of database on bio-resources from different ecosystems of the state as well as explored its trade potential with respect to resources commercial use. As part of the Project volume of production/ extraction of most of the cultivated tradable bio-resources (such as the produces obtained from agriculture, horticulture, animal husbandry, aquaculture etc.) and the wild tradable ones (like forest and allied products, medicinal plants etc.) and aquatic products (marine, estuarine, fresh water) and their value has been estimated. An overview of the bio-resources based industries in the state, and the resources of ABS potential has also been identified. The analysis of the data provide some idea about the resources sustainability, volume of use in different commercial sectors and industries as well as its future demand. This information will be helpful for the policy makers in designing the BioTrade policy for the state. The report presents a detailed analysis of biodiversity goods production statistics, overall market scenario and revenue of different sectors as agriculture, forest, marine and coastal, animal husbandry etc., export scenario, ABS potential and value chain with value addition at each stage of marketing and manufacturing of selected bio-resources. Further we emphasised on various constraints and opportunities in documentation of Tradable bio-resources and its economic valuation as well as key emerging policy issues.

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4.1 KERALA'S BIODIVERSITY: BRIEF PROFILE

Kerala is a state that is rich in biodiversity. Kerala has been declared as one of the ten must-visit places on Earth during one's lifetime by National Geographic magazine. This is mainly because of the rich biodiversity and natural heritage of Kerala.

The eastern part of the State consists of the Western Ghats and the catchment of a number of rivers with very unique varieties of flora and fauna. The vegetation of mountain landscapes of Kerala consists of sholas, grasslands, dry mixed deciduous forests, moist deciduous forests, forest plantations (eucalyptus, wattle, pine, teak, sandal, etc.), commercial plantations, agri-horticultural fields and mixed farms. Biological resources are broadly sourced from forest landscapes, ecotypes represented by traditional cultivators and landraces, and wetland ecosystems. The unique agro-ecological system of this landscape is famous for a variety of cultivated crops and their wild relatives, landraces etc, and medicinal plants, which can cater to the demand for herbal medicines by domestic, national and international companies.

Many timber species in Kerala's forests are of good economic use. There are 117 species used for soft wood purposes, 146 species for extraction of tannin, 29 species for latex, 111 species for gum, 65 species for resin and 284 species for oil. 1170 species are used medicinally. The traditional/local communities, most of them empowered with bio-resources based TK in the landscape also use the locally available medicinal and aromatic plants and different agricultural produces for their day-to-day life.

The western part of the State on the Arabian Sea coast is a low-lying area with estuaries and backwaters rich in aquatic flora and fauna. The wetland ecosystem of the States primarily consists of freshwater lakes, ponds, streams, and rivers and the brackish water estuaries and backwaters. These water bodies are rich in aquatic flora and fauna having significant value. The brackish water areas in the coastal belt of the State are suitable for aquaculture. (Directorate of Fisheries, 2017 & 2020) The value estimated for the ecosystem services and natural capital of Kerala coast is US \$ 1660-1930 billion per year from an area of 260101 km² which includes brackish water, estuaries and open ocean (Joshi et al., 2015).

Kerala is a major processor of various agricultural products, such as spices, cashews, coconuts, etc. Approximately Rs. 5000 Crores worth of processed food is exported annually from Kerala. In spite of its limited land mass, Kerala accounts for nearly 20 percent in the country's total food exports. The agro-climatic conditions in the hilly areas of Kerala are conducive for the growth of highly diversified floral species which are ecologically and economically vital for the day-to-day livelihood of the natives. These areas are famous for commercial plantations like tea, cardamom, coffee, and human dominated home gardens.

In brief, the unique landscape and the agro-climatic conditions in Kerala enrich the forest ecosystem, coastal and wetland ecosystems and agro-biodiversity, which is the buffer zone of a large number of bio-resources having significant commercial value. Therefore, a systematic documentation of the biological wealth in this region, which are entering trade and manufacturing as raw-materials and ultimately entering the ABS compliance, is extremely important. The documentation of commercially important bio-resources (which enter into trade) is important in understanding the nature and stock of each resource and designing the appropriate management strategies. Further, the ABS agreements

can provide opportunities to the local communities, traditional knowledge holders, and the BMCs to conserve the biodiversity and enhance and explore further the economic opportunities of the rich biodiversity of Kerala.

4.2 ROLE OF BIODIVERSITY IN KERALA'S ECONOMY

Kerala's economic growth is driven by sectors such as food processing, spices, rubber, ayurveda, handlooms, apparels and garments, coir and traditional products such as wood carvings, designer jewellery, tourism, IT, electronics, among others. It is very clear that majority of the above mentioned sectors are biodiversity or biological resources related, as they obtained raw-materials from the biodiversity. The GSDP growth of Kerala has remained stable from 2015-16 onwards, with the state being able to maintain an average annual growth rate of 7.4 percent between 2015-16 and 2018-19. There has been a change in the state economy with diminishing share of the agriculture and allied sectors in the Gross State Value Added (GSVA) over the recent years, and the increase in the share of services in the GSVA of the state.

Kerala is a high-income Indian State and, the annual income per capita in Kerala was 1,49,563 in 2019-20 against a national average (for 2019-20) of 96,152. The average income per person in Kerala was approximately 1.5 times the Indian average in 2019-20. Crops, livestock, fishing, and forestry contributed 8.03 per cent to Kerala's Gross State Value Added (GSVA) in 2019-20 (constant prices) (Kerala State Planning Board, 2020).

The share of agriculture and allied sector in GSVA is negligible but Kerala ranks third in India with respect to GVA in agriculture per worker at 2.20 lakh as per SDG India Index 2019, Traditional industries manufacturing items; coir, handlooms, and handicrafts employ around one million people.

Kerala is one of the leading producers of natural rubber, coir, coconut, cashew, coffee and spices in the country. In the agriculture and allied sector, livestock is one the fastest growing sectors in the state. Manufacturing segment in Kerala largely consists of traditional industries such as coir, handloom and cashew processing. Services are the fastest growing sector in Kerala, with IT and tourism being the key drivers of the state's services sector. The services sector in the state shall remain the cornerstone of the state economy.

According to the Department for Promotion of Industry and Internal Trade (DPIIT), cumulative FDI inflow in Kerala was valued at US\$ 269.61 million between October 2019 and March 2021. Exports from the state stood at US\$ 3.94 billion in FY21.

- ◀ In 2019-20, the total production of horticulture crops in the state was 10219.76 thousand metric tonnes and area under production was 1590.56 thousand hectares.
- ◀ In 2019-20, the total production of vegetables and fruits were estimated at 2757.05 thousand metric tonnes and 1731.44 thousand metric tonnes, respectively.
- ◀ In 2019-20, tea production in Kerala stood at 59.26 million kgs. Tea export from the state stood at US\$ 75.65 million during 2020-21 (until January 2021).
- ◀ In FY21, the total marine products exports from Kerala accounted for US\$ 511.52 million, which was 15% of the total exports of the country.

Under SEZ Act, 2005, Kerala has 29 formally approved SEZs, 25 notified SEZs and 19 exporting SEZs. a multi-product SEZ at Kochi; two port-based SEZs at Vallarpadam and Puthuvyppeen at Kochi; a food processing SEZ near Calicut; a pulp and paper SEZ at Kottayam KINFRA Mega food Park at Palakkad, Sea food Park, Aroor, Rubber Park, Global Ayurveda Village, Thonnakal, Apparel Park, Menamkulam, Export Promotion Park, Kakkanad, Textile Centre, Taliparamba, Industrial Parks in all districts.

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.

Kerala has 18 ports, of which, Cochin is the major one. Furthermore, there are three intermediate and 14 minor ports. The state has a long coastline of 580 km & innumerable water bodies, generating a huge potential for inland & marine fishing & providing it a prominent position in fish cultivation. Kochi & Neendakara are the two major fishing harbours for mechanized sector and the Thankasserry fishing harbour is the only one for the traditional sector. Handlooms and power looms, rubber, bamboo, coir, khadi and village, sericulture, seafood and other marine products, cashew, mining, tourism, food processing, spice and spice extracts, IT & electronics. The industrial clusters include:

Table 4.1: District wise industrial clusters (key industries) in Kerala

District	Industries
Kannur	Handlooms, power looms, beedi
Alappuzha	Coir products
Idukki	Agriculture and forest based
Thiruvananthapuram	Handlooms, IT
Thrissur	Power looms, handlooms, textile, timber, tile, canning
Palakkad	Power looms, sericulture
Kollam	Minerals and mining
Kozhikode	Rubber
Wayanad	Minerals and mining
Kasargod	Minerals and mining
Kottayam	Rubber, food products, engineering
Ernakulam	IT

The following table no. 4.2 provide the biodiversity / bio-resources based sectors employment generation.

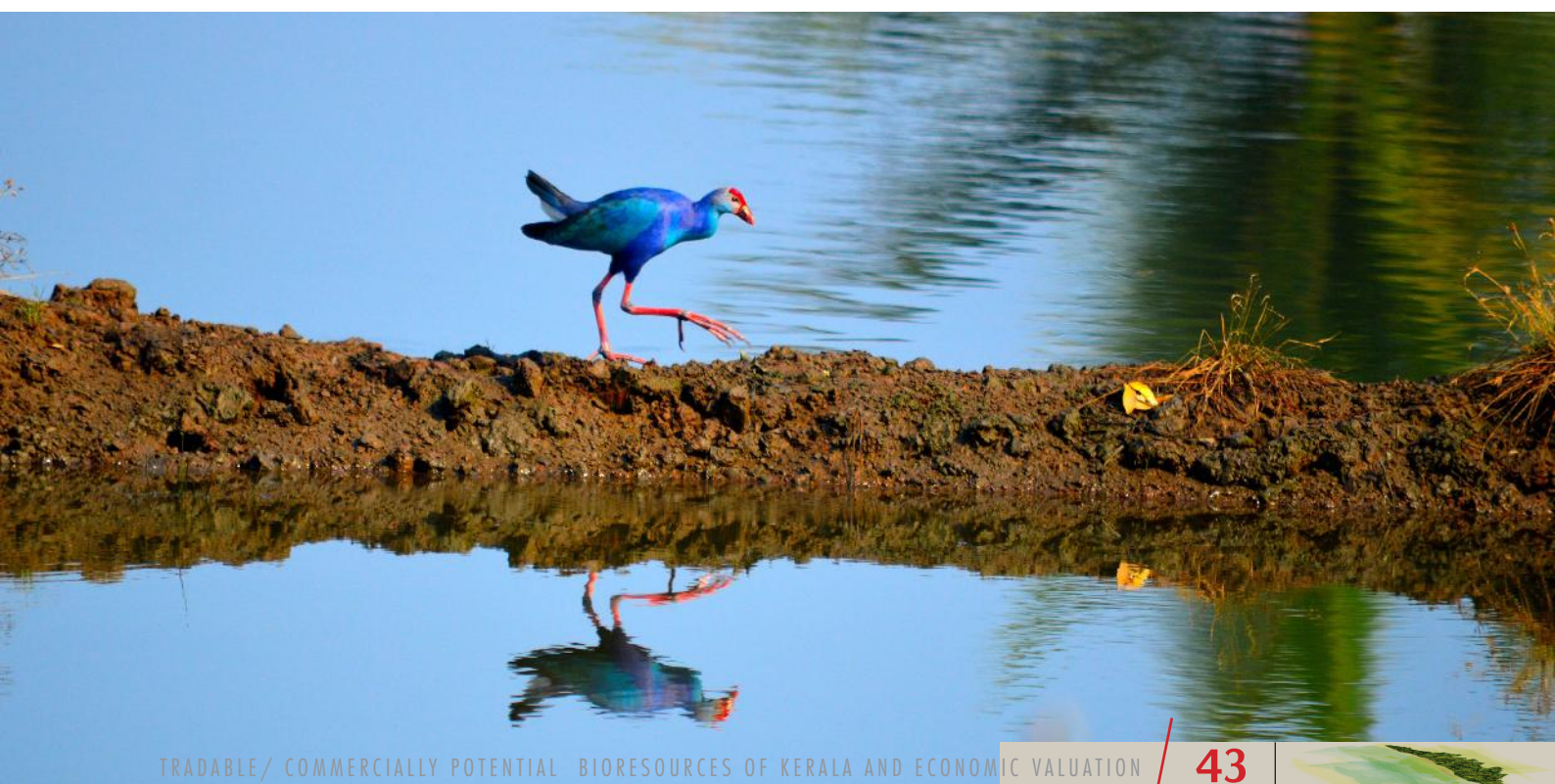


Table 4.2: District wise industrial clusters (key industries) in Kerala

S. No	Sectors	Employment (Numbers)
1	Agriculture	
	(a) Cultivators (Main and Marginal)	6,70,253
	(b) Agriculture labourers (Main and Marginal)	13,22,850
	Total	19,93,103
2	Fisheries (Active fishermen),	
	(a) Inland	92,124
	(b) Marine	2,47,849
	Total	3,39,973
	Fish Vendors	25,395
4	Forest (Forest statistics, 2019)	
	1. VSS	
	(a) SC (7,062x4)	28,248
	(b) ST (15,225x4)	60,900
	(c) Others (36,798x4)	1,47,192
	VSS Total	2,36,340
	2. EDC	
	(a) SC (3,462x4)	13,848
	(b) ST (3,868x4)	15,472
	(c) Others (5,088x4)	20,352
EDC Total	49,672	
3	Livestock – (Dairying only Poultry Others)	3,78,773
6	Tourism (Eco-tourism) only	4,50,000
	Total	34,73,256

Source: (a) Agriculture statistics at a glance 2019, Govt of India, (b) Fisheries handbook 2020, Directorate of fisheries, Govt of Kerala, (c) Dept of Animal Husbandry, (d) Kerala Tourism Perspective plan 2023.

About 10% of the population of Kerala is directly dependant on Biodiversity, in addition a considerable number of people are dependent on trade of bio resources, manufacturing different products at small scale and large scale, handicrafts, supply and value addition of bioresources, biodiversity related tourism etc

Biodiversity related sectors of the state play a significant role in manufacturing different consumer products, mobilizing state income, and generating employment opportunities and livelihood enhancement. Subsequent chapters examine the key (commercially significant) bio- resources quantity and values obtained or derived from different ecosystems or sectors of the State.

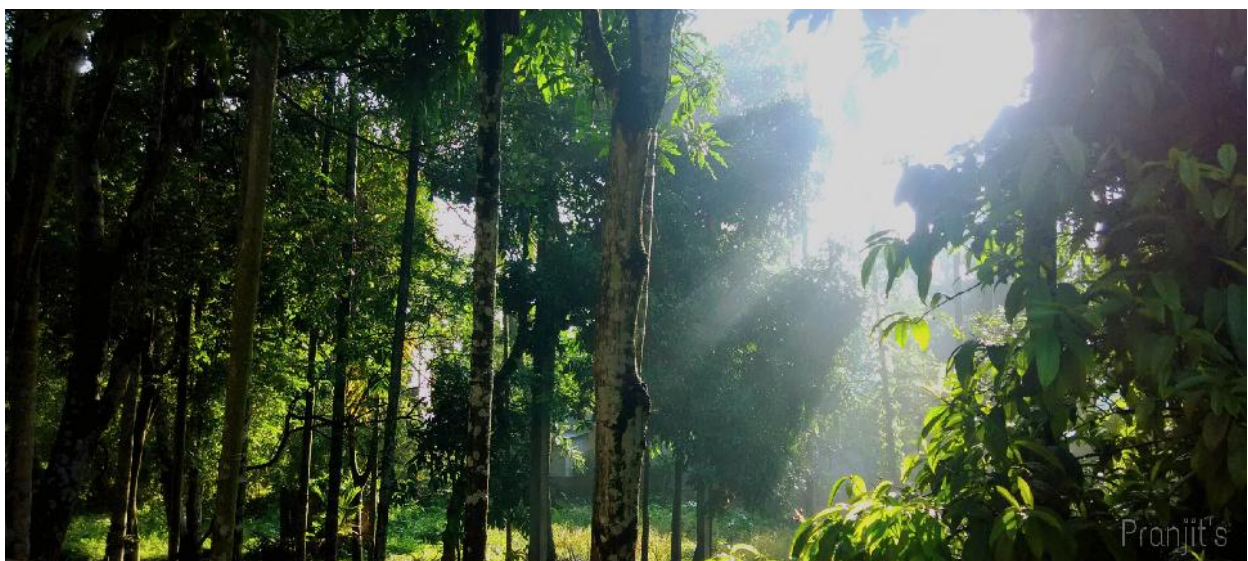
5.1 FOREST: GOODS AND SERVICES AND HUMAN WELLBEING

Forests cover one third of the earth's land mass, performing vital functions and services which make our planet come alive with possibilities. Forests play a significant role in sustaining life on earth. They are the most biologically diverse ecosystems on land and are home to more than half the terrestrial species of animals and plants. Many of the world's most threatened and endangered animals live in forests, making them crucial to sustaining ecosystems. Forests feed our rivers, which are major sources of irrigation and domestic water supply. They create and maintain soil fertility and help to regulate the devastating impact of storms and floods. Forests are often referred to as the 'lungs of the earth' as they absorb global greenhouse gas emissions. Forests play a key role in climate regulations, releasing oxygen into the atmosphere while storing carbon dioxide.

Forests also provide a home, security and livelihood to millions of people worldwide. The entire tribal ecology is dependent on forest eco-systems. The tribes collect and sell minor forest products: fruits, nuts, herbs, bamboo, firewood, skins, etc., which are the main source of their income. Around 1.6 billion people depend on forests for their livelihoods.

The benefits or positive impacts of forests reach even further. In many developing countries, over 80% of the total energy consumed by people and industry derives from forests in the form of fuel wood and charcoal. Trade in timber and other forest products are estimated at \$330 billion a year. Its value multiplies as it is processed into products used globally every day. Use of the genetic diversity within forests enables the development of new medicines, progress in healthcare and science. Forests also provide many cultural services to the community in the form of non material benefits such as recreational activities and aesthetic and spiritual enrichment. Mangrove forests are the ultimate illustration of why humans need nature. As a major coastal resource, mangroves protect the coasts from erosion and cyclonic destruction. They also support coastal and inland fisheries, act as a breeding ground for numerous birds, control floods and are a source of fuel wood.

In brief, beyond supporting the natural habitat and ecological stability, forests sustain economic growth and are a livelihood source for large numbers of poor people.



5.2 TREE (TIMBER) SPECIES OF KERALA: A BRIEF PROFILE

Kerala is home to numerous diverse tree species including an array of timber tree species. The favourable edaphic and climatic conditions in the State significantly attributed in this. Species such as *Tectona grandis* (teak), *Dalbergia latifolia* (rosewood), *Swietenia macrophylla* (mahogany), *Artocarpus heterophyllus* (Jack) *Artocarpus hirsutus* (wild jack), *Xylia xylocarpa*, *Lagerstroemia* spp., *Albizia* spp., *Terminalia tomentosa*, *Pterocarpus marsupium*, *Grewia tilaefolia* etc. are important traditional structural timber trees for industrial and furniture use.

The humid conditions of Kerala facilitate the growth of fast growing trees such as *Ailanthus triphysa*, *Gmelina arborea*, Mahogany, eucalypts, acacias, casuarinas etc. These are mainly utilised in matchwood, packing case, pulpwood and plywood industries. The enormous needs of the above industries are often curtailed however, due to the non availability of these species in required quantity. The sustenance of these industries is permitted probably due to the availability of rubber in large quantities. For instance, wooden packing case industries located in Andhra Pradesh and Tamil Nadu are supplied with sawn rubber wood from the rubber based sawmills in Kerala (Kunhamu, et. al., 2009; 2010; Anoop et. al., 2012).

Table 5.1 Sector wise Utilisation of Important Tree Species in Kerala

Sector	Species being used	Sources
Construction timbers	<i>Artocarpus heterophyllus</i> (jack), <i>A. hirsutus</i> (wild jack), <i>Tectona grandis</i> (teak), <i>Swietenia macrophylla</i> (mahogany), <i>Eucalyptus</i> spp, <i>Acacia auriculiformis</i> , <i>Acacia mangium</i>	Home gardens and forests
	Purpleheart or violet wood (<i>Peltogyne</i> spp.), mora (<i>Mora excelsa</i>), beech wood (<i>Fagus sylvatica</i>), taukkyan wood (<i>Terminalia alata</i>), Kwila or merbau (<i>Instia bijuga</i>), green heart (<i>Ocotea rodiei</i>)	Import from abroad
Furniture	Teak, rosewood, mahogany, <i>Xylia xylocarpa</i> , <i>Lagerstroemia lanceolata</i> , <i>Albizia lebbek</i> , <i>Albizia odoratissima</i> , <i>Terminalia tomentosa</i> , <i>Terminalia paniculata</i> , <i>Gmelina arborea</i> , <i>Pterocarpus marsupium</i> , <i>Bridelia retusa</i> . purpleheart, rubberwood, acacia sp.	Forests, home gardens, estates , imports from other States and abroad.
Packing case	<i>Eucalyptus</i> spp. <i>Grevillea robusta</i> (silver oak), <i>Albizia</i> spp, <i>Alstonia scholaris</i> , <i>Olea dioica</i> (edana), cashew wood, cocoa wood, <i>A. heterophyllus</i> , <i>A. hirsutus</i> , <i>Erythrina indica</i> , <i>Bombax ceiba</i> , <i>Michaelia chempaka</i>	Estates, home gardens , import from other States.
Matchwood	<i>Ailanthus triphysa</i> (matty), <i>Macaranga peltata</i> (vatta), <i>Alstonia scholaris</i> (pala), <i>Bombax ceiba</i> (elavu) and <i>Albizia</i> spp.	Home gardens, forests
Plywood	Rubberwood, <i>Macaranga peltata</i> (vatta), eucalypts, silveroak, <i>Terminalia chebula</i> (kadukka), <i>Vateria indica</i> (white dammar), <i>kalpine</i> , <i>Swietenia macrophylla</i> (mahogany), <i>plavu</i> , <i>anjily</i> , imported sp.	Estates, home gardens , imports from other States and abroad.

Source: Kunhamu, T.K. 2017

Physical and Biological Characteristics of Different Tree Species and Timber Usages

1. Teak (*Tectona grandis*): It is a large to very large deciduous tree growing up to 25-45 m in height and reaching diameters up to 190 cm. It is a versatile timber species with multiple uses such as building construction and various types of plywood including decorative plywood. It is also used to build furniture, cabinets, poles and textile mill accessories. Its unique properties can be utilised to make musical instruments; mathematical, engineering and drawing instruments, as well as for boat and shipbuilding.

2. Irul/Kadamaram (*Xylia xylocarpa*): It is a medium to large species which can grow up to 15-25 m in height and up to 70 cm in diameter. Its uses include construction of bridges, buildings, poles, cross arms, ballies and fence posts. It is also sturdy enough for utilisation as railway sleepers as well as boat and shipbuilding. Textile mill accessories and agricultural implements are also made using this wood.

3. Maruthu (*Terminalia arjuna*): It is a large evergreen tree with spreading crown and drooping branches, growing up to 18-24 high and over 3 m in girth. The bole is rarely long or straight and is usually buttressed and often fluted. The timber is mainly used for making agricultural implements, water troughs, and may also be used for boat building, cart making and pit props. The constructional purposes include door and window frame construction. Plywood and block boards are also made from this species. As the trees are found on river banks, they are often not felled for fear of erosion.

4. Vaka/Pulivaka (*Albizia odoratissima*): It is a medium size tree, growing up to about 20 m in height and up to 100 cm in diameter. It is utilised in making commercial and decorative plywood, as well as in making furniture, cabinets, tool handles and flush door shutters. It is a useful timber species in construction of buildings, bridges, railway sleepers, and mathematical and engineering instruments. Shafts of carts and carriages can also be made from the timber of this species.

5. Venga/Karavenga (*Pterocarpus marsupium*): It is a large to very large deciduous trees, which can grow up to 30 m in height. The heartwood which is strong, tough and durable and of good quality can be used for various purposes including manufacture of musical instruments, door and window frames, posts, agricultural implements. It can also be used for boat and cart building, as well as construction of railway carriages and railway sleepers.

6. Anjily (*Artocarpus hirsutus*): It is a large to very large tree that grows up to 25-45 m in height with a clear bole of around 10-20 m and up to 130 cm in diameter. Its uses include boat and shipbuilding; and incorporation in vehicle bodies; beams, rafters, window, door frames and ceiling boards. It is also used in manufacturing of furniture, cabinets, turnery, and flush door shutters; Class I plywood and veneers. Additionally, tool handles, fence posts, textile mill accessories, cooperage, and hurdles for sports; mathematical, engineering and drawing instruments, brush ware, carts and carriages can also be made from this wood.

7. Rosewood (*Dalbergia latifolia*): It is a medium to large tree with a straight, cylindrical bole; growing up to 15-30 m in height and up to 130 cm in diameter. It yields one of the best known Indian timber, which is utilised for the manufacturing of high class furniture and cabinet. This wood is also good for construction of buildings and flush door shutters. Fabrication of Class I, decorative, aircraft and marine plywoods can also be done using this wood. Other common uses include making of tool handles; artificial limbs and rehabilitation aids; textile mill accessories; chess pieces, discus and carom draughts; musical instruments; engineering instruments: bentwood articles and handicrafts.

8. Mahogany (*Swietenia macrophylla*): It is a large tree that can grow up to 25 m tall with girth up to 4 m. It is one of three species that yields genuine mahogany timber (*Swietenia*), the others being *Swietenia mahagoni* and *Swietenia humilis*. It is popular because of its beauty, durability, and colour.



The straight, fine, and even grain of the wood, which is relatively free of voids and pockets makes it an highly sought after timber species. Its reddish-brown colour darkens over time, and displays a reddish sheen when polished. It has excellent workability, and is very durable. These properties make it a favourable wood for crafting cabinets and furniture. Historically, the tree's girth allowed for making wide boards. It is also used in the manufacture of furniture, boats, musical instruments and flooring veneers.

9. Kambakam/Thambakam (*Hopea parviflora*): This tree is large to very large, growing up to 25-40 m in height with a clear bole of 10-20 m and up to 130 cm in diameter often with a buttressed trunk form. The wood is commonly utilised in the manufacturing of beams, rafters and trusses used in building construction. Other uses include manufacturing of planks for shipbuilding, tool handles, poles and posts, railway sleepers, cart and carriages.

10. Thembavu (*Terminalia elliptica*): This tree is medium to large, growing up to 15-30 m in height with a clear bole of 8-15 m and up to 100 cm in diameter. The wood is used in construction of buildings and bridges, where they form integral components such as beams, rafters, posts, door and window frames. Fabrication of Class I, general purpose and decorative plywood is also one of its uses. Other uses include manufacturing of furniture and cabinets; block boards; tool handles; piles, poles and fence posts; railway sleepers; sports goods; lorry and bus bodies; cart and carriages.

11. Venteak/Venthekku (*Lagerstroemia microcarpa*): It is a large tree that grows up to about 20-30 m in height with a clear bole of 12-15 m and up to 110 cm in diameter. The timber is largely used for building construction, being incorporated in door and window frames. Its timber also has other varied utility including creation of battens for tea- chests, packing cases, ammunition and explosive boxes, pent top wooden cases, wooden ladders and trestles, wooden poles for overhead power and telecommunication lines, fence posts, panelled and glazed shutters, furniture and cabinets, tool handles, poles and posts, wooden crates, mine work, ballies, railway sleepers, textile mill accessories, artificial limbs and rehabilitation aids, boat and ship buildings, lorry and bus bodies, clubs, strip flooring, balancing bench, javelins, hurdles, vaulting stands and balancing bars, cooperage, cart and carriages, bent wood articles and toys. Its unique bending properties makes it suitable for making common grades of badminton and tennis rackets, boat parts, shafts and walking sticks.

12. Jack/Plavu (*Artocarpus heterophyllus*): It is a medium to large tree, growing up to 18-25 m in height, and up to 120 cm in diameter. The common uses of its timber include manufacturing of commercial plywood, flush door shutters, tool handles, musical instruments, mathematical, engineering and drawing instruments and cart shafts. It is also used in construction of buildings and railway sleepers.

13. Unnam/Chadachi (*Grewia tiliaefolia*): It is a tree of medium size, growing up to 20 m in height, with a clear bole of 8 m and up to about 65 cm in diameter. The timber is used for manufacturing of agricultural implements, tool handles, badminton rackets, clubs, balancing bench, hurdles, cricket stumps and bails, lorry and bus bodies, brush ware, carts and carriages. The timber also has constructional purposes like door and window frames, furniture, poles, ballies, cross arms, fence posts and railway sleepers, tent accessories. It is utilised in boat and shipbuilding as well.

14. Thanni (*Terminalia bellerica*): It is a large tree, which grows up to 20-30 m in height with a clear bole of 10-15 m and up to 130 cm in diameter, often seen with a buttressed form. The utility of its timber includes manufacturing of temporary construction-work, general purpose Class I plywood, blockboards, heavy packing cases and boxes.

15. Karimthakara (*Albizia procera*): It is a large tree, which grows up to about 30 m in height with a clear bole of 12 m and up to 80 cm in diameter. The timber is utilised for manufacturing of commercial plywood, flush door shutters, tool handles, musical instruments, mathematical, engineering and



drawing instruments, and shafts of carts. It is also used in buildings and railway sleeper construction.

16. Poovam (*Schleichera oleosa*): It is a large deciduous tree growing to 30 m height, often having a fluted trunk with diameter up to 100-150 cm. The heartwood is reddish to pinkish-brown and is clearly demarcated from the sapwood. The wood is very hard, very heavy and very strong. It is difficult to work, being very hard to saw, though it can be planed to a very smooth surface which takes a high, lasting polish. It yields an excellent wood for making pestles, cartwheels, axles, ploughs, tool handles and rollers of sugar mills and oil presses. It is also used in house construction, ship building and manufacturing of musical instruments. The wood is suitable as firewood and makes excellent charcoal.

17. Kanjiram (*Anogeissus latifolia*): It is a large tree, which grows up to 30 m in height with a clear bole of 15 m and up to about 60 cm in diameter. The timber is used to make tool handles, agricultural implements, railway sleepers, clubs, gymnastic rings, jumping and vaulting stands, carts and carriages, picker arms in textile mills, cross arms and ballies. The wood is also suitable for making excellent charcoal.

18. Kanikonna (*Cassia fistula*): It is a medium sized deciduous or semi-deciduous tree, growing up to 10 to 15 m tall with a straight bole of up to 5 m and 1 m in diameter. It provides fuel-wood and good quality charcoal, as well as a hard and heavy timber suited to make furniture, farm implements, posts, wheels and mortars. The bark yields tannins and dyestuff.

19. Elavu (*Bombax ceiba*): It is a large to very large sized tree, deciduous 25-40 m in height with a clear bole of 15-25 m and up to 150cm in diameter, often having huge buttressed form. It is used for making class III plywood and veneers, packing cases and boxes, match splints and boxes, wooden crates, fishing floats, cooperage toys, pencil slates, dug-outs, drums and cheap grade pencils as well as in shipbuilding.

20. Kulamavu/Ooravu (*Persea macrantha*): It is a large tree, which grows up to 20-30 m in height and up to 100 cm in diameter. Its timber is used for flooring and ceiling boards, Class I plywood for general purposes, packing cases, boxes and match splints.

21. Manjakadambu (*Haldina cordifolia*): It is a medium to large sized tree, growing up to 15-35 m in height and up to 110 cm in diameter. The timber is used to manufacture class I plywood, tea chests, furniture and cabinets, block boards, tool handles, bobbins, cricket stumps and bails, and musical instruments.

22. Mazhamaram (*Samanea saman*): It is a deciduous Tree growing to 20 m (65ft) by 30 m (98ft) at a fast rate. The wood is light in weight but highly durable. It is used for carvings, furniture, panelling, boat building, interior trim, crafts, boxes, veneers, and general construction.

23. Mulluvenga (*Bridelia crenulata*): It is a small to medium sized tree, growing up to 8-18 m in height, and up to 65 cm in diameter with cylindrical straight stem having strong conical spines up to 5 cm long on the bark of the young stem. It yields good second class timber used for construction, door and window shutters, rafters, posts and floor boards and other domestic purposes. It is also used for making agricultural implements, tool handles, handicrafts, yokes, packing cases, mine work, railway sleeper, furniture, cabinets, carts and carriages.

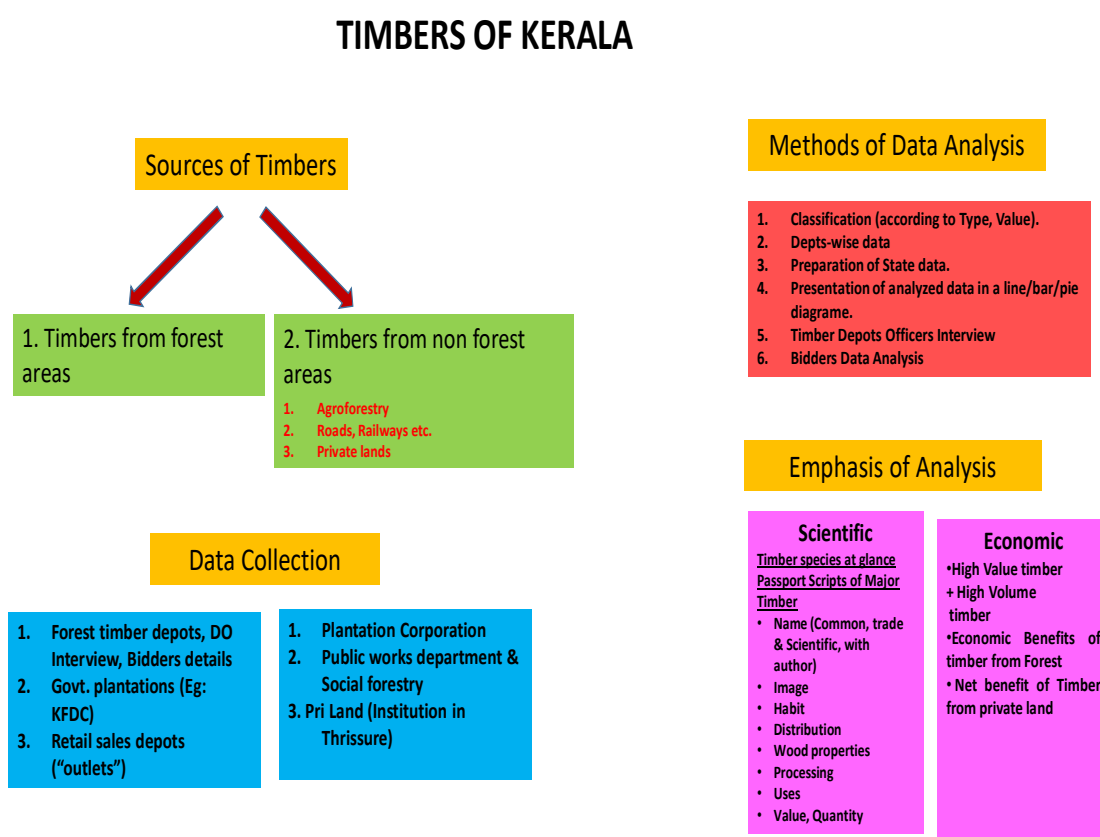
24. Pala (*Alstonia scholaris*): It is a medium to large sized evergreen tree, growing up to 30 m in height with a clear bole of 6-15 m and up to about 60-180 cm in diameter. It is often buttressed at the base. The timber is mainly used for class III plywoods and veneers, light packing cases and boxes, match splints, pencil slats, block boards and wooden footwear. It is a specified timber for the manufacture of extension and escape ladders for fire fighting.



5.3 ESTIMATION OF THE VALUE OF TIMBER FROM KERALA'S FORESTS

Kerala's forest ecosystem is rich with timber (wood). Hence, extraction, trade, commercial utilization and ABS scope of high value timber has been considered in the purview of tradable bio-resources' documentation and the ambit of ABS. Information on the high value resources, such as sandalwood and other timber were collected from the Forest Department's store houses or depots which are engaged in auction with a structured format. The auction details for the last 5 years, such as: items auctioned with their quantity, auction price/value, shipment and end use of the timber, etc. collected and the cumulative auction value may be considered for further investigation. The ABS potential of high value bio-resources is also estimated based on the norms prescribed in the ABS Guidelines, 2014 and 2019 (Draft) as well as the Guidelines issued by the NBA for the red sanders' (*Pterocarpus santalinus*) ABS estimation.

The methodology followed for data collection and analysis is summarised in a figure given below (Fig. 5.1)



Timber is one of the predominant resources extracted from the forests and its value is huge. Kerala's timber (especially teak, irul, maruthu, vaka, vengal, anjily, rosewood, mahogany, kambakam, thembavu, ventek, jack, myla, unnam/chadachi, thanni, karimthakara, poovam, and kanjiram) has good market and huge quantity is supplied annually. In 2020-21, 216.8 crore was collected towards revenue from the sale of timber alone which accounted for 91.6 per cent of the total forest revenue. The *Marayoor* sandalwood has a high demand even in international markets. Generally, the ABS potential of timber is significant and the KSBB need to really absorb its possibilities. In the case of NBA, out of the total ABS amount collected so far, around 95% has been obtained from red sanders. A snapshot of major forest produce (timber) during the year 2019-21 is given below (Table 5.2). Production of teak and bamboo decreased considerably during 2020-21. Production of teak decreased by 7402 cubic meters in comparison to previous year while sandalwood production increased by 11.7 per cent during the year.

Table 5.2 a Production of Major Forest Produce (2019-20 & 2020-21)

Sl.No	Item	Unit	2019-20	2020-21
1.	Timber	Cum.	30274.605	20664.477
2.	Fire wood	MT	4258.355	3350.75
3.	Honey	Kg.	25661.100	26115.700
4.	Reeds	MT	653.960	918.940
5.	Bamboo	MT	1986.570	60.668
6.	Eucalyptus	MT.	23.264	7.773
7.	Sandal wood	Kg.	69692.000	77872.696
8.	Accacia auriculoformis	MT	98.413	82.585
9.	Accacia Manjium	MT	2.604	13.18

Table 5.2 b Revenue from Forest Products (Rs in lakh)

S No	Item	2018-19	2019-20	2020-21
1.	Timber	24438.24	22651.6	21682.01
2.	Firewood and Charcoal	138.27	84.75	165.63
3.	Receipts from sale of forest produce coming under the Kerala private forest (Vesting and Assignment) Act.	31.27	10.80	0.00
4.	Receipts from forest development tax	1397.74	1183.18	1128.99
5.	Receipts under Kerala Forest Produce	32.52	22.91	8.00
6.	Other Items	191.01	64.58	70.97
	Total	26229.05	24017.92	23055.60



Table 5.2 c Outturn of Timber as on 31.03.2020

Sl.No	Species	Unit	Production
1	Acacia	MT	234.15
2	Anjily	MT	2.60
3	Akil/Vellakil	M3	19.38
4	Ambazham	M3	5.50
5	Anjilu	M3	237.02
6	Bamboo	MT	1986.57
7	Billets	MT	1470.09
8	Chandanavembu/ Red-cidar	M3	2844.26
9	Cheeni	M3	63.82
10	Chorakkali	M3	505.61
11	Elavu/Poola	M3	220.16
12	Eucalyptus	MT	23.26
13	Fire wood	MT	4322.95
14	Irul	M3	794.91
15	Jack/Plavu	M3	94.54
16	Kambakom	M3	333.1.5371
17	Kanjiram	M3	1.53
18	Karimthakara	M3	5.83
19	Karigazha	M3	6.65
20	Karuva	M3	10.11
21	Kulamavu/ooravu	M3	371.88
22	Kumbil	M3	5.38
23	Kunnivaka	M3	14.53
24	Kurangatti	M3	11.38
25	Mahagony	M3	48.33
26	Malaveppu	M3	1.45
27	Manimaruthu	M3	5.83
28	Manjakadambu	M3	13.64
29	Maruthu	M3	1699.04
30	Matti	M3	39.27
31	Mavu	M3	32.31
32	Mazhamaram	M3	4.87
33	Mullankaini	M3	97.42
34	Mulluvangai	M3	50.89
35	Murikku	M3	0.52
Sl.No	Species	Unit	Production
36	Njaval	M3	99.85
37	Pala/Mukkampala	M3	142.40



38	Pali	M3	10.87
39	Pathiri	M3	1.30
40	Poochakadambu	M3	21.25
41	Poomaram	M3	2.19
42	Poon/Punna/Punnappa	M3	45.79
43	Poovam	M3	135.45
44	Pothondi	M3	7.65
45	Parakom	M3	0.10
46	Reeds	MT	653.96
47	Rosewood	M3	186.80
48	Sandal wood	Kg	69692
49	Silver Oak	M3	27.63
50	Teak	M3	19492.94
51	Teak poles	MT	14094.72
52	Thanni	M3	192.62
53	Thellippaine	M3	8.27
54	Thembavu/Karimaruthu	M3	107.91
55	Unnam/Chadachi	M3	87.58
56	Uthi	M3	4.81
57	Vaka	M3	49.12
58	Vatta	M3	148.90
59	Vediplavu	M3	3.33
60	Vetti	M3	2.84
61	Vengai	M3	192.38
62	Venteak	M3	245.34

5.3.1 TIMBER AUCTION IN KERALA

For collection of timber data from the depots a format has been prepared (Annexure 1). With the permission of the Head of the Forest Department of Kerala, our project staff visited each depot and collected the information. An interview was conducted with the depot officer with a pre designed questionnaire (Annexure 2) to know more about the depots as well as the trend and nature of different timber auctioned over a period. Further, bidders interview (each depot wise) was also carried out with a designed format (Annexure 3) to understand the magnitude and extend of trade and manufacturing from the timber.

The secondary data pertaining to quantity and value of different timber species of Kerala forest for the last 5-6 years (2015 - 2020) was collected from the records of 27 timber depots of Kerala Forest and Wildlife Department. The trend of the quantity of timber species sold through e-auction and the revenue generated for this period were collected and analysed. Teak is the major timber species in all depots of Kerala. The miscellaneous timber represents economically important timbers other than teak. It includes irul, maruthu, vaka, vengai, anjily, rosewood, mahogany, kambakam, thembavu, venteak, jack, myla, unnam/chadachi, thanni, karimthakara, poovam, kanjiram etc. The 27 timber depots in Kerala come under six timber sales divisions (Table 5.3).
Table 5.3

Table 5.3 Timber Depots in Kerala

Timber Sales Division	Timber Depot	District	Year of Establishment*
1. Thiruvananthapuram	1. Achencoil	Kollam	1975
	2. Aryankavu	Kollam	1945
	3. Kulathupuzha	Kollam	1970
	4. Thenmala	Kollam	1965
2. Punalur	5. Pathanapuram	Kollam	1970
	6. Tuet	Kollam	NA
	7. Kadakkamon	Kollam	1924
	8. Areekkakkavu	Pathanamthitta	1970
	9. Konni	Pathanamthitta	1968
	10. Veeyapuram	Alappuzha	1820
3. Kottayam	11. Kothamangalam	Ernakulam	1970
	12. Thalakkode	Ernakulam	1966
	13. Vettikkad	Kottayam	1920
	14. Parampuzha	Kottayam	1970
4. Perumpavoor	15. Chalakkudy	Thrissur	1950
	16. Chettikkulam	Thrissur	NA
	17. Mudikkal	Ernakulam	1970
	18. Varappuzha	Ernakulam	1960
	19. Vettoor	Ernakulam	1965
5. Palakkad	20. Nedunkayam	Malappuram	NA
	21. Aruvakkode	Malappuram	2014
	22. Walayar	Palakkad	NA
6. Kozhikode	23. Chaliyam	Kozhikode	NA
	24. Kuppady	Wayanad	NA
	25. Baveli	Wayanad	NA
	26. Kannavam	Kannur	2014
	27. Parappa	Kasargode	1990

Source: Interview with the concerned depot officer*

A. DIVISION AND DEPOT WISE ANALYSIS OF TIMBER

Division and Depot wise Analysis of timber data has been carried out and it revealed the following conclusions:

1. Aryankavu Timber Depot

The analysis of five years quantity and value data collected from the Aryankavu Government timber depot at Thiruvananthapuram division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 398.68 cubic meters (M3) that accounts 75.17 % of the total timber auctioned in this depot. The Aryankavu depot had fetched Rs. 2,20,36,981/- as revenue (cumulative average) through the timber auction to the Government. It accounts for 93.12 % of the total revenue received at Aryankavu depot.

The miscellaneous timbers account a quantity of 24.83% of the total timbers and it contribute to 6.88% of total timber value (cumulative average). Among miscellaneous timbers Mahagony, Maruthuu, Anjily,



Mazhamaram, Unnam, Venteak, Uravu, Pulivaka and Kambakom contribute to significantly both in cumulative quantity and cumulative value.

The Aryankavu timber depot conducted 84 auctions during the period of 2015 to 2019. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2019. The quantity and value of teak auctioned was very low during 2015-16 and showed an increasing trend from 2016 to 2017 and again showed a decreasing trend from 2017 to 2019 (details are given in the Tables 5.4 (a)&(b) and figures 5.2 (a)-(f)).

Table 5.4 (a)
Quantity and Value of Timber Auctioned from Aryankavu Depot

Sl. No.	Species Name	2015 (7)		2016 (4)		2017(22)		2018 (21)		2019 (30)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	170.71	13053109.54	39.64	2605960.36	798.78	56938026.38	879.35	55455393.00	104.91	4169398.00
2	Mahagon y	1.17	39668.25	2.22	54985.60	34.44	1305658.38	79.46	2632926.00	0.71	5105.00
3	Maruthuu	0.00	0.00	0.00	0.00	128.26	1224472.05	6.31	135711.00	0.00	0.00
4	Anjily	0.00	0.00	0.00	0.00	17.27	473770.02	5.90	171895.00	0.00	0.00
5	Mazhamaram	0.00	0.00	0.00	0.00	25.36	88906.64	46.86	500586.00	0.00	0.00
6	Unnam	1.73	8876.50	0.00	0.00	31.90	504310.58	2.76	40452.00	0.00	0.00
7	Venteak	4.46	50721.90	0.00	0.00	34.93	440094.02	3.18	60969.00	0.00	0.00
8	Uravu	0.00	0.00	0.00	0.00	39.72	356455.08	0.00	0.00	0.00	0.00
9	Pulivaka	5.71	201155.10		0.00	0.00	0.00	5.93	124813.00	0.00	0.00
10	Kambakom	0.00	0.00	0.00	0.00	5.76	219528.32	2.00	71865.00	0.00	0.00
11	Others	0.00	0.00	2.88	43622.20	151.83	964888.45	14.41	49222.00	0.41	431.00
	Grand Total	183.78	13353531.29	44.73	2704568.16	1268.24	62516109.92	1046.15	59243832.00	106.03	4174934.00



(Cumulative Annual Average: 2015-2019)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	398.68	75.17	22036981.21	93.12
2	Mahagony	23.60	4.45	673057.21	2.84
3	Maruthuu	26.91	5.07	226697.18	0.96
4	Anjily	4.63	0.87	107610.84	0.45
5	Mazhamaram	14.44	2.72	98248.77	0.42
6	Unnam	7.28	1.37	92273.18	0.39
7	Venteak	8.51	1.61	91964.15	0.39
8	Uravu	7.94	1.50	59409.18	0.25
9	Pulivaka	2.91	0.55	54328.02	0.23
10	Kambakom	1.55	0.29	48565.55	0.21
11	<i>Others</i>	<i>33.91</i>	<i>6.39</i>	<i>176360.61</i>	<i>0.75</i>
	Grand Total	530.37	100.00	23665495.90	100.00

Figure 5.2 (a)

Percentage share of Timber Quantity: Aryankavu
(Cumulative Annual Average: 2015-2019)

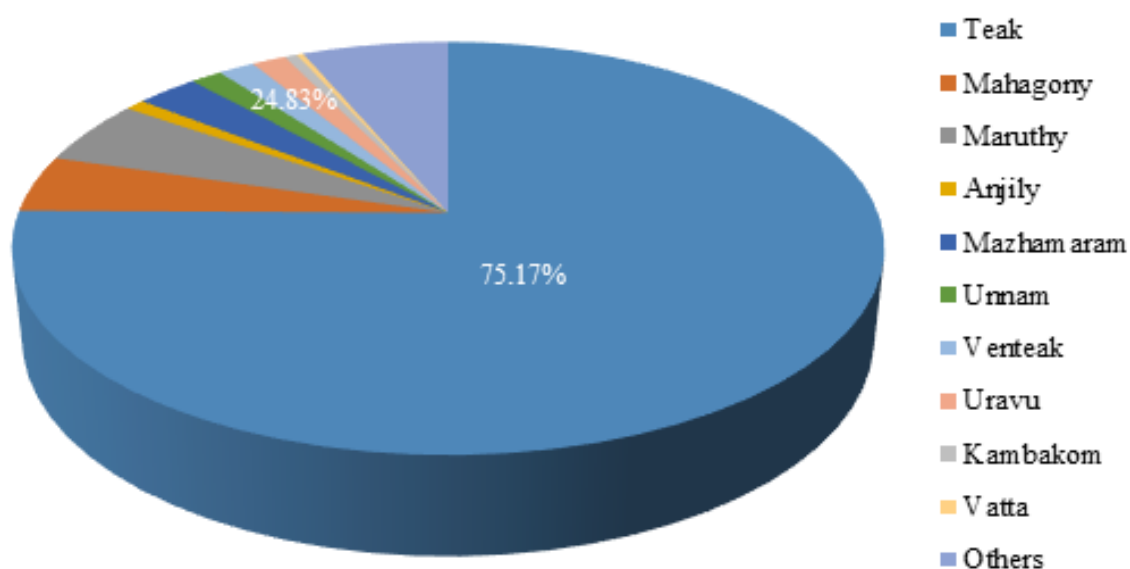


Figure 5.2 (b)

Percentage Share of Timber Value Aryankavu
(Cumulative Annual Average: 2015-2019)

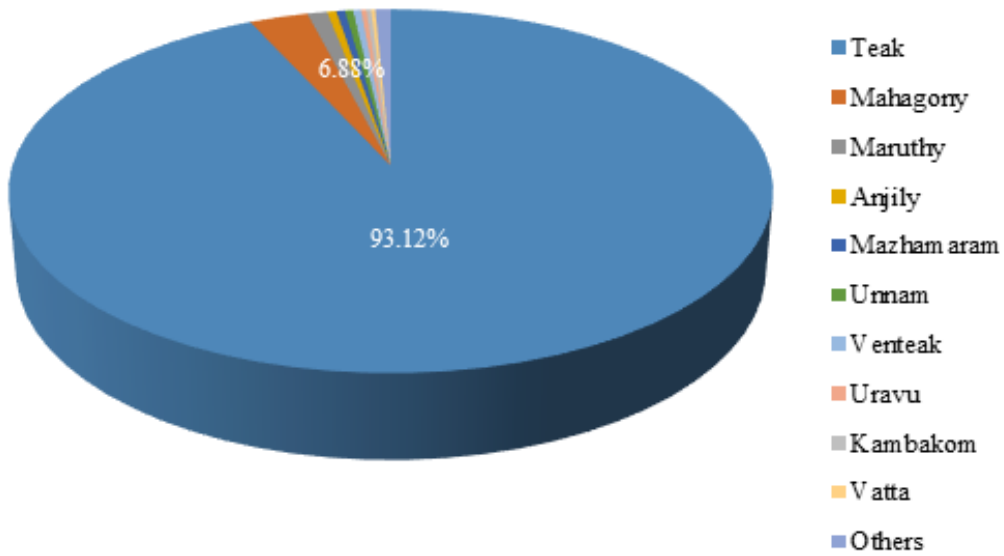


Figure 5.2 (c)

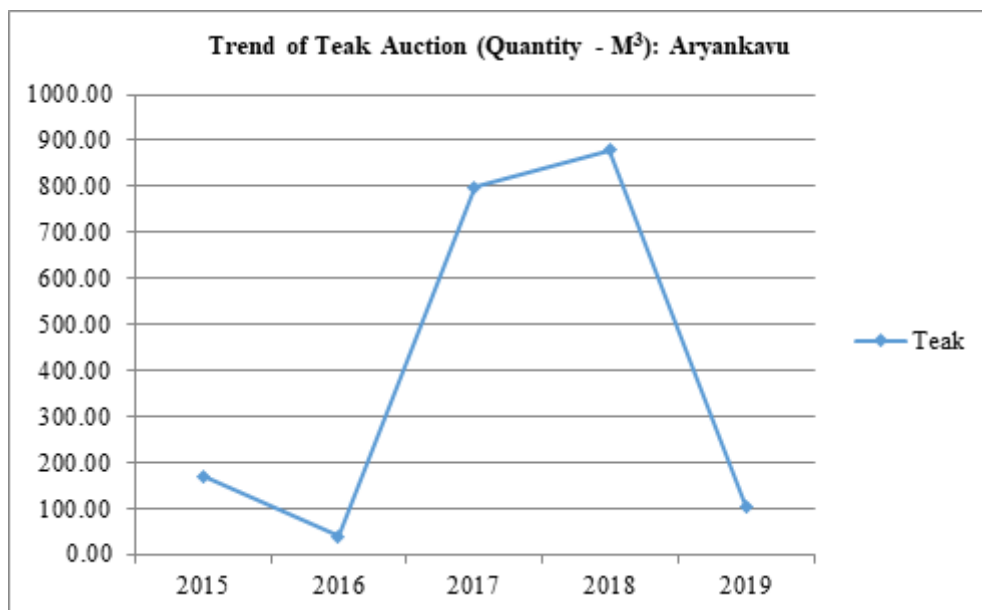


Figure 5.2 (d)

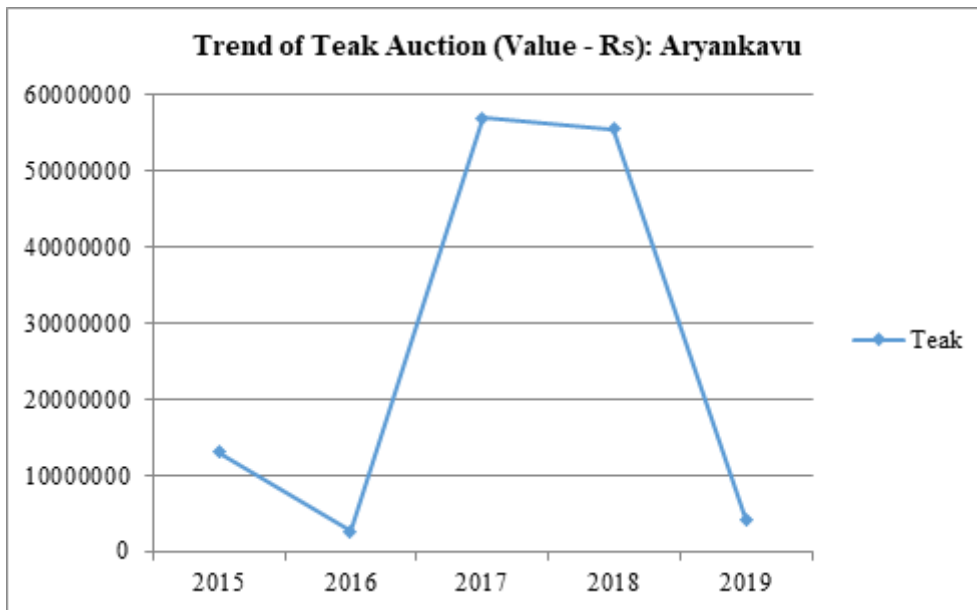


Figure 5.2 (e)

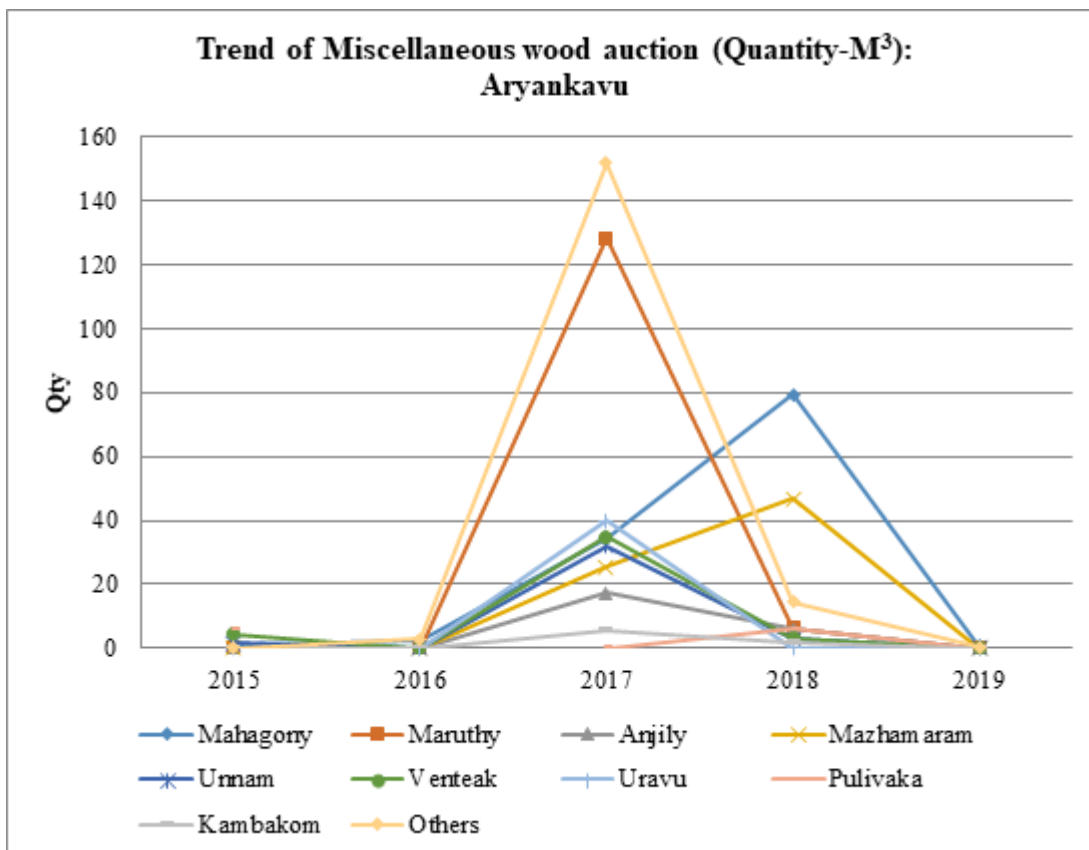
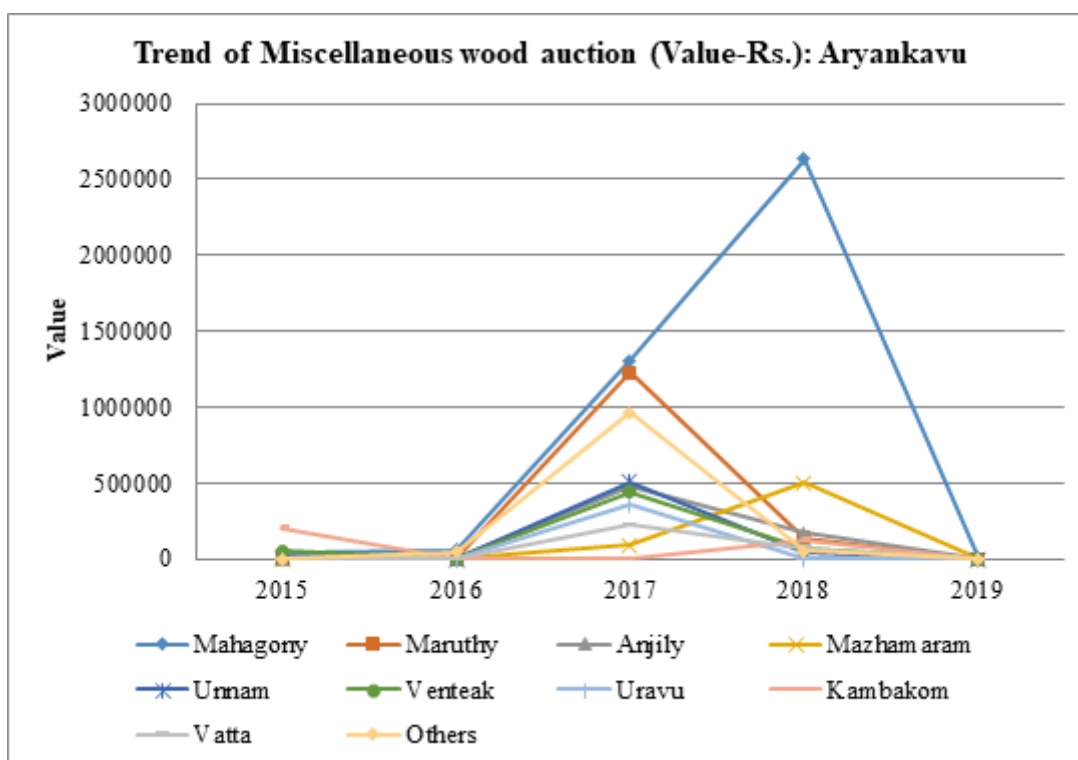


Figure 5.2 (f)



The analysis of five years quantity and value data collected from the Achankovil Government timber depot at Thiruvananthapuram division indicates that the main timber species auctioned is teak with an annual cumulative average quantity of 2023.91 cubic meters (M3) that accounts 62.42% of the total timber auctioned in this depot. The Achankovil depot had fetched Rs.12,71,42,790 /- as revenue (cumulative average) to the Government. It accounts 87.31 % of the total revenue received at Achankovil depot.

The miscellaneous timbers account a quantity of 37.58% of the total timber and it contribute to 12.69% of total timber value (annual cumulative average). Among miscellaneous timbers Unnam, Pulivaka, Maruthuu, Kadamaram, Mulluvenga, Thanni, Venteak, Anjily and Thembavu contribute almost equally to both cumulative quantity and cumulative value.

The Achankovil timber depot conducted 107 auctions during the period 2015 to 2019. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2019. The quantity and value of teak auctioned showing increasing trend from 2016 to 2019 (details are given in the Tables 5.5 (a)&(b) and figures 5.3 (a)-(f)).

Table 5.5 (a)
Quantity and Value of Timber Auctioned from Achankovil Depot (107)

Sl. No.	Species Name	2015 (32)		2016 (16)		2017 (27)		2018 (21)		2019 (11)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	1310.32	118254506.92	686.97	63775736.77	1800.99	113981001.86	2332.22	157900456.00	3989.07	181802251.00
2	Unnam	74.47	1570793.01	71.93	1899384.99	1206.57	21019564.64	848.05	12036386.00	627.64	10295521.00
3	Pulivaka	46.14	1381027.04	37.88	1459554.51	256.71	7502163.41	97.97	2360708.00	8.75	198360.00
4	Maruthuu	106.38	1304842.47	34.97	676635.51	518.01	4121211.17	249.86	2492800.00	211.56	2045562.00
5	Kadamaram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	263.10	5883912.00
6	Mulluvenga	7.87	103832.65	6.51	109031.64	60.27	908102.98	81.86	1008382.00	158.29	2387623.00
7	Thanni	14.74	182921.23	8.33	125793.00	206.24	2585270.28	12.44	168376.00	60.43	576926.00
8	Venteak	13.46	188293.94	4.28	74775.75	62.63	721160.09	71.97	898491.00	26.76	309374.00
9	Anjily	2.79	57575.98	19.70	581101.85	27.40	791851.41	5.27	90284.00	0.00	0.00
10	Thembaru	0.27	1507.00	2.47	39072.10	22.80	263507.98	13.22	126944.00	9.80	134223.00
11	Others	112.82	974635.07	27.94	218226.81	172.19	984278.26	106.21	670247.00	112.28	850312.00
	Grand Total	1689.25	124019935.29	900.99	68959312.94	4333.81	152878112.08	3819.06	177753074.00	5467.66	204484064.00

Table 5.5 (b)
Quantity and Value of Timber Auctioned from Achankovil Depot (107)
(Cumulative Annual Average: 2015-2019)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	2023.91	62.42	12,71,42,790.51	87.31
2	Unnam	565.73	17.45	93,64,329.93	6.43
3	Pulivaka	89.49	2.76	25,80,362.59	1.77
4	Maruthuu	224.16	6.91	21,28,210.23	1.46
5	Kadamaram	52.62	1.62	11,76,782.40	0.81
6	Mulluvenga	62.96	1.94	9,03,394.46	0.62
7	Thanni	60.44	1.86	7,27,857.30	0.50
8	Venteak	35.82	1.10	4,38,418.96	0.30
9	Anjily	11.03	0.34	3,04,162.65	0.21
10	Thembaru	9.71	0.30	1,13,050.82	0.08
11	Others	106.29	3.28	739539.83	0.51
	Grand Total	3242.15	100.00	14,56,18,899.66	100.00



Figure 5.3 (a)

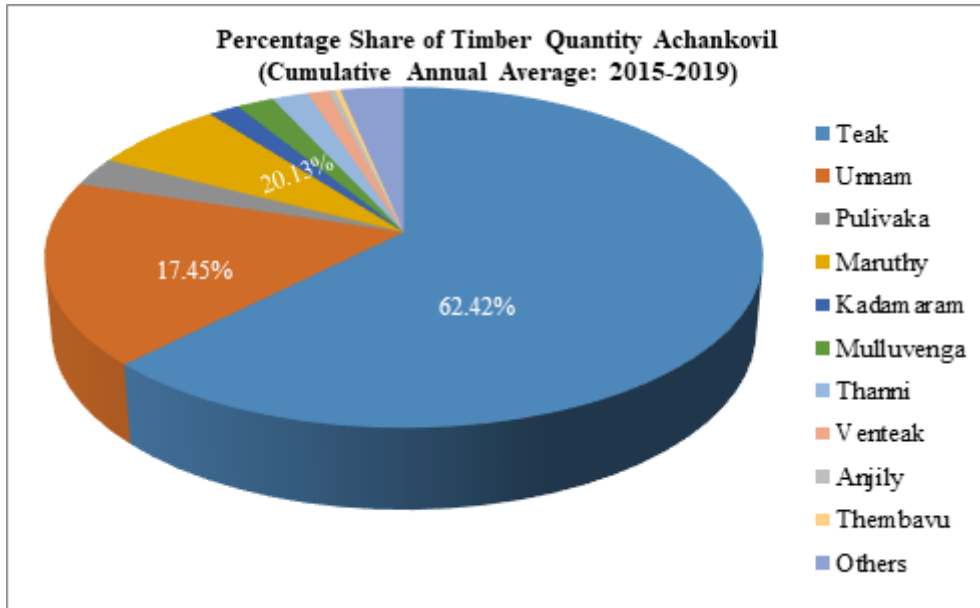


Figure 5.3 (b)

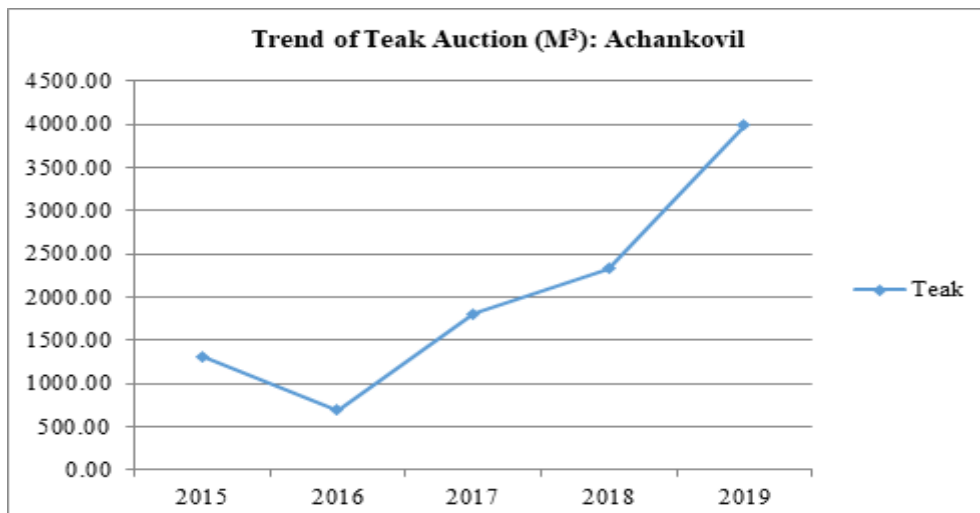
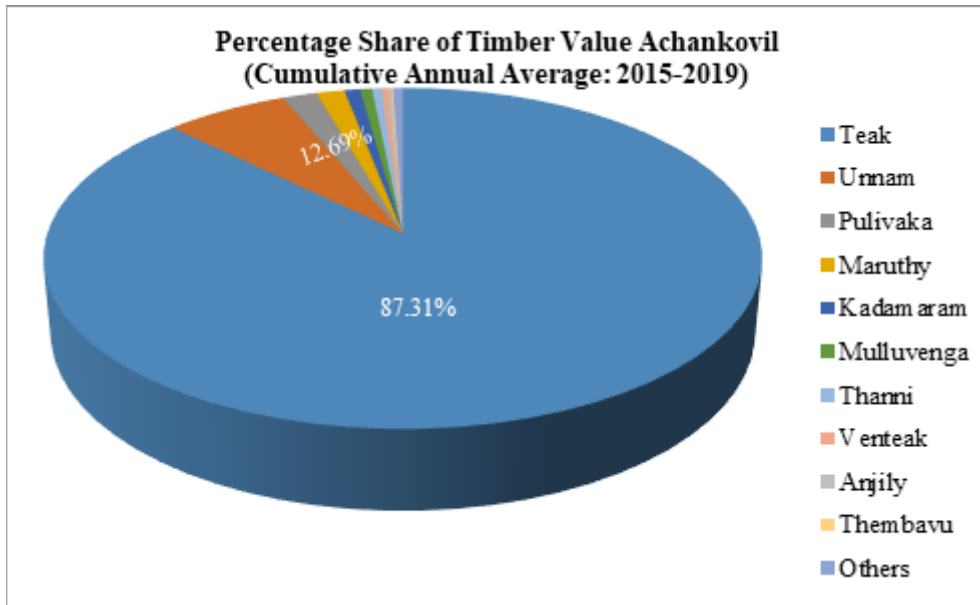


Figure 5.3 (d)

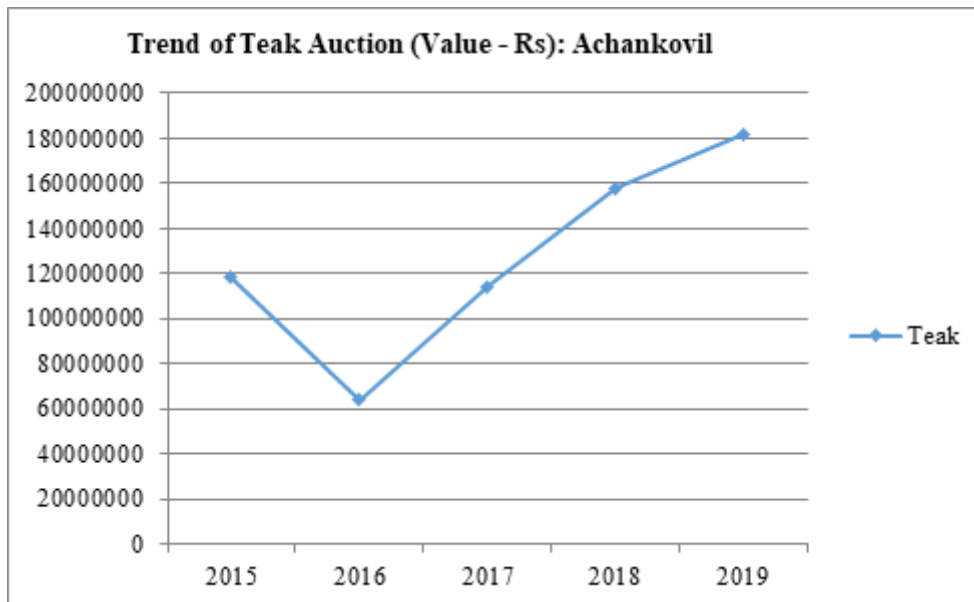


Figure 5.3 (e)

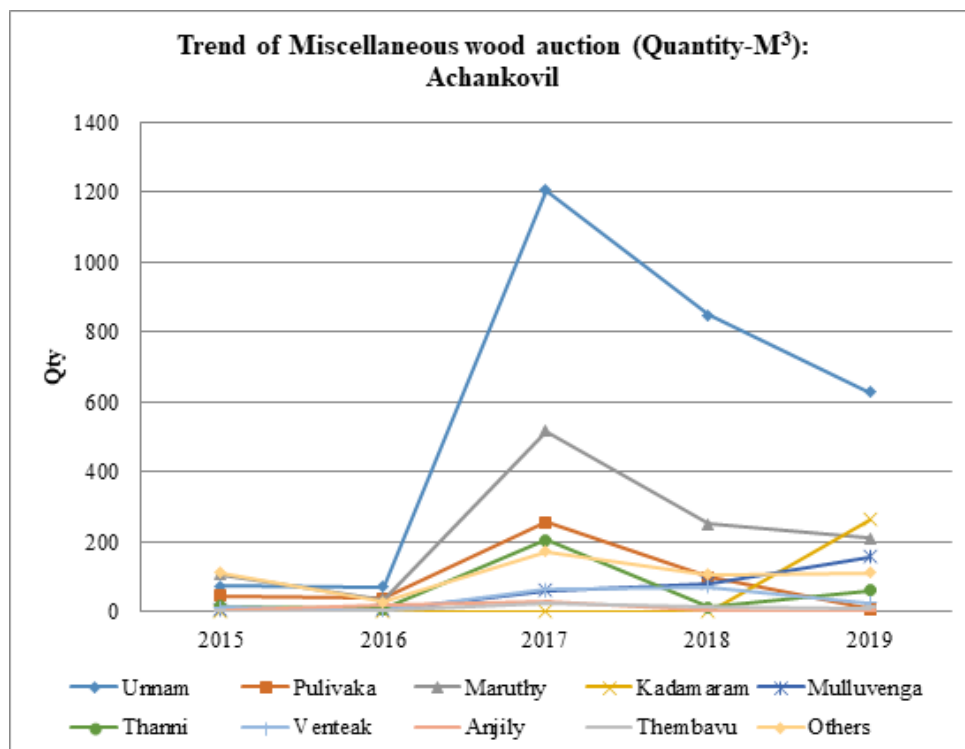
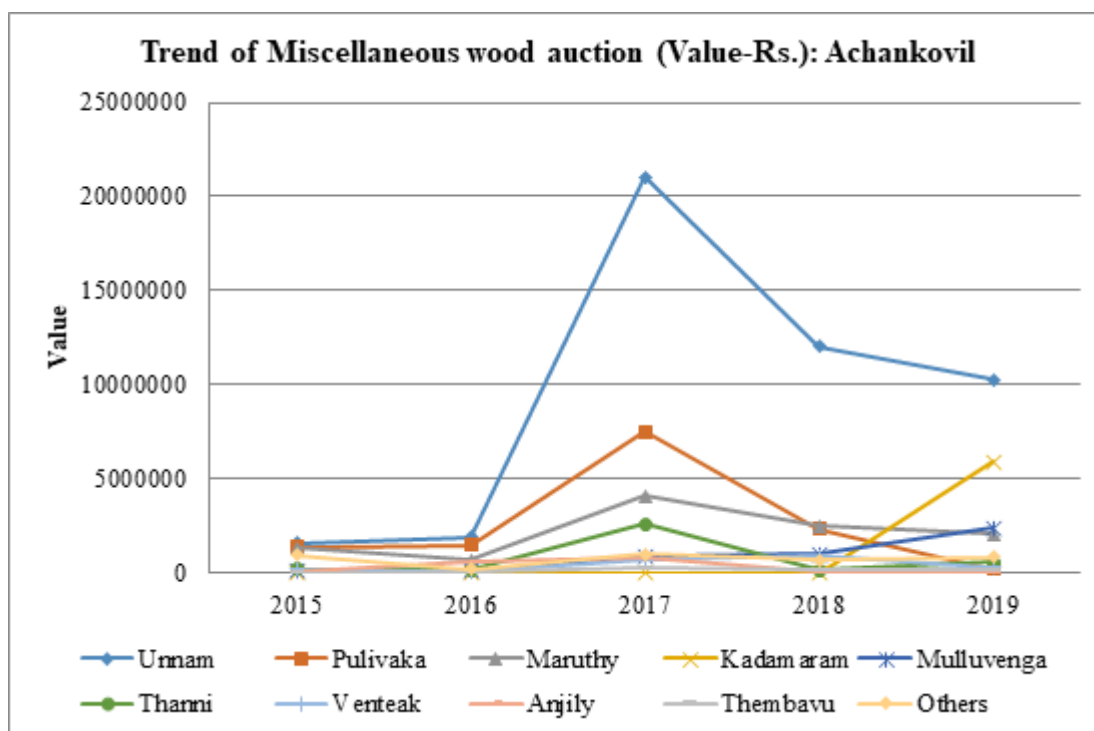


Figure 5.3 (f)



3. Thenmala Timber Depot

The analysis of five years quantity and value data collected from the Thenmala Government timber depot at Thiruvananthapuram division indicates that the main timber species auctioned is teak with a cumulative average quantity of 352.14 cubic meters (M3) that accounts 83.59% of the total timber auctioned in this depot. The Thenmala depot had fetched Rs.2,56,05,081/- in revenue (cumulative average) to the Government. It accounts 97.20 % of the total revenue received at Thenmala depot.

The miscellaneous timbers account a quantity of 16.41% of the total timbers and it contributes to 2.80% of total timber value (cumulative average). Among miscellaneous timbers Maruthuu, Venteak, Mahagony, Anjily, Plavu, Mazhamaram, Mulluelavu, Thembavu and Elavu contribute to both cumulative quantity and cumulative value.

The Thenmala timber depot conducted 46 auctions during the period 2015 to 2019. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2019 are given in tables and figures. The quantity and value of teak auctioned showed increasing trend from 2015 to 2018 and decreased in 2019. Details are given in the Tables 5.6 (a)&(b) and figures 5.4 (a)-(f).

Table 5.6 (a)

Quantity and Value of Timber Auctioned from Thenmala Depot (46)

Sl. No.	Species Name	2015 (6)		2016 (5)		2017 (9)		2018 (13)		2019 (13)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	40.53	1846967.84	119.07	9123014.86	473.62	36567777.04	573.49	44653041.00	553.99	35834605.00
2	Maruthuu	112.39	850789.79	7.40	52547.10	34.04	259225.75	0.00	0.00	1.99	21836.00
3	Venteak	0.00	0.00	20.41	266173.37	31.16	410623.03	6.60	76715.00	0.00	0.00
4	Mahagony	2.70	53747.16	9.04	181579.18	7.37	142784.88	0.89	19129.00	0.88	7785.00
5	Anjily	0.00	0.00	0.78	1644.30	0.00	0.00	1.98	80676.00	5.64	285477.00
6	Plavu	0.23	3624.97	4.80	181833.49	0.00	0.00	2.96	35077.00	0.80	14098.00
7	Mazhamaram	14.82	188307.07	0.00	0.00	0.00	0.00	3.28	9168.00	0.00	0.00
8	Mulluelavu	0.00	0.00	0.00	0.00	0.00	0.00	20.10	102704.00	10.66	75598.00
9	Thembavu	0.00	0.00	0.00	0.00	0.00	0.00	3.56	111949.00	0.00	0.00
10	Elavu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.11	68780.00
11	Others	3.65	23994.18	0.45	2295.00	10.65	88036.35	9.69	48989.00	7.77	19901.00
	Grand Total	174.31	2967431.01	161.95	9809087.30	556.83	37468447.05	622.56	45137448.00	590.84	36328080.00

Table 5.5 (b)

Quantity and Value of Timber Auctioned from Thenmala Depot (46)
(Cumulative Annual Average: 2015-2019)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	352.14	83.59	25605081.15	97.20
2	Maruthuu	31.16	7.40	236879.73	0.90
3	Venteak	11.63	2.76	150702.28	0.57
4	Mahagony	4.17	0.99	81005.04	0.31
5	Anjily	1.68	0.40	73559.46	0.28
6	Plavu	1.76	0.42	46926.69	0.18
7	Mazhamaram	3.62	0.86	39495.01	0.15
8	Mulluelavu	6.15	1.46	35660.40	0.14
9	Thembavu	0.71	0.17	22389.80	0.08
10	Elavu	1.82	0.43	13756.00	0.05
11	Others	6.44	1.53	36643.11	0.14
	Grand Total	421.29	100.00	26342098.67	100.00

Figure 5.4 (a)

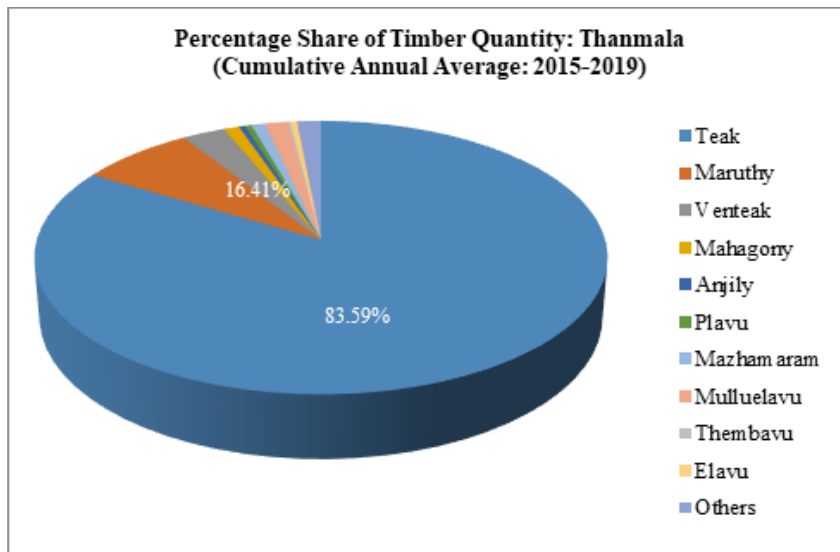


Figure 5.4 (b)

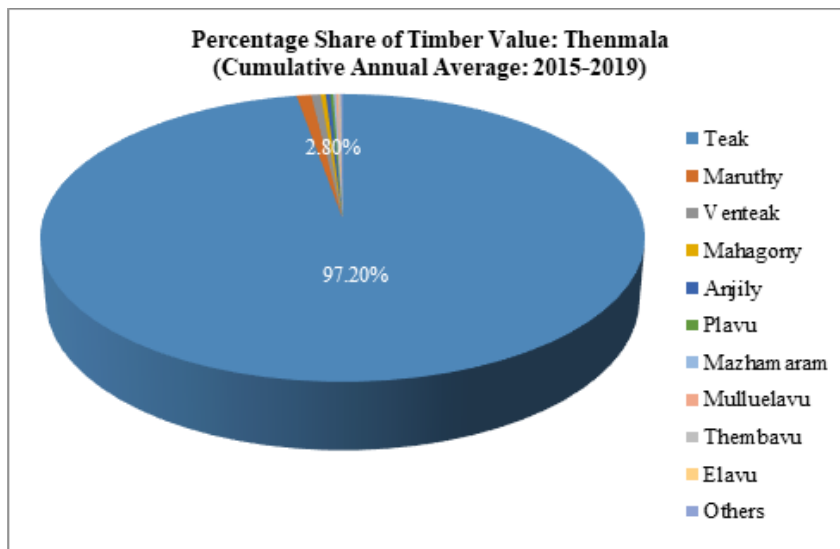


Figure 5.4 (c)

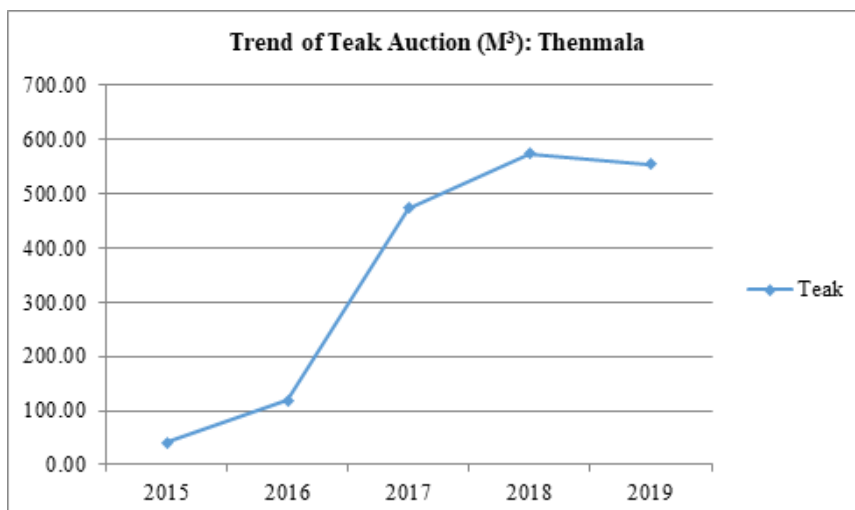


Figure 5.4 (d)

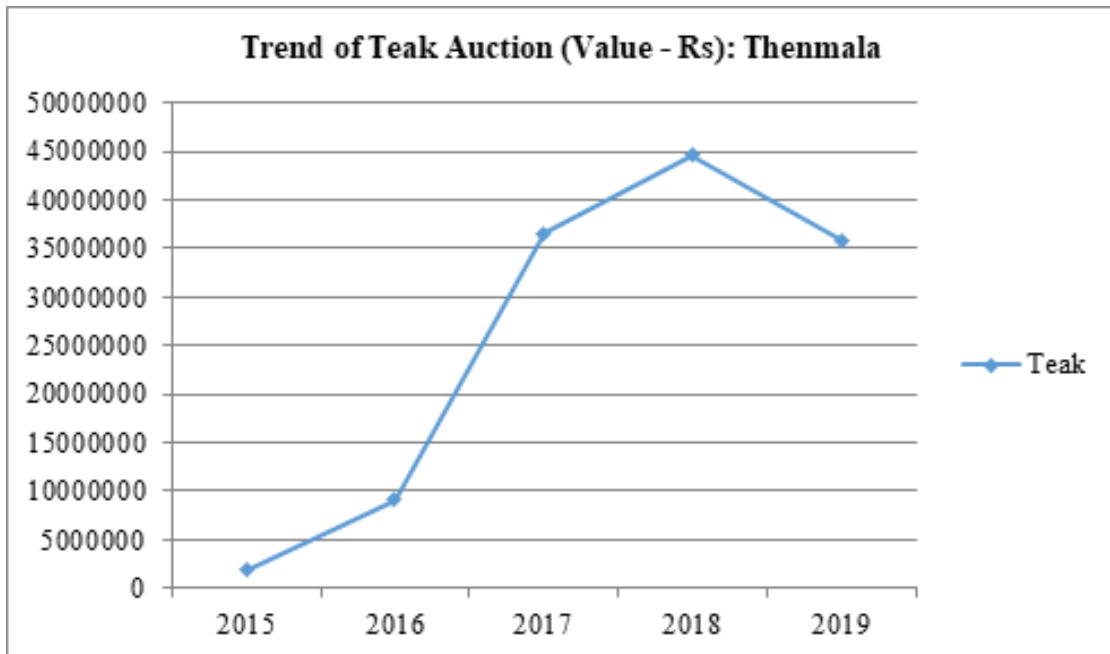
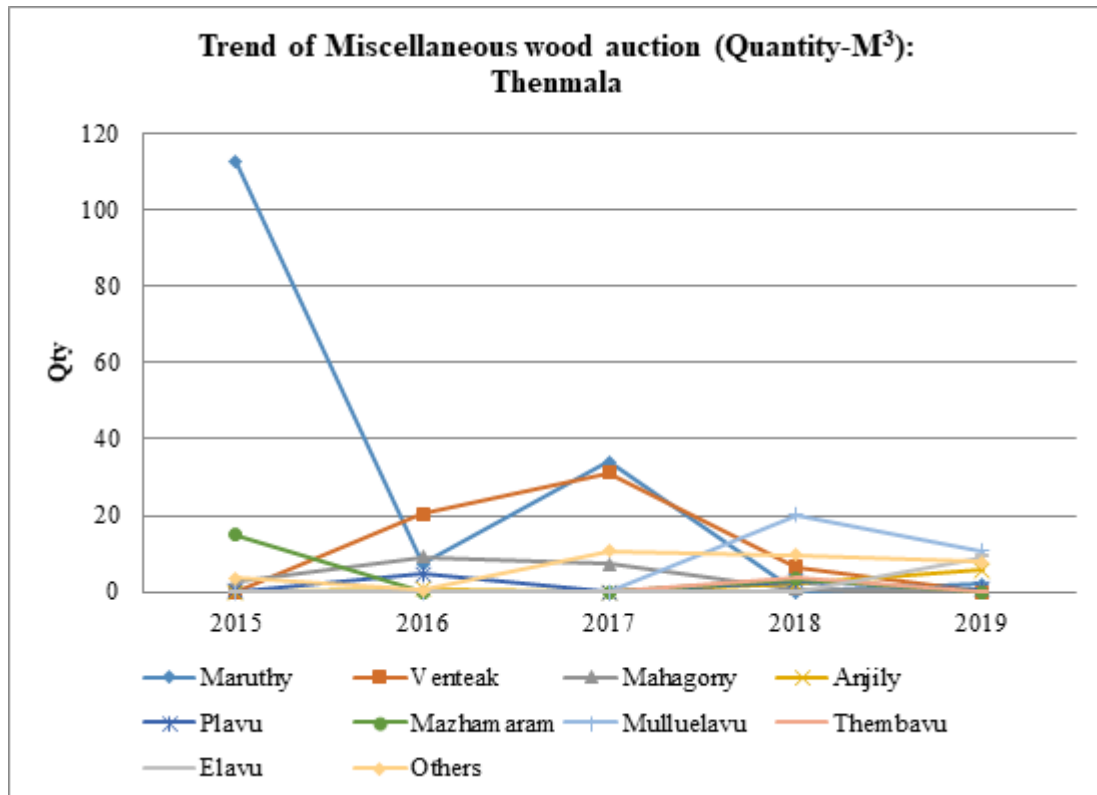


Figure 5.4 (e)



4. Kulathupuzha Timber Depot

The analysis of five years quantity and value data collected from the Kulathupuzha Government timber depot at Thiruvananthapuram division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 659.39 cubic meters (M3) that accounts 83.41% of the total timber in this depot. The Kulathupuzha depot had fetched Rs. 54824102.69/- as revenue (cumulative annual average) to the Government. It accounts 95.39 % of the total revenue received at Kulathupuzha depot.

The miscellaneous timbers account a quantity of 16.59% of the total timbers and it contribute to 4.61% of total timber value (cumulative average). Among miscellaneous timbers Kambakom, Maruthuu, Anjily, Pulivaka, Mahagony, Karavenga, Unnam, Venteak and Pala contribute to both cumulative quantity and cumulative value.

The Kulathupuzha timber depot conducted 67 auctions during the period 2015 to 2019. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2019 are given in tables and figures. The quantity and value of teak auctioned showed increasing trend from 2015 to 2017 and a decrease in 2018 and again increased in 2019. Details are given in the Tables 5.7 (a)&(b) and figures 5.5 (a)-(f).

Table 5.7 (a)
Quantity and Value of Timber Auctioned from Kulathupuzha Depo) (67)

Sl.No.	Species Name	2015 (20)		2016 (8)		2017 (14)		2018 (12)		2019 (13)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	255.77	17262743.58	310.66	31493261.02	1197.07	102908349.37	656.79	51236078.00	876.64	58578811.00
2	Kambakom	68.51	1810020.21	7.39	155678.84	4.63	223370.83	66.03	2027377.00	0.00	0.00
3	Maruthuu	74.33	868858.67	129.51	1522871.02	45.51	413858.25	2.55	15218.00	0.00	0.00
4	Anjily	46.85	2221077.33	5.19	76278.63	8.72	446682.60	0.00	0.00	0.00	0.00
5	Pulivaka	18.63	822951.31	0.12	247.80	1.14	14801.20	0.00	0.00	0.00	0.00
6	Mahagony	0.96	28805.70	12.03	468711.88	1.40	18235.00	0.00	0.00	1.63	22299.00
7	Karavenga	14.02	189452.11	0.96	19944.00	1.00	4241.90	0.00	0.00	0.00	0.00
8	Unnam	3.86	212676.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Venteak	0.61	3962.70	1.86	39123.00	12.94	158036.06	0.00	0.00	0.00	0.00
10	Pala	29.55	140408.65	9.62	38815.25	0.00	0.00	0.00	0.00	0.00	0.00
11	Others	49.38	257068.51	26.40	273922.46	8.30	138673.68	1.57	6503.00	0.54	1099.00
	Grand Total	562.48	23818025.68	503.73	34088853.90	1280.71	104326248.88	726.93	53285176.00	878.81	58602209.00



Table 5.7 (b)
Quantity and Value of Timber Auctioned from Kulathupuzha Depot (67)
(Cumulative Annual Average: 2015-2019)

No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	659.39	83.41	52295848.59	95.39
2	Kambakom	29.31	3.71	843289.38	1.54
3	Maruthuu	50.38	6.37	564161.19	1.03
4	Anjily	12.15	1.54	548807.71	1.00
5	Pulivaka	3.98	0.50	167600.06	0.31
6	Mahagony	3.20	0.41	107610.32	0.20
7	Karavenga	3.20	0.40	42727.60	0.08
8	Unnam	0.77	0.10	42535.38	0.08
9	Venteak	3.08	0.39	40224.35	0.07
10	Pala	7.83	0.99	35844.78	0.07
11	Others	17.24	2.18	135453.33	0.25
	Grand Total	790.53	100.00	54824102.69	100.00

Figure 5.5 (a)

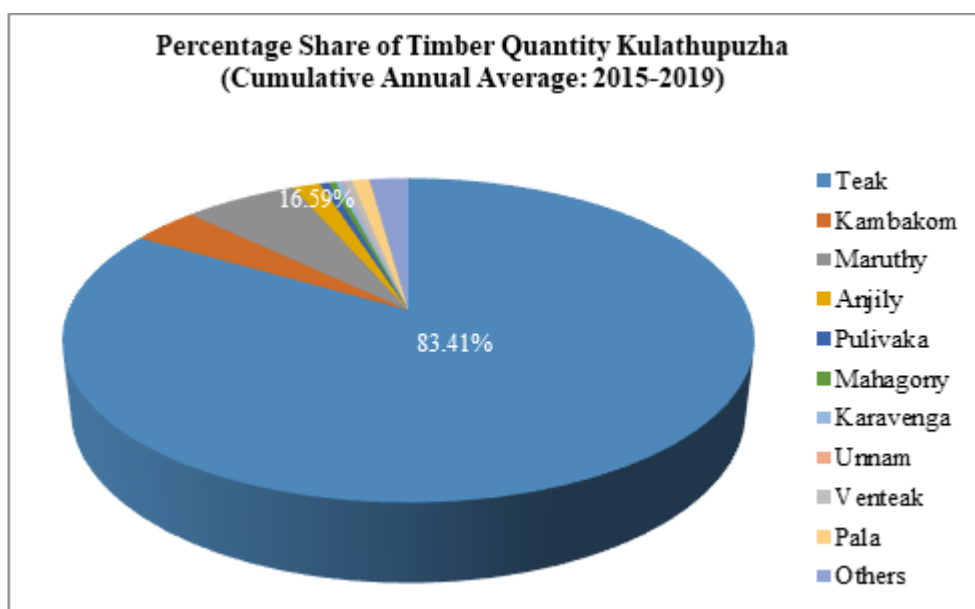


Figure 5.5 (b)

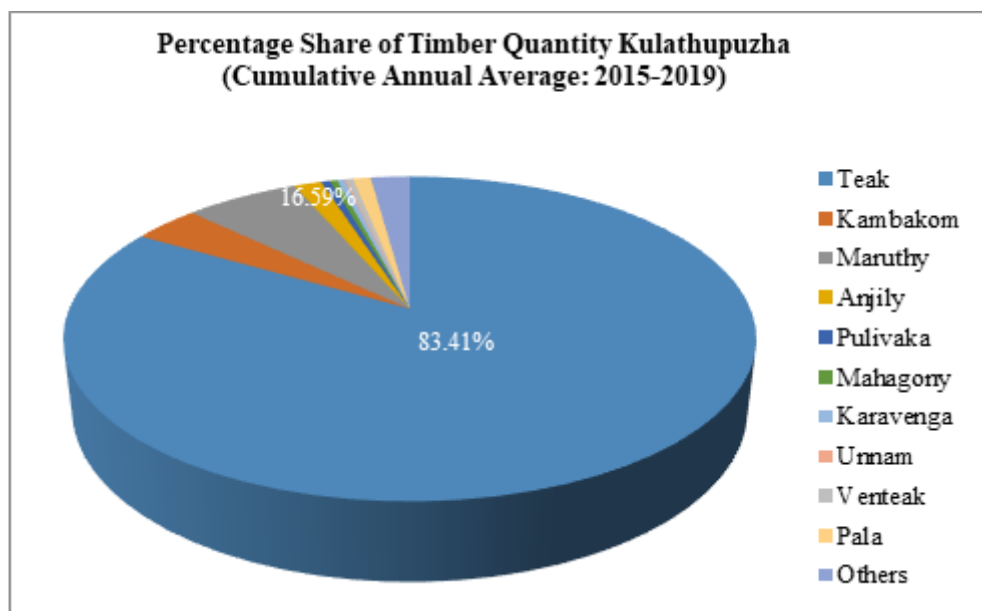


Figure 5.5 (c)

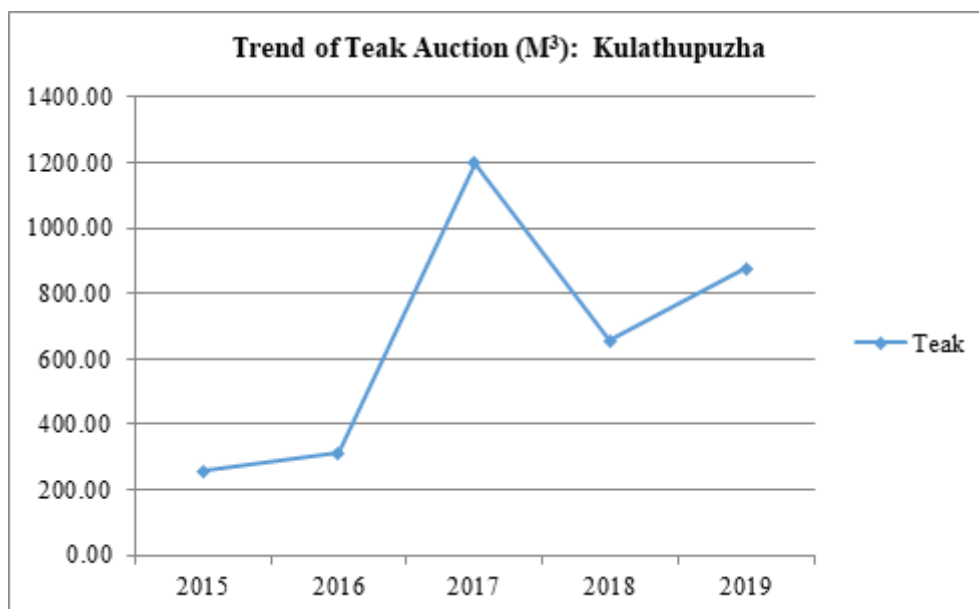


Figure 5.5 (d)

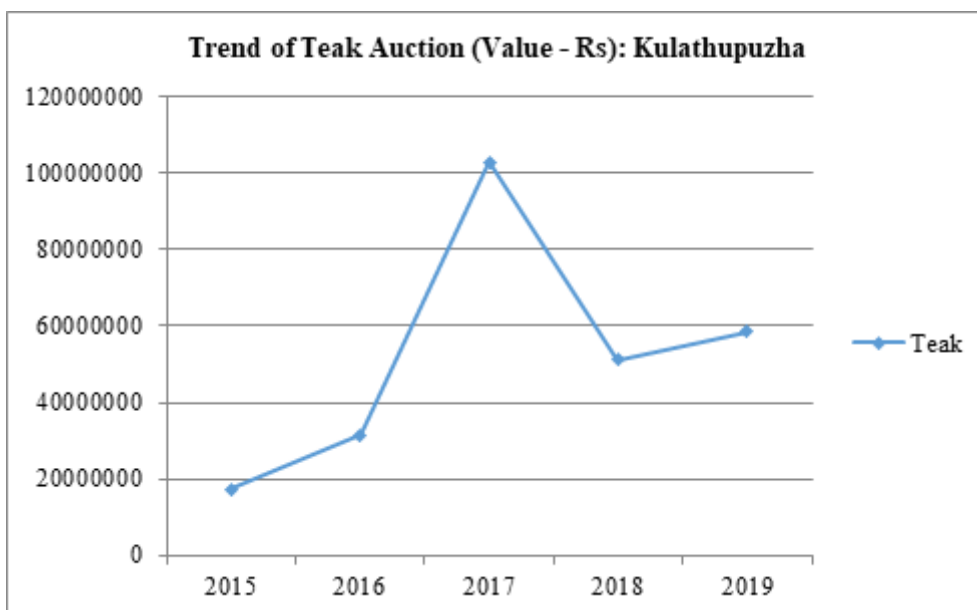


Figure 5.5 (e)

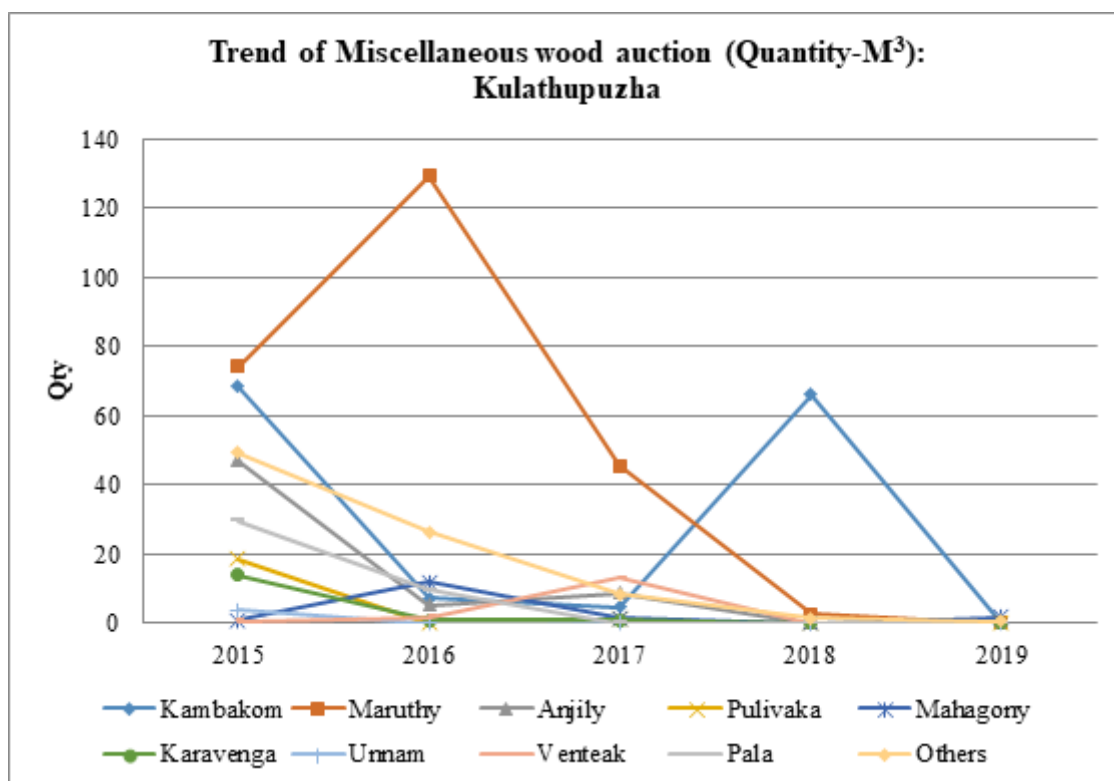
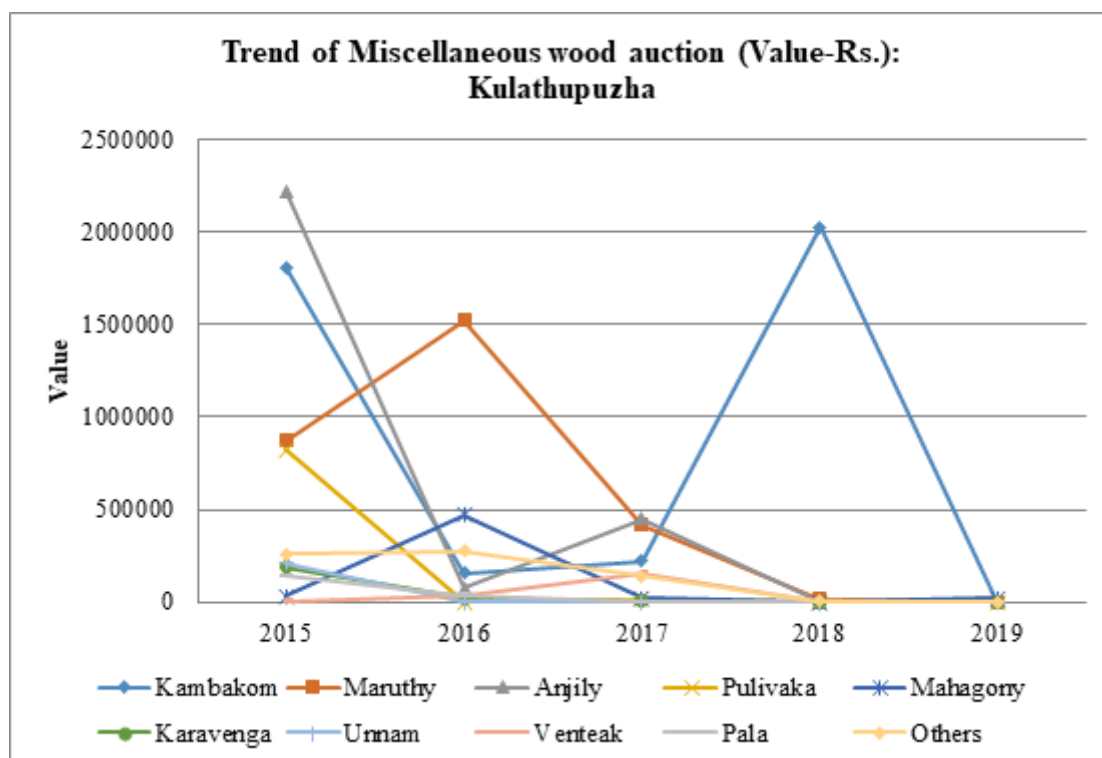


Figure 5.5 (f)



Punalur Timber Sales Division

There are six Government timber depots under Punalur timber sales division.

1. Areekakkavu Timber Depot

The analysis of six years quantity and value data collected from the Areekakkavu Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 444.59 cubic meters (M3) that accounts 37.77% of the total timber in Areekakkavu depot. The Areekakkavu depot had fetched Rs.3,01,11,007/- in revenue (cumulative average) to the Government. It accounts for 80.29% of the total revenue received at Areekakkavu depot. The second important auctioned timber species is Maruthuu with a cumulative annual average quantity of 375.71 cubic meters (M3) that accounts 31.91% total timber in this depot and this could contribute 9.12 % (Rs.34,18,835/-) in revenue (cumulative average) of this depot.

The other miscellaneous timbers account a quantity of 30.32% of the total timbers and it contribute to 10.59% of total timber value (cumulative average). Among miscellaneous timbers Venteak, Kulamavu, Thanni, Elavu, Kambakam, Karivenga, Mulluvenga and Anjili contribute almost equally to both cumulative quantity and cumulative value.

The Areekakkavu timber depot conducted 72 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020. The quantity and value of teak auctioned decreased from 2015 to 2016, and then have an increasing trend till 2018. In 2019 value decreased even though quantity increased. Details are given in the Tables 5.8 (a)&(b) and figures 5.6 (a)-(f).

Table 5.8 (a)
Quantity and Value of Timber Auctioned from
Areekakkavu Depot (72)

Sl. No.	Species Name	2015 (10)		2016 (6)		2017 (11)		2018 (15)		2019 (16)		2020 (14)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	715.39	47504722.00	246.66	20144920.00	274.51	22723656.19	480.70	33409114.00	503.27	27621423.00	447.01	29262209.00
2	Maruthuu	156.20	1941572.00	118.09	1153309.00	575.46	3573463.89	437.28	4775493.00	557.57	4014408.00	409.69	5054769.00
3	Venteak	27.47	412857.00	23.45	303905.00	38.92	476705.80	87.57	1376613.00	90.95	708547.00	93.72	1294952.00
4	Kulamavu	32.83	282402.00	118.25	1069015.00	83.93	573154.00	164.56	1997786.00	0.00	0.00	6.32	51317.00
5	Thanni	38.05	418220.00	33.71	371157.00	0.81	2523.00	25.31	306276.00	0.00	0.00	149.30	1964092.00
6	Elavu	58.49	464895.00	0.89	1513.00	149.07	1154315.00	102.29	259532.00	0.00	0.00	89.01	530665.00
7	Kambakam	0.00	0.00	21.32	1506449.00	0.00	0.00	3.45	38306.00	0.00	0.00	0.00	0.00
8	Karivenga	5.11	51095.00	0.00	0.00	7.75	79602.12	8.75	111362.00	25.68	476356.00	22.15	530124.00
9	Mulluvenga	62.07	222276.00	0.00	0.00	3.02	14649.13	7.95	69849.00	37.38	466276.00	24.19	455554.00
10	Anjili	39.77	911751.00	2.96	142750.00	6.72	126407.00	1.67	13225.00	0.00	0.00	0.27	2789.00
11	Others	97.79	703551.00	25.68	233637.00	125.11	1118691.22	76.01	1348129.00	40.42	435928.00	81.46	750924.00
	Grand Total	1233.17	52913341.00	591.00	24926655.00	1265.30	29843167.36	1395.53	43705685.00	1255.25	33722938.00	1323.09	39897395.00

Table 5.8 (b)
Quantity and Value of Timber Auctioned from Areekakkavu Depot (72)
(Cumulative Annual Average: 2015-2020)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	444.59	37.77	30111007.37	80.29
2	Maruthuu	375.71	31.91	3418835.82	9.12
3	Venteak	60.34	5.13	762263.30	2.03
4	Kulamavu	67.65	5.75	662279.00	1.77
5	Thanni	41.20	3.50	510378.00	1.36
6	Elavu	66.62	5.66	401820.00	1.07
7	Kambakam	4.13	0.35	257459.17	0.69
8	Karivenga	11.57	0.98	208089.85	0.55
9	Mulluvenga	22.43	1.91	204767.36	0.55
10	Anjili	8.56	0.73	199487.00	0.53
11	Others	74.41	6.32	765143.37	2.04
	Grand Total	1177.22	100.00	37501530.23	100.00



Figure 5.6 (a)

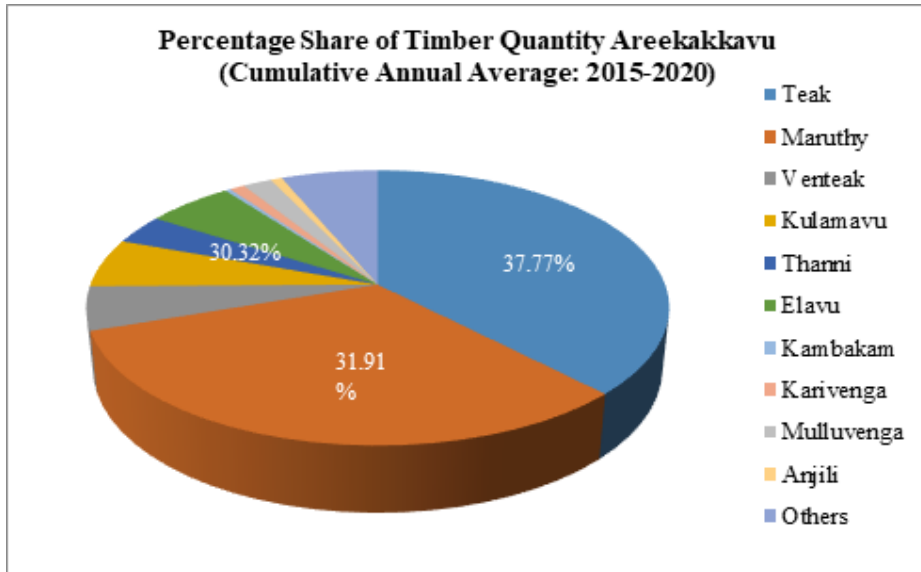


Figure 5.6 (b)

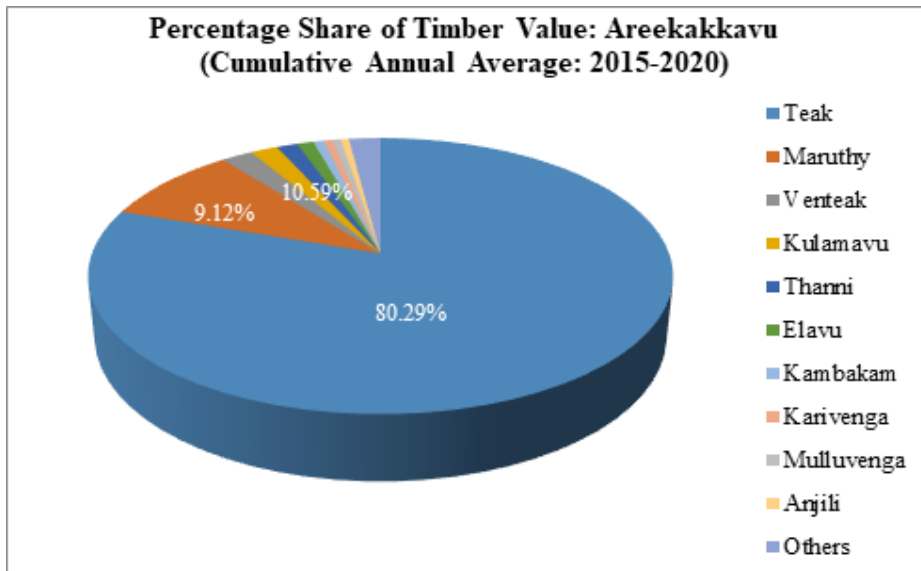


Figure 5.6 (c)

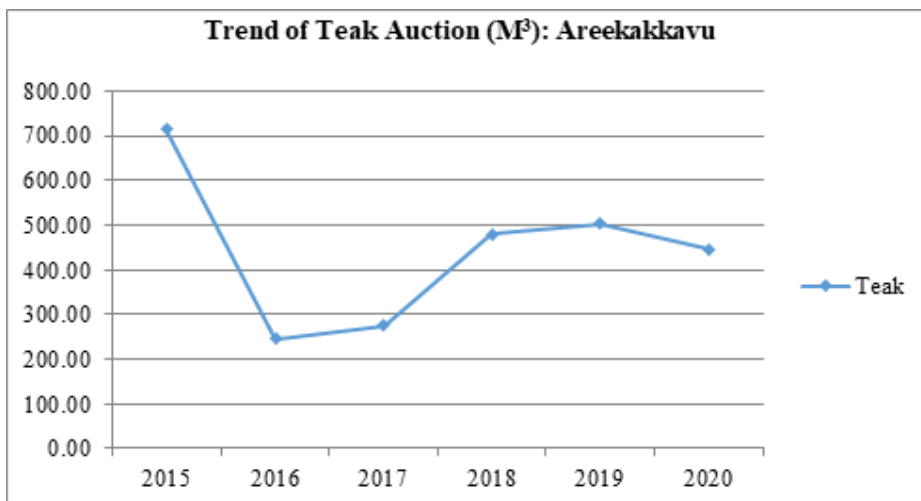


Figure 5.6 (d)

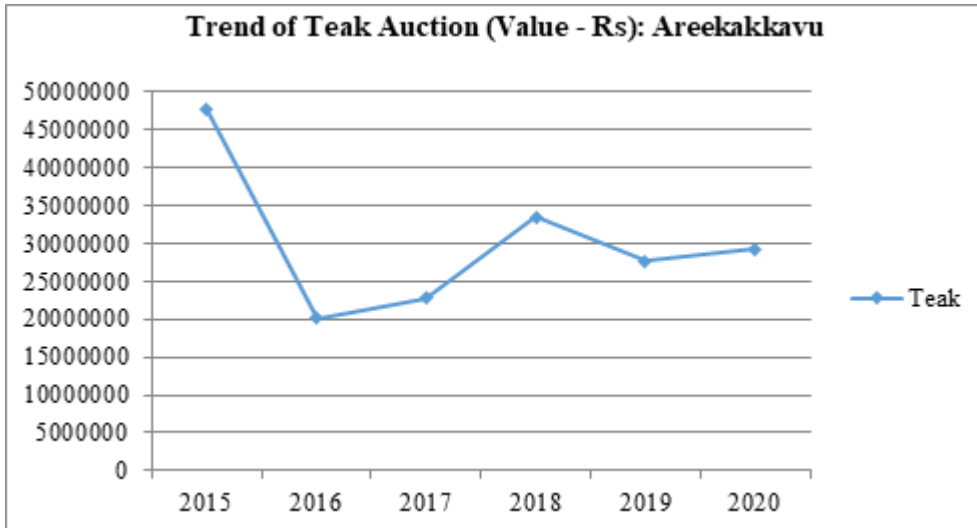


Figure 5.6 (e)

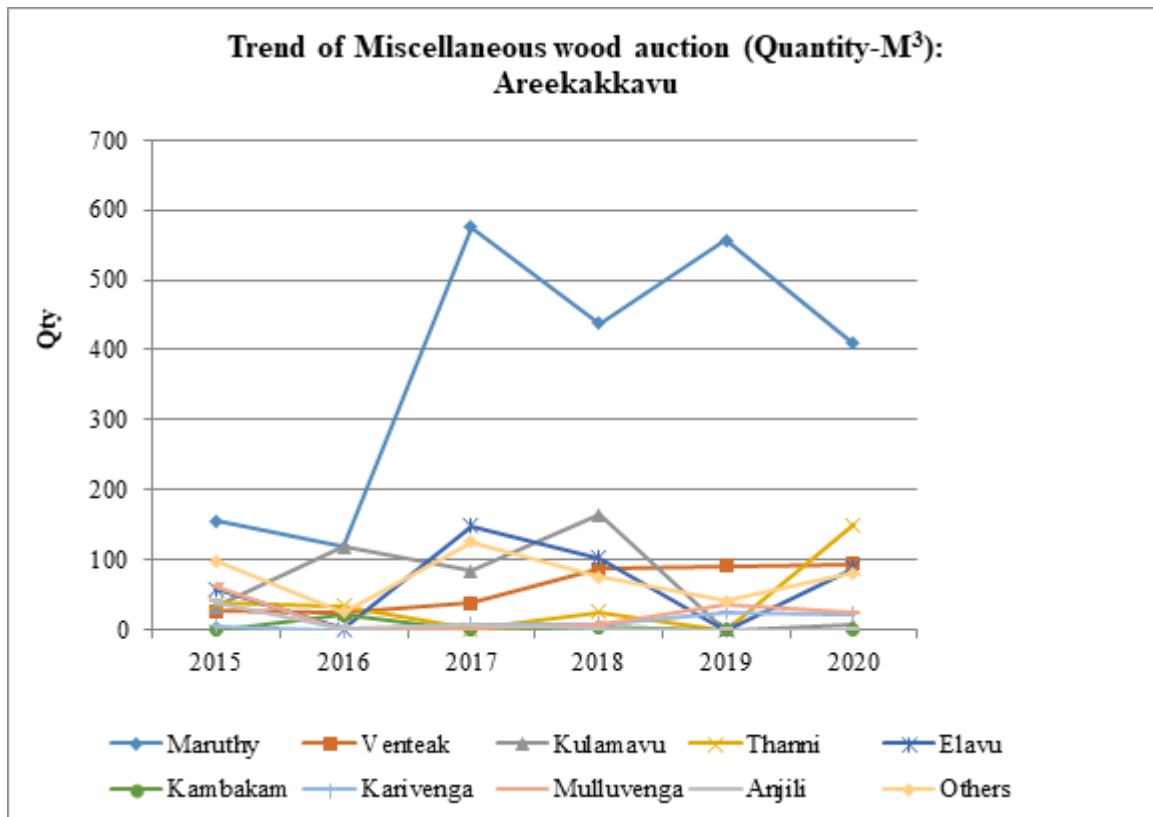
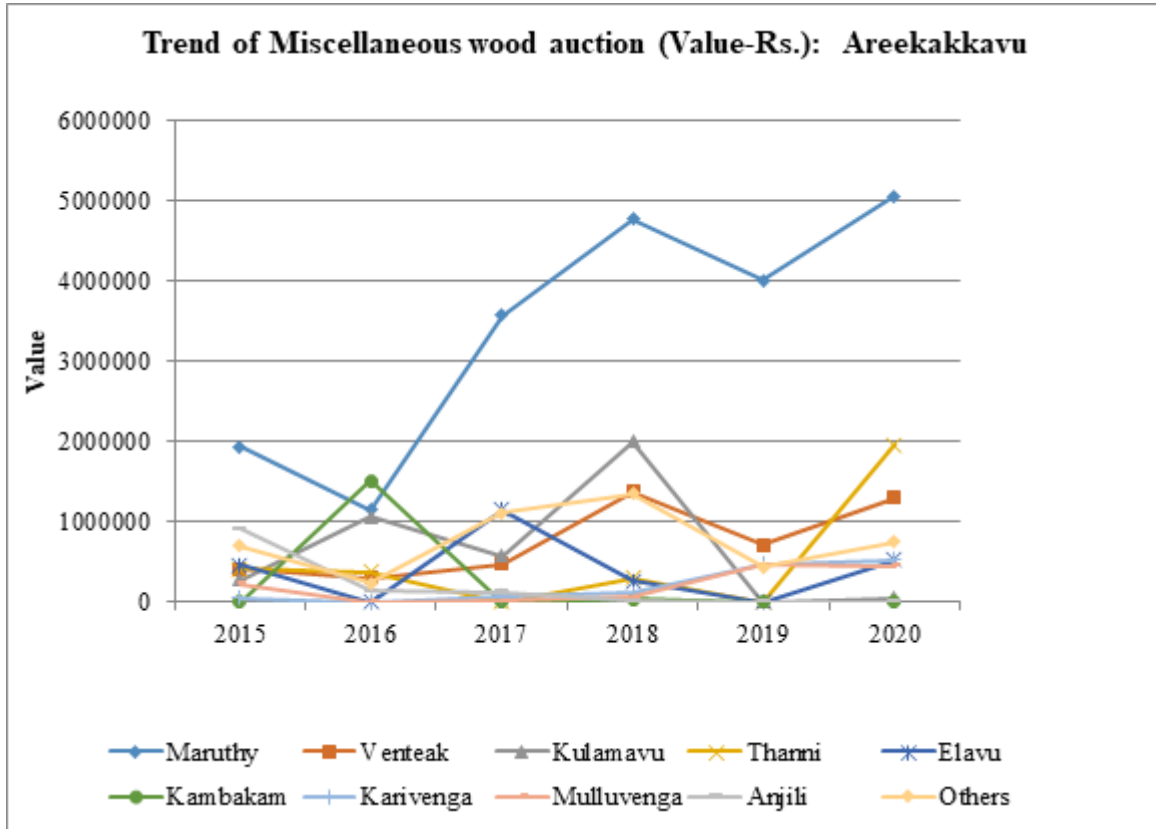


Figure 5.6 (f)



2. Kadakkamon Timber Depot

The analysis of six years quantity and value data collected from the Kadakkamon Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 599.68 cubic meters (M3) that accounts 88.19% of the total timber auctioned in this depot. The Kadakkamon depot had fetched Rs.4,76,13,800/- in revenue (cumulative average) to the Government. It accounts 96.59% of the total revenue received at Kadakkamon depot.

The miscellaneous timbers account a quantity of 11.81% of the total timbers and it contribute to 3.41% of total timber value (cumulative average). Among miscellaneous timbers Kanikonna, Maruthuu, Thembavu, Kadamaram, Kambakam, Venteak, Mulluvenga, Unnam and Anjili contribute to both cumulative quantity and cumulative value.

The Kadakkamon timber depot conducted 68 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020. The quantity and value of teak auctioned decreased from 2015 to 2016, and then have an increasing and decreasing trend in alternative years till 2020. Details are given in Tables 5.9 (a)&(b) and figures 5.7 (a)-(f).

Table 5.9 (a)
Quantity and Value of Timber Auctioned
from Kadakkamon Depot (68)

Sl.No.	Species Name	2015 (13)		2016 (7)		2017 (11)		2018 (11)		2019 (12)		2020 (14)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	1062.99	87352522.00	347.71	27238749.00	553.91	53324538.00	515.76	41827016.00	639.69	46208998.00	478.01	29730982.00
2	Kanikonna	0.44	3767.00	0.00	0.00	48.63	2873636.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Maruthuu	102.31	1048723.00	25.38	328746.00	68.90	521534.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Thembavu	15.58	164933.00	13.02	650526.00	4.04	88711.00	0.26	1326.00	0.00	0.00	0.00	0.00
5	Kadamaram	0.00	0.00	18.93	544999.00	7.04	192260.00	2.94	9274.00	0.00	0.00	0.00	0.00
6	Kambakam	28.82	585395.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	Venteak	21.79	413781.00	0.75	11957.00	0.00	0.00	5.06	20228.00	0.00	0.00	0.00	0.00
8	Mulluvenga	16.00	295327.00	0.00	0.00	3.44	47022.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Unnam	19.00	225482.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Anjili	2.90	22239.00	3.10	97294.00	0.00	0.00	1.78	23275.00	0.00	0.00	0.00	0.00
11	Others	31.76	356089.00	4.96	25294.00	2.62	9153.00	29.68	1443822.00	0.69	22704.00	0.00	0.00
	Grand Total	1301.59	90468258.00	413.84	28897565.00	688.57	57056854.00	555.48	43324941.00	640.38	46231702.00	478.01	29730982.00

Table 5.9 (a)
Quantity and Value of Timber Auctioned from Kadakkamon Depot (68)
(Cumulative Annual Average: 2015-2020)

Sl.No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	599.68	88.19	47613800.83	96.59
2	Kanikonna	8.18	1.20	479567.17	0.97
3	Maruthuu	32.76	4.82	316500.50	0.64
4	Thembavu	5.48	0.81	150916.00	0.31
5	Kadamaram	4.82	0.71	124422.17	0.25
6	Kambakam	4.80	0.71	97565.83	0.20
7	Venteak	4.60	0.68	74327.67	0.15
8	Mulluvenga	3.24	0.48	57058.17	0.12
9	Unnam	3.17	0.47	37580.33	0.08
10	Anjili	1.30	0.19	23801.33	0.05
11	Others	11.94	1.76	318424.32	0.65
	Grand Total	679.96	100.00	49293964.32	100.00



Figure 5.7 (a)

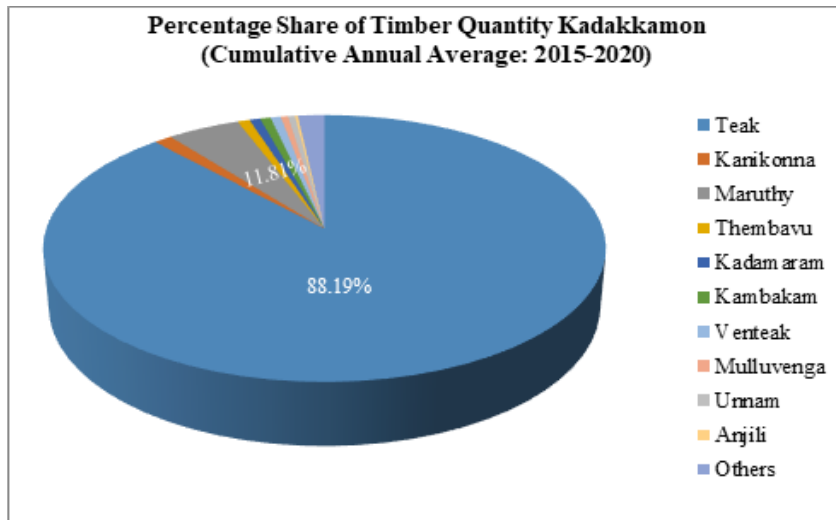


Figure 5.7 (b)

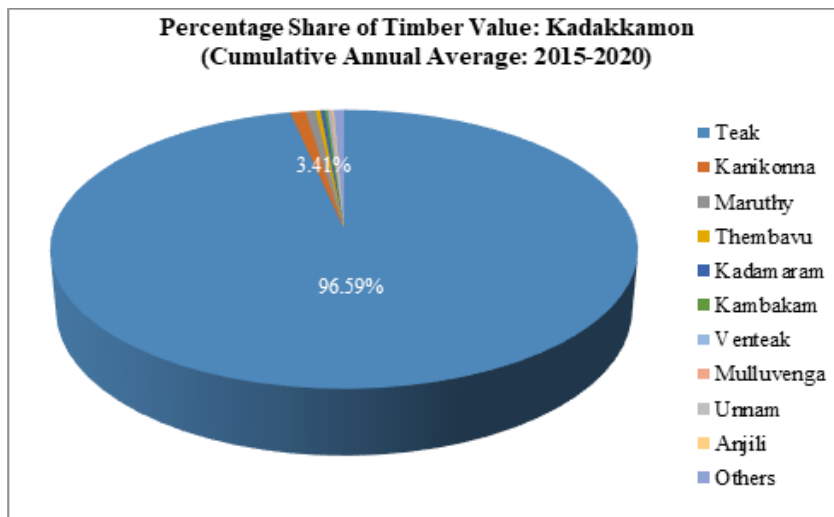


Figure 5.7 (c)

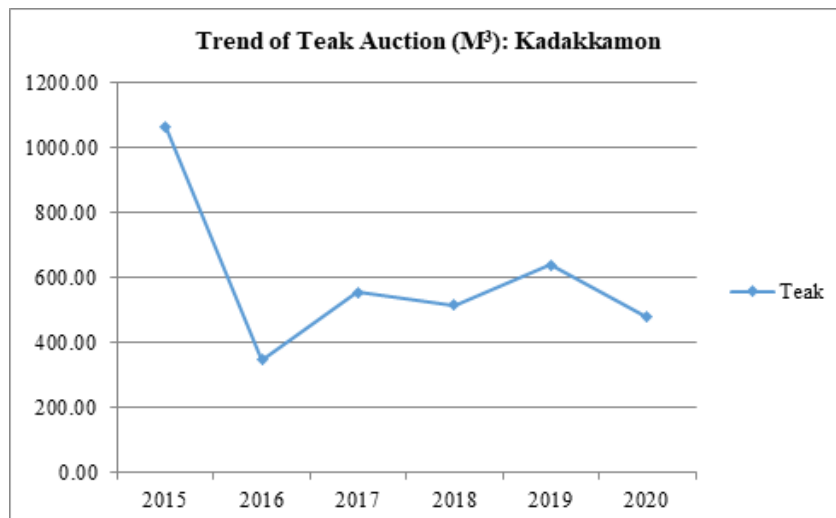


Figure 5.7 (d)

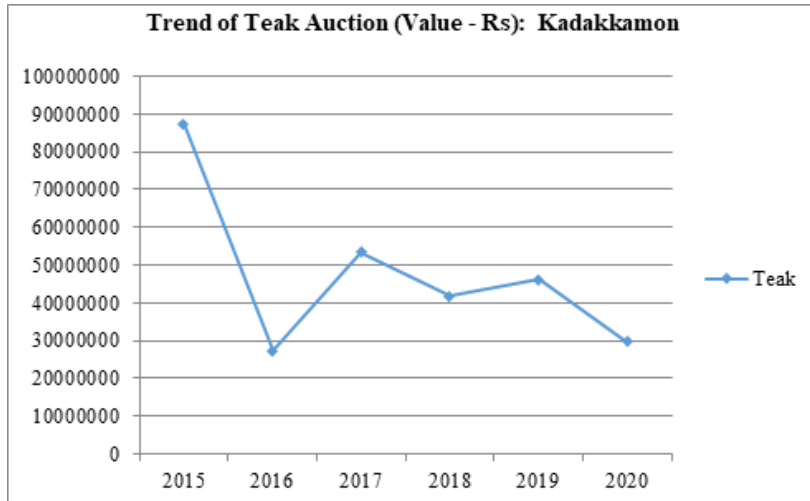


Figure 5.7 (e)

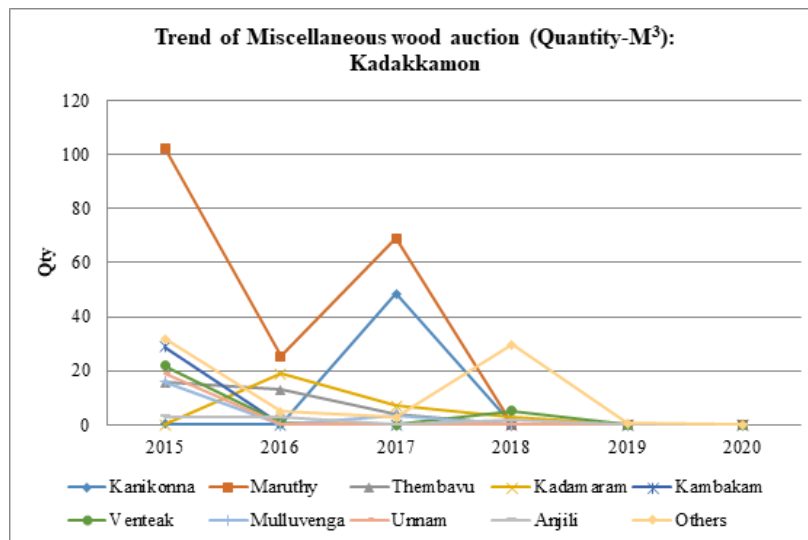
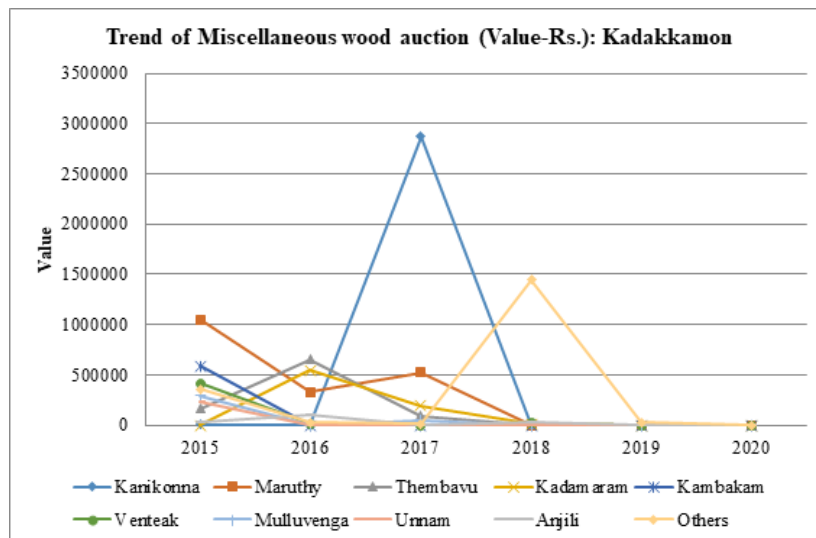


Figure 5.7 (f)



3. Konni Timber Depot

The analysis of six years quantity and value data collected from the Konni Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 685.74 cubic meters (M3) that accounts 50.72 % of the total timber in this depot. The Koonni depot had fetched Rs.5,59,58,778/- as revenue (cumulative average) to the Government. It accounts 86.75 % of the total revenue received at Konni depot.

The miscellaneous timbers account a quantity of 49.28% of the total timbers and it contribute to 13.25% of total timber value (cumulative annual average). Among miscellaneous timbers Maruthuu, Irul, Venteak, Thanni, Pulivaka, Unnam, Anjili, Thembavu, and Elavu contribute almost equally to both cumulative quantity and cumulative value.

The Konni timber depot conducted 84 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020. The quantity and value of teak auctioned increased from 2018 to 2020. Details are given in Tables 5.10 (a)&(b) and figures 5.8 (a)-(f).

Table 5.10 (a)
Quantity and Value of Timber Auctioned from Konni Depot (84)

Sl.No.	Species Name	2015 (10)		2016 (9)		2017 (16)		2018 (14)		2019 (19)		2020 (16)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	671.65	54633263.00	623.17	52869964.00	673.69	66946081.00	512.97	41364695.00	736.95	55020837.00	896.01	64917833.00
2	Maruthuu	27.37	310030.00	212.74	3014491.00	264.13	3032641.00	116.64	1860827.00	1052.24	8614857.00	9.01	103804.00
3	Irul	0.00	0.00	0.00	0.00	25.87	704894.00	0.00	0.00	181.41	4332125.00	21.00	362984.00
4	Ventek	6.15	62755.00	61.18	1045632.00	91.31	1628953.00	3.19	76983.00	42.24	902820.00	23.33	331160.00
5	Thanni	0.00	0.00	1.51	15213.00	184.24	2240938.00	17.19	272610.00	32.02	373736.00	0.00	0.00
6	Pulivaka	0.00	0.00	7.67	260354.00	25.61	902113.00	4.70	116818.00	41.46	1216739.00	1.69	22012.00
7	Unnam	2.08	12608.00	20.23	356979.00	108.12	1908817.00	5.09	80432.00	3.96	75529.00	0.00	0.00
8	Anjili	0.59	2340.00	39.14	1305789.00	23.54	798671.00	0.00	0.00	8.88	201821.00	0.00	0.00
9	Thembavu	0.00	0.00	0.00	0.00	8.24	248750.00	1.37	18082.00	62.83	1747510.00	27.15	270625.00
10	Elavu	0.00	0.00	37.24	275226.00	210.09	1648139.00	36.29	92841.00	25.26	237541.00	0.00	0.00
11	Others	3.59	29638.00	125.43	1320500.00	403.23	4850708.00	170.90	1965737.00	192.65	1934903.00	10.03	39438.00
	Grand Total	711.42	55050634.00	1128.32	60464148.00	2018.05	84910705.00	868.33	45849025.00	2379.89	74658418.00	988.22	66047856.00



Table 5.10 (b)
Quantity and Value of Timber Auctioned from Konni Depot (84)
(Cumulative Annual Average: 2015-2020)

Sl.No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	685.74	50.72	55958778.83	86.75
2	Maruthuu	280.36	20.74	2822775.00	4.38
3	Irul	38.05	2.81	900000.50	1.40
4	Ventek	37.90	2.80	674717.17	1.05
5	Thanni	39.16	2.90	483749.50	0.75
6	Pulivaka	13.52	1.00	419672.67	0.65
7	Unnam	23.25	1.72	405727.50	0.63
8	Anjili	12.02	0.89	384770.17	0.60
9	Thembavu	16.60	1.23	380827.83	0.59
10	Elavu	51.48	3.81	375624.50	0.58
11	Others	153.83	11.38	1699261.20	2.63
	Grand Total	1351.90	100.00	64505904.87	100.00

Figure 5.8 (a)

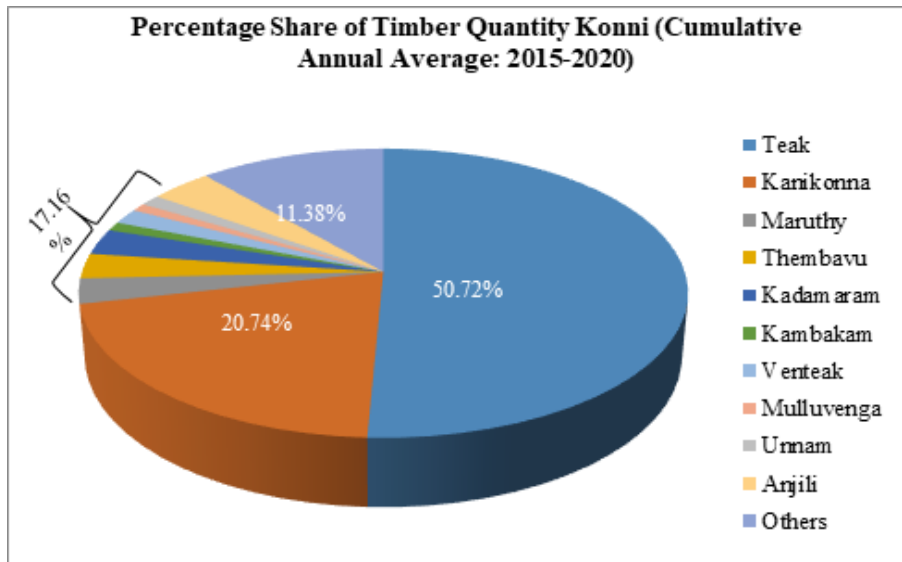


Figure 5.8 (b)

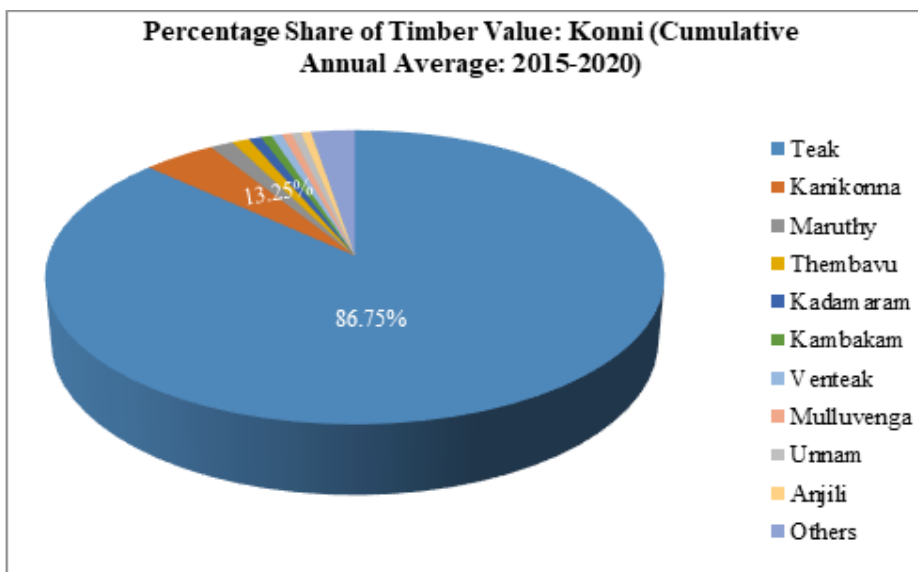


Figure 5.8 (c)

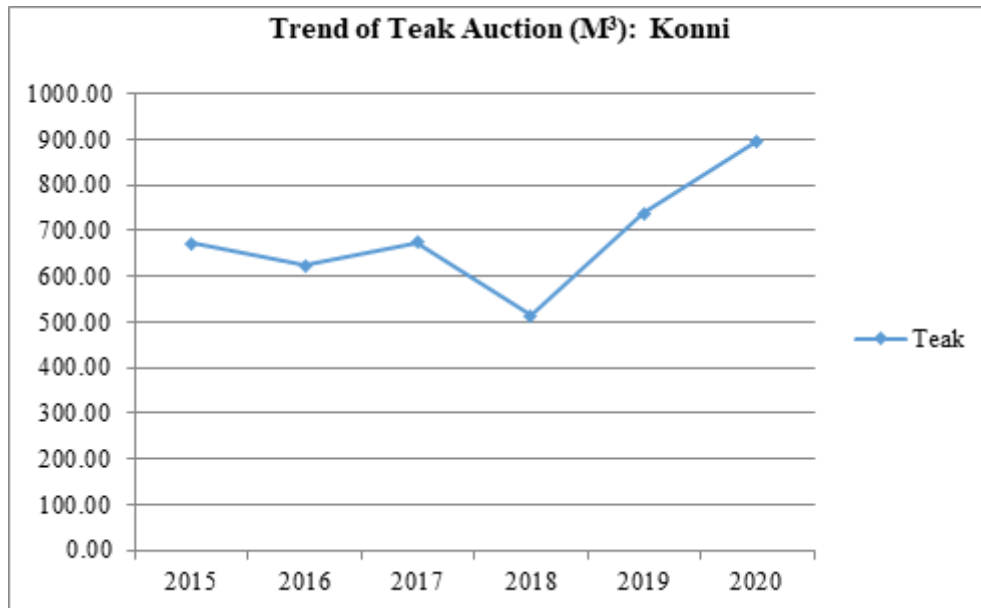


Figure 5.8 (d)

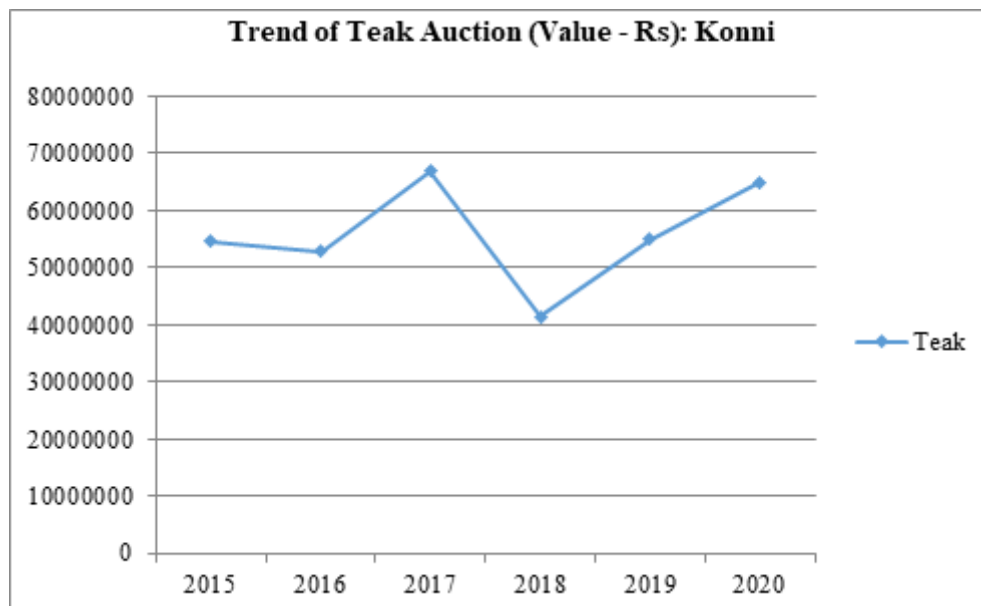


Figure 5.8 (e)

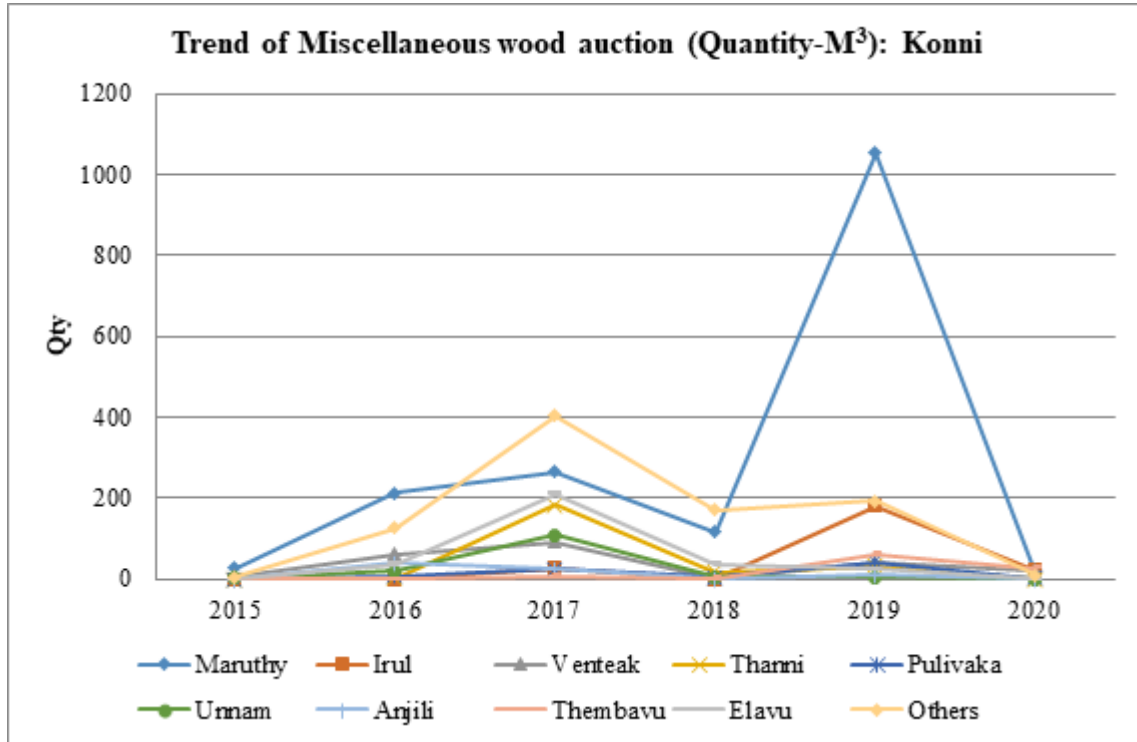
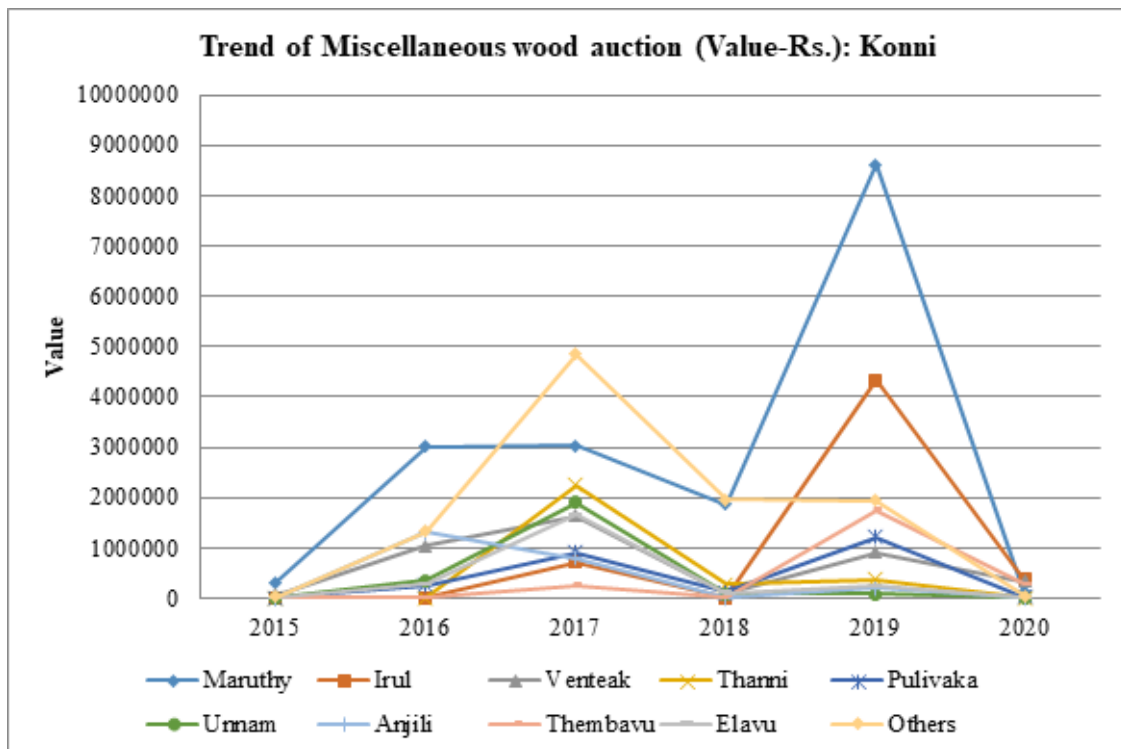


Figure 5.8 (f)



The analysis of six years quantity and value data collected from the Pathanapuram Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 508.34 cubic meters (M3) that accounts 92.33 % of the total timber in this depot. The Pathanapuram depot had fetched Rs.3,74,79,373/- in revenue (cumulative average) to the Government. It accounts 97.09 % of the total revenue received at Pathanapuram depot.

The miscellaneous timbers account a quantity of 7.69% of the total timbers and it contribute to 2.91% of total timber value (cumulative annual average). Rosewood, Maruthuu, Venteak, Manjakkadambu, Mulluvenga, Pulivaka, Anjili, Thembavu and Kanikonna are the main miscellaneous timbers.

The Pathanapuram timber depot conducted 68 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020 are given in tables figures. The quantity and value of teak auctioned increased from 2016 to 2019 (details are given in Tables 5.11 (a)&(b) and figures 5.9 (a)-(f)).

Table 5.11 (a) Quantity and Value of Timber Auctioned from Pathanapuram Depot (68)

S I. N o. .	Specie s Name	2015 (10)		2016 (6)		2017 (10)		2018 (10)		2019 (16)		2020 (16)	
		Qty (M 3)	Valu e (Rs.)	Qty (M 3)	Valu e (Rs.)	Qty (M 3)	Valu e (Rs.)	Qty (M 3)	Valu e (Rs.)	Qty (M 3)	Valu e (Rs.)	Qty (M 3)	Valu e (Rs.)
1	Teak	40 7.5 7	2567 3298 .00	27 4.9 8	2484 4373 .00	30 3.9 2	2683 4873 .00	58 3.9 3	4444 1562 .00	87 0.0 7	5826 7237 .00	60 9.5 8	4481 4895 .00
2	Rose Wood	5.5 4	4677 14.0 0	0.0 0	0.00	6.6 2	7551 18.0 0	8.4 3	1049 687. 00	10. 72	6841 89.0 0	0.0 0	0.00
3	Marut huu	77. 94	1070 974. 00	0.0 0	0.00	65. 09	4916 23.0 0	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
4	Vente ak	11. 07	1247 77.0 0	0.0 0	0.00	22. 26	3073 17.0 0	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
5	Manja kkada mbu	0.0 0	0.00	4.0 5	1458 29.0 0	2.0 4	6542 1.00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
6	Mullu venga	6.3 2	1326 91.0 0	0.0 0	0.00	0.0 0	0.00	0.4 8	1059 .00	0.0 0	0.00	0.0 0	0.00
7	Puliva ka	3.9 2	1014 57.0 0	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
8	Anjili	0.8 7	8345 .00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
9	Them bavu	0.7 5	6377 .00	0.0 0	0.00	0.0 0	0.00	0.3 6	1850 .00	0.0 0	0.00	0.0 0	0.00
10	Kanik onna	0.0 0	0.00	0.0 0	0.00	1.2 7	7346 .00	0.0 0	0.00	0.0 0	0.00	0.0 0	0.00
11	Other s	1.4 5	4029 .00	0.0 0	0.00	0.2 3	943. 00	23. 96	1315 010. 00	0.0 0	0.00	0.0 0	0.00
	Grand Total	51 5.4 3	2758 9662 .00	27 9.0 3	2499 0202 .00	40 1.4 2	2846 2641 .00	61 7.1 6	4680 9168 .00	88 0.7 8	5895 1426 .00	60 9.5 8	4481 4895 .00



Table 5.11 (b)
Quantity and Value of Timber (wood) from Forest
(Auction Depot: 4. Pathanapuram Depot) (68)
(Cumulative Annual Average: 2015-2020)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	508.34	92.33	37479373.00	97.09
2	RoseWood	5.22	0.95	492784.67	1.28
3	Maruthuu	23.84	4.33	260432.83	0.67
4	Venteak	5.56	1.01	72015.67	0.19
5	Manjakkadambu	1.01	0.18	35208.33	0.09
6	Mulluvenga	1.13	0.21	22291.67	0.06
7	Pulivaka	0.65	0.12	16909.50	0.04
8	Anjili	0.14	0.03	1390.83	0.00
9	Thembavu	0.18	0.03	1371.17	0.00
10	Kanikonna	0.21	0.04	1224.33	0.00
11	Others	4.27	0.78	219997.00	0.57
	Grand Total	550.57	100.00	38602999.00	100.00

Figure 5.9 (a)

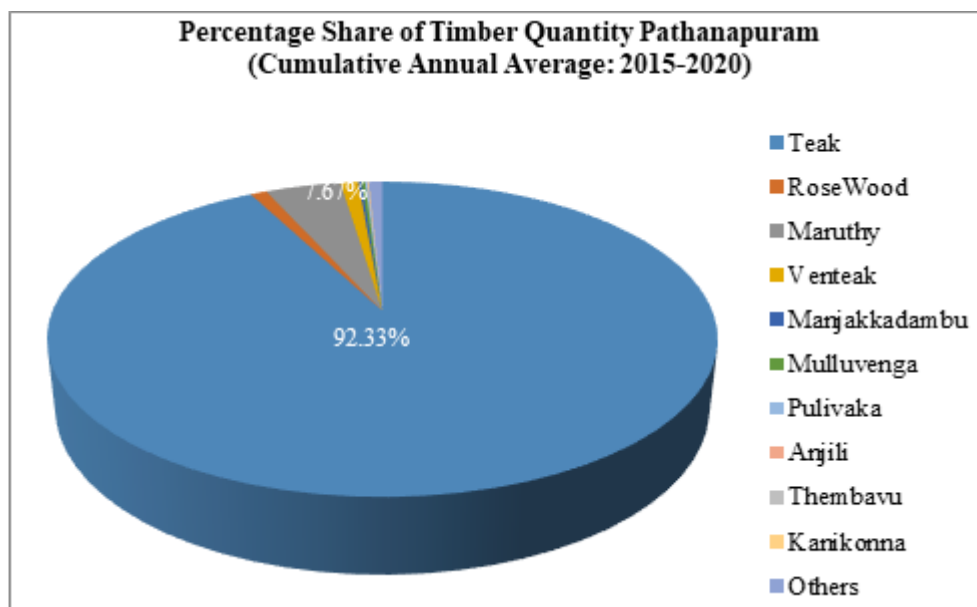


Figure 5.9 (b)

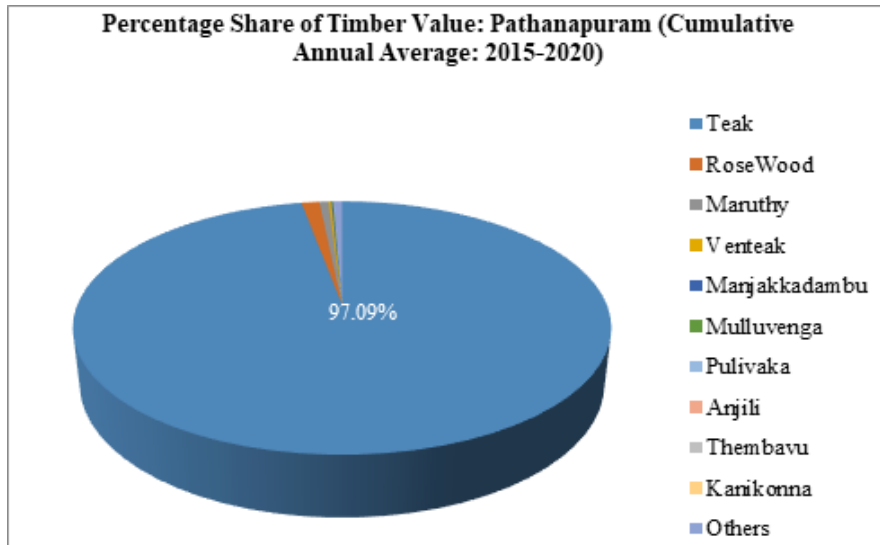


Figure 5.9 (c)

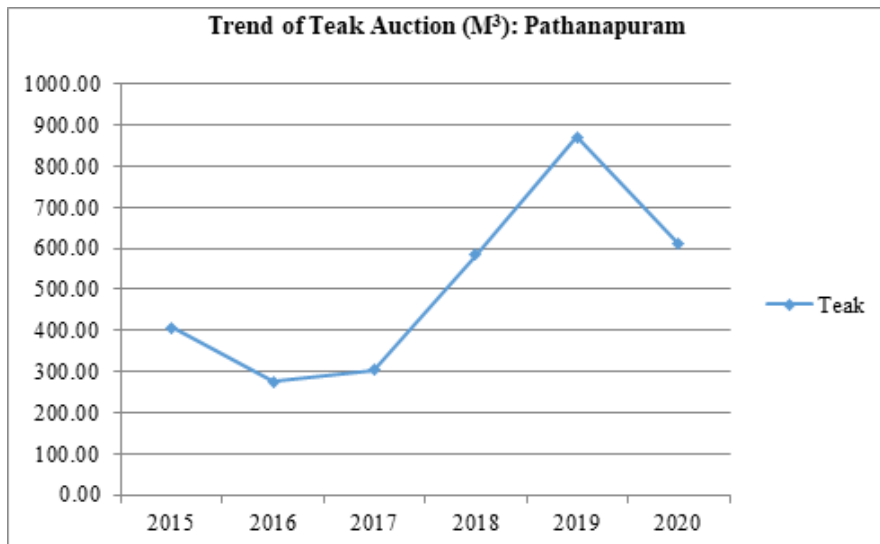


Figure 5.9 (d)

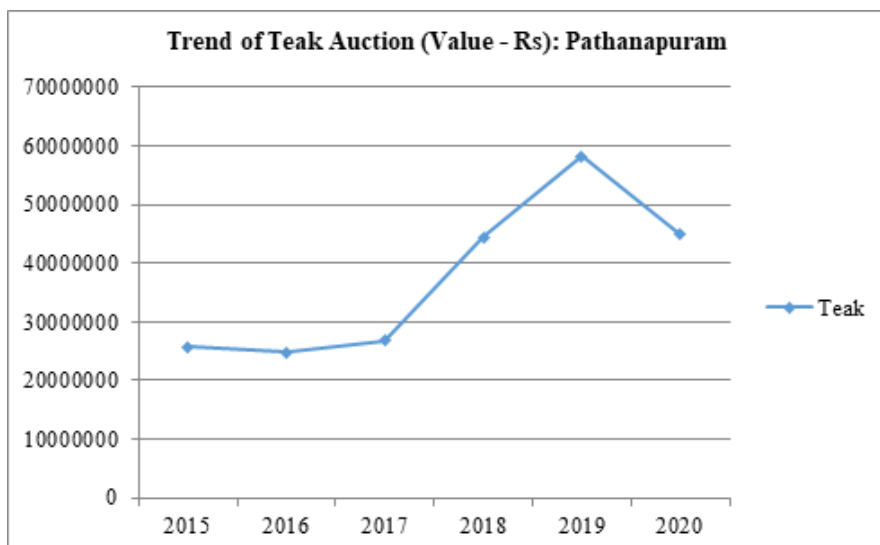


Figure 5.9 (e)

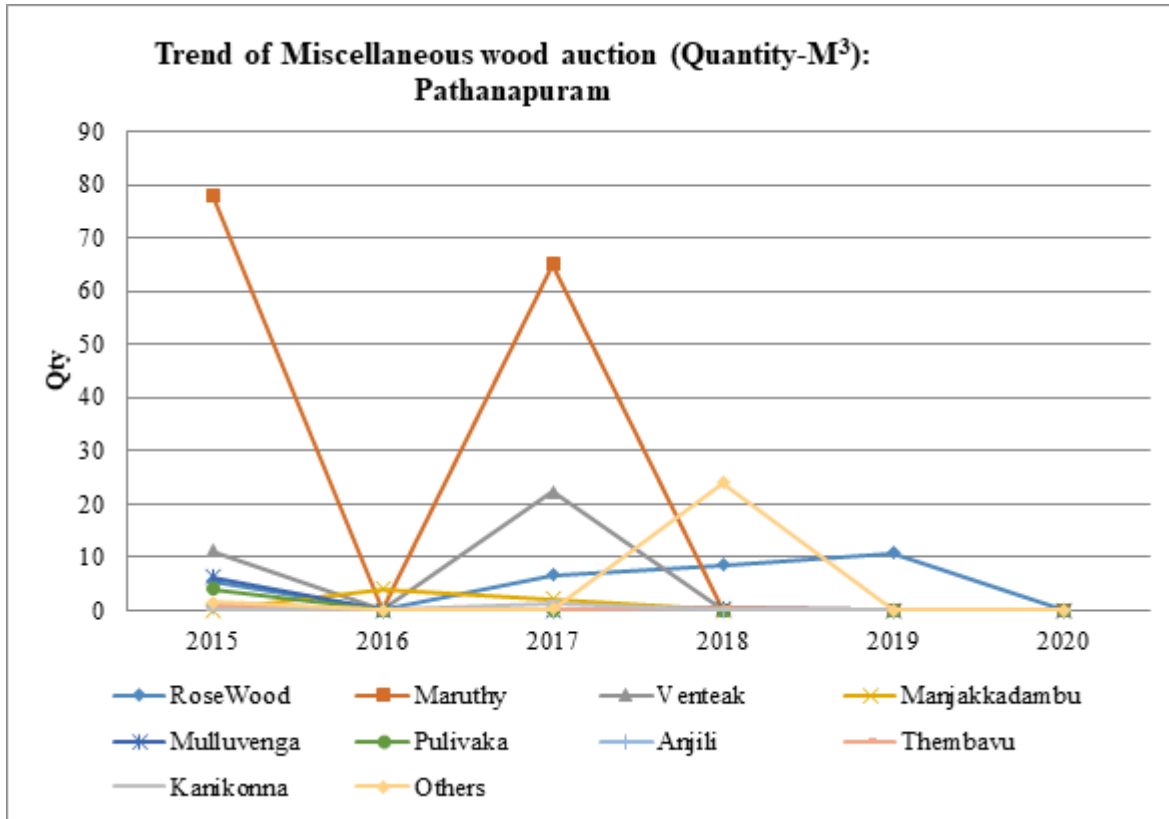
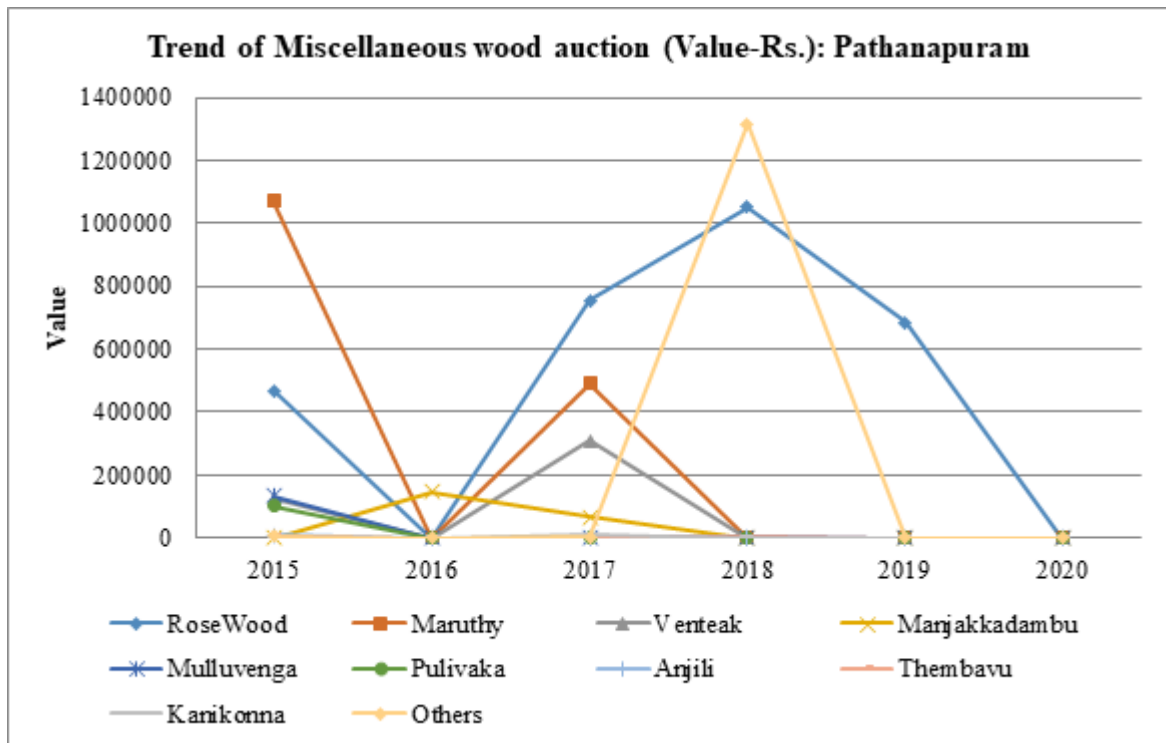


Figure 5.9 (e)



5. Veeyapuram Timber Depot

The analysis of six years quantity and value data collected from the Veeyapuram Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 156.30 cubic meters (M3) that accounts 85.04% of the total timber in this depot. The Veeyapuram depot had fetched Rs. 6,87,72,787/- in revenue (cumulative annual average) to the Government. It accounts 97.27 % of the total revenue received at Veeyapuram depot.

The miscellaneous timbers account a quantity of 14.96% of the total timbers and it contribute to 2.72% of total timber value (cumulative annual average). Among miscellaneous timbers Maruthuu, Ventek, Unnam, Mulluvenga, Karivenga, Poovam and Pulivaka contribute almost equally to both cumulative quantity and cumulative value.

The Veeyapuram timber depot conducted 33 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020. The quantity and

value of teak auctioned decreased from 2015 to 2017 and showing an increasing trend from 2017 to 2019 and again decreased in 2020. Details are given in Tables 5.12 (a)&(b) and figures 5.10 (a)-(f).



Table 5.12 (a)
Quantity and Value of Timber Auctioned from Veeyapuram Depot (33)

S I. N o. .	Speci es Nam e	2015 (7)		2016 (2)		2017 (3)		2018 (6)		2019 (8)		2020 (7)	
		Qt y. (M 3)	Value (Rs.)	Qt y. (M 3)	Valu e (Rs.)	Qt y. (M 3)	Valu e (Rs.)	Qt y. (M 3)	Valu e (Rs.)	Qt y. (M 3)	Value (Rs.)	Qt y. (M 3)	Value (Rs.)
1	Teak	20 3.8 4	1254 9542. 00	11 0.2 2	6868 258.0 0	38 .1 3	3650 209.0 0	95 .3 5	9701 864.0 0	29 8.1 9	2326 3283. 00	19 2.0 7	1273 9631. 00
2	Maru thuu	65. 15	8230 66.00	58. 21	6428 62.00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
3	Vent eak	13. 26	2046 64.00	13. 26	1613 00.00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
4	Unna m	4.6 8	6126 9.00	0.0 0	0.00 00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
5	Mull uven ga	0.6 6	8229. 00	1.6 7	1006 3.00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
6	Kariv enga	0.0 0	0.00 00	1.0 1	3460. 00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
7	Poov am	6.3 3	2659. 00	0.0 0	0.00 00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
8	Puliv aka	0.0 0	0.00 00	0.7 2	2298. 00	0. 00	0.00 00	0. 00	0.00 00	0.0 0	0.00 00	0.0 0	0.00 00
	Gran d Total	29 3.9 2	1364 9429. 00	18 5.1 0	7688 241.0 0	38 .1 3	3650 209.0 0	95 .3 5	9701 864.0 0	29 8.1 9	2326 3283. 00	19 2.0 7	1273 9631. 00



Table 5.12 (a)
Quantity and Value of Timber Auctioned from Veeyapuram Depot (33)
(Cumulative Annual Average: 2015-2020)

Sl. No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	156.30	85.04	68772787.00	97.28
2	Maruthuu	20.56	11.19	1465928.00	2.07
3	Venteak	4.42	2.41	365964.00	0.52
4	Unnam	0.78	0.42	61269.00	0.09
5	Mulluvenga	0.39	0.21	18292.00	0.03
6	Karivenga	0.17	0.09	3460.00	0.00
7	Poovam	1.06	0.57	2659.00	0.00
8	Pulivaka	0.12	0.07	2298.00	0.00
	Grand Total	183.79	100.00	70692657.00	100.00

Figure 5.10 (a)

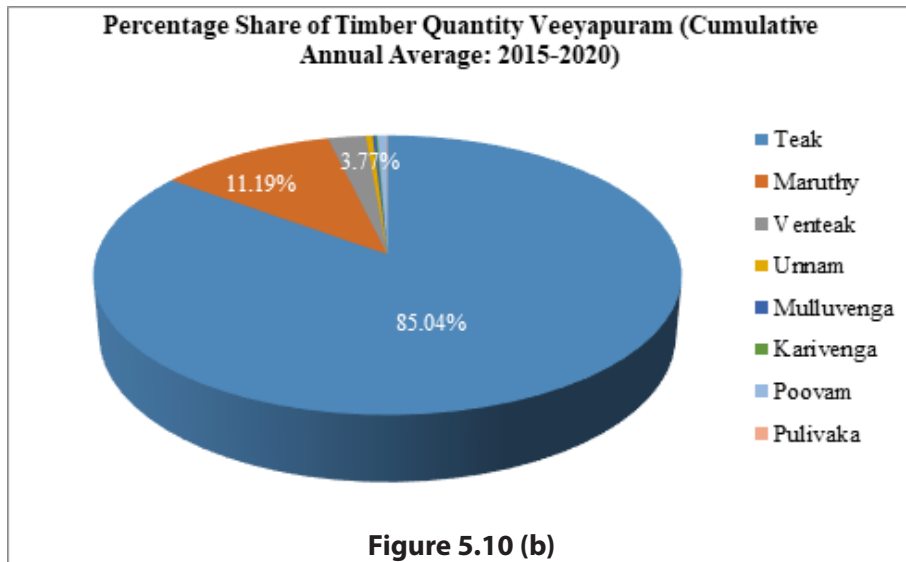


Figure 5.10 (b)

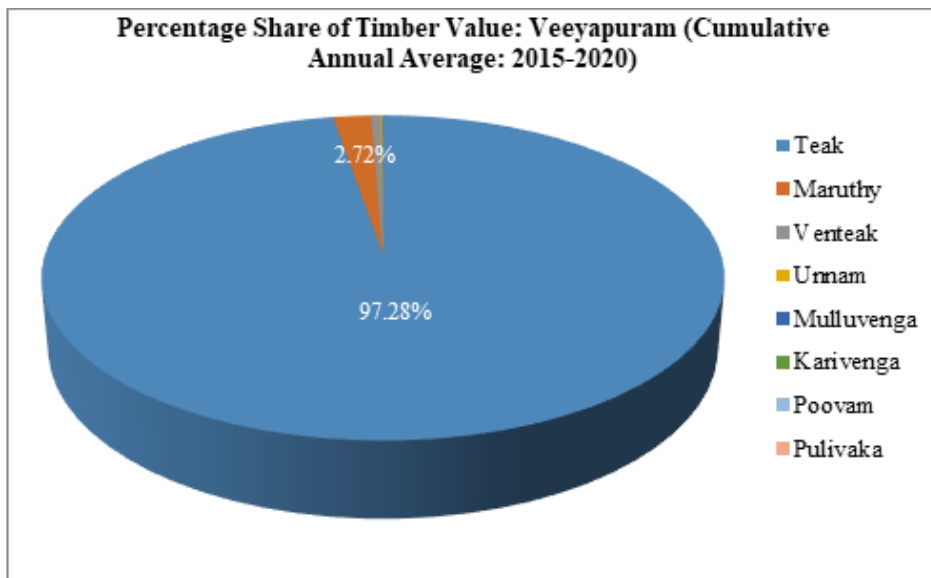


Figure 5.10 (c)

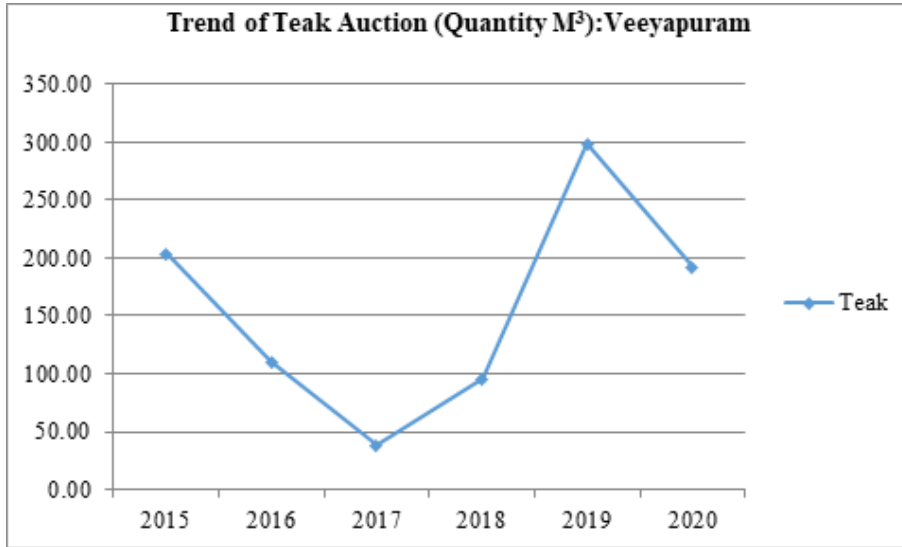


Figure 5.10 (d)

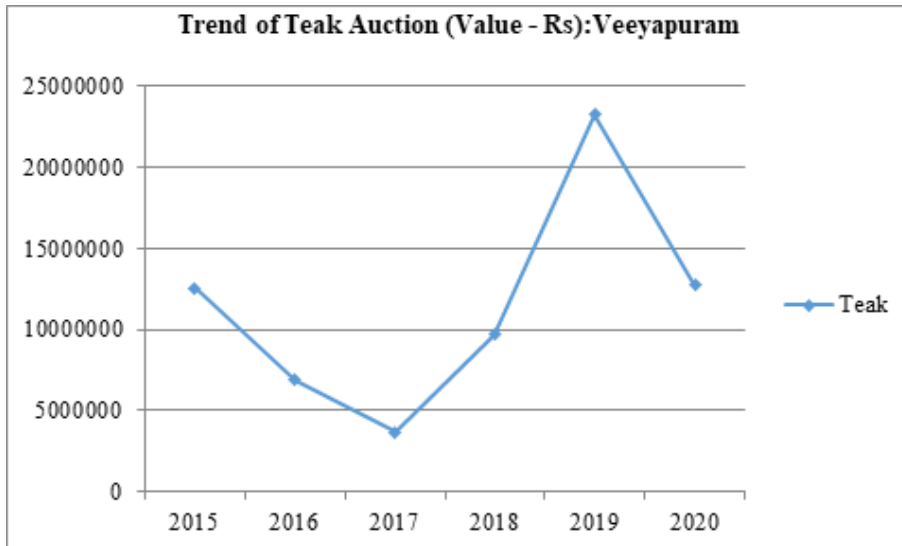
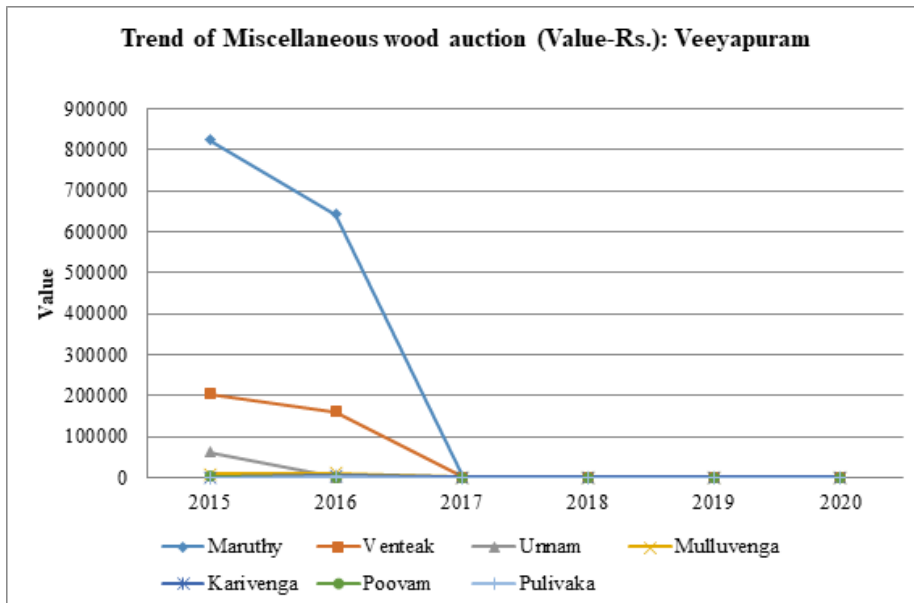


Figure 5.10 (d)



6. Tuet Timber Depot

The analysis of six years quantity and value data collected from the Tuet Government timber depot at Punalur division indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 125.10 cubic meters (M3) that accounts 94.84% of the total timber in this depot. The Tuet depot had fetched Rs. 1,14,64,034/- in revenue (cumulative annual average) to the Government. It accounts 95.75 % of the total revenue received at Tuet depot.

The miscellaneous timbers account a quantity of 5.16% of the total timbers and it contribute to 4.25% of total timber value (cumulative annual average). Kanikonna, Maruthuu, Venteak and Elavu are the main miscellaneous timbers.

The Tuet timber depot conducted 33 auctions during the period 2015 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs.) received during 2015 to 2020 are given in the tables and figures. The quantity and value of teak auctioned showed increasing and decreasing trend in alternative years from 2015 to 2020. Details are given in Tables 5.13 (a)&(b) and figures 5.11 (a)-(f).

Table 5.13 (a)
Quantity and Value of Timber Auctioned from Tuet Depot (33)

Sl. No.	Species Name	2015		2016 (3)		2017 (7)		2018 (8)		2019 (6)		2020 (9)	
		Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)	Qty. (M3)	Value (Rs.)
1	Teak	0.00	0.00	159.50	137570.02	118.57	129452.87	197.31	216726.34	110.67	979627.00	164.58	106130.05
2	Kanikonna	0.00	0.00	0.00	0.00	22.45	291030.90	0.00	0.00	0.00	0.00	0.00	0.00
3	Maruthuu	0.00	0.00	14.79	126824.00	2.92	9477.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Venteak	0.00	0.00	0.00	0.00	0.53	2683.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Elavu	0.00	0.00	0.18	1288.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Grand total	0.00	0.00	174.47	138851.14	144.46	158677.56	197.31	216726.34	110.67	979627.00	164.58	106130.05



Table 5.13 (b)
Quantity and Value of Timber Auctioned from Tuet Depot (33)
(Cumulative Annual Average: 2015-2020)

Sl.No.	Species Name	Cumulative Annual Average			
		Qty. (M3)	% Qty.	Value (Rs.)	% Value
1	Teak	125.10	94.84	11464034.17	95.75
2	Kanikonna	3.74	2.84	485051.50	4.05
3	Maruthuu	2.95	2.24	22716.83	0.19
4	Venteak	0.09	0.07	447.17	0.00
5	Elavu	0.03	0.02	214.67	0.00
	Grand total	131.91	100.00	11972464.33	100.00

Figure 5.11 (a)

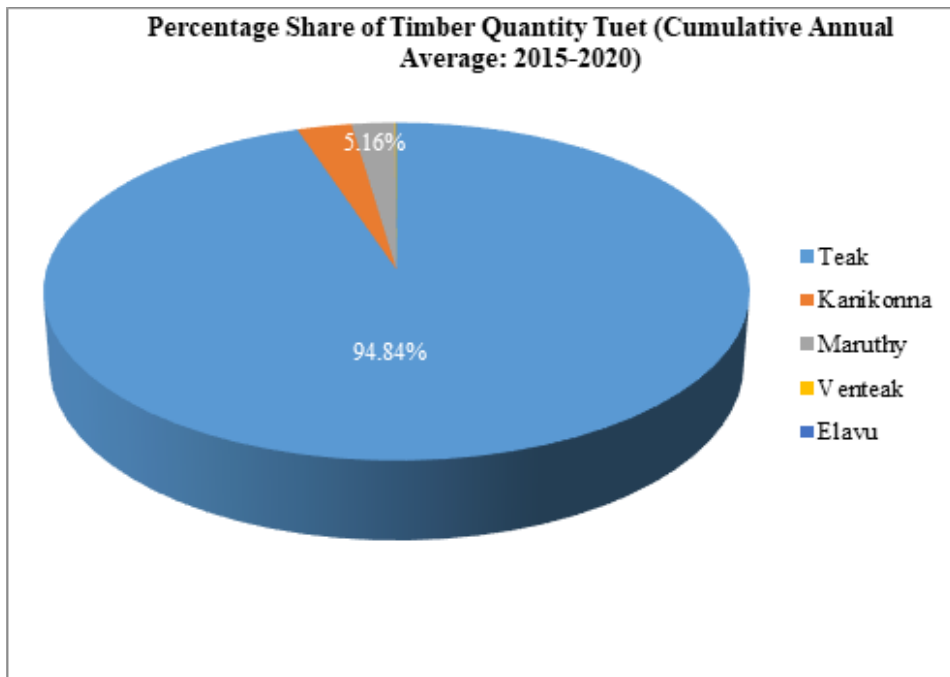


Figure 5.11 (b)

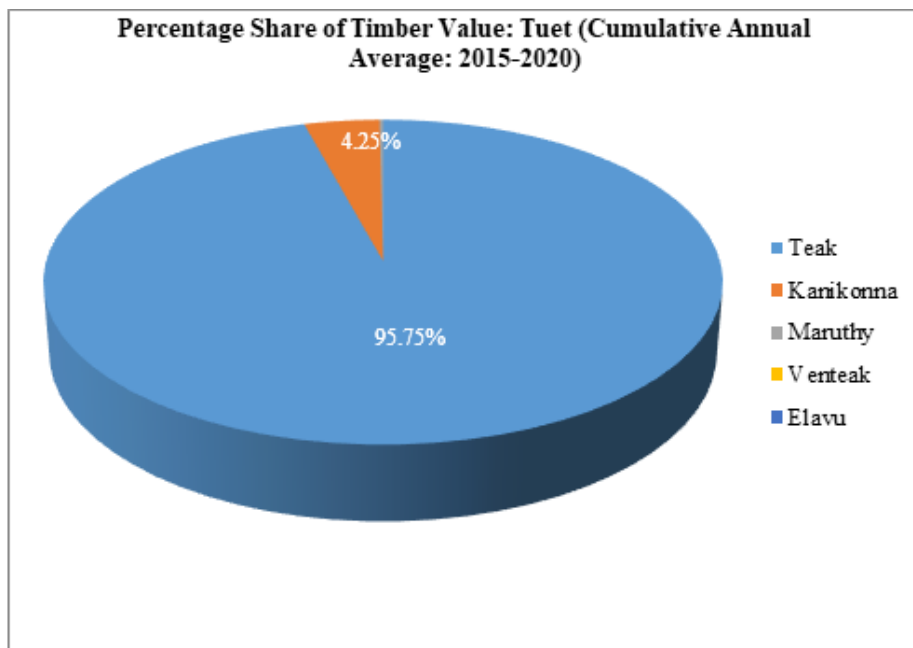


Figure 5.11 (c)

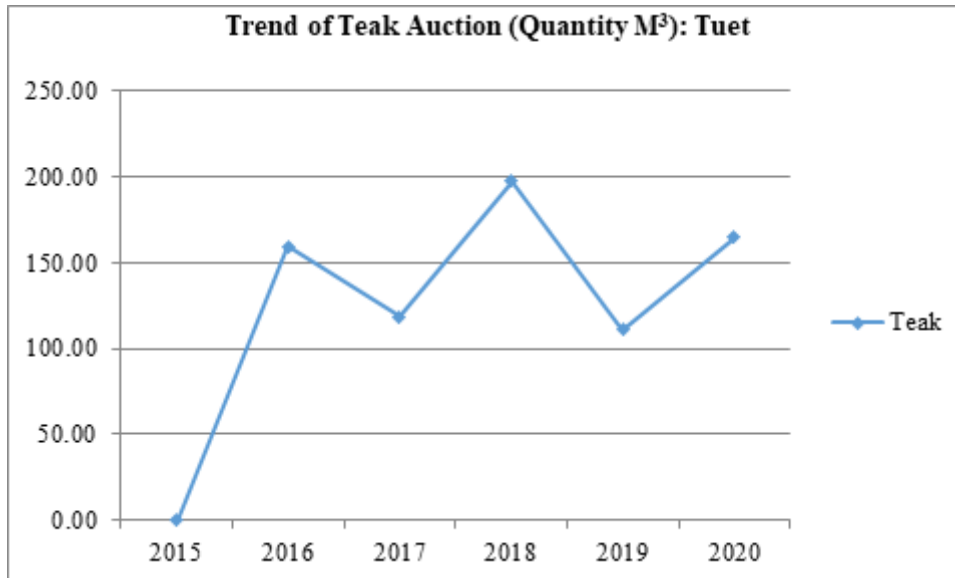


Figure 5.11 (d)

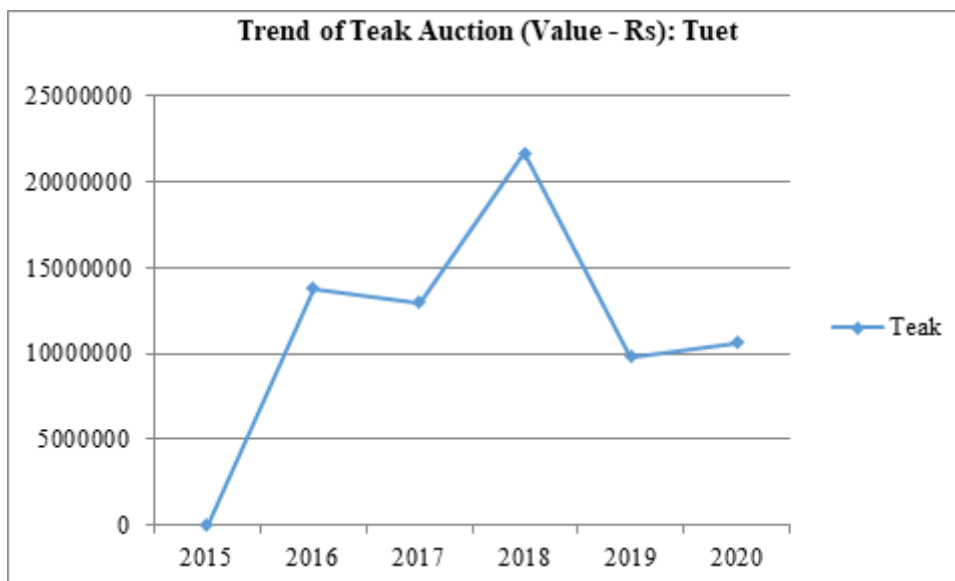


Figure 5.11 (e)

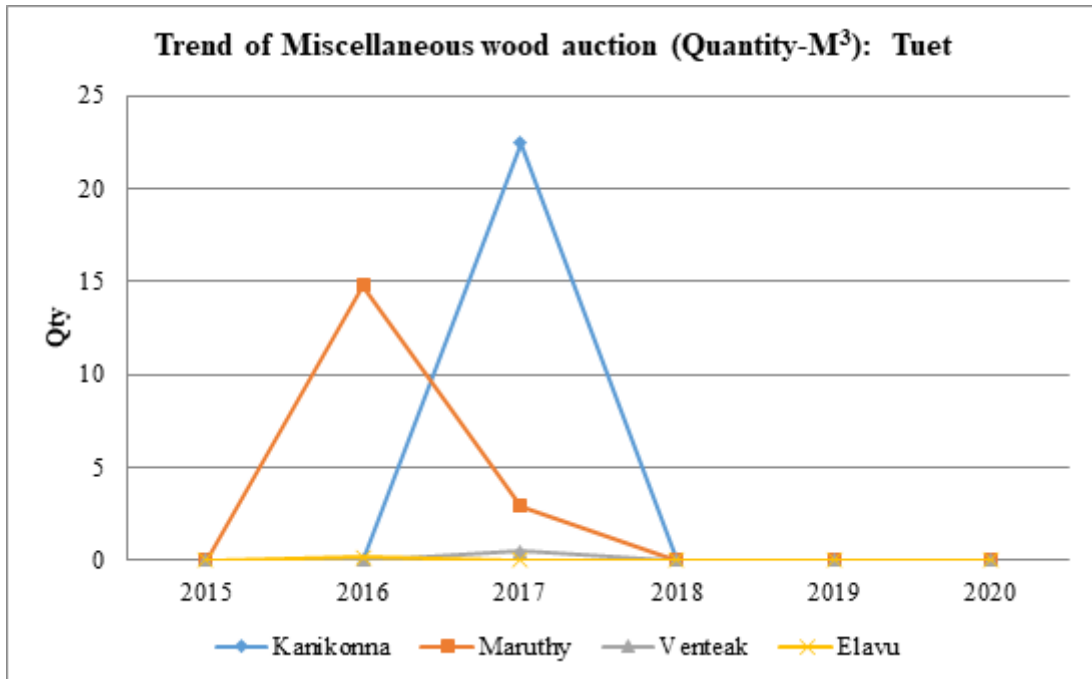
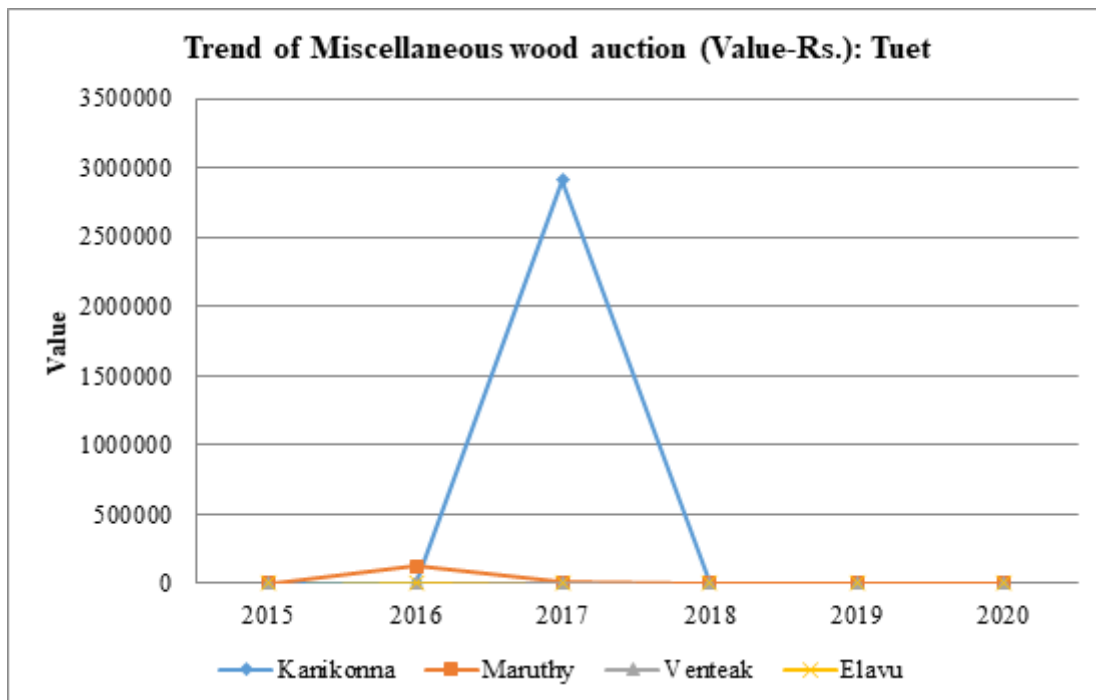


Figure 5.11 (f)



Kottayam timber sales division

There are four Government timber depots under Kottayam timber sales division.

1. Kothamangalam Timber Depot

The analysis of four years quantity and value data collected from the Kothamangalam Government timber depot at Ernakulam indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 388.406 cubic meters (M3) that accounts 69.53% of the total timber in Kothamangalam depot. The Kothamangalam depot had fetched Rs.2,56,63,024/- in revenue (cumulative annual average) to the Government. It accounts 89.75% of the total revenue received at Kothamangalam depot.

The miscellaneous timbers account a quantity of 30.47% of the total timbers and it contribute to 10.25% of total timber value (cumulative annual average). Among miscellaneous timbers maruthu, anjily, unnam/chadachi, irul, vaka, mahagony, poovam, plavu, venga, vetty, ventek and thembavu contribute almost equally to both cumulative quantity and cumulative value.

The Kothamangalam timber depot conducted 27 auctions during the period 2017 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2017 to 2020 are given in figures. The quantity and value of teak auctioned increased steadily from 2017 to 2018 reaching a maximum at 2018 (546 M3 and Rs.4,02,01,357/- respectively), then recorded a decrease in 2019 (482.425 M3 and Rs.3,13,40,151/- respectively) and 2020 (433.113 M3 and Rs.2,30,23,793/- respectively) when compared to 2017.

Details are given in Tables 5.14 (a)&(b) and figures 5.12 (a)-(h).



Table 5.14 (a) Quantity and Value of Timber Auctioned from Kothamangalam (27)

Species Name	2015 (...)		2016 (...)		2017 (4)		2018 (8)		2019 (8)		2020 (7)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak					92	8086795	546.089	40201357	482.425	31340151	433.113	23023793
Mahogany					1.2	12612	46.245	1778026	14.451	171918		
Anjili					0.96	6236	14.162	41326	34.703	1381634	3.802	69106
Maruthuu					2.23	7054	3.403	88308	32.425	955920	6.888	280659
Venga							7.026	66800	3	31758	60.714	430379
Venteak					0.75	7970	19.88	187170			38.507	289405
Unnam/Chadachi					0.67	1950	3.632	35775	13.219	82300	11.424	198011
Poovam							7.436	54288	1.56	10895		
Irul					0.55	1820	21.56	524459	17.771	376782		
Vaka							6.382	28550			26.451	323220
Thembavu					0.8	2560	14.533	291772	1.84	12947		
Jack/Plavu					0.564	7590	3.759	21368	5.431	432837	7.834	213145
Rosewood							1.28	21368			13.186	166444
TOTAL IW					99.724	8134587	695.387	43340567	606.825	34797142	601.919	24994162
Others					1.046	3140	23.398	376295	56.907	570807	10.18	153182
Grand Total					100.77	8137727	718.785	43716862	663.732	35367949	612.099	25147344



Table 5.14 (a)
Quantity and Value of Timber Auctioned from Kothamangalam (27)
(Cumulative Annual Average: 2015-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	388.40675	69.52523	25663024	89.75431
Mahogany	20.632	3.69315	654185.3333	2.287959
Anjili	13.40675	2.399823	374575.5	1.310047
Maruthuu	11.2365	2.011346	332985.25	1.164588
Venga	23.58	4.220846	176312.3333	0.616638
Venteak	19.71233333	3.528529	161515	0.564885
Unnam/Chada chi	7.23625	1.295297	79509	0.278076
Poovam	4.498	0.805147	32591.5	0.113986
Irul	13.29366667	2.379581	301020.3333	1.052794
Vaka	16.4165	2.938571	175885	0.615143
Thembavu	5.724333333	1.024662	102426.3333	0.358228
Jack/Plavu	4.397	0.787068	168735	0.590137
Rosewood	7.233	1.294715	93906	0.328428
TOTAL IW	535.7730833	95.90396	28316670.58	99.03522
Others	22.88275	4.096037	275856	0.964784
Grand Total	558.6558333	100	28592526.58	100

Figure 5.12 (a)

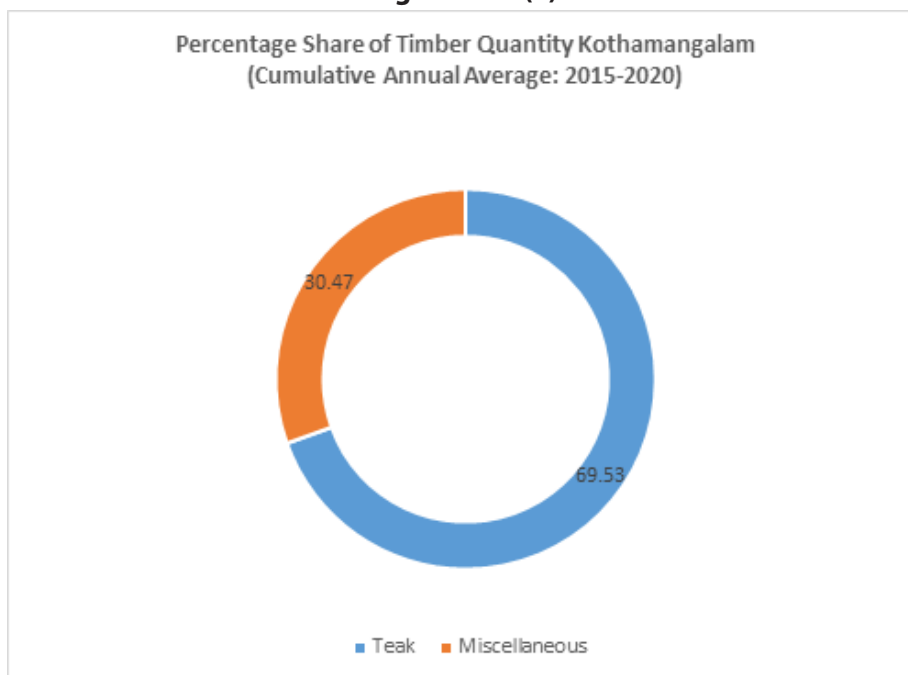


Figure 5.12 (b)

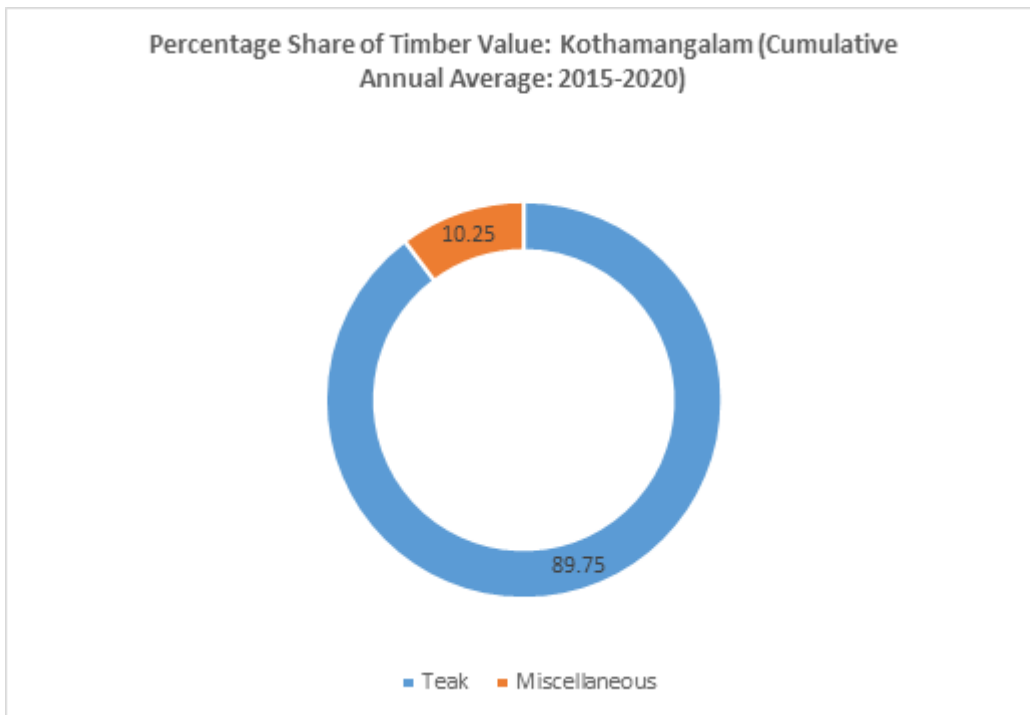


Figure 5.12 (c)

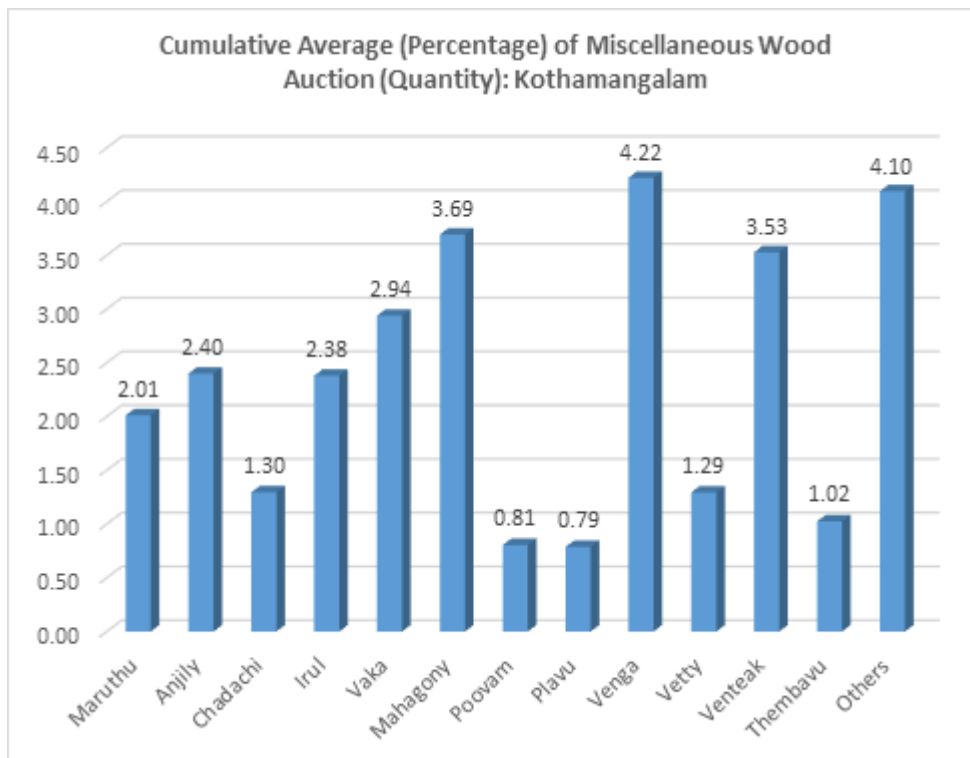


Figure 5.12 (d)
Cumulative Average (Percentage) of Miscellaneous Wood Auction
(Value): Kothamangalam

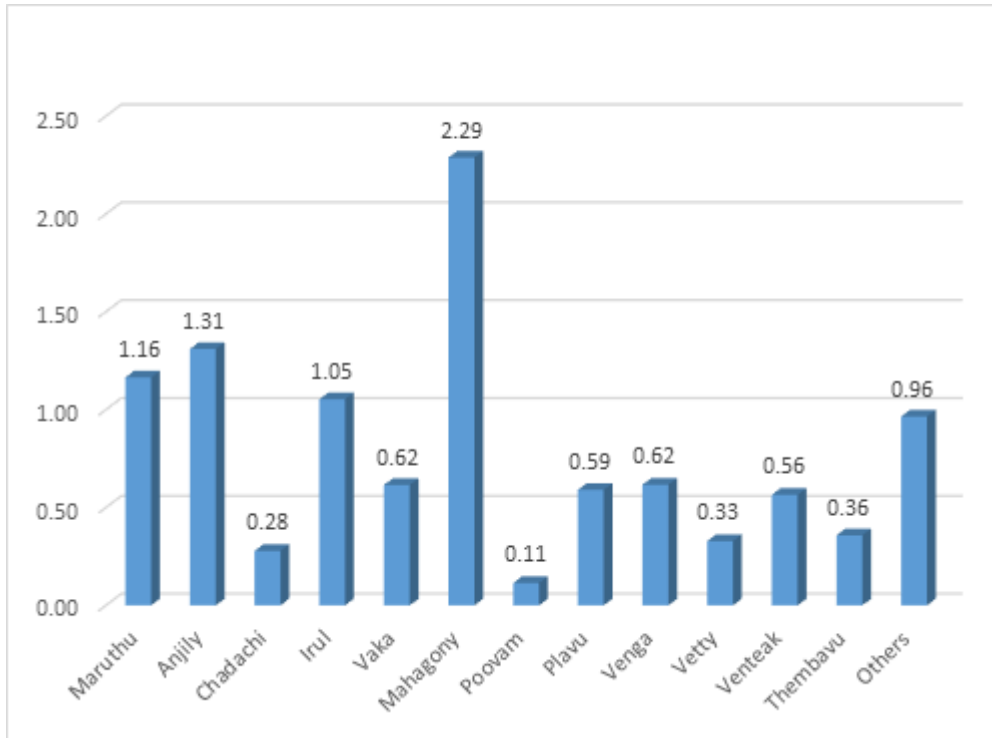


Figure 5.12 (e)

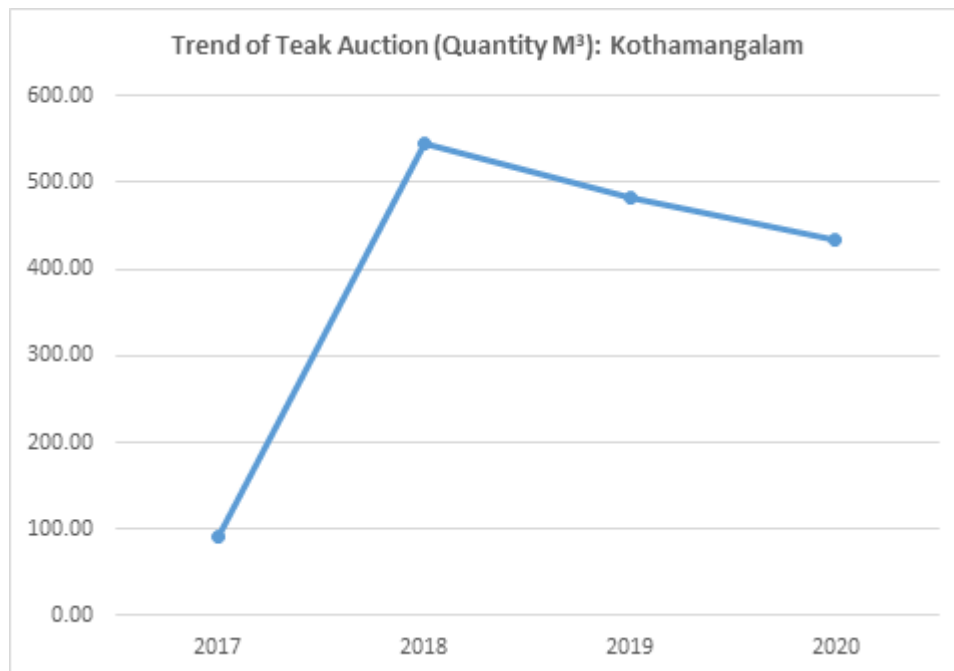


Figure 5.12 (g)

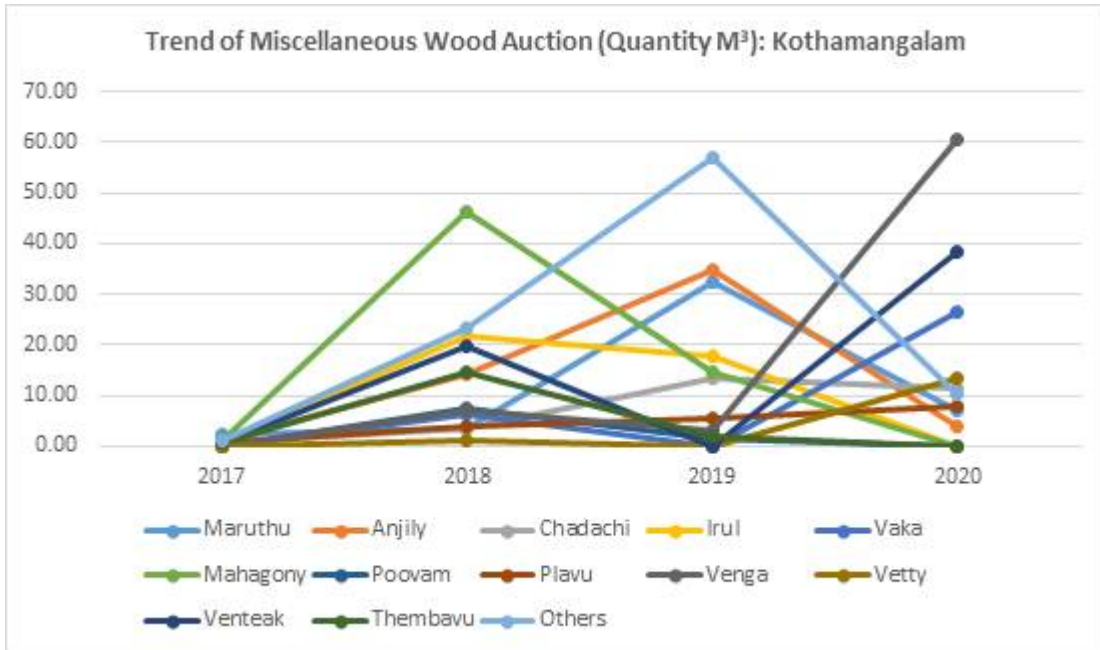
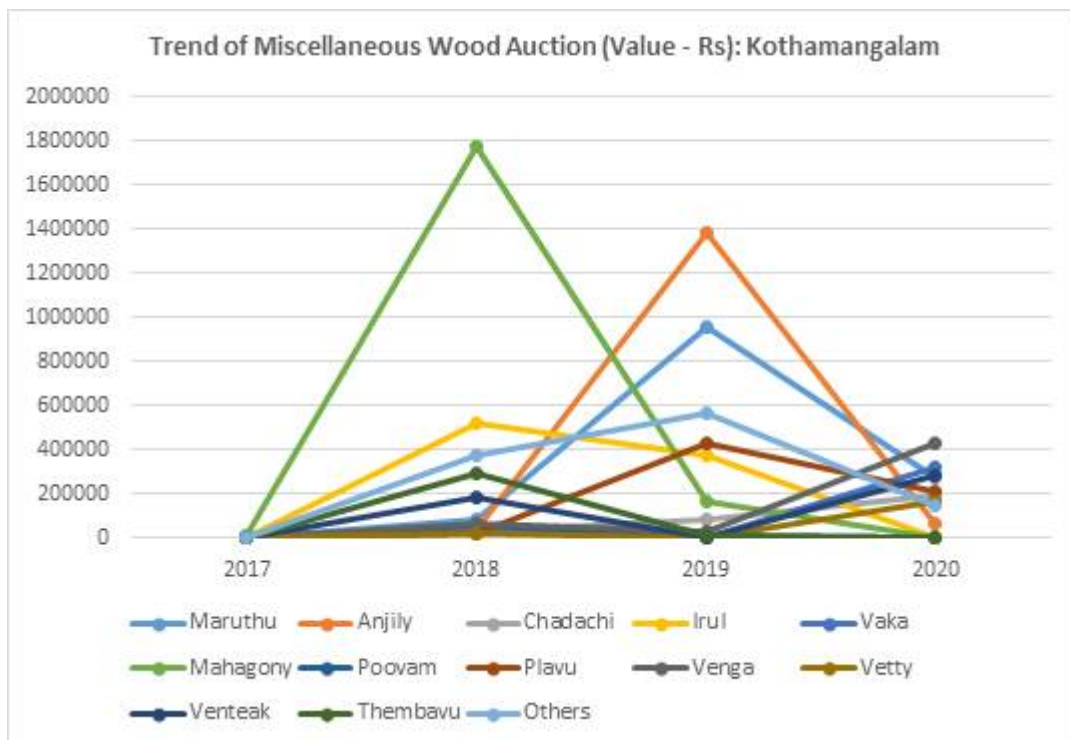


Figure 5.12 (h)



2. Thalakkode Timber Depot

The analysis of three years quantity and value data collected from the Thalakkode Government timber depot at Ernakulam indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 681.35 cubic meters (M³) that accounts 78.09% of the total timber in Thalakkode depot. The Thalakkode depot had fetched Rs.3,17,08,365.33/- in revenue (cumulative annual average) to the Government. It accounts 94% of the total revenue received at Thalakkode depot.

The miscellaneous timbers account a quantity of 21.91% of the total timbers and it only contribute to 5.84% of total timber value (cumulative annual average). In miscellaneous timbers, maruthu, anjily, venteak and kamakam predominate than other timbers in cumulative quantity (11.01%, 2.37%, 2.21% and 1.21% respectively) and cumulative value (1.67%, 1.14%, 0.57% and 0.99% respectively).

The Thalakkode timber depot conducted 50 auctions during the period 2018-2020. The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2018-2020 are given in Tables 5.15 (a)&(b) and figures 5.13 (a)-(j).

Table 5.15 (a) Quantity and Value of Timber Auctioned from Thalakkode (50)

Species Name	2015 (...)		2016 (...)		2017 (...)		2018 (13)		2019 (18)		2020 (19)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak							876.497	37975226	336.61	16025470	830.945	41124400
Mahogany											0.56	25
Anjili							5.951	115000	22.578	438075	33.538	597150
Maruthuu							3.549	49625	80.866	708832	203.663	931700
Venga							1.795	25050			7.778	115250
Venteak							15.043	41475	30.332	447269	12.531	88625
Unnam/Chadachi							0.304	12825	0.267	8400	1.626	45200
Thanni											1.183	50
Poovam											6.727	61800
Kanjiram											2.175	650
Irul							1.227	57750	0.816	21100	19.699	218750
Vaka							7.811	135725	0.906	9600	0.594	7500
Kambakam									10.6	333275		
Jack/Plavu									0.93	13475		
TOTAL IW							912.177	38412676	483.905	18005496	1121.019	43191100
Others							9.091	110550	16.66	127525	25.542	293690
Grand Total							921.268	38523226	500.565	18133021	1146.561	43484790





Table 5.15 (b)
Quantity and Value of Timber Auctioned from Thalakkode (50)
(Cumulative Annual Average: 2018-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	681.3506667	78.090857	31708365.33	94.15554155
Mahogany	0.56	0.0641826	25	7.42356E-05
Anjili	20.689	2.3712045	383408.3333	1.13850143
Maruthuu	96.026	11.005717	563385.6667	1.672930219
Venga	4.7865	0.5485896	70150	0.208305006
Venteak	19.302	2.2122378	192456.3333	0.571484216
Unnam/Chadachi	0.732333333	0.0839341	22141.66667	0.065747969
Thanni	1.183	0.1355858	50	0.000148471
Poovam	6.727	0.7709939	61800	0.183510326
Kanjiram	2.175	0.2492808	650	0.001930125
Irul	7.247333333	0.8306302	99200	0.294566737
Vaka	3.103666667	0.355717	50941.66667	0.151267344
Kambakam	10.6	1.2148856	333275	0.989634369
Jack/Plavu	0.93	0.106589	13475	0.040012972
TOTAL IW	855.4125	98.040405	33499324	99.47365497
Others	17.09766667	1.9595951	177255	0.52634503
Grand Total	872.5101667	100	33676579	100

Figure 5.13 (a)

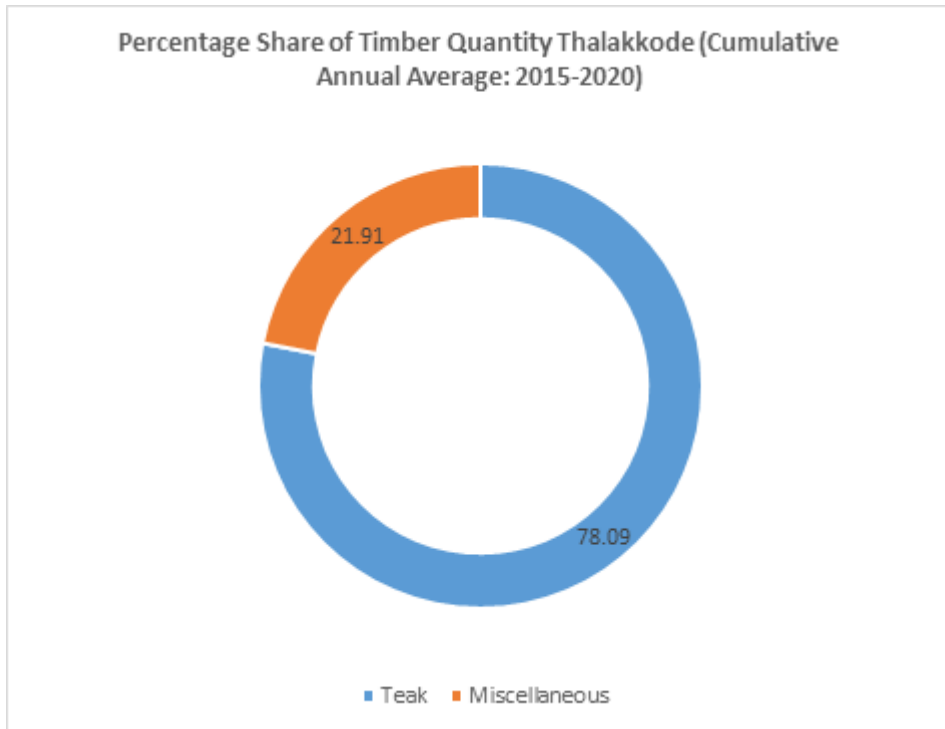


Figure 5.13 (b)

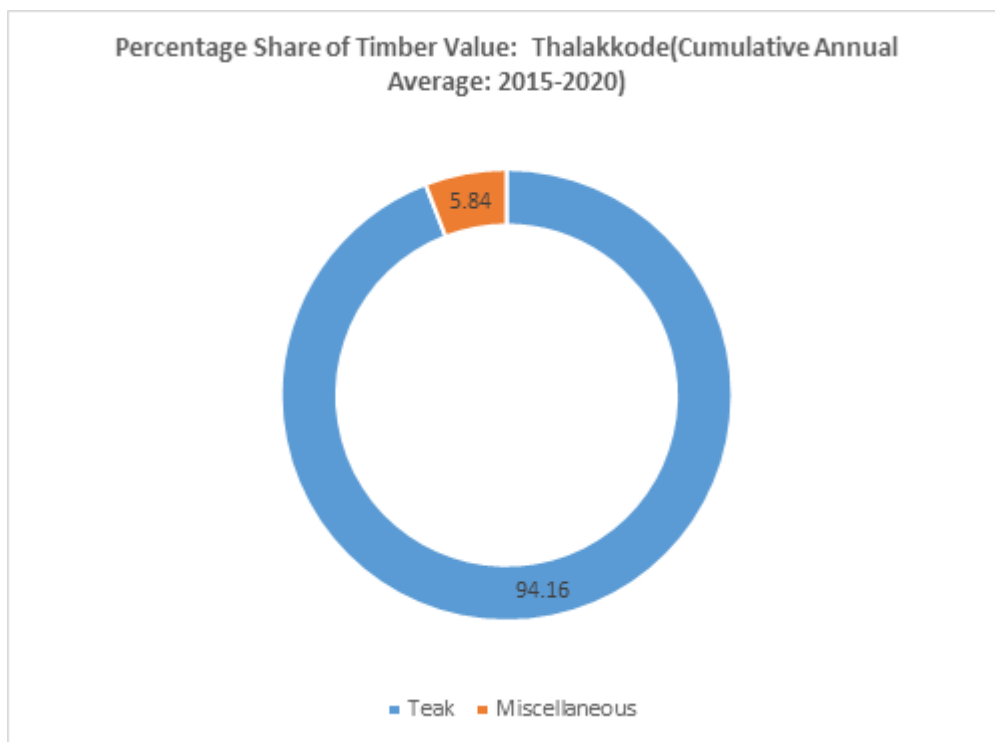


Figure 5.13 (c)

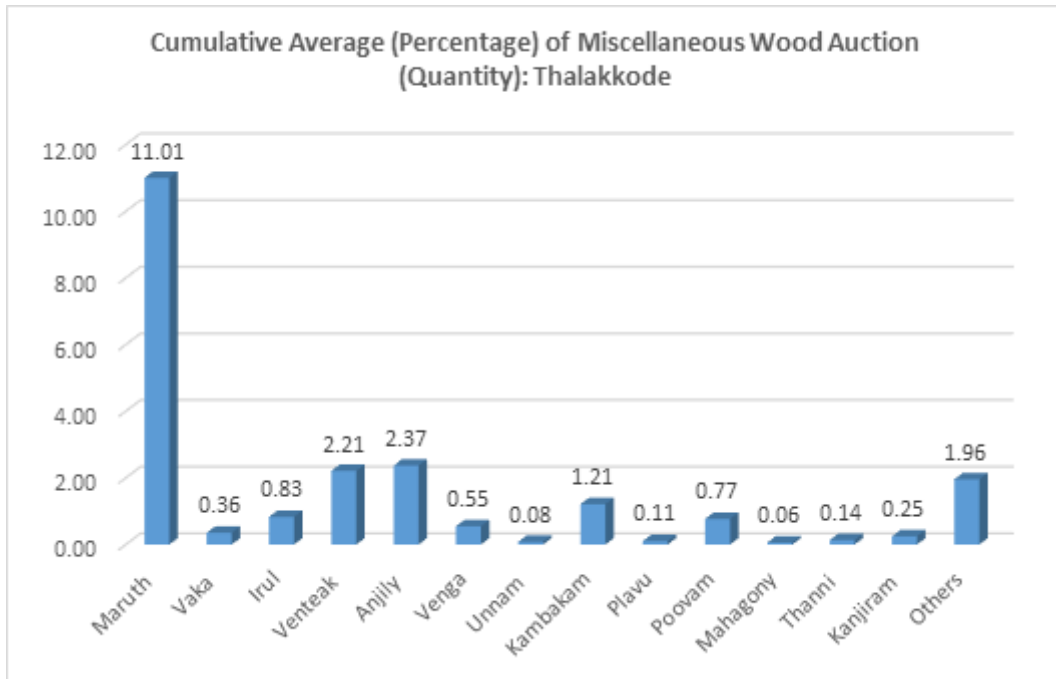


Figure 5.13 (d)

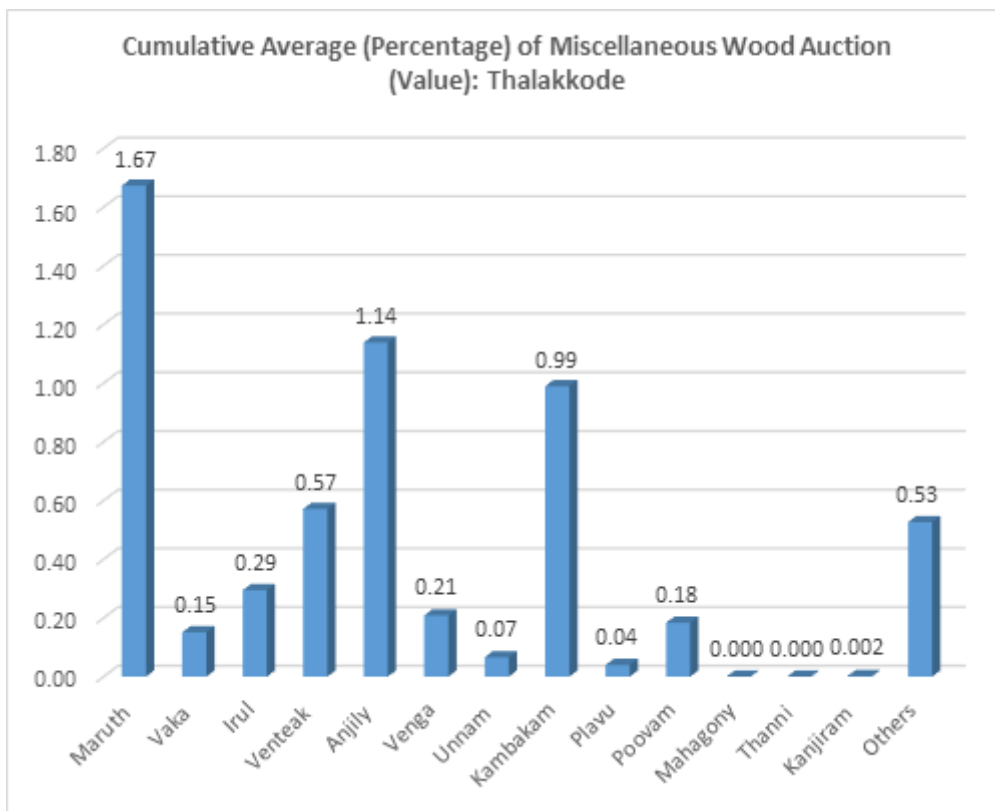


Figure 5.13 (e)

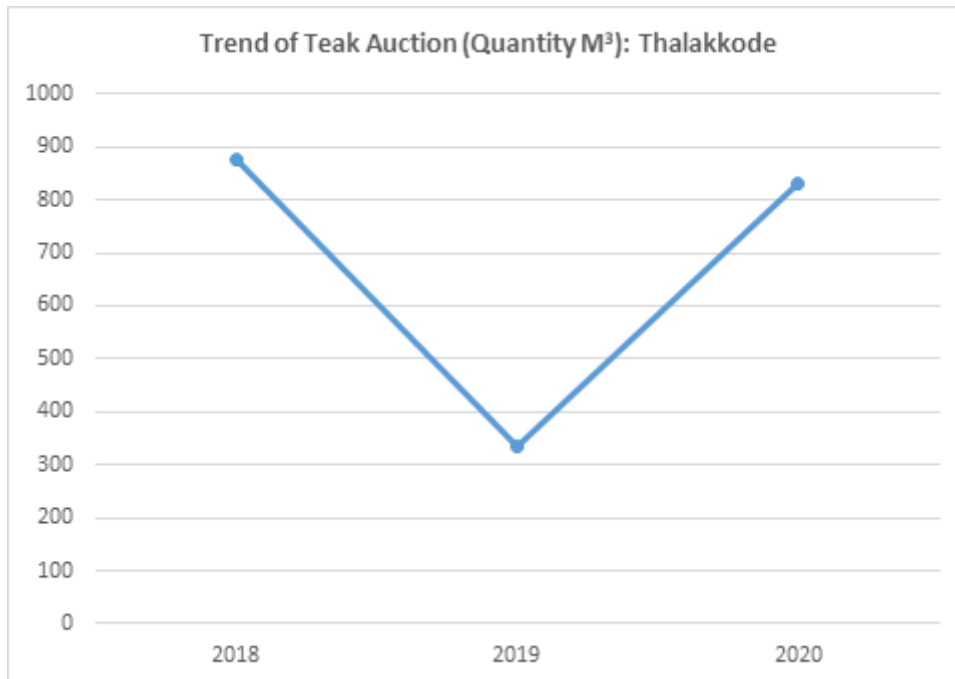


Figure 5.13 (f)

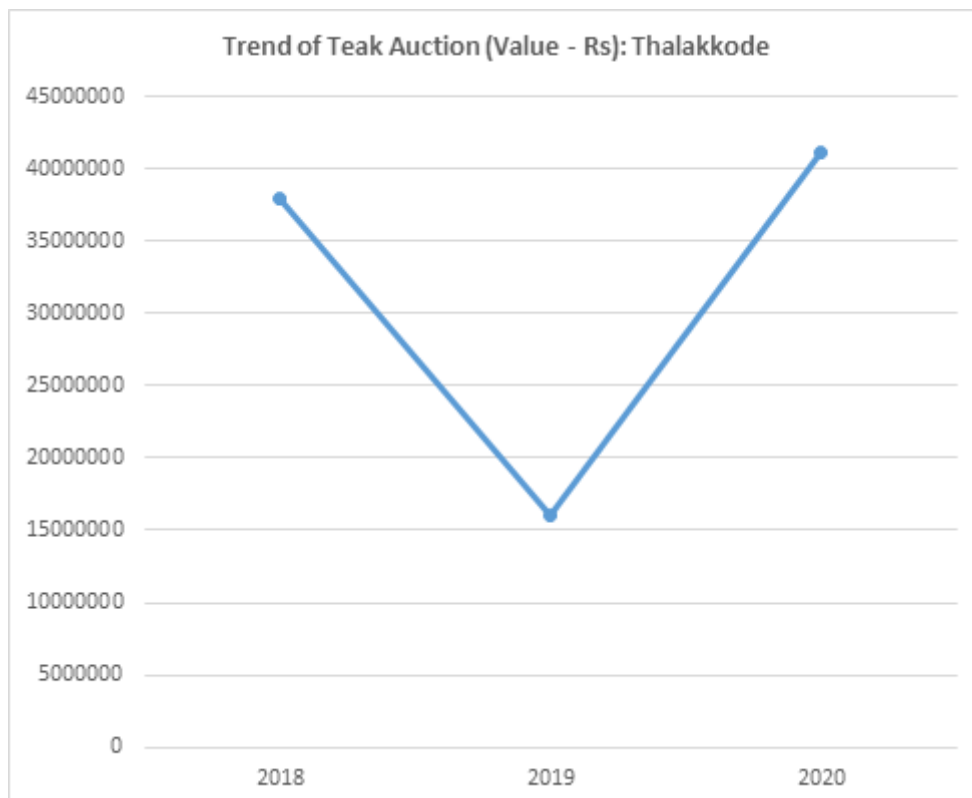


Figure 5.13 (g)

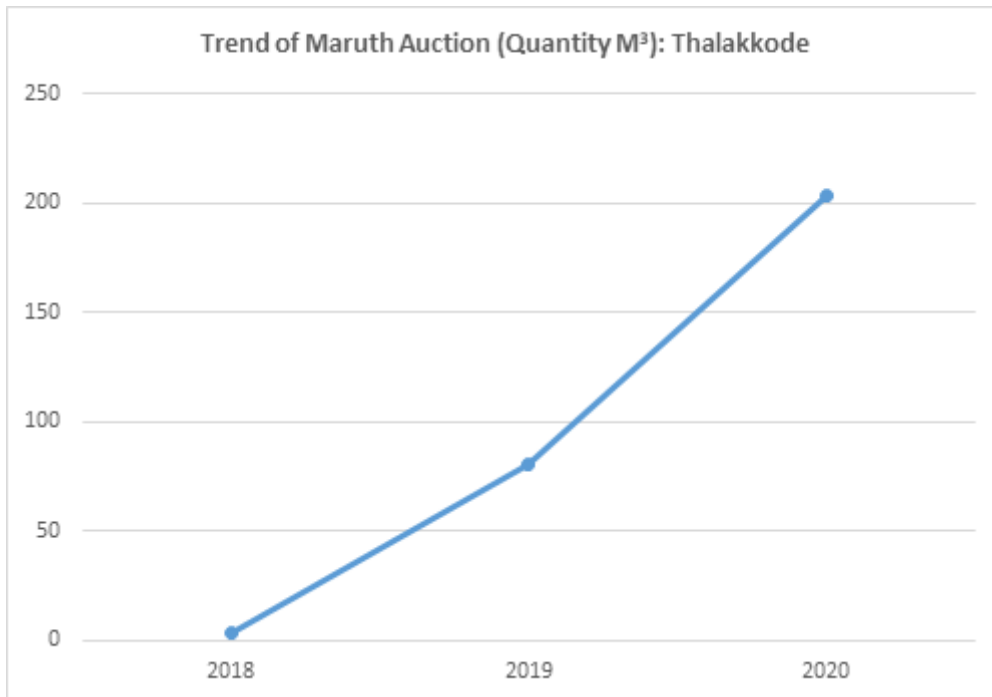


Figure 5.13 (h)

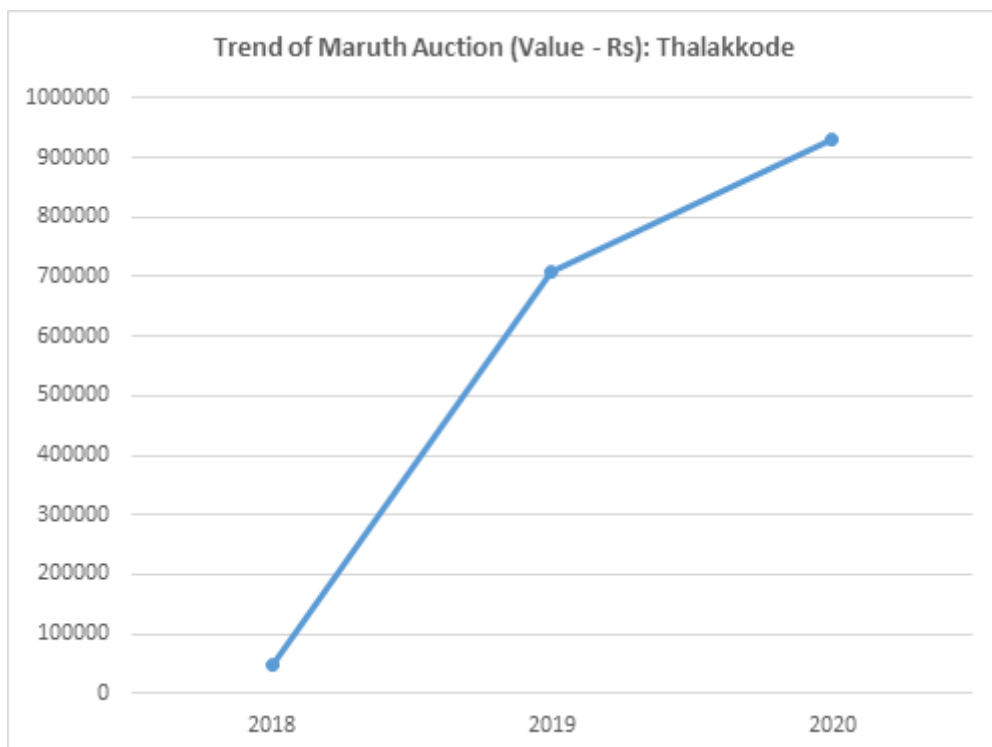


Figure 5.13 (i)

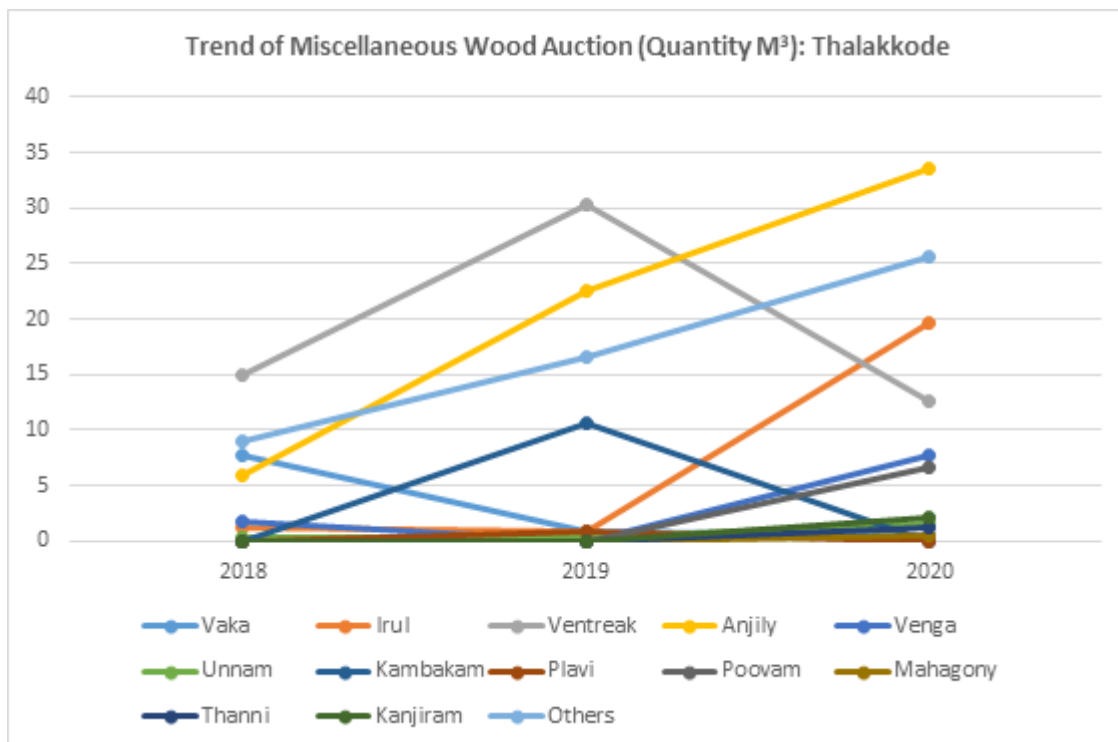
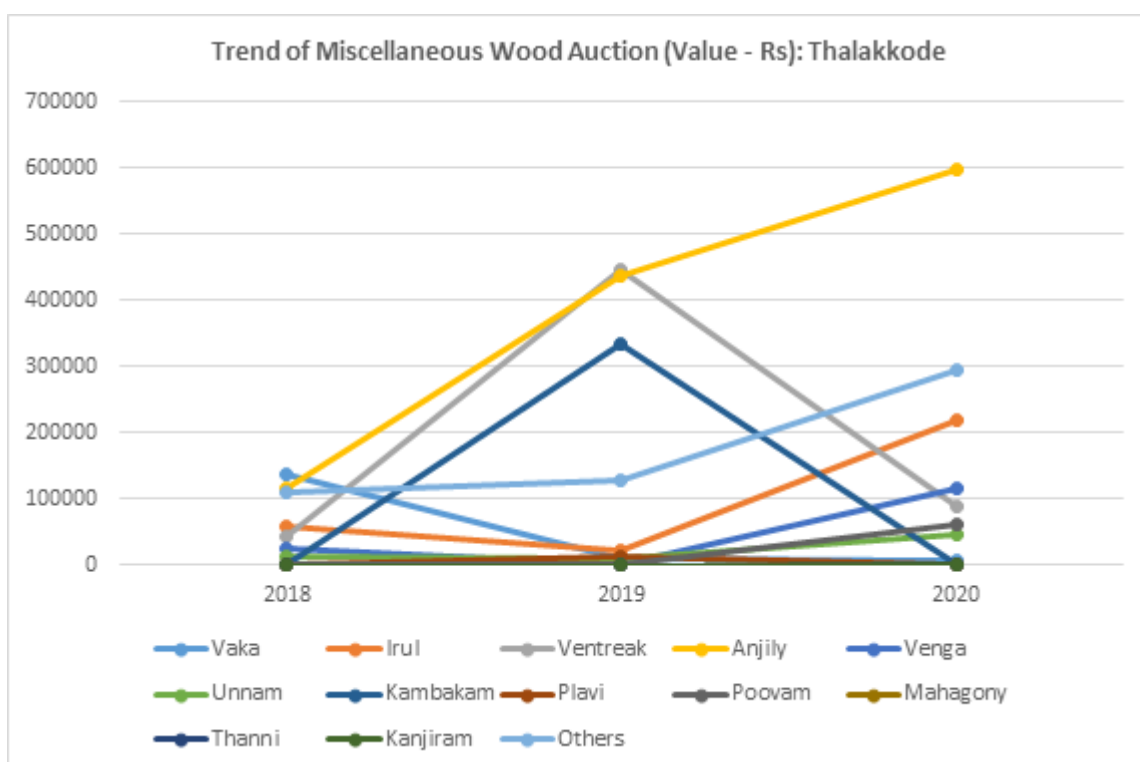


Figure 5.13 (j)



3. Vettikkad Timber Depot

The analysis of five years quantity and value data collected from the Vettikkad Government timber depot near Thalayolapparamu at Kottayam indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 785.49 cubic meters (M3) that accounts 63.83% of the total timber in Vettikkad depot. The Vettikkad depot had fetched Rs.5,46,62,941.5/- in revenue (cumulative annual average) to the Government. It accounts 85.87% of the total revenue received at Vettikkad depot.

The miscellaneous timbers account a quantity of 36.17% of the total timbers and it contribute to 14.13% of total timber value (cumulative annual average). In miscellaneous timbers anjily, irul, maruthu, venteak and thembavu predominate other timbers in cumulative quantity (4.29%, 2.39%, 10.97%, 6.72%, and 4.41% respectively) and cumulative annual value (3.06%, 1.27%, 1.99%, 1.67% and 1.65% respectively). The Vettikkad timber depot conducted 89 auctions during the period 2016 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016 to 2020 are given in figures. The quantity and value of teak auctioned decreased from 2016 to 2020 (919.238 M3 and Rs.7,35,79,714/- respectively in 2016; 644.702 M3 and Rs.4,29,19,416.55/- respectively in 2020).

Details are given in Tables 5.16 (a)&(b) and figures 5.14 (a)-(h).



**Table 5.16 (a) Quantity and Value of Timber Auctioned
from Vettikkad (89)**

Species Name	2015 (...)		2016 (18)		2017 (19)		2018 (14)		2019 (22)		2020 (16)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			919.238	73579714	1172.895	75457885	382.873	31320521	807.744	50037171	644.702	919.238
Rosewood							0.217	152				
Anjili			3.974	156777	18.459	580176			76.389	2992664	112.411	4072233.5
Maruthuu			85.194	1221228	231.332	1982672	64.109	347702	66.046	1011112	228.472	1775625.235
Venga			61.454	1569125	7.96	82132	6.192	124254	1.889	28769.24	1.99	14303.5
Venteak			14.344	217685	177.44	2288055	14.254	234074	49.233	880890	158.465	1684646.51
Unnam/Chadachi			1.81	24589	40.78	465357	7.271	43180				
Thanni					19.477	232202	1.713	11460	2.987	4180	6.17	26169.325
Poovam			3.26	24739	0.245	1109	0.417	175	2.424	9945.675	2.791	16695.95
Kanjiram									0.803	5862	8.801	33394.065
Irul			41.055	1441015	6.457	120279	63.663	1554523	31.804	809987.3	4.182	105367.255
Vaka			0	0	1.889	19983	1.07	8567	11.199	197069.2	15.813	896.425
Kambakam											3.091	107895.725
Jack/Plavu					1.046	4127	2.377	8914				
Thembavu					4.823	13602	153.553	3062512			4.406	66694.1
TOTAL IW			1130.329	78234872	1682.803	81247579	697.709	36716034	1050.676	55979452	1198.202	50844834.39
Others			2.624	33210	83.257	907260	6.943	36223	36.735	522603.1	54.125	618681.775
Grand Total			1132.953	78268082	1766.06	82154839	704.652	36752257	1087.411	56502055	1252.327	51463516.16



Table 5.16 (b)
Quantity and Value of Timber Auctioned from Vettikkad (89)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	785.4904	63.834181	54662941.5	85.86861
Rosewood	0.217	0.0176349	152	0.000239
Anjili	52.80825	4.2915501	1950462.69	3.063932
Maruthuu	135.0306	10.973486	1267667.82	1.991347
Venga	15.897	1.2918961	363716.747	0.571353
Venteak	82.7472	6.7245886	1061070.11	1.666808
Unnam/Chadachi	11.3854	0.9252534	111284.65	0.174814
Thanni	7.58675	0.6165498	68502.8313	0.107609
Poovam	1.8274	0.1485067	10532.925	0.016546
Kanjiram	4.802	0.3902425	19628.0325	0.030833
Irul	29.4322	2.3918566	806234.305	1.266493
Vaka	7.49275	0.6089108	56628.9063	0.088957
Kambakam	3.091	0.2511952	107895.725	0.169491
Jack/Plavu	1.7115	0.1390879	6520.5	0.010243
Thembavu	54.2606666			
	7	4.4095832	1047602.7	1.645652
TOTAL IW	1193.78011			
	7	97.014523	61540841.5	96.67292
Others	36.7368	2.985477	2117977.83	3.327077
Grand Total	1230.51691			
	7	100	63658819.3	100

Figure 5.14 (a)

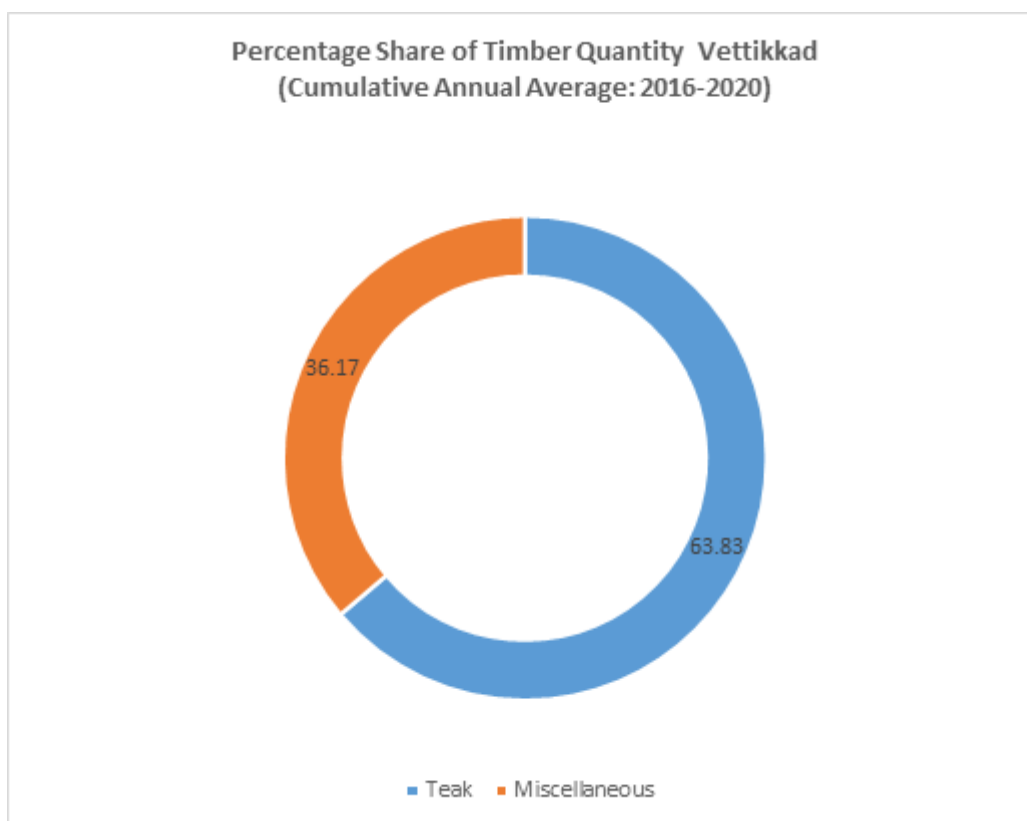


Figure 5.14 (b)

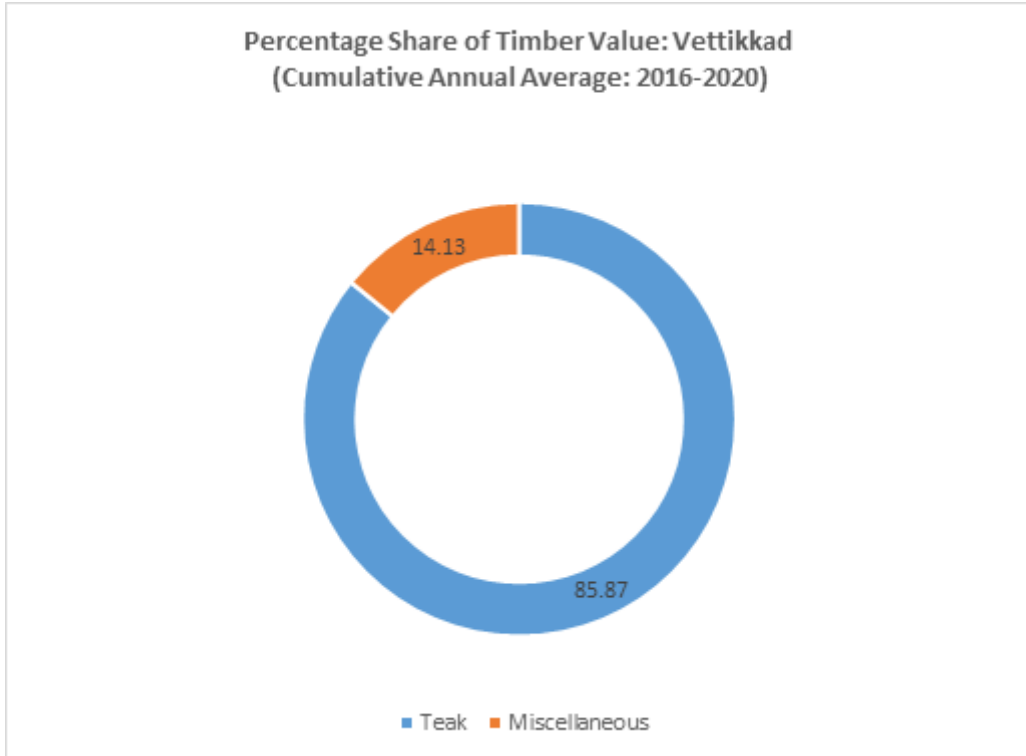


Figure 5.14 (c)

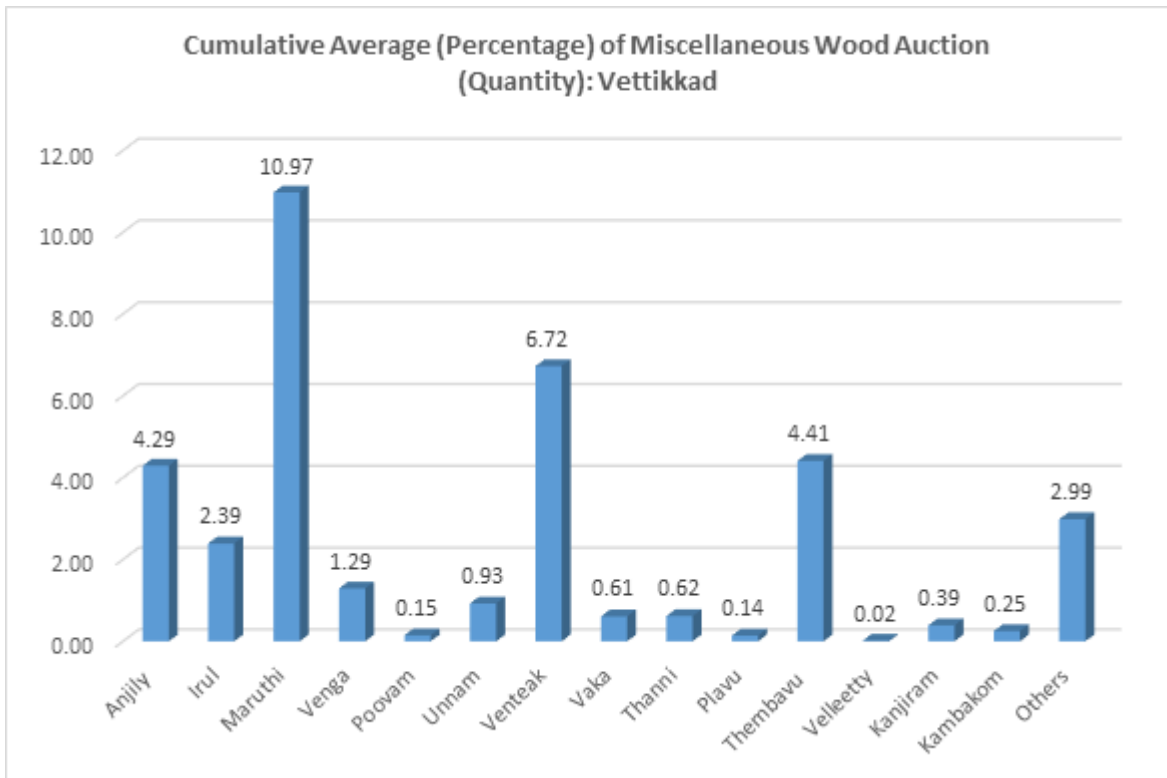


Figure 5.14 (d)

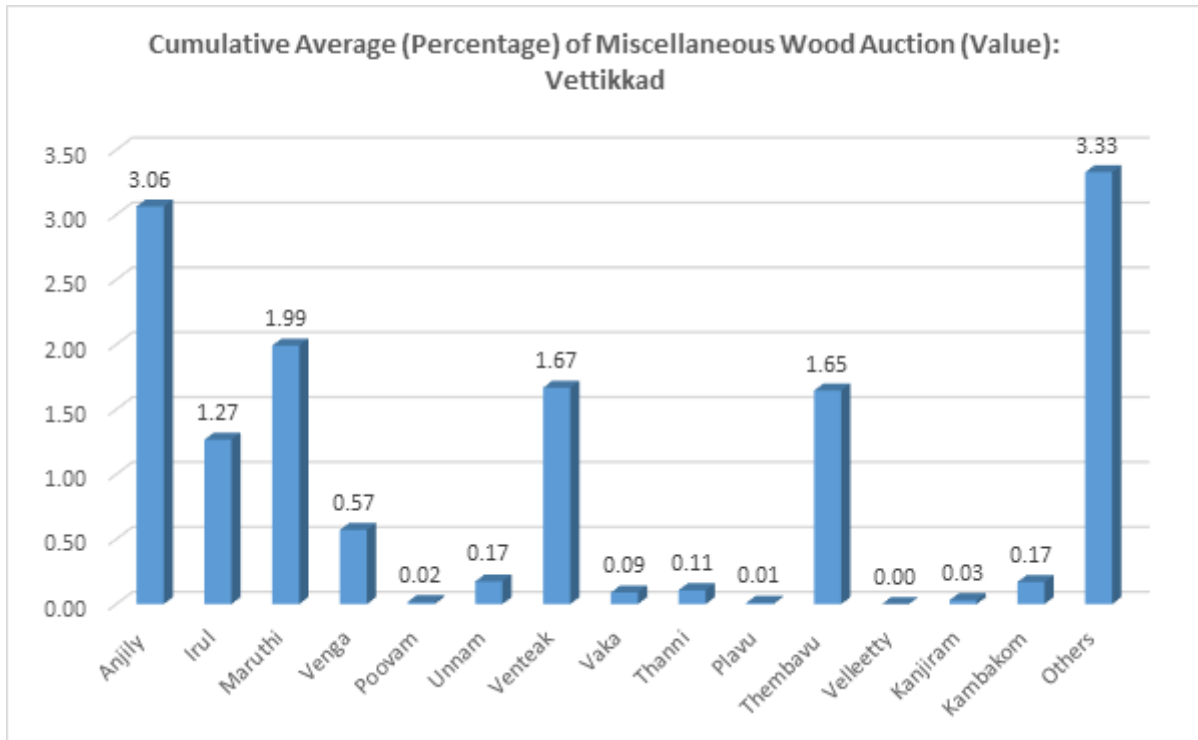


Figure 5.14 (e)

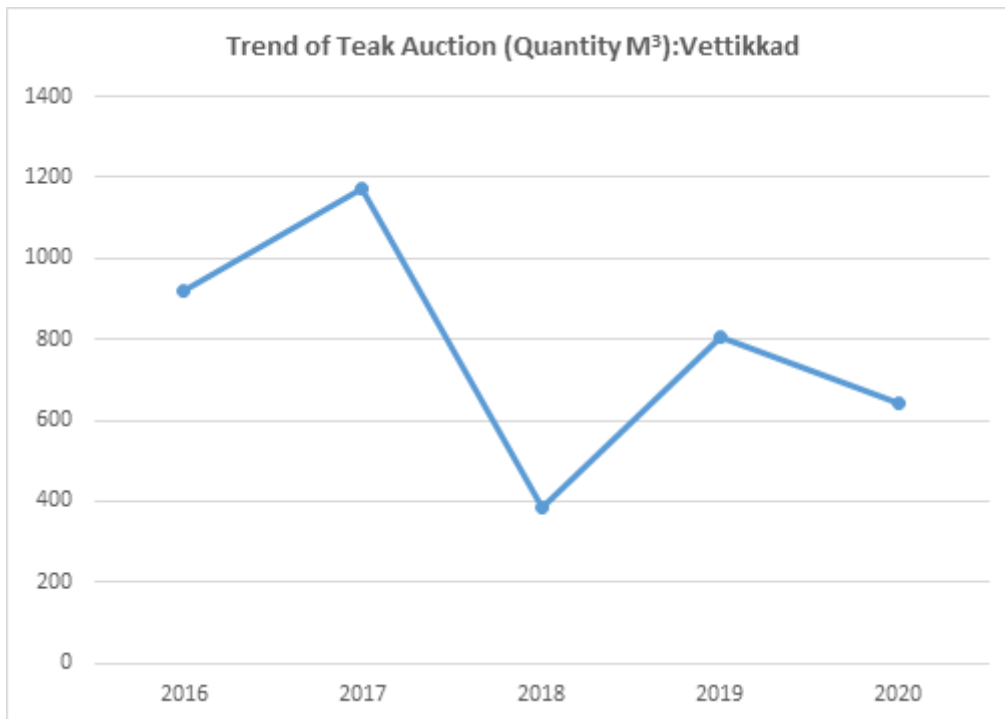


Figure 5.14 (f)

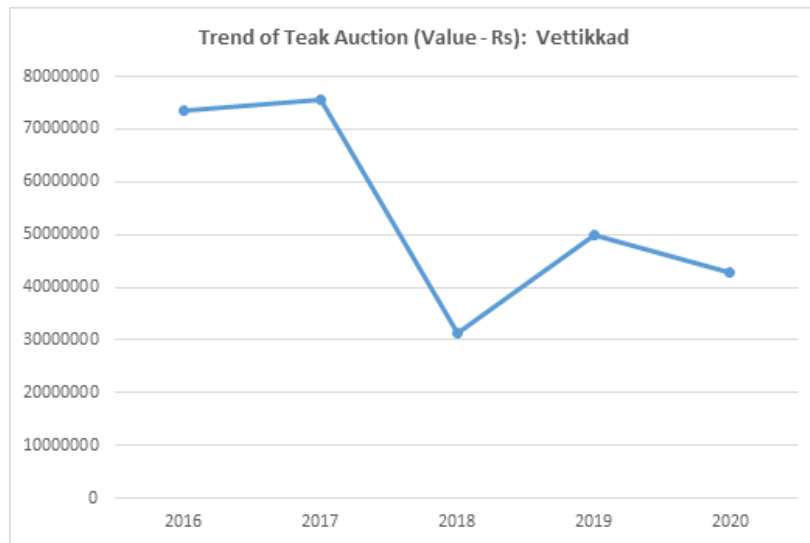


Figure 5.14 (g)

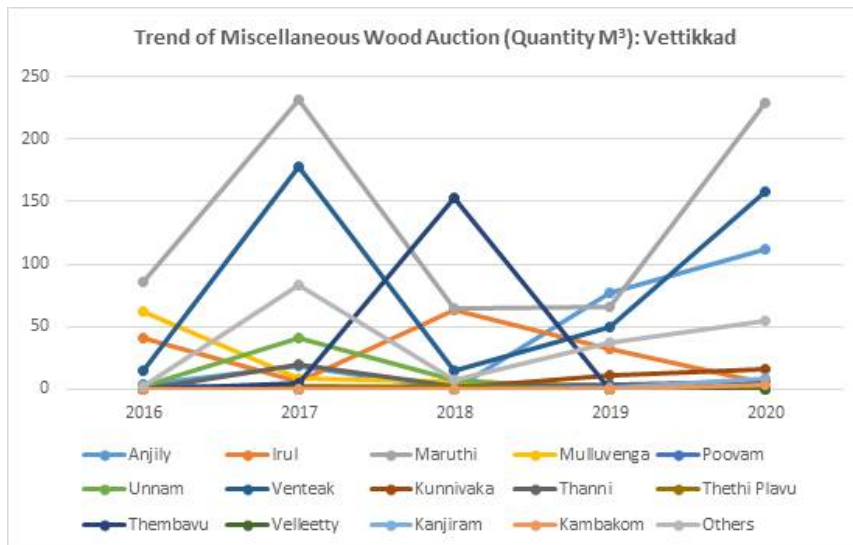
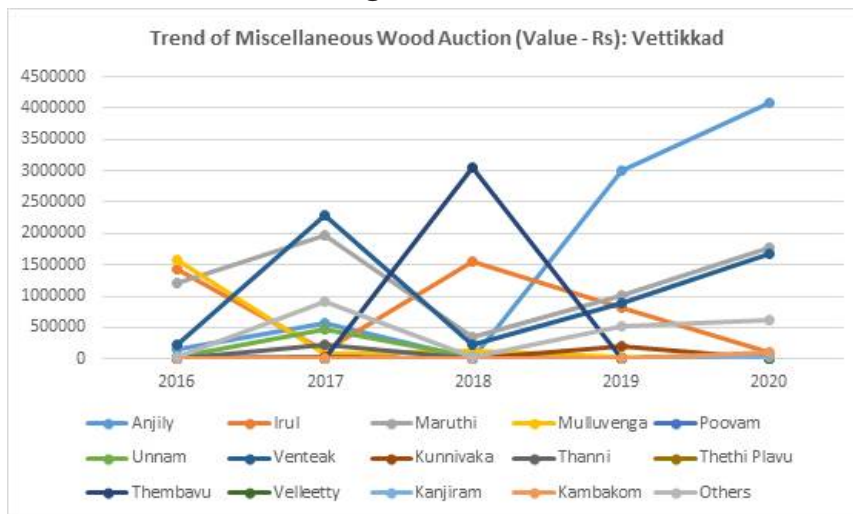


Figure 5.14 (h)



4. Parampuzha Timber Depot

The analysis of five years quantity and value data collected from Parampuzha timber depot indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 434.89 cubic meters (M3) that accounts 69.89% of the total timber auctioned in Parampuzha depot. The Parampuzha depot had fetched Rs.1,32,37,775.6/- in revenue (cumulative annual average) to the Government. It accounts 65.98% of the total revenue received at Parampuzha depot.

The miscellaneous timbers account a quantity of 30.11% of the total timbers and it contribute to 34.02% of total timber value (cumulative annual average). In miscellaneous timbers rosewood, maruthu, venteak, anjily predominate other timbers in cumulative quantity (8.62%, 6.22%, 4.54%, and 2.90% respectively). The cumulative value of rosewood accounts 30.22% of the total.

The Parampuzha timber depot conducted 90 auctions during the period 2016 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016 to 2020 are given in figures. The quantity and value of teak auctioned decreased from 2016 to 2020 (390.73 M3 and Rs.1,25,90,005/- respectively in 2016; 223 M3 and Rs. 60,27,200/- respectively in 2020).

The trend of quantity and value of miscellaneous timbers showed that there is steadily decrease in the quantity and value of timbers in 2017 when compared to previous years, and then increased during 2018-2020 except Irul. Irul showed a decrease in quantity and value in 2020 when compared to 2019. Details are given in Tables 5.17 (a)&(b) and figures 5.15 (a)-(j).



Table 5.17 (a)
Quantity and Value of Timber Auctioned from Parampuzha (90)

Species Name	2015 (...)		2016 (20)		2017 (16)		2018 (16)		2019 (23)		2020 (15)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			390.7 32	125900 05	473.8 27	143043 75	476.7 62	142129 98	609.9 54	190543 00	223.1 78	60272 00
Rosewood			40.86 4	498670 0	47.44 5	653480 0	37.20 3	361850 0	103.2 46	125795 00	39.44 3	25965 00
Plavu			2.398	76025	0.447	8760						
Maruthu			50.80 1	131150	37.85 9	109050	0.284	3000	47.47 9	65800	57.09 1	18812 5
Venga			10.81 6	65775	2.287	24725			3.647	62525		
Venteak			8.521	41800	53.59 7	137300			0.946	7050	49.85 1	17442 5
Irul			4.257	117825	5.688	137025			7.59	59975	6.289	11475
Poovam			0.869	6200								
Unnam					6.649	71300			6.327	8125	0.572	1600
Anjili							0.668	9625	35.65 2	452075	17.84 8	41202 5
Vaka									6.812	10825		
Thanni											7.254	7000
TOTAL IW			509.2 58	180154 80	627.7 99	213273 35	514.9 17	178441 23	821.6 53	323001 75	401.5 26	94183 50
Others			21.17 4	37325	15.89 8	65255	0	0	1.577	7275	26.52 3	11430 0
Grand Total			530.4 32	180528 05	643.6 97	213925 90	514.9 17	178441 23	823.2 3	323074 50	428.0 49	95326 50



Table 5.17 (a)
Quantity and Value of Timber Auctioned from Parampuzha (90)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	434.8906	69.89291186	13237775.6	65.9782953
Rosewood	53.6402	8.620719258	6063200	30.2195484
Plavu	1.4225	0.228615351	42392.5	0.21128813
Maruthu	38.7028	6.220073253	99425	0.49554338
Venga	5.583333333	0.8973186	51008.33333	0.25423024
Venteak	28.22875	4.536749094	90143.75	0.44928477
Irul	5.956	0.957211269	81575	0.40657733
Poovam	0.869	0.139660274	6200	0.03090137
Unnam	4.516	0.725783427	27008.33333	0.13461203
Anjili	18.056	2.901847997	291241.6667	1.45157535
Vaka	6.812	1.094782264	10825	0.0539528
Thanni	7.254	1.165817754	7000	0.03488865
TOTAL IW	605.9311833	97.3814904	20007795.18	99.7206977
Others	16.293	2.618509604	56038.75	0.2793023
Grand Total	622.2241833	100	20063833.93	100

Figure 5.15 (a)

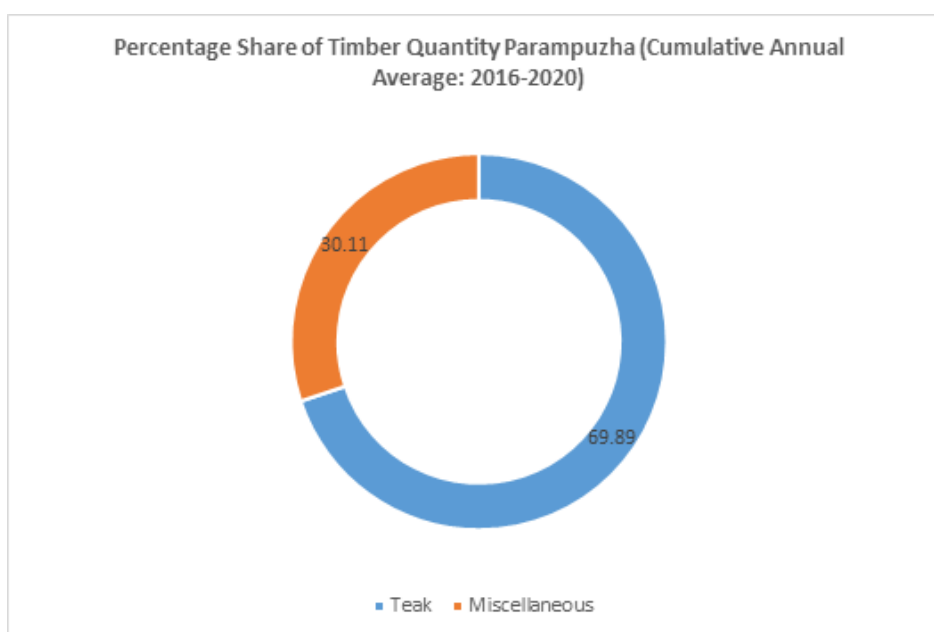


Figure 5.15 (b)

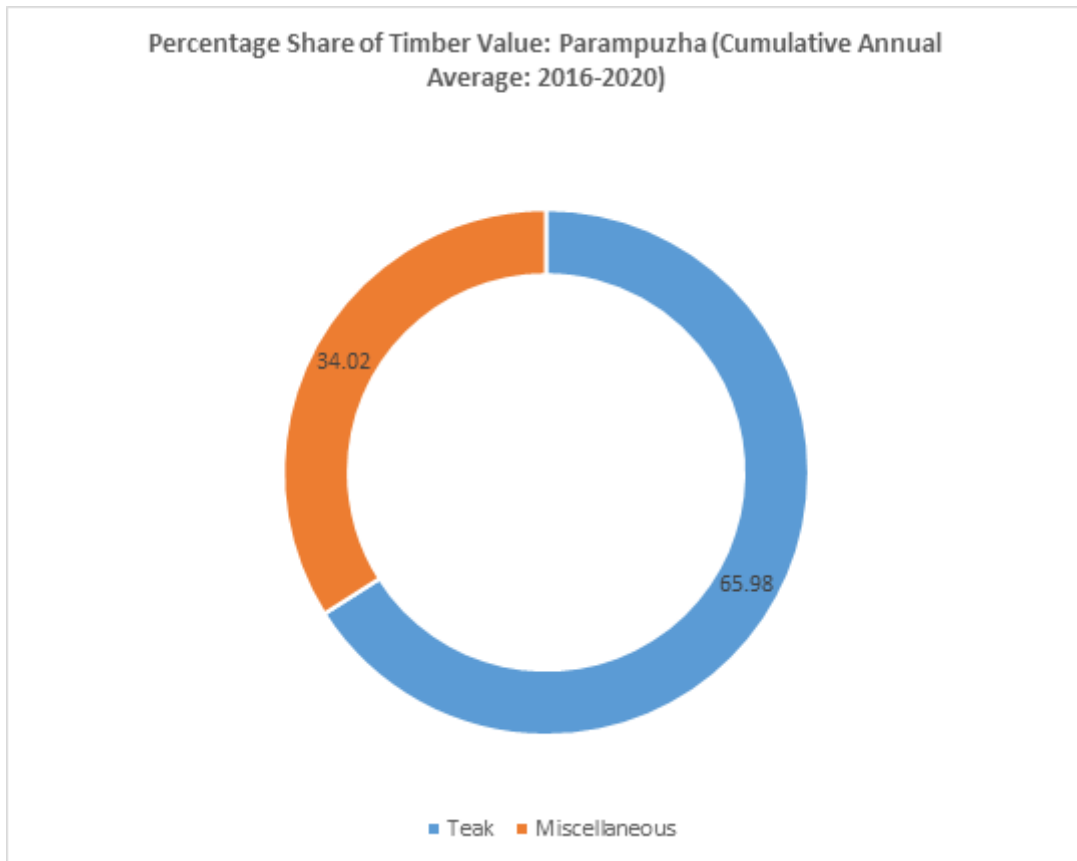


Figure 5.15 (c)

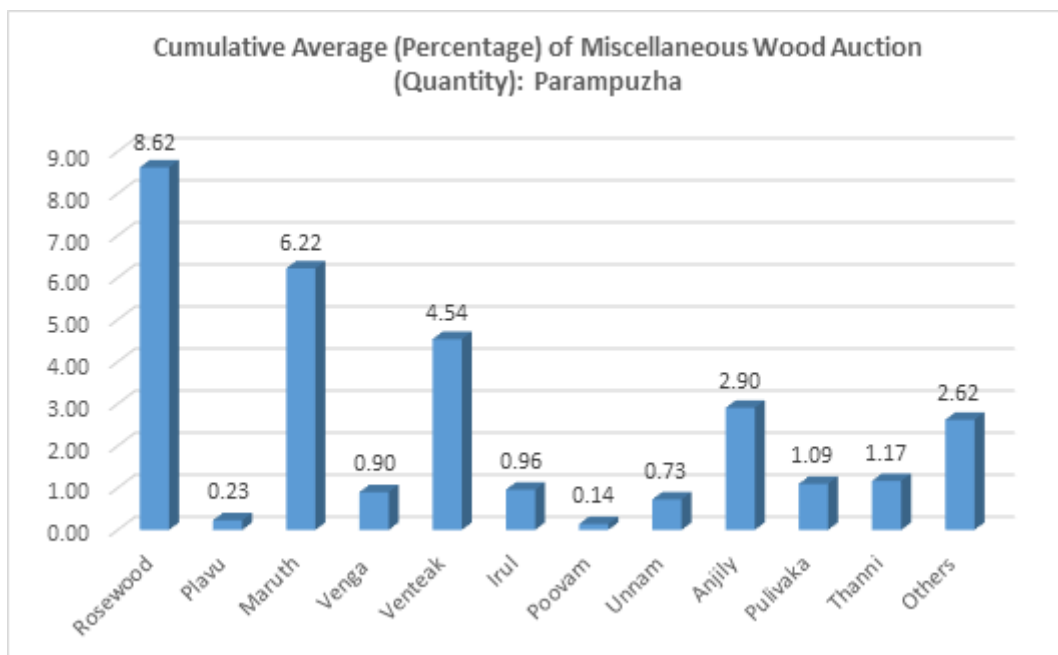


Figure 5.15 (d)

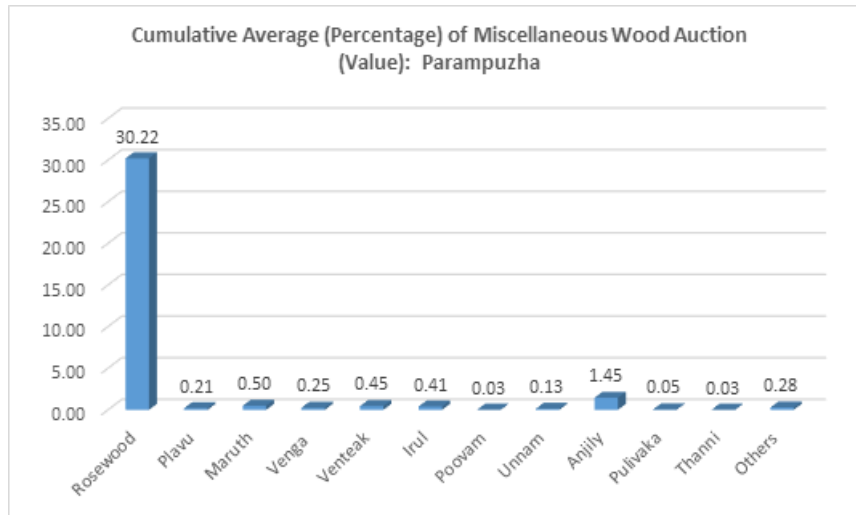


Figure 5.15 (e)

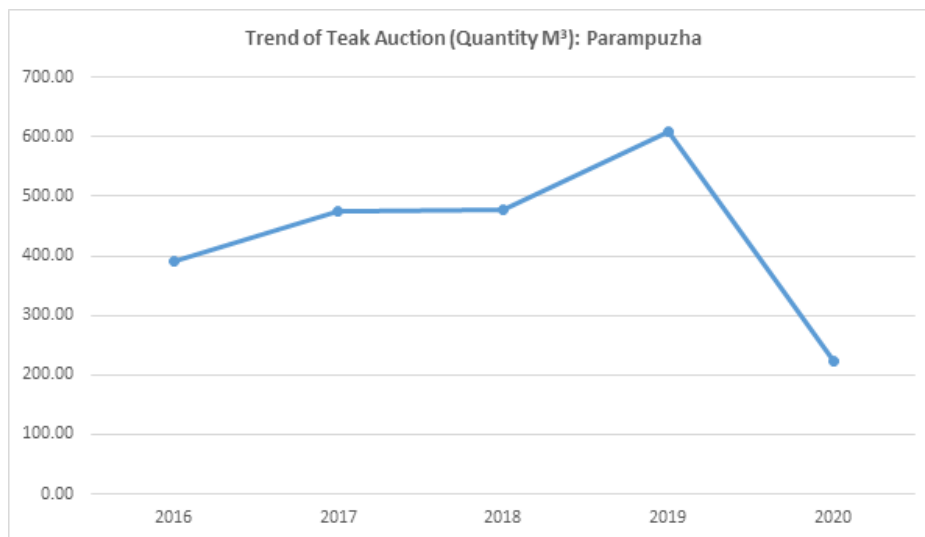


Figure 5.15 (f)

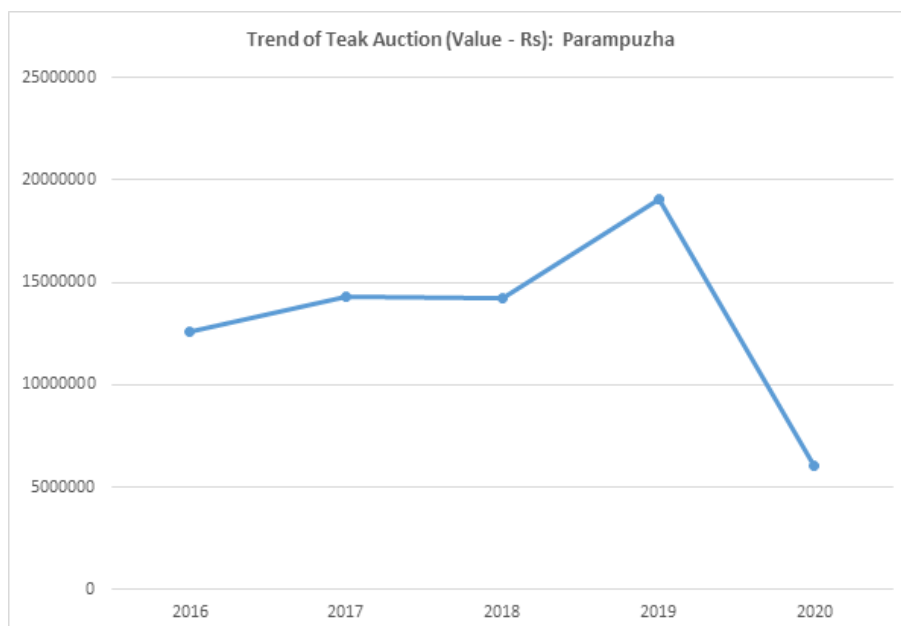


Figure 5.15 (g)

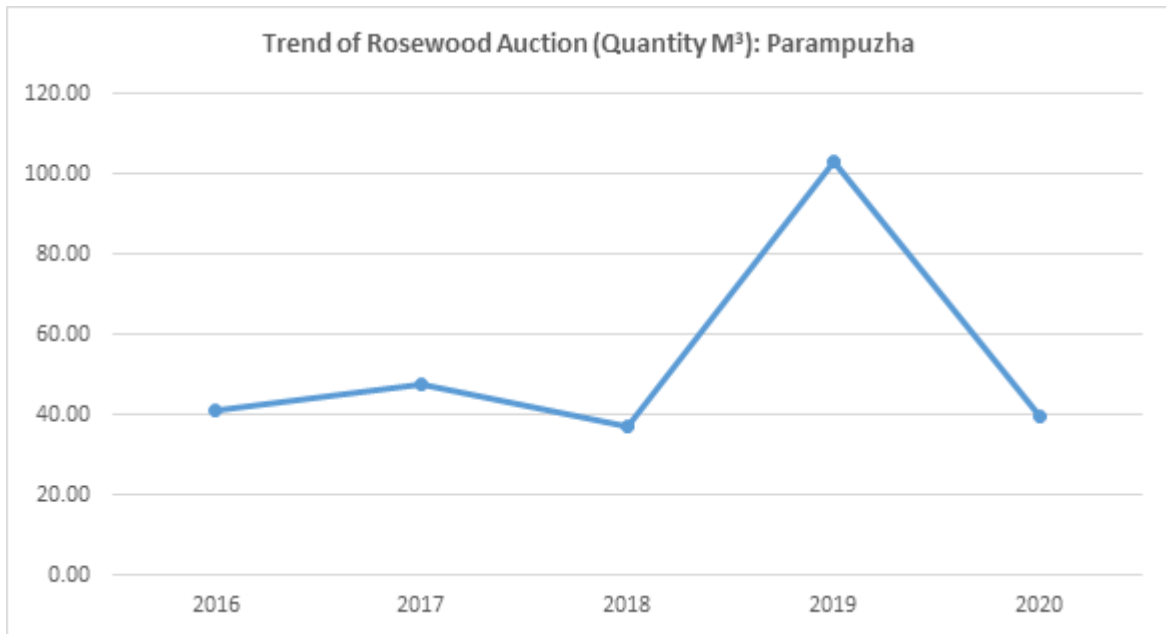


Figure 5.15 (h)

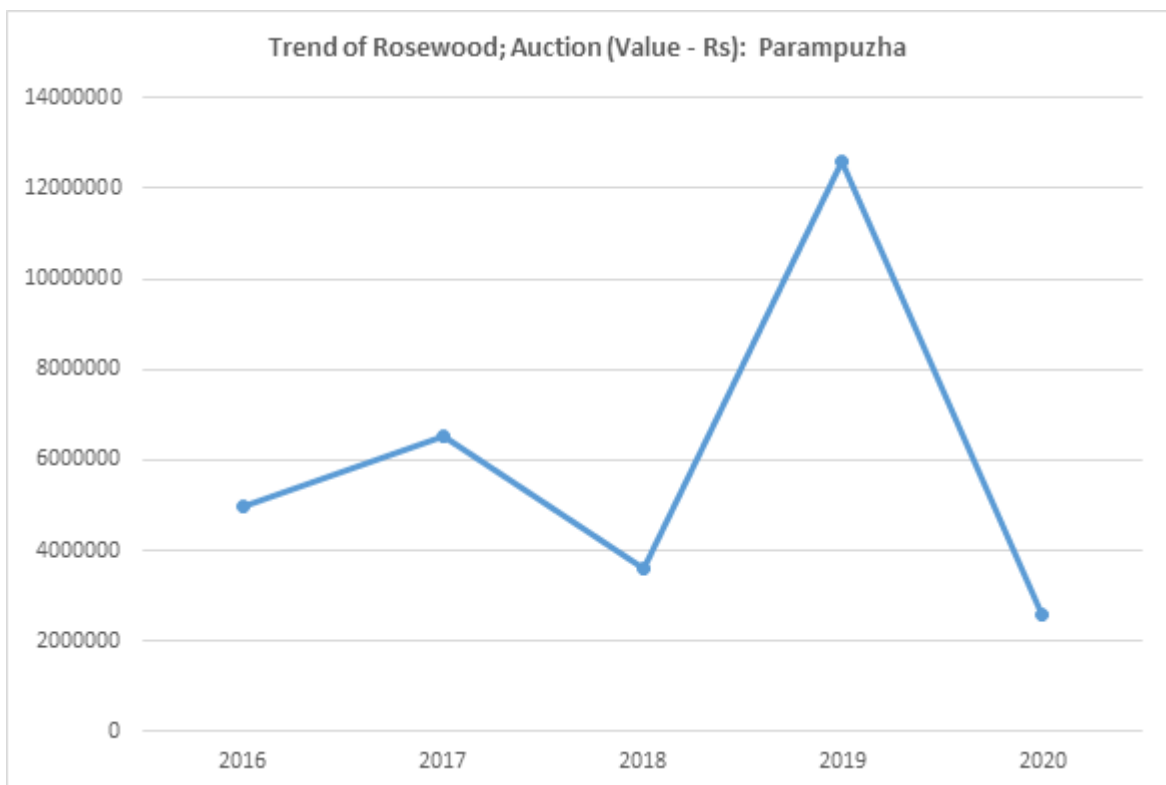


Figure 5.15 (i)

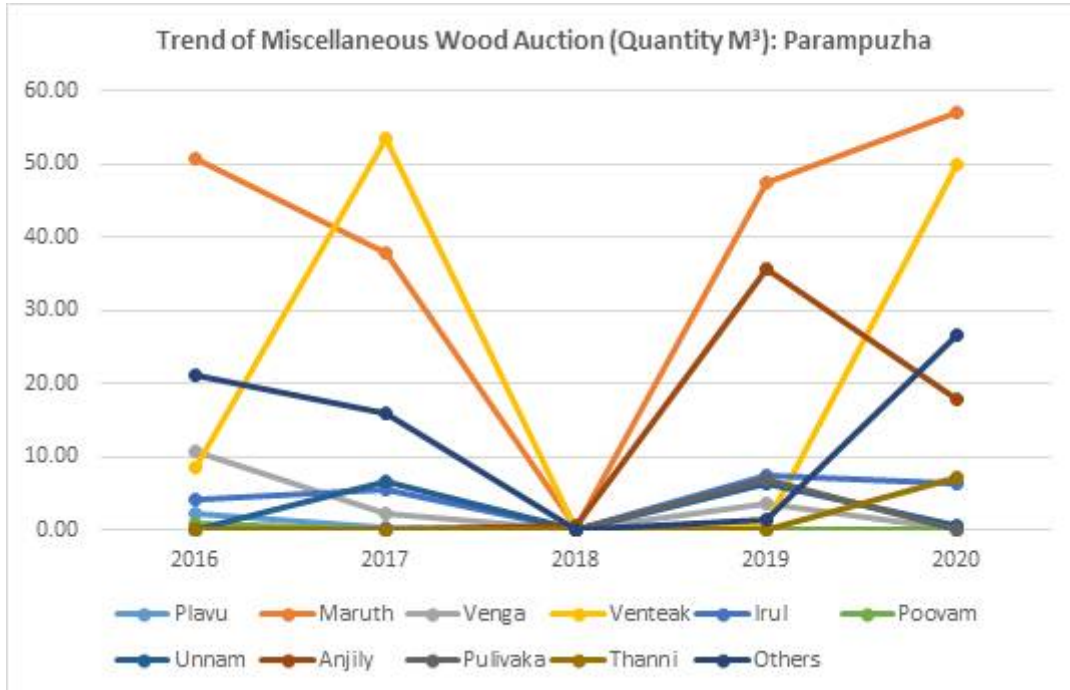
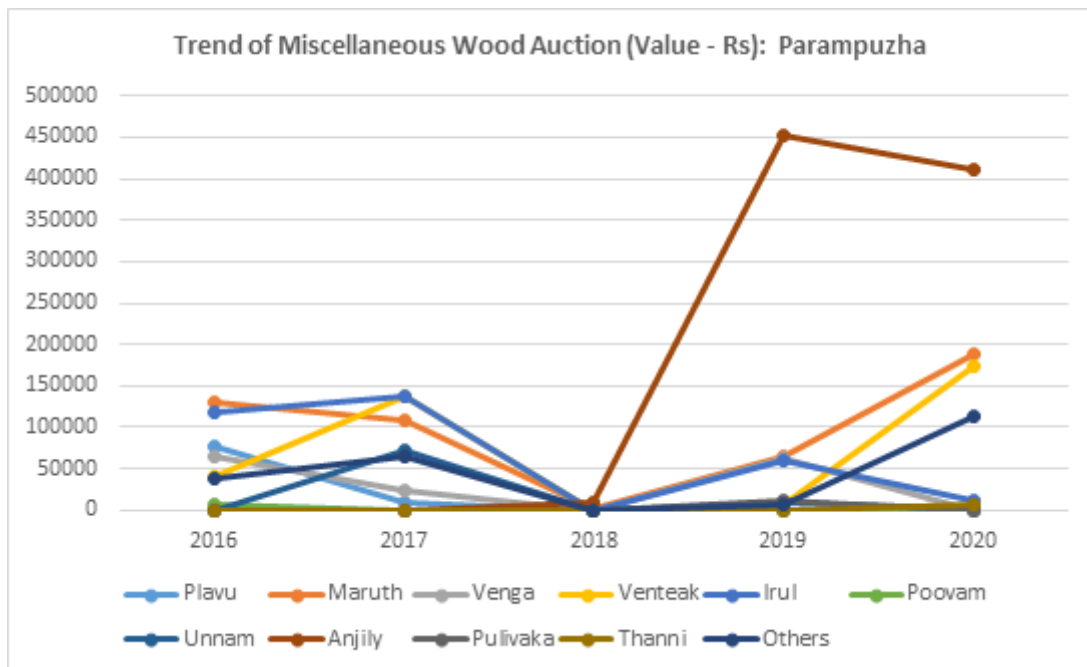


Figure 5.15 (j)



Perumpavoor timber sales division

There are five Government timber depots under Perumpavoor timber sales division.

1. Chalakkudy Timber Depot

The analysis of five years quantity and value data collected from the Chalakkudy (appx. 70 years in timber auction) Government timber depot at Thrissur indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 558.41 cubic meters (M3) that accounts 53.55% of the total timber in Chalakkudy depot. The Chalakkudy depot had fetched Rs.3,00,02,717/- in revenue (cumulative average) to the Government. It accounts 74.26% of the total revenue received at Chalakkudy depot.

The miscellaneous timbers account a quantity of 46.45% of the total timbers and it contribute to 25.74% of total timber value (cumulative annual average). In miscellaneous timbers such as vaka and unnam/chadachi predominate other timbers in cumulative quantity (24.62% and 12.03% respectively) and cumulative value (16.15% and 5.29% respectively).

The Chalakkudy timber depot conducted 41 auctions during the period 2016 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016-2020 are given in figures. The quantity and value of teak auctioned decreased over 2016 to 2020 reaching a minimum at 2020 (quantity and value of 1234.71 M3 and Rs.6,98,24,397/-respectively in 2016; 230.44 M3 and Rs.1,27,53,730/- respectively in 2020). The trend of quantity and value of miscellaneous timbers also marked a decrease over years.

Details are given in Tables 5.18 (a)&(b) and figures 5.16 (a)-(h).



Table 5.18 (a) Quantity and Value of Timber Auctioned from Chalakkudy (41)

Species Name	2015 (...)		2016 (9)		2017 (12)		2018 (6)		2019 (9)		2020 (5)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			1234.705	69824397	430.591	23619339	442.656	19754795	453.679	24061324	230.441	12753730
Mahogany							5.528	41598			1.672	5058
Anjili			1.997	100898	11.33	522306						
Maruthuu			14.976	191560	44.489	426276	0.411	2476				
Venga			11.414	205458	47.649	874481						
Venteak			2.526	42879	18.056	279937						
Unnam/Chadachi			62.147	1083775	188.71	3186637						
Poovam			2.201	13481	2.201	13481						
Vaka			101.866	3525811	667.921	16042036					0.532	11824
Jack/Plavu			21.3	142710	4.4	16280						
Irul			3.159	85056	28.96	765414	4.256	173101	0.432	3240		
TOTAL IW			1456.291	75216025	1444.307	45746187	452.851	19971970	454.111	24064564	232.645	12770612
Others			3.058	27431	17.177	300480	0	0	0	0	3.406	103704
Total			1459.349	75243456	1461.484	46046667	452.851	19971970	454.111	24064564	236.051	12874316



Table 5.18 (b)
Quantity and Value of Timber Auctioned from Chalakkudy (41)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	558.4144	53.549847	30002717	74.26211
Mahogany	3.6	0.3452265	23328	0.057741
Anjili	6.6635	0.6390047	311602	0.771271
Maruthuu	19.95866667	1.9139613	206770.6667	0.511795
Venga	29.5315	2.8319601	539969.5	1.336521
Venteak	10.291	0.9868683	161408	0.399514
Unnam/Chadac hi	125.4285	12.028123	2135206	5.285018
Poovam	2.201	0.2110676	13481	0.033368
Vaka	256.773	24.623568	6526557	16.1544
Jack/Plavu	12.85	1.2322668	79495	0.196764
Irul	9.20175	0.8824133	256702.75	0.635385
TOTAL IW	1034.913317	99.244306	40257236.92	99.64389
Others	7.880333333	0.7556944	143871.6667	0.356108
Total	1042.79365	100	40401108.58	100

Figure 5.16 (a) Percentage Share of Timber Quantity Chalakkudy
(Cumulative Annual Average: 2016-2020)

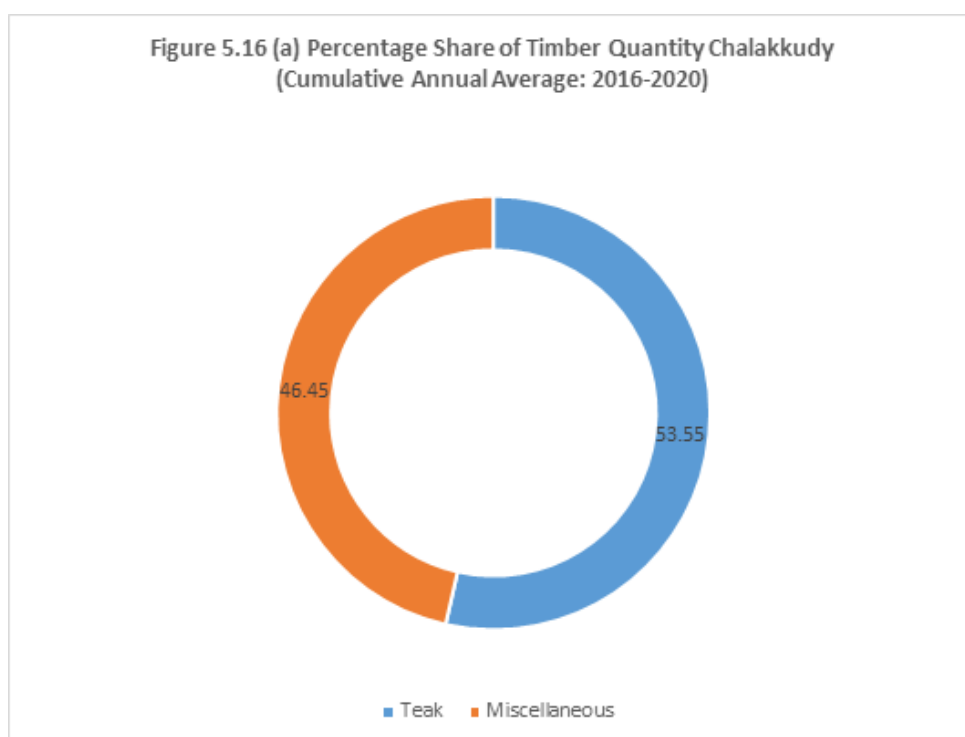


Figure 5.16 (b)

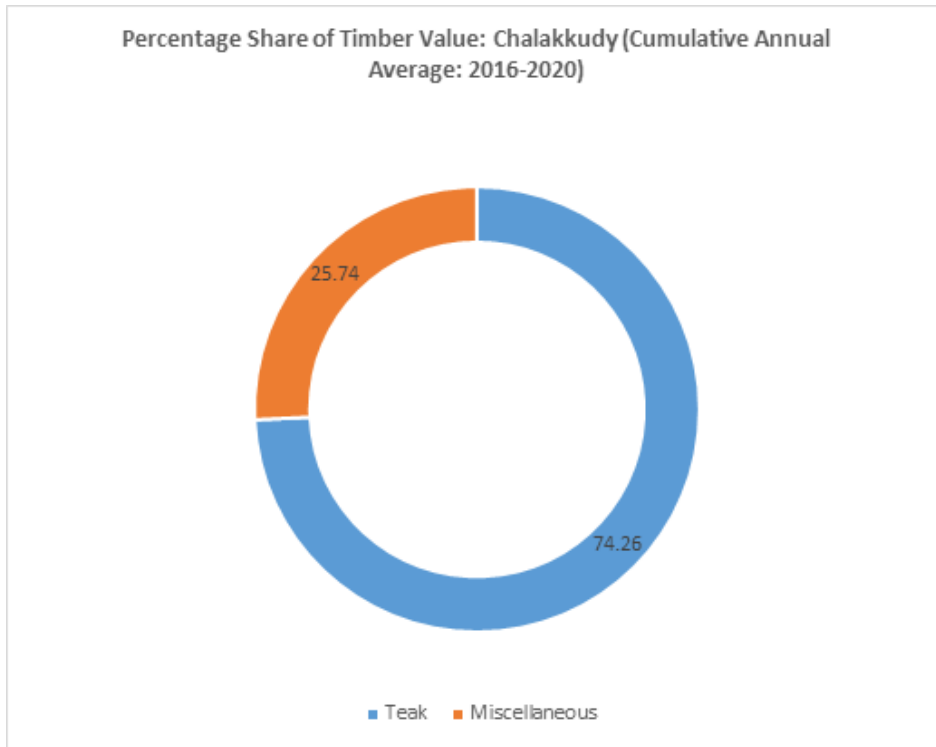


Figure 5.16 (c)

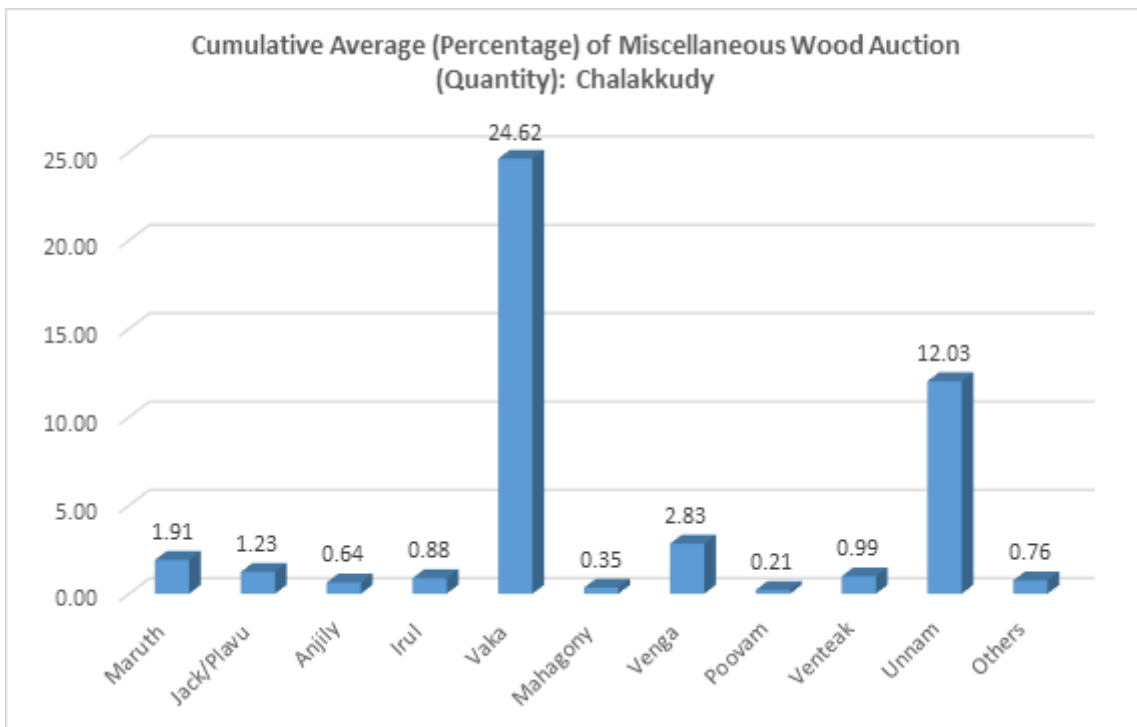


Figure 5.16 (d)

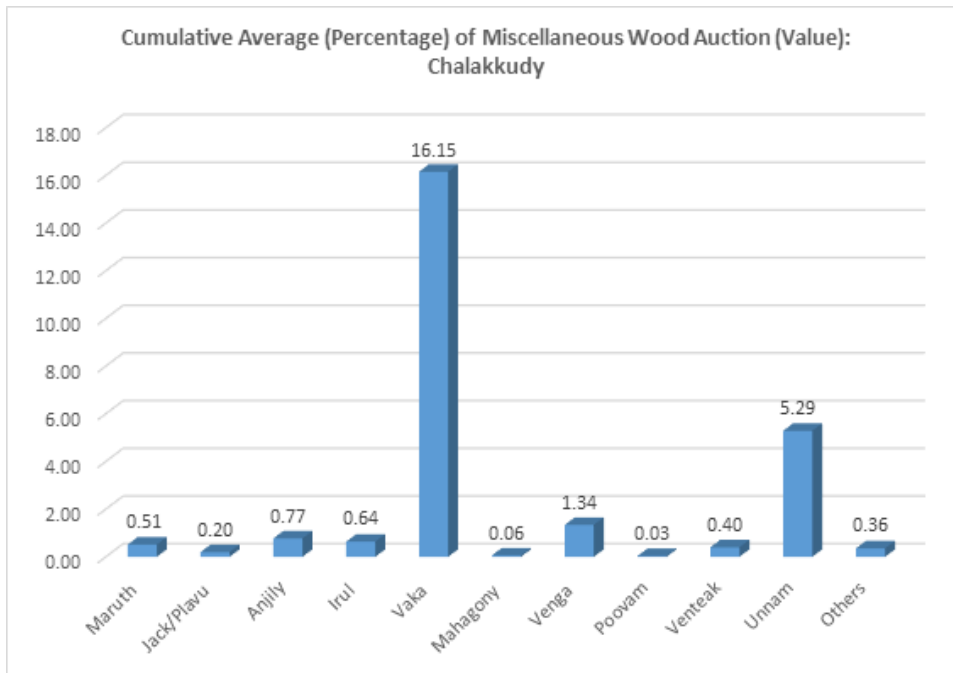


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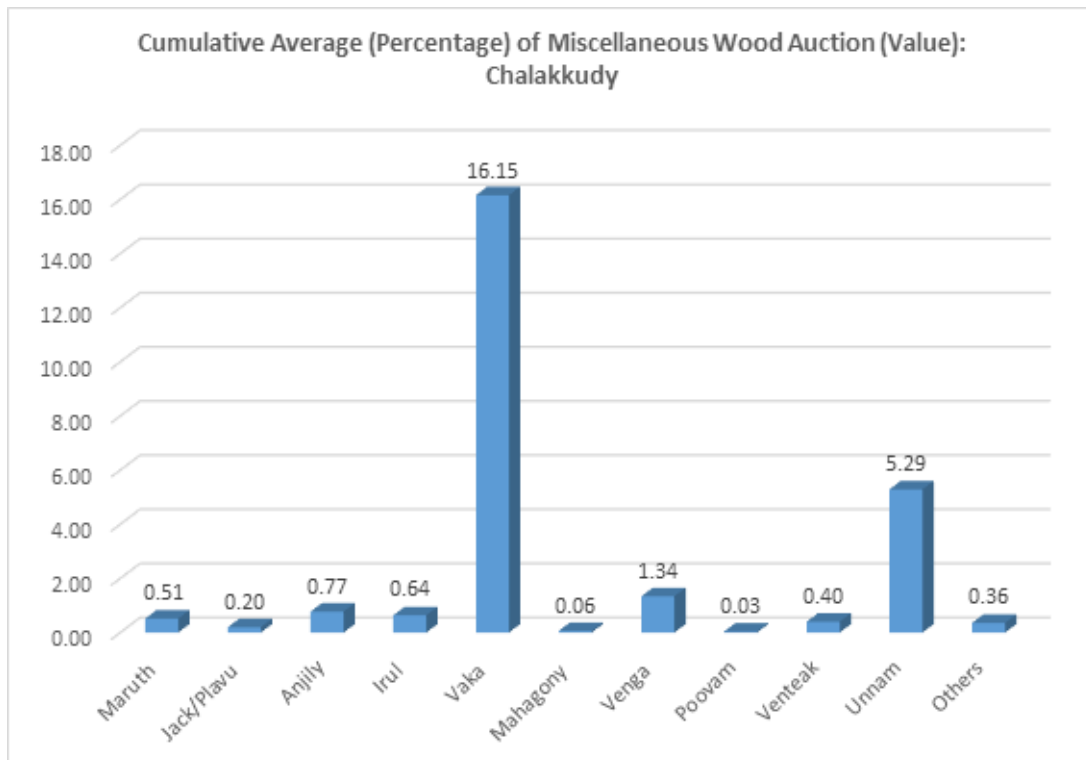


Figure 5.16 (e)

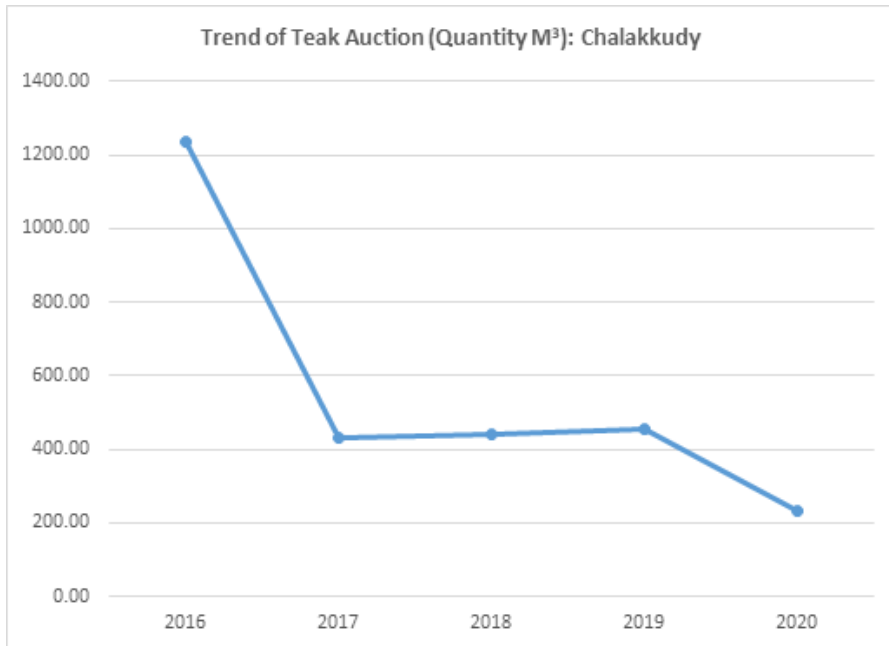


Figure 5.16 (f)

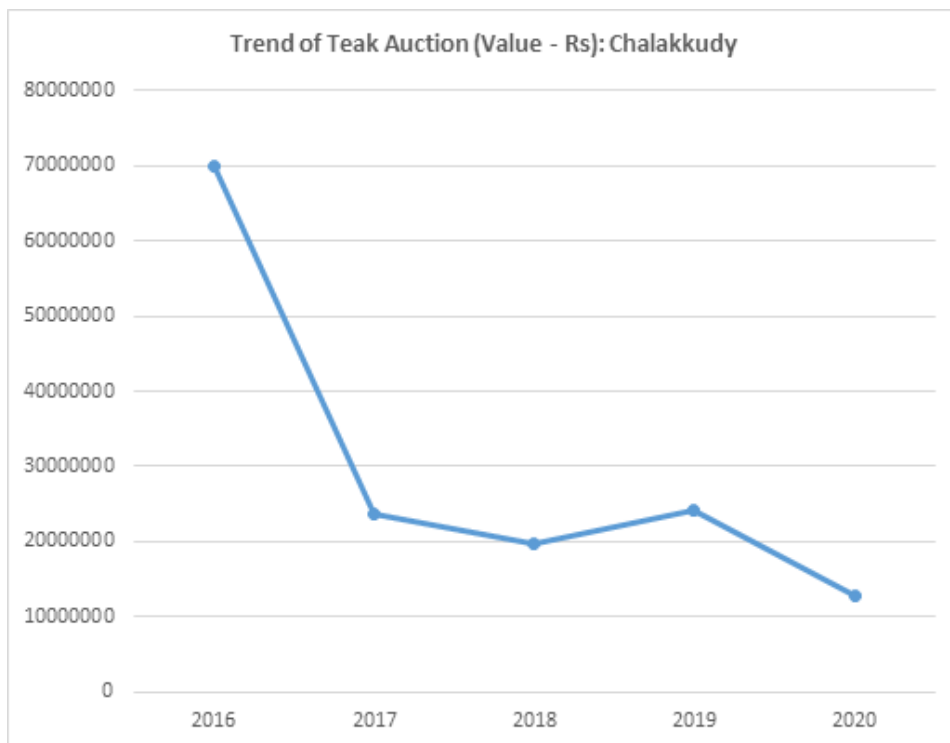


Figure 5.16 (g)

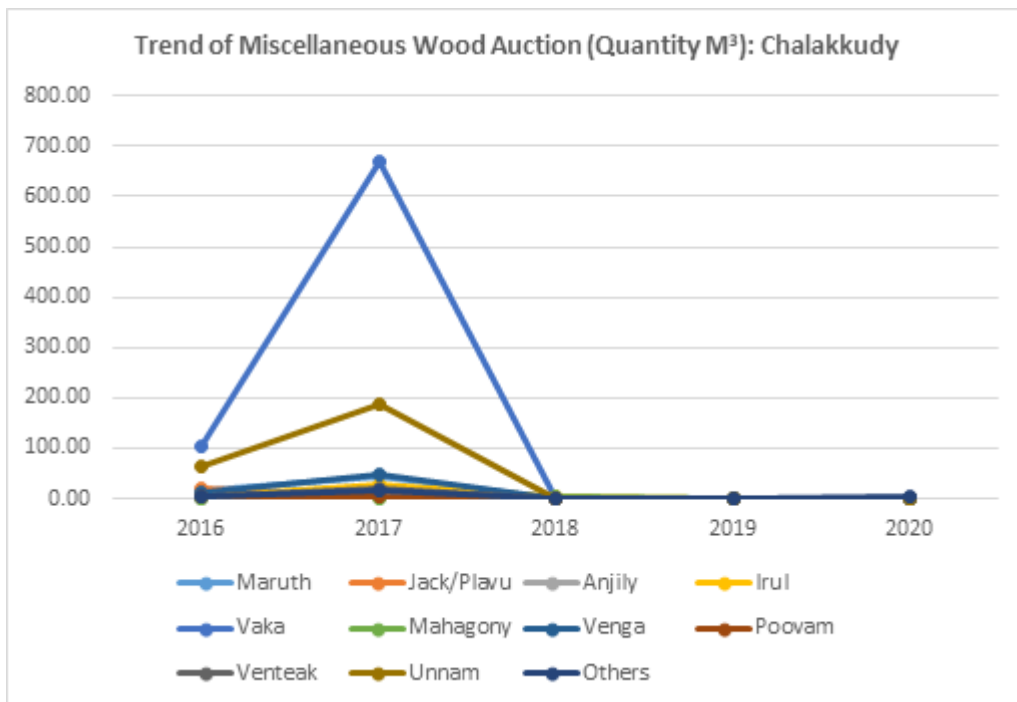
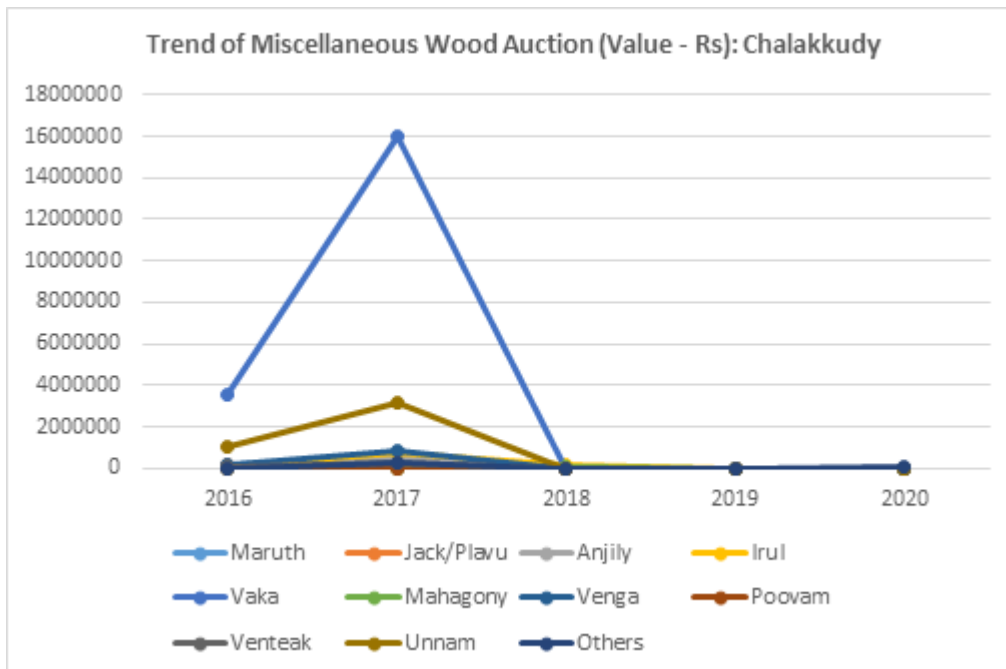


Figure 5.16 (h)



2. Chettikkulam Timber Depot

The analysis of five years quantity and value data collected from the Chettikkulam (appx. 25 years in timber auction) Government timber depot at Thrissur indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 341.975 cubic meters (M3) that accounts 35.17% of the total timber in Chettikkulam depot. The Chettikkulam depot had fetched Rs.1,86,23,585.8/- in revenue (cumulative annual average) to the Government. It accounts 64.44% of the total revenue received at Chettikkulam depot.

The miscellaneous timbers account a quantity of 64.83% of the total timbers and it contribute to 35.56% of total timber value (cumulative annual average). In miscellaneous timbers unnam/chadachi, vaka, irul and venteak predominates other timbers in cumulative quantity (27.79%, 19.74%, 6.52% and 3.28% respectively) and cumulative value (11%, 15.29%, 5.24% and 1.6% respectively).

The Chettikkulam timber depot conducted 40 auctions during the period 2016 to 2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016 to 2020 are given in figures. The quantity and value of teak auctioned decreased over the years. The trend of quantity and value of miscellaneous timbers also showed that there is a decrease in the quantity and value of these timbers over the years.

Details are given in Tables 5.19 (a)&(b) and figures 5.17 (a)-(h).



Table 5.19 (a)
Quantity and Value of Timber Auctioned from Chettikkulam (40)

Species Name	2015 (...)		2016 (8)		2017 (12)		2018 (7)		2019 (7)		2020 (6)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			173.94 2	874743 6	647.1 5	335572 91	420.2 42	262449 80	227.6 74	120636 21	240.8 67	125046 01
Rosewood			1.656	869								
Mahogany											0.261	790
Anjili			2.149	18540							1.155	46316
Maruthuu			23.013	244339	105.5 3	103111 5	13.80 8	94454	0.616	1095	6.81	7412
Venga			20.91	309217	11.41	98221	18.12 2	537835	0.628	3156	1.62	62093
Venteak			43.827	651435	20.05	276136						
Unnam/Chadachi			350.70 6	413900 5	189.8	221954 0						
Poovam			6.893	27043	0.64	2887					0.865	319
Kanjiram			0.263	125								
Irul			190.08 5	465808 4	111.2 2	248749 7	11.30 2	296515	3.457	106173	1.154	29004
Jack/Plavu			2.44	4281								
Thambakam											0.823	1488
Vaka			407.08 8	102143 45	534.7 6	115264 08	9.028	152023	5.604	90399	3.491	105563
TOTAL IW			1222.972	29014719	1620.56	51199095	472.502	27325807	237.979	12264444	257.046	12757586
<i>Others</i>			<i>38.845</i>	<i>169555</i>	<i>48.03</i>	<i>458612</i>	<i>0.902</i>	<i>8484</i>	<i>0</i>	<i>0</i>	<i>1.81</i>	<i>46597</i>
Grand Total			1261.817	29184274	1668.59	51657707	473.404	27334291	237.979	12264444	258.856	12804183

Table 5.19 (b)
Quantity and Value of Timber Auctioned from Chettikkulam (40)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	341.975	35.1685464	18623585.8	64.4448
Rosewood	1.656	0.17030225	869	0.003007
Mahogany	0.261	0.02684112	790	0.002734
Anjili	1.652	0.16989089	32428	0.112213
Maruthuu	29.9554	3.08059909	275683	0.95397
Venga	10.538	1.08372291	202104.4	0.699359
Venteak	31.9385	3.28454015	463785.5	1.604877
Unnam/Chadachi	270.253	27.79269	3179272.5	11.00151
Poovam	2.799333333	0.28788211	10083	0.034891
Kanjiram	0.263	0.02704679	125	0.000433
Irul	63.4436	6.52450965	1515454.6	5.244058
Jack/Plavu	2.44	0.25092844	4281	0.014814
Thambakam	0.823	0.08463693	1488	0.005149
Vaka	191.9942	19.7445922	4417747.6	15.28711
TOTAL IW	949.9920333	97.6967289	28727697.4	99.40892
<i>Others</i>	<i>22.39675</i>	<i>2.30327112</i>	<i>170812</i>	<i>0.591075</i>
Grand Total	972.3887833	100	28898509.4	100



Figure 5.17 (a)

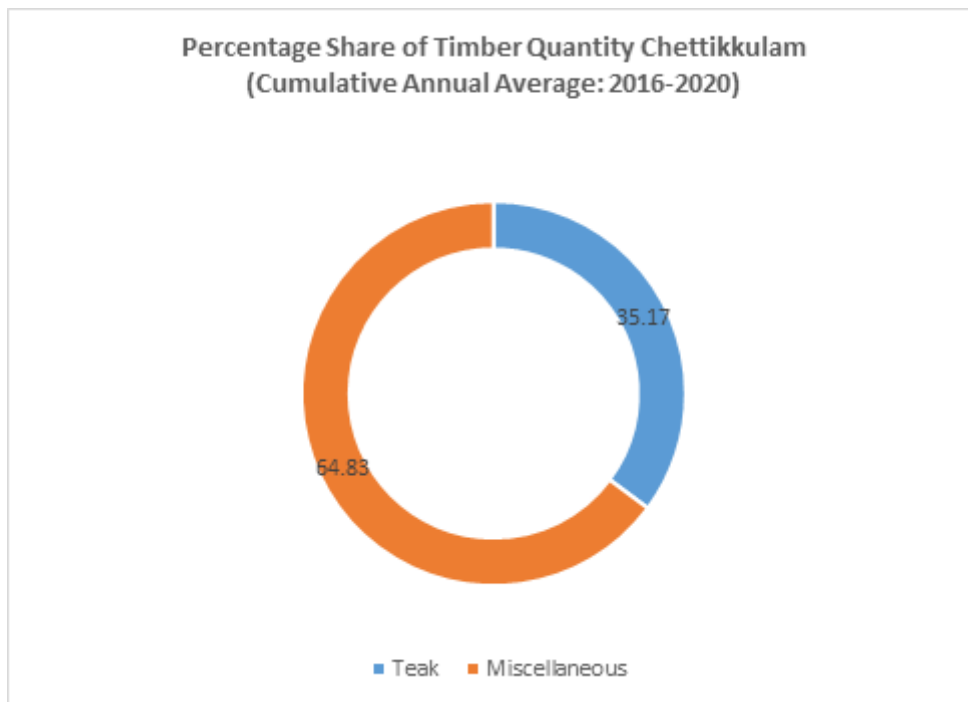


Figure 5.17 (b)

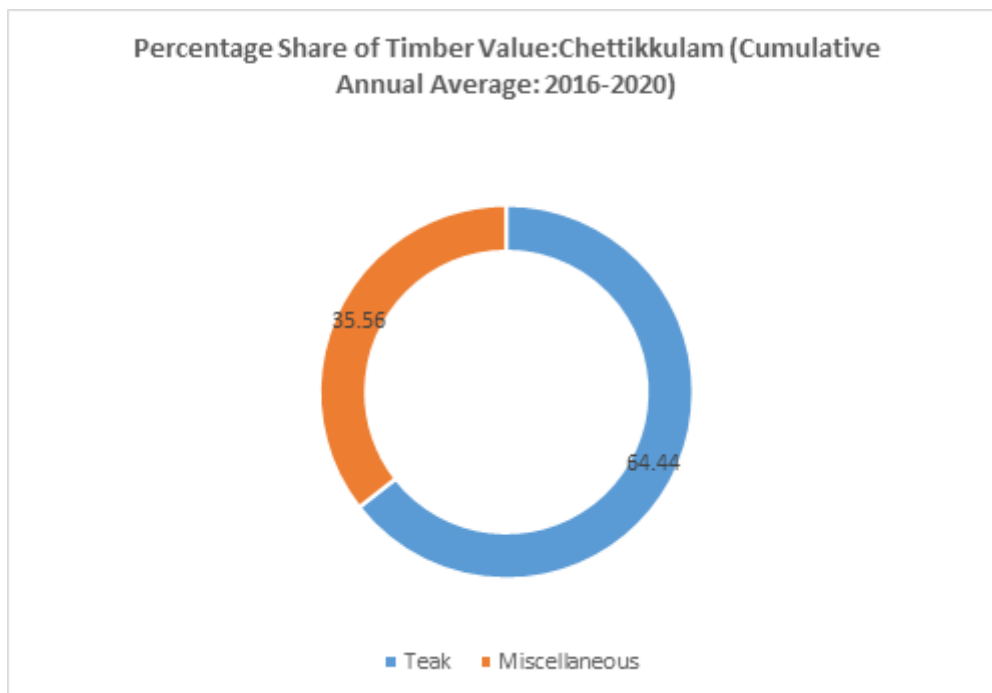


Figure 5.17 (c)

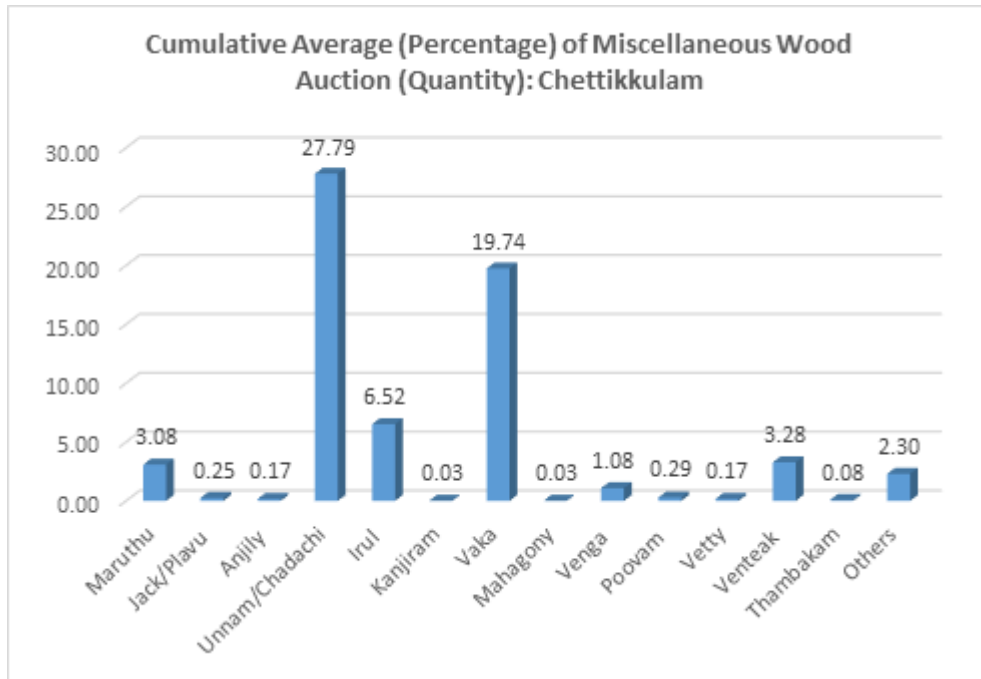


Figure 5.17 (d)

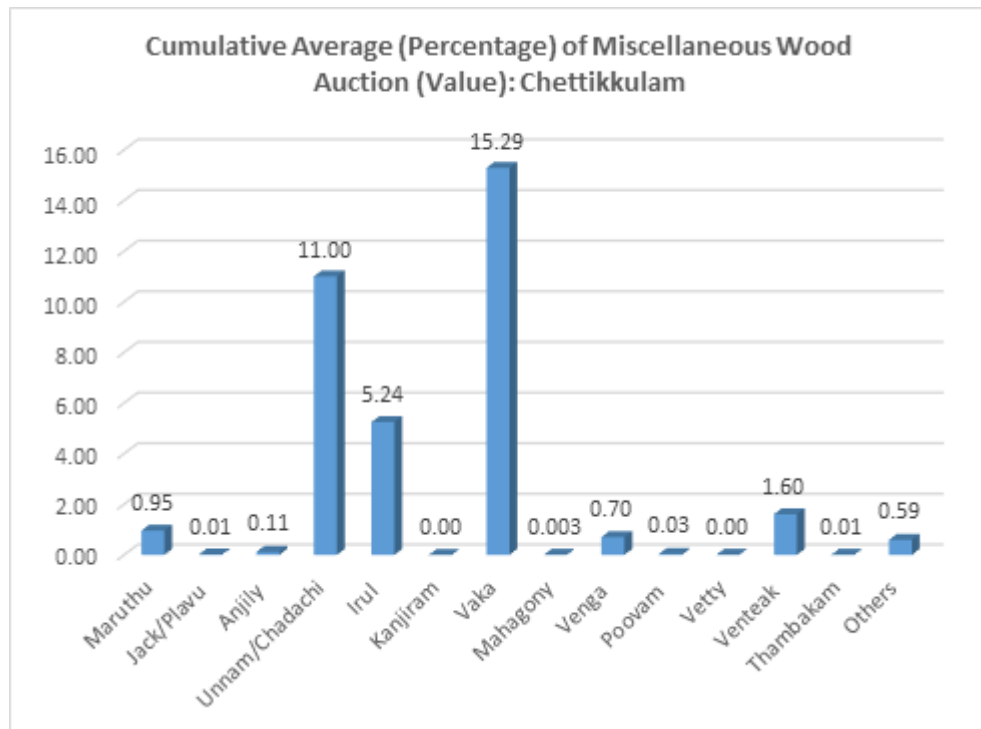


Figure 5.17 (e)

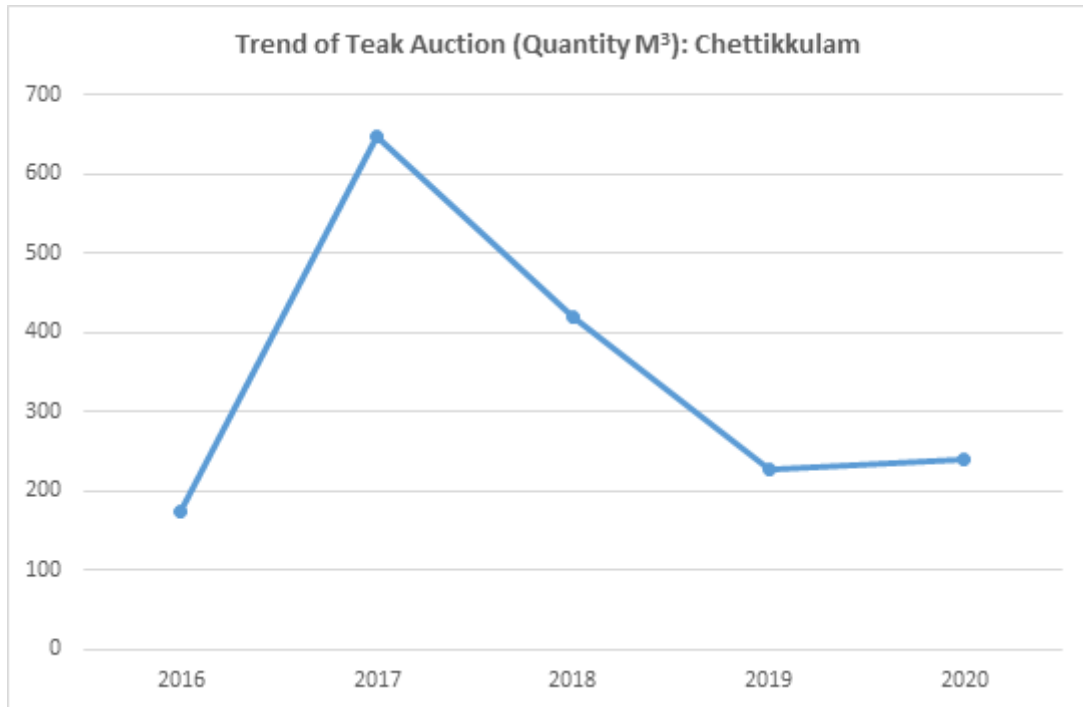


Figure 5.17 (f)

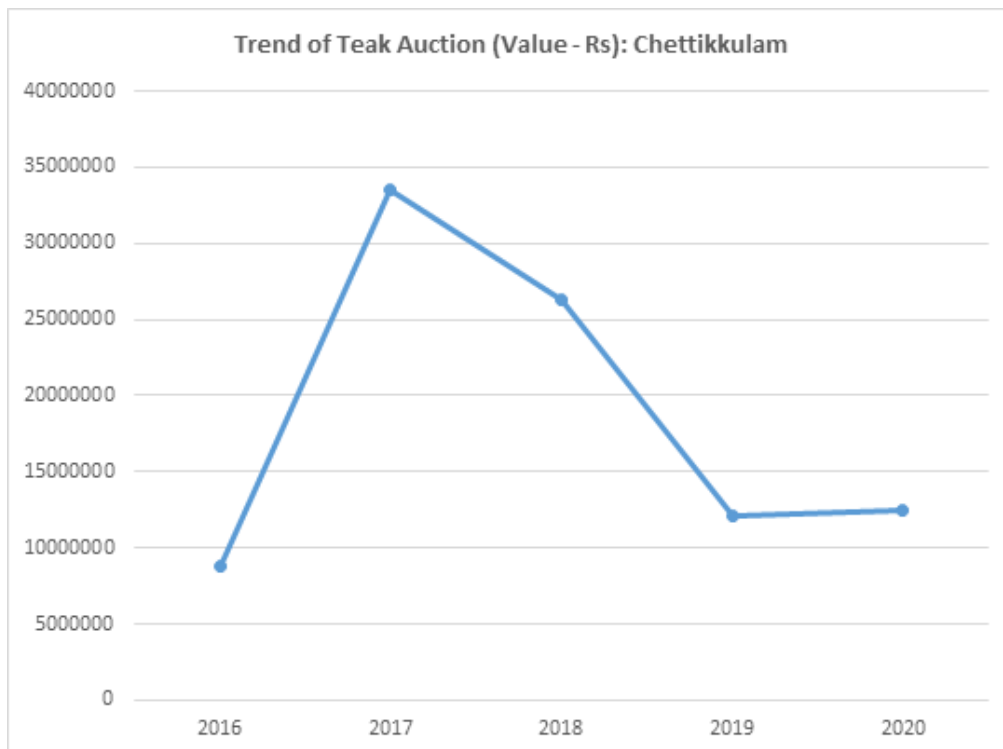


Figure 5.17 (g)

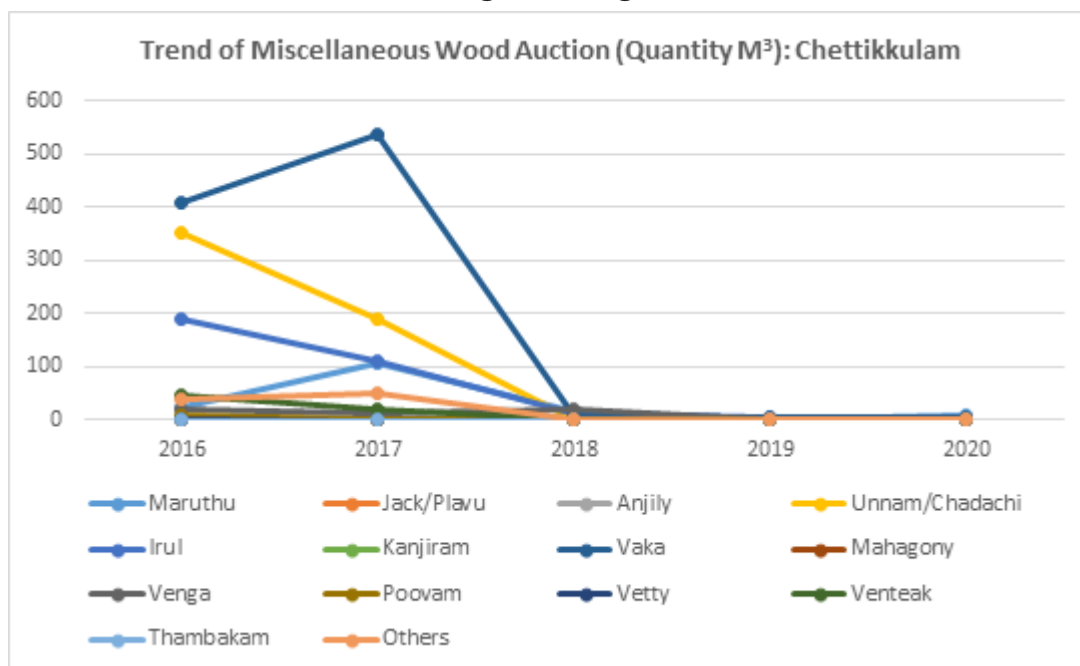
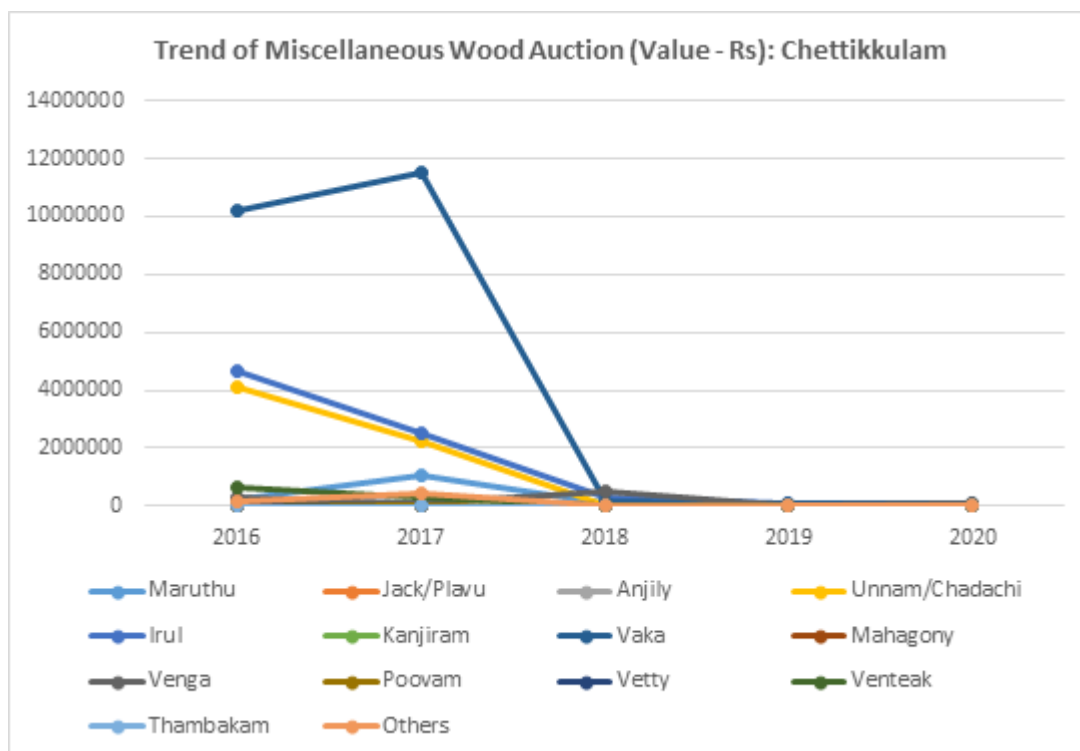


Figure 5.17 (h)



3. Mudikkal Timber Depot

The analysis of five years quantity and value data collected from the Mudikkal (appx. 50 years in timber auction) Government timber depot near Perumpavoor at Ernakulam indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 456.42 cubic meters (M3) that accounts 79.03% of the total timber in Mudikkal depot. The Mudikkal depot had fetched Rs.3,09,57,882/- in revenue (cumulative average) to the Government. It accounts 84.93% of the total revenue received at Mudikkal depot.

The miscellaneous timbers account a quantity of 20.97% of the total timbers and it contribute to 15.07% of total timber value (cumulative annual average). In miscellaneous timbers rosewood, mahogany, maruthu and irul predominates other timbers in cumulative quantity (6.93%, 2.53%, 4.89%, and 2.99% respectively). The cumulative value of rosewood (11.89%) dominated in miscellaneous timbers when compared to other timbers.

The Mudikkal timber depot conducted 43 auctions during the period 2016-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity and value of teak (846.72 M3 and Rs.4,84,44,678/- respectively) and rosewood (85.35 M3 and Rs.51,92,561/- respectively) auctioned showed maximum in 2019, then recorded a significant decrease in 2020.

The trend of quantity and value of miscellaneous timbers such as maruthu, irul, vaka and unnam/chadachi was the maximum in 2018.

Details are given in Tables 5.20 (a)&(b) and figures 5.18 (a)-(j).



Table 5.20 (a)
Quantity and Value of Timber Auctioned from Mudikkal (43)

Species Name	2015 (...)		2016 (7)		2017 (10)		2018 (6)		2019 (12)		2020 (8)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			823.2 37	68086 500	259.2 9	20185 533	209.7 18	12077 663	846.7 18	48444 678	143.1 54	59950 36
Rosewood			49.44 2	91747 47	12.20 2	93525 5	39.82 5	38582 91	85.35 1	51925 61	13.19 3	25025 78
Anjili							1.235	16265				
Venteak											0.694	7842
Maruthuu			0.25	1625			80.00 5	83505 3			4.396	55026
Irul							17.27 3	34213 2				
Unnam/Chadachi							11.56 6	13254 8			0.164	1722
Mahagany			7.179	28278 2					22	31350		
Vaka							8.751	18733 3			0.991	7572
Jack/Plavu			3.957	17247 9			1.258	3372				
TOTAL IW			884.0 65	77718 133	271.4 92	21120 788	369.6 31	17452 657	954.0 69	53668 589	162.5 92	85697 76
Others									1.366	13510	10.18 2	15867 7
Grand Total			884.0 65	77718 133	271.4 92	21120 788	369.6 31	17452 657	955.4 35	53682 099	172.7 74	87284 53



Table 5.20 (b)
Quantity and Value of Timber Auctioned from Mudikkal (43)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	456.4234	79.02723911	30957882	84.93312599
Rosewood	40.0026	6.926233482	4332686.4	11.88674987
Anjili	1.235	0.21383356	16265	0.04462312
Venteak	0.694	0.12016234	7842	0.021514572
Maruthuu	28.217	4.885620689	297234.6667	0.815465005
Irul	17.273	2.990726376	342132	0.938641095
Unnam/Chadachi	5.865	1.015492977	67135	0.184185256
Mahogany	14.5895	2.526092889	157066	0.430911468
Vaka	4.871	0.843387262	97452.5	0.26736149
Jack/Plavu	2.6075	0.451474499	87925.5	0.241224111
TOTAL IW	571.778	99.00026318	36363621.07	99.76380198
Others	5.774	0.99973682	86093.5	0.236198009
Grand Total	577.552	100	36449714.57	100

Figure 5.18 (a)

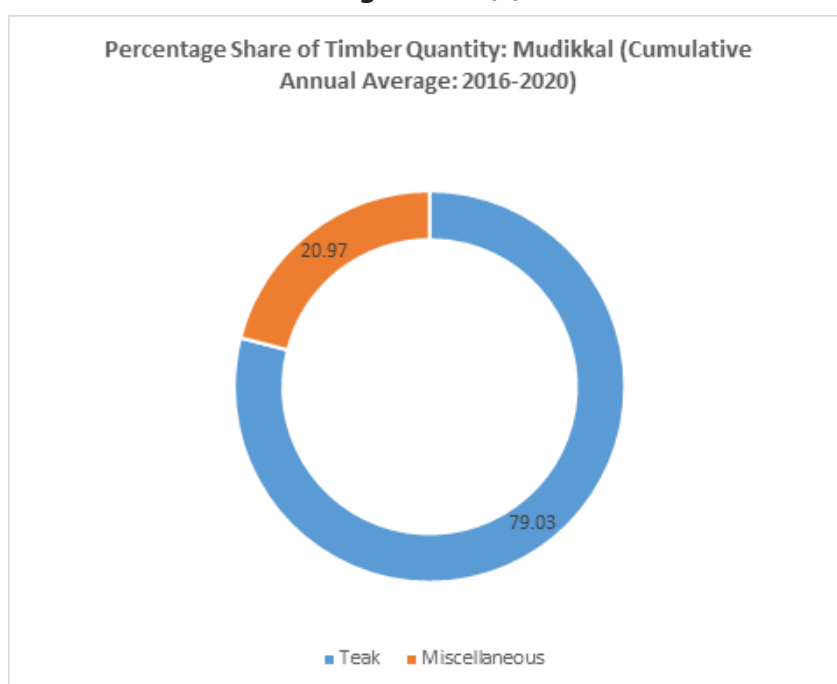


Figure 5.18 (a)

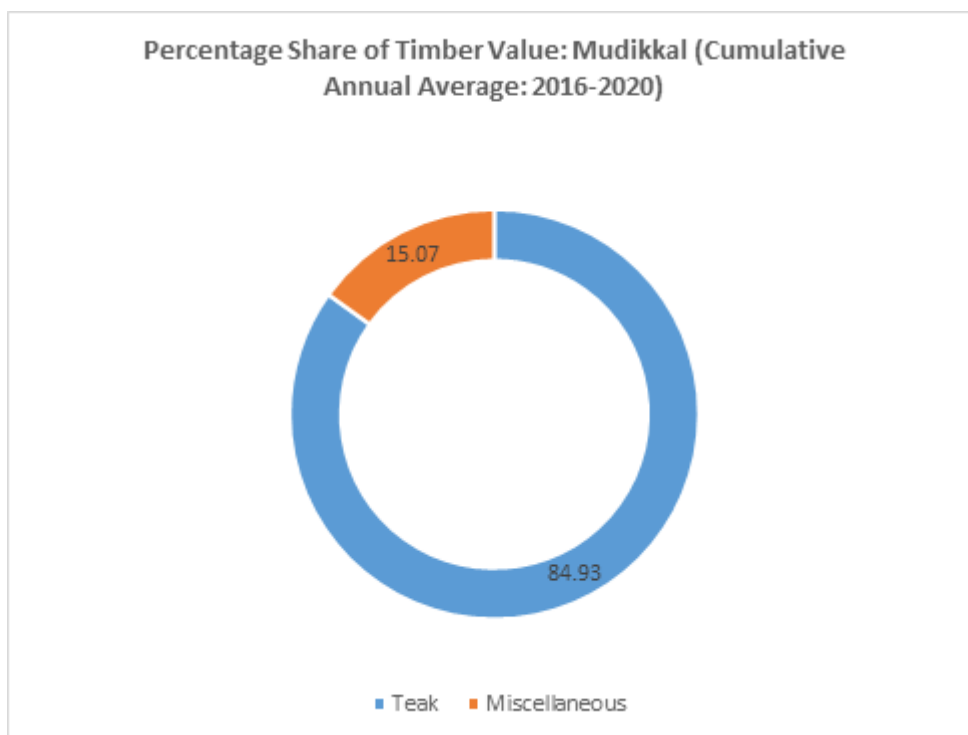


Figure 5.18 (b)

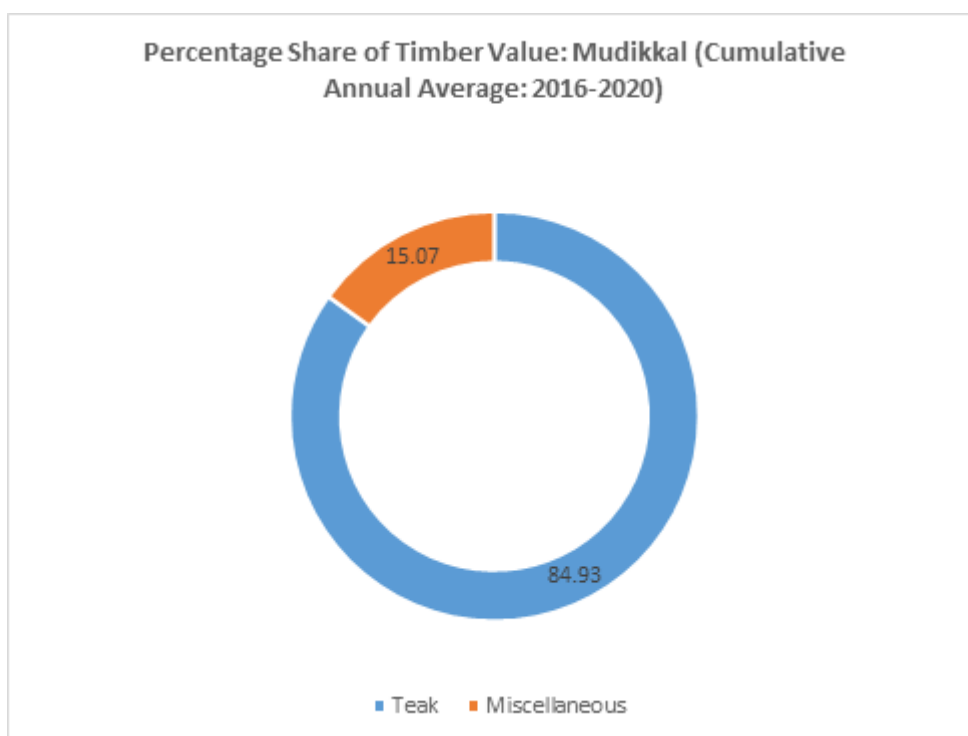


Figure 5.18 (c)

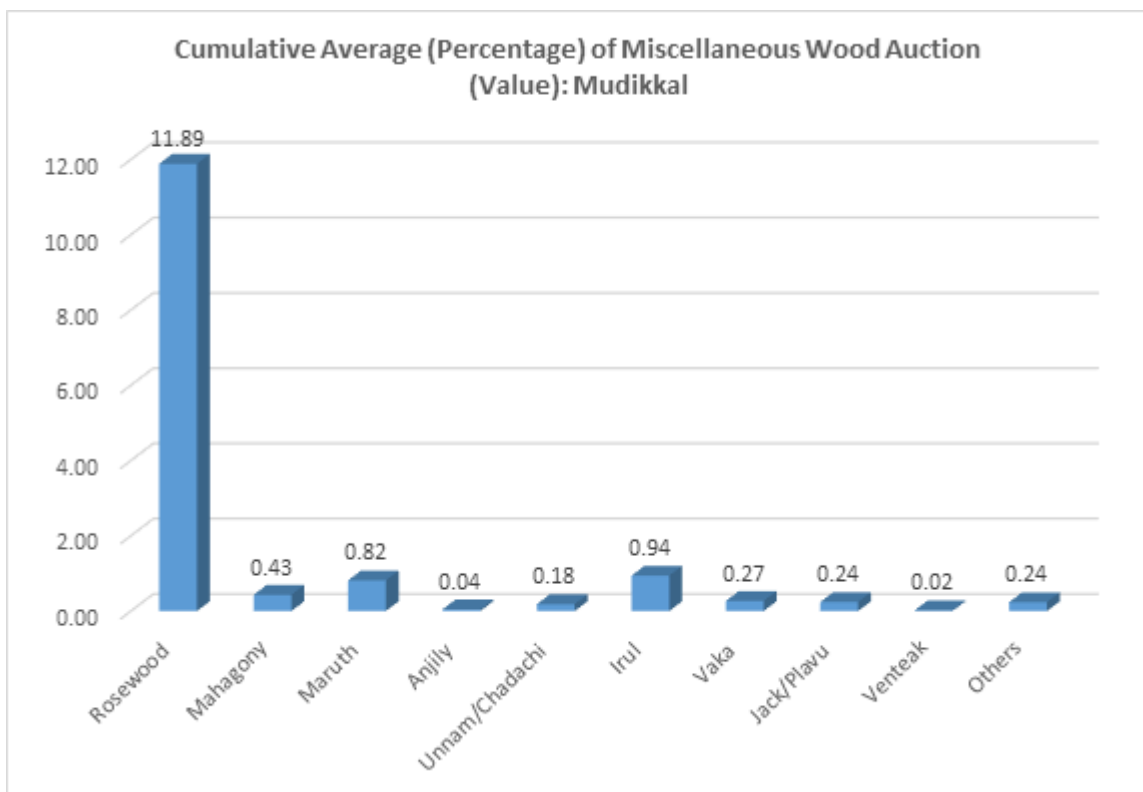
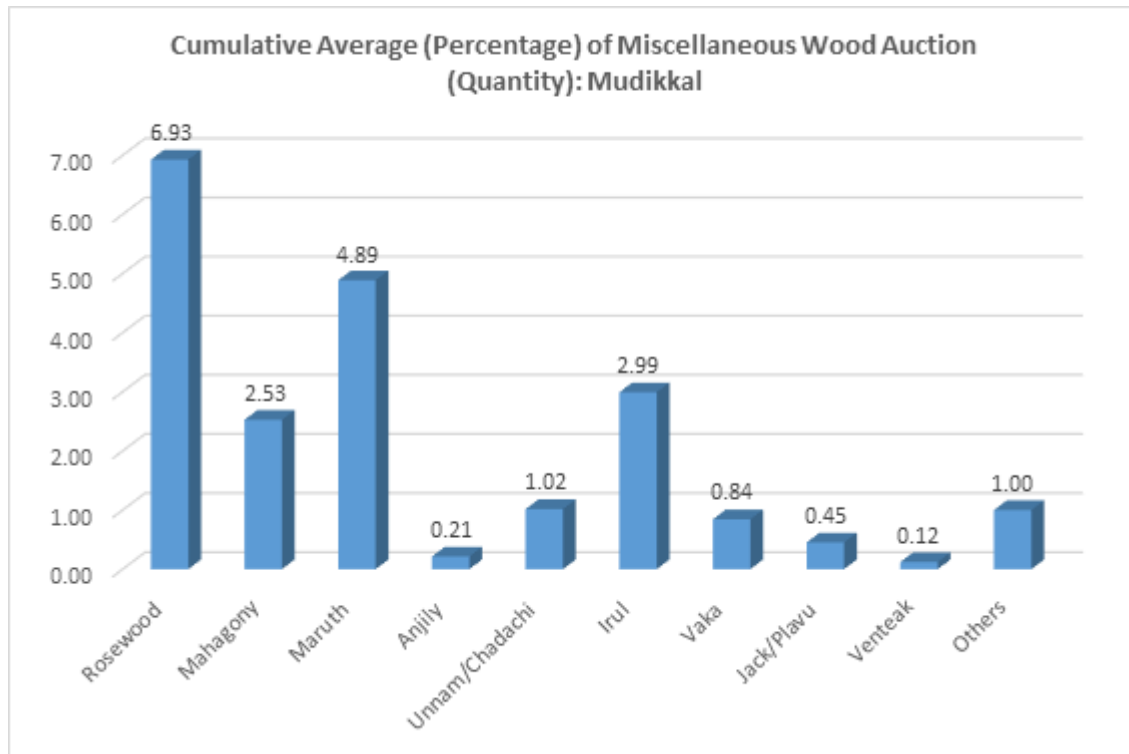


Figure 5.18 (e)

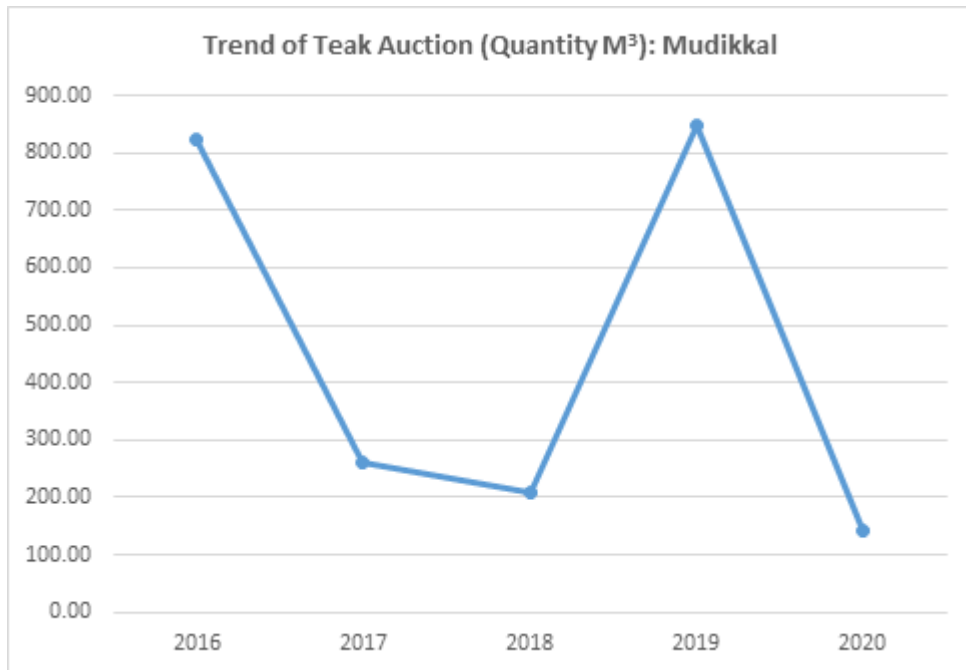


Figure 5.18 (f)

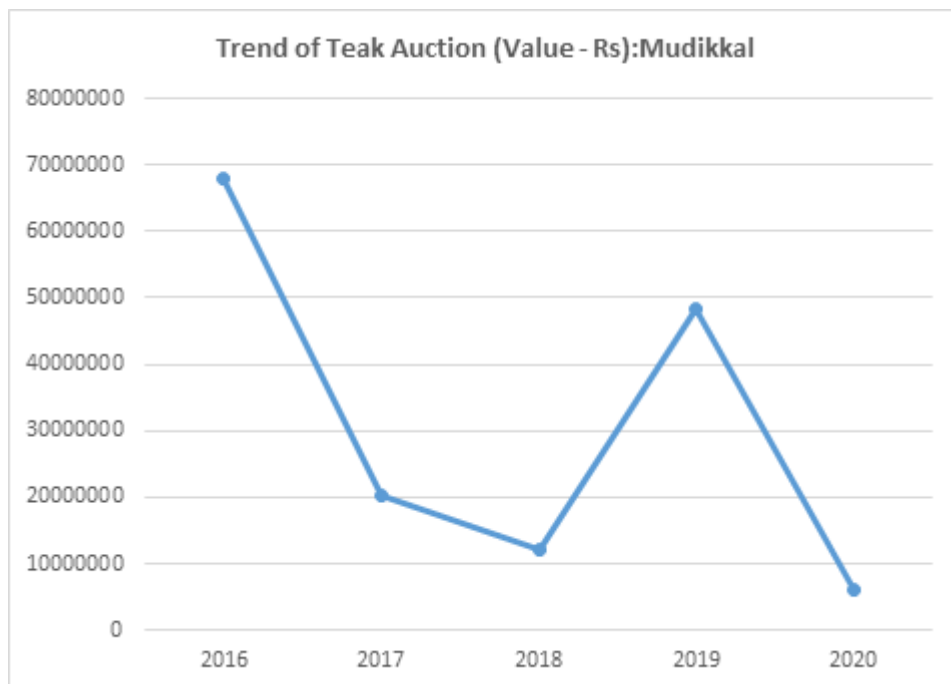


Figure 5.18 (g)

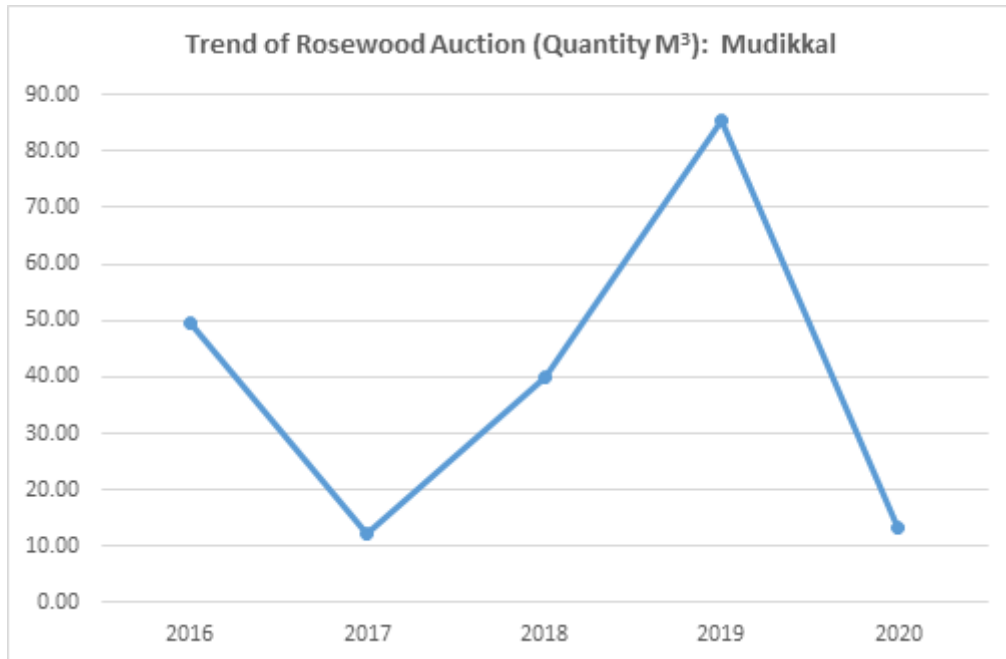


Figure 5.18 (h)

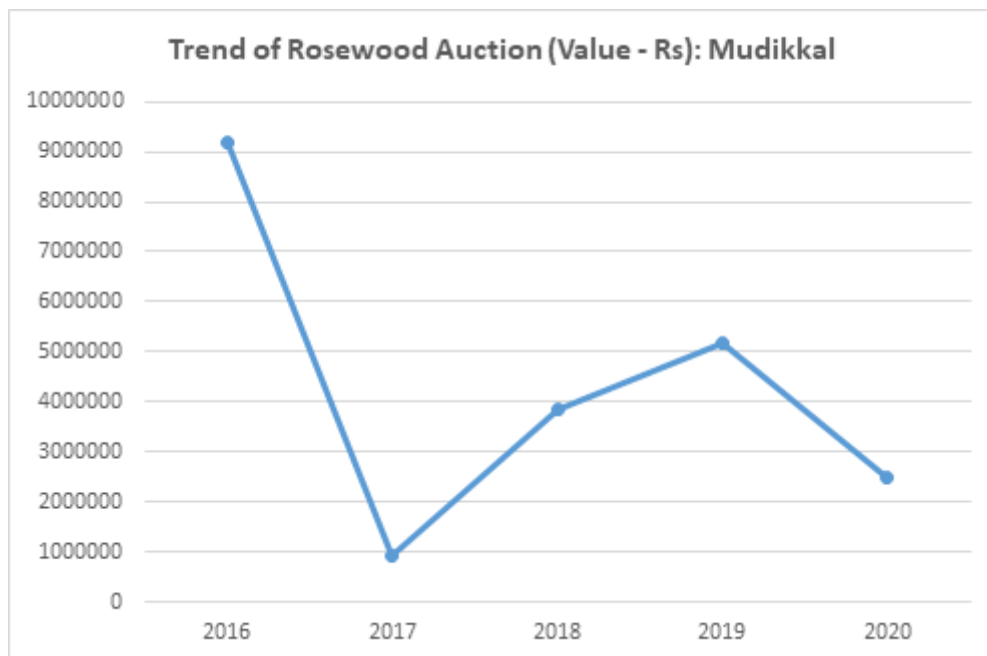


Figure 5.18 (i)

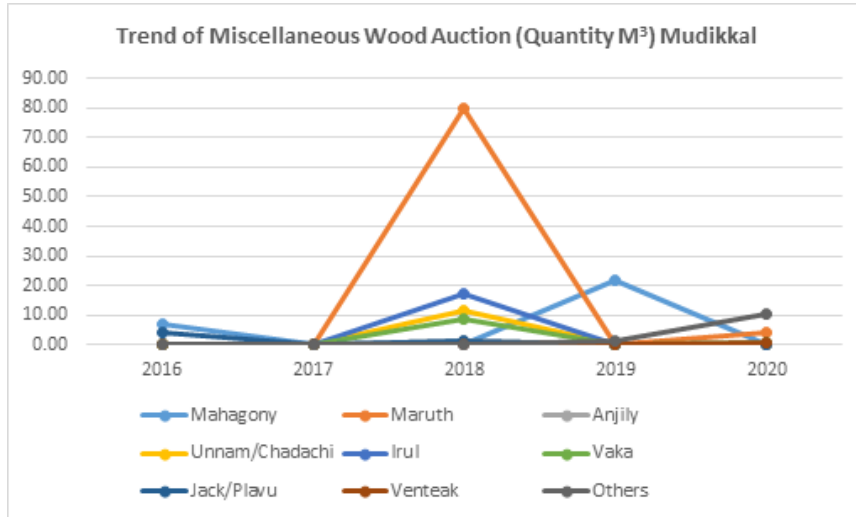


Figure 5.18 (i)

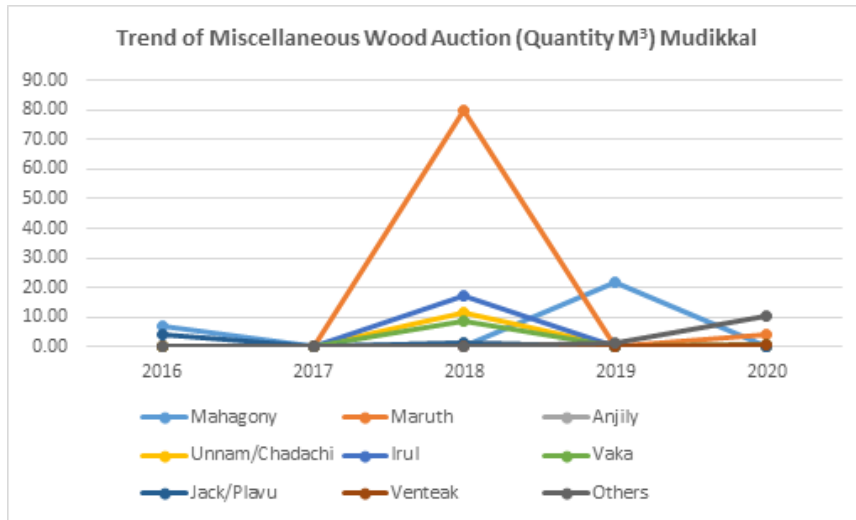
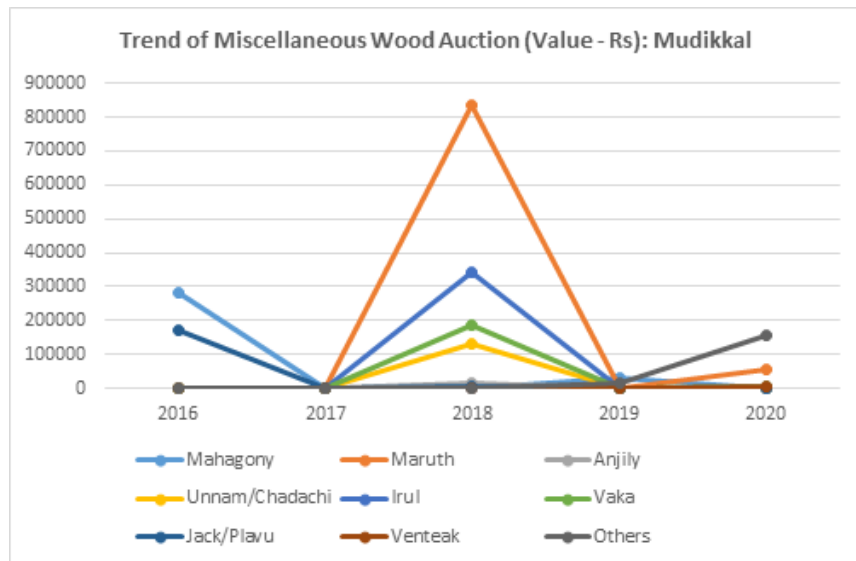


Figure 5.18 (j)



4. Varappuzha Timber Depot

The analysis of five years quantity and value data collected from the Varappuzha (appx. 60 years in timber auction) Government timber depot at Ernakulam indicates that the main/"only" timber species auctioned is teak with a cumulative annual average quantity of 236.94 cubic meters (M³) that accounts 99.535% of the total timber in Varappuzha depot. The Varappuzha depot had fetched Rs.1,82,94,426.2/- in revenue (cumulative average) to the Government. It accounts 99.99% of the total revenue received at Varappuzha depot. In 2019, in addition to teak, miscellaneous timbers also auctioned (insignificant when compared to teak) from this depot with a quantity of 1.108 M³ and value of Rs.1,828/-.

The Varappuzha timber depot conducted 26 auctions during the period 2016 to 2020. The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2016 to 2020 are given in figures. The quantity and value of teak auctioned decreased from 2016 to 2020. Details are given in Tables 5.21 (a)&(b) and figures 5.19 (a)-(d).

Table 5.21 (a)
Quantity and Value of Timber Auctioned from Varappuzha (26)

Species Name	2015 (...)		2016 (6)		2017 (3)		2018 (4)		2019 (10)		2020 (3)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			491.94 9	4558610 2	14.40 2	161152 8	68.12 8	593079 6	474.89 5	3086230 0	135.33 4	748140 5
TOTAL IW			491.94 9	4558610 2	14.40 2	161152 8	68.12 8	593079 6	474.89 5	3086230 0	135.33 4	748140 5
Others									1.108	1828		
Grand Total			491.94 9	4558610 2	14.40 2	161152 8	68.12 8	593079 6	476.00 3	3086412 8	135.33 4	748140 5

Table 5.21 (b)
Quantity and Value of Timber Auctioned from Varappuzha (26)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	236.9416	99.534550 8	18294426.2	99.9900089
TOTAL IW	236.9416	99.534550 8	18294426.2	99.9900089
Others	1.108	0.4654492 2	1828	0.00999112
Grand Total	238.0496	100	18296254.2	100



Figure 5.19 (a)

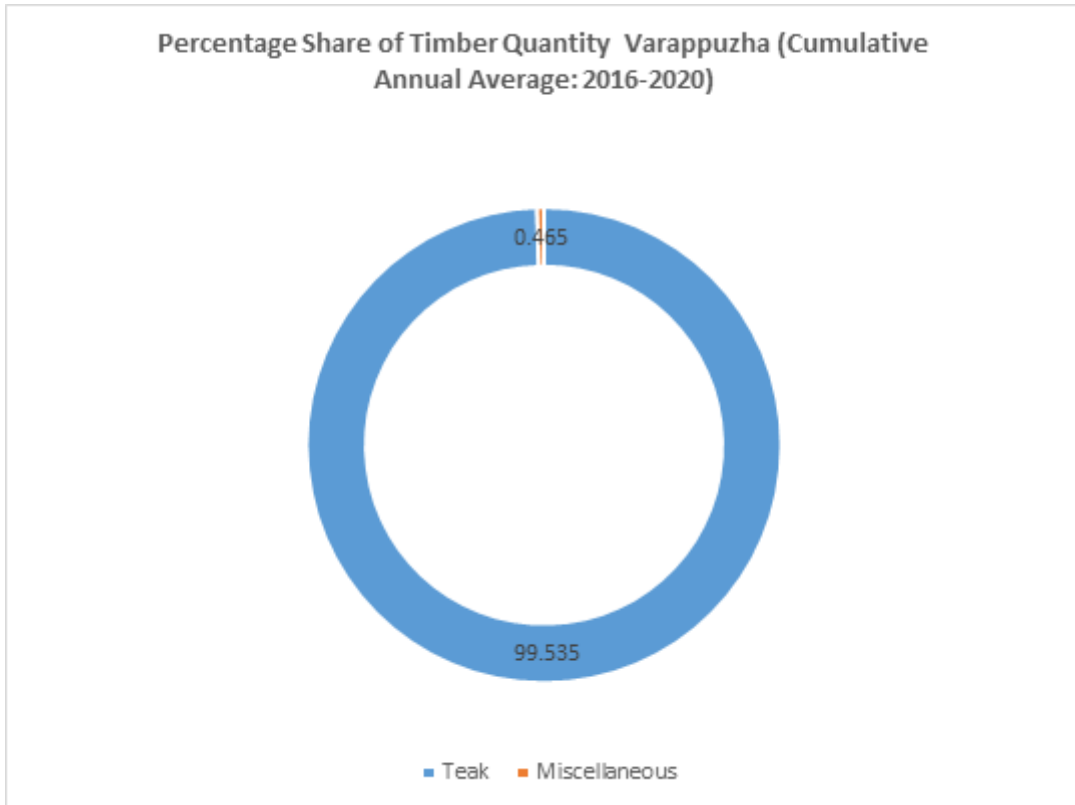


Figure 5.19 (b)

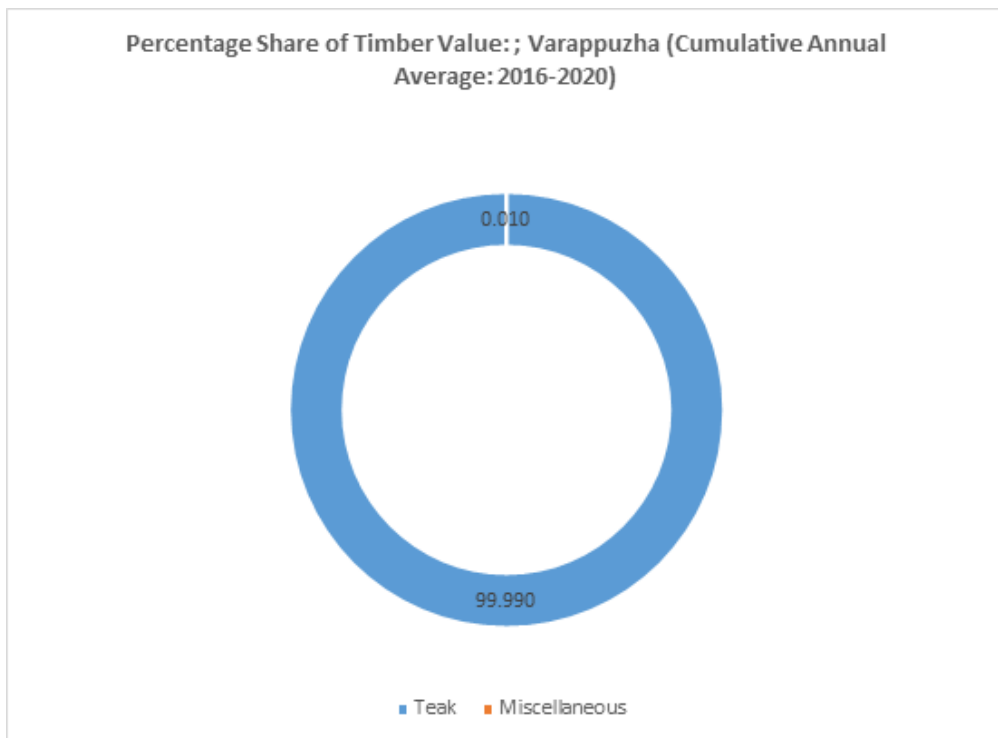


Figure 5.19 (c)V

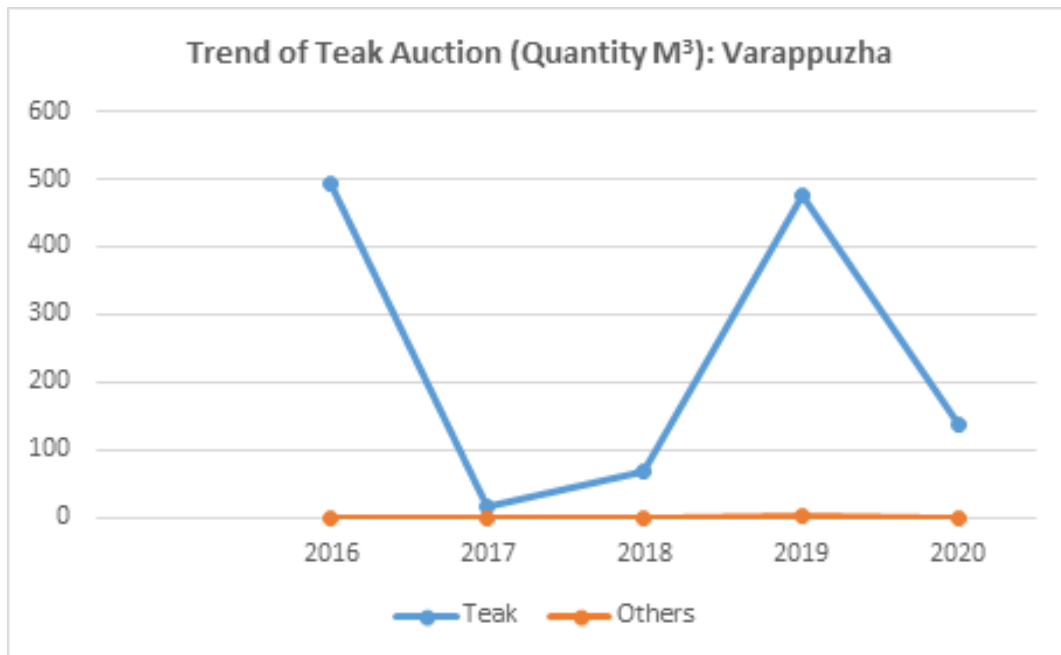
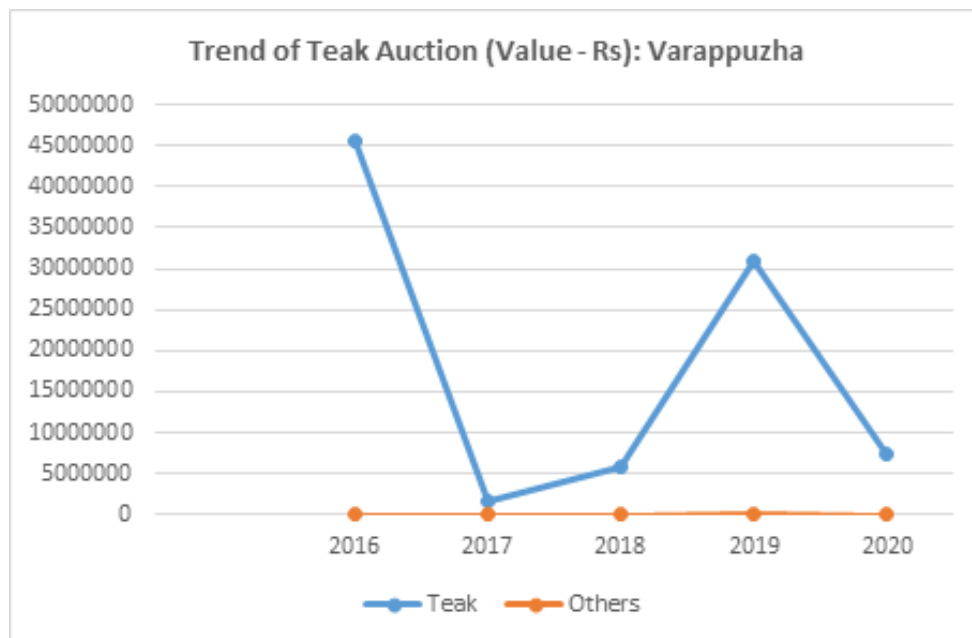


Figure 5.19 (d)



5.

The analysis of five years quantity and value data collected from the Vettoor (appx. 55 years in timber auction) Government timber depot at Ernakulam indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 558.344 cubic meters (M³) that accounts 55.34% of the total timber in Vettoor depot. The Vettoor depot had fetched Rs.3,67,14,496.4/- in revenue (cumulative annual average) to the Government. It accounts 85.97% of the total revenue received at Vettoor depot.

The miscellaneous timbers account a quantity of 44.66% of the total timbers and it contribute to 14.03% of total timber value (cumulative annual average). In miscellaneous timbers irul, maruthu and unnam/chadachi predominates other timbers in cumulative quantity (21.98%, 6.51% and 3.19% respectively). The cumulative value of irul shared 8.58% of the total value.

The Vettoor timber depot conducted 36 auctions during the period 2016 to 2020. The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2016 to 2020 are given in figures 5.20 (a)-(d). The quantity and value of teak auctioned significantly increased in 2019 (1772.44 M³ and Rs.10,88,57,102/-respectively) when compared to other years.

The trend of quantity and value of miscellaneous timbers such as irul, maruthu and unnam increased in 2019 when compared to other years.

Details are given in Tables 5.22 (a)&(b) and figures 5.20 (a)-(h).

Table 5.22 (a)
Quantity and Value of Timber Auctioned from Vettoor (36)

Species Name	2015 (...)		2016 (7)		2017 (4)		2018 (7)		2019 (11)		2020 (7)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			469.2 64	391206 89	169.8 67	132703 29	267.1 32	169575 57	1772.4 39	108857 102	113.0 19	53668 05
Anjili									1.951	89796		
Maruthuu			0.799	3296					130.51 5	650274		
Venga									1.176	1085		
Venteak									3.813	18723		
Unnam/Chadachi									32.183	368286		
Poovam									5.203	8849		
Vaka									2.703	39583		
Kanjiram									2.103	6992		
Jack/Plavu									5.239	109705	1	1010
Rosewood									2.149	37769		
Irul									221.76 2	366575 3		
Thembavu									10.056	67168		
TOTAL IW			470.0 63	391239 85	169.8 67	132703 29	267.1 32	169575 57	2191.2 92	113921 085	114.0 19	53678 15
Others			3.9 1	23373	213.5 65	280959 5	0	0	69.2	921711	0	0
Total			473.9 73	391473 58	383.4 32	160799 24	267.1 32	169575 57	2260.4 92	114842 796	114.0 19	53678 15



Tables 5.22 (b)
Quantity and Value of Timber Auctioned from Vettoor (36)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	558.3442	55.3420126	36714496.4	85.9672066
Anjili	1.951	0.1933794	89796	0.21025786
Maruthuu	65.657	6.50779666	326785	0.76516898
Venga	1.176	0.11656288	1085	0.00254053
Venteak	3.813	0.37793729	18723	0.04384001
Unnam/Chadac hi	32.183	3.1899176	368286	0.86234381
Poovam	5.203	0.51571144	8849	0.02071998
Vaka	2.703	0.26791621	39583	0.09268382
Kanjiram	2.103	0.20844535	6992	0.01637181
Jack/Plavu	6.239	0.61839779	110715	0.25923982
Rosewood	2.149	0.21300478	37769	0.08843633
Irul	221.762	21.9806266	3665753	8.58338194
Thembavu	10.056	0.99673155	67168	0.15727426
TOTAL IW	913.3392	90.5284402	41456000.4	97.0694658
Others	95.55833333	9.47155982	1251559.66 7	2.93053423
Total	1008.897533	100	42707560.0 7	100



Figure 5.20 (a) Percentage Share of Timber Quantity Vettoor
(Cumulative Annual Average: 2016-2020)

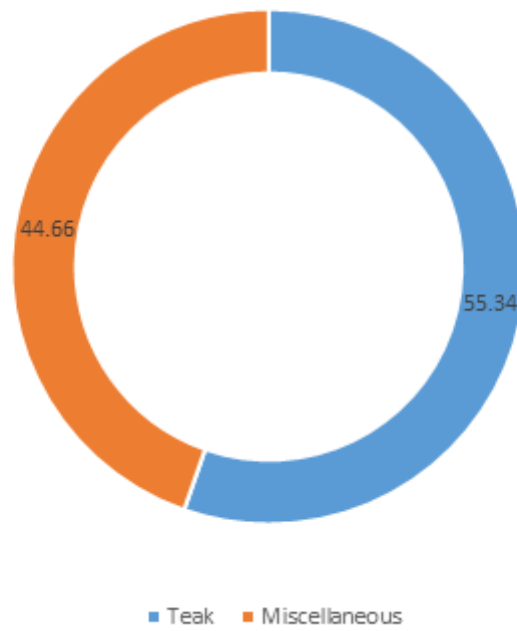


Figure 5.20 (b)

Percentage Share of Timber Value: Vettoor
(Cumulative Annual Average: 2016-2020)

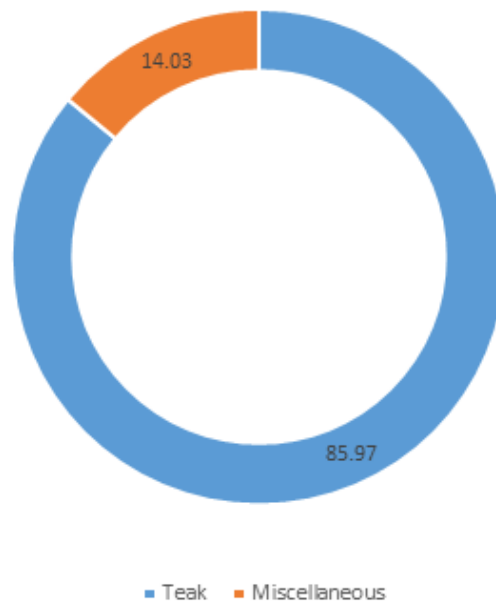


Figure 5.20 (c)

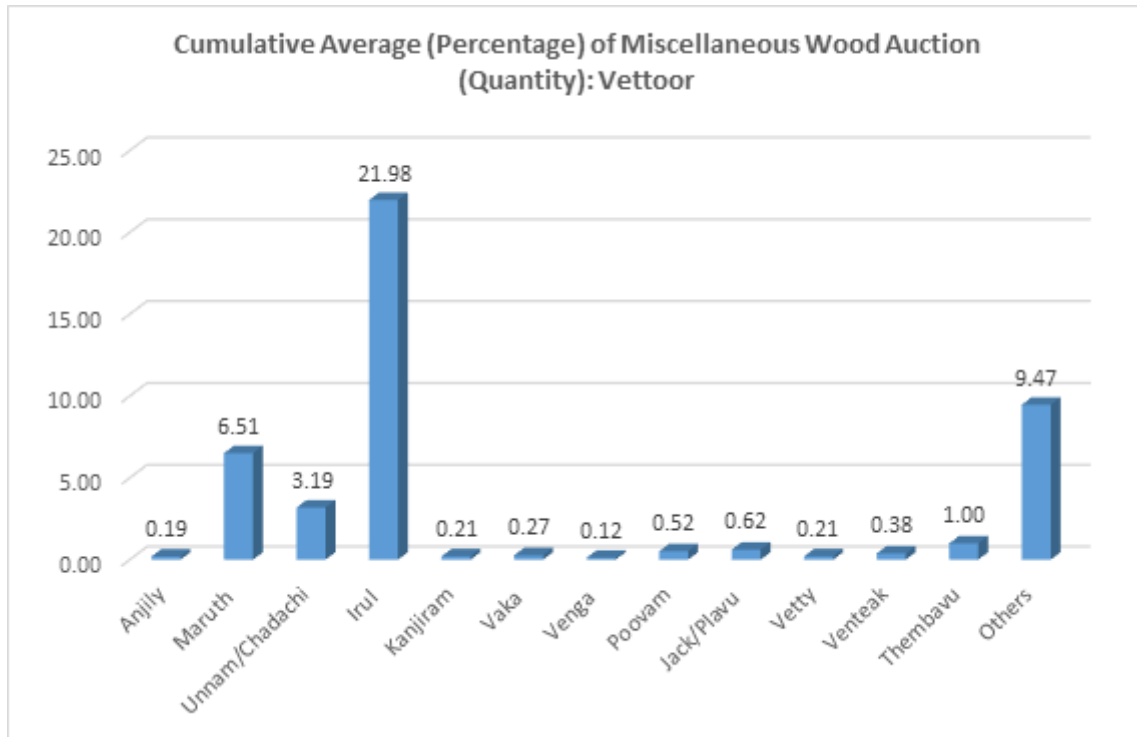


Figure 5.20 (d)

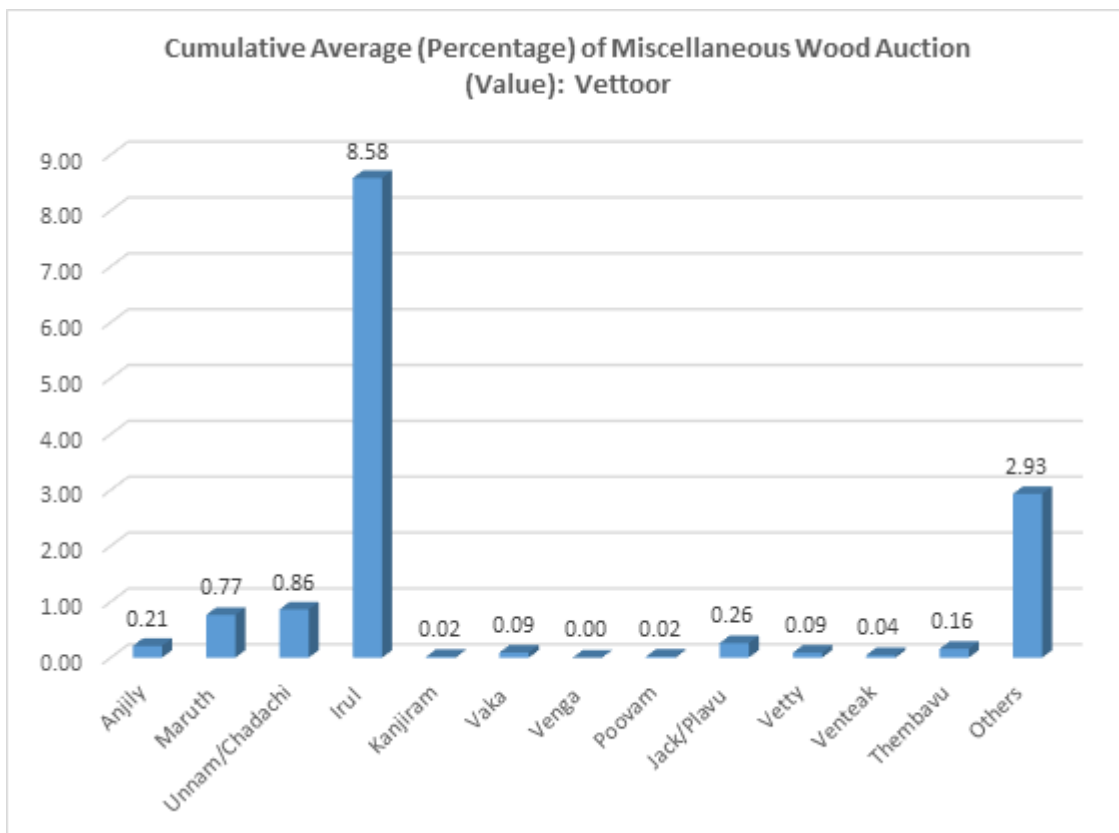


Figure 5.20 (e)

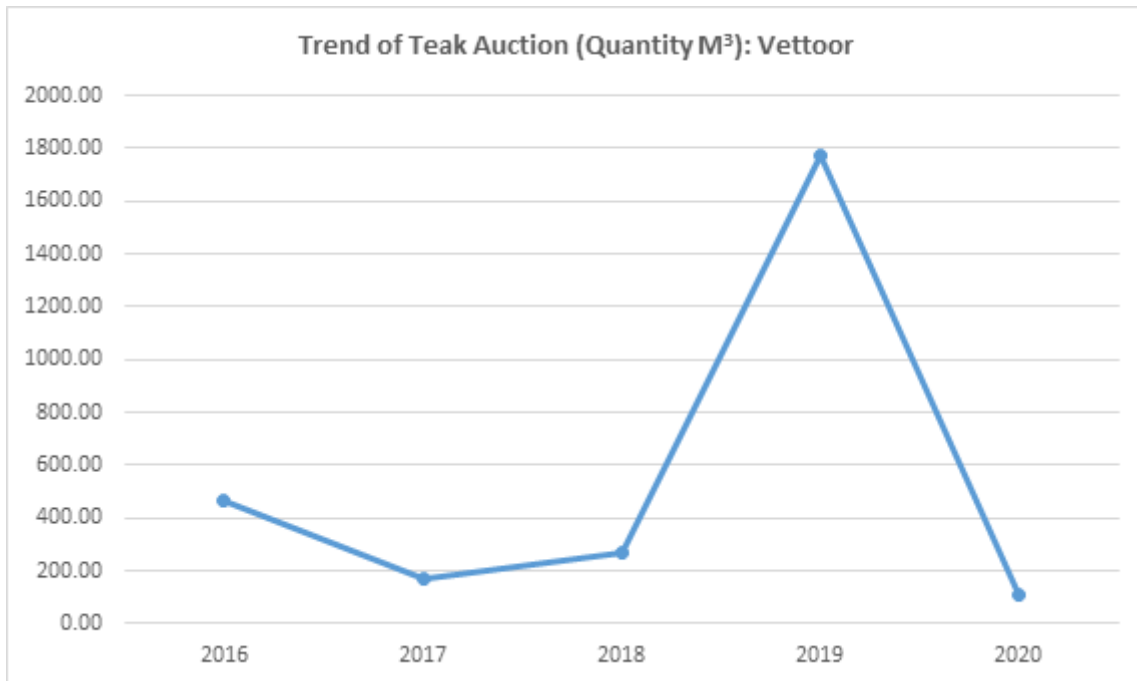


Figure 5.20 (f)

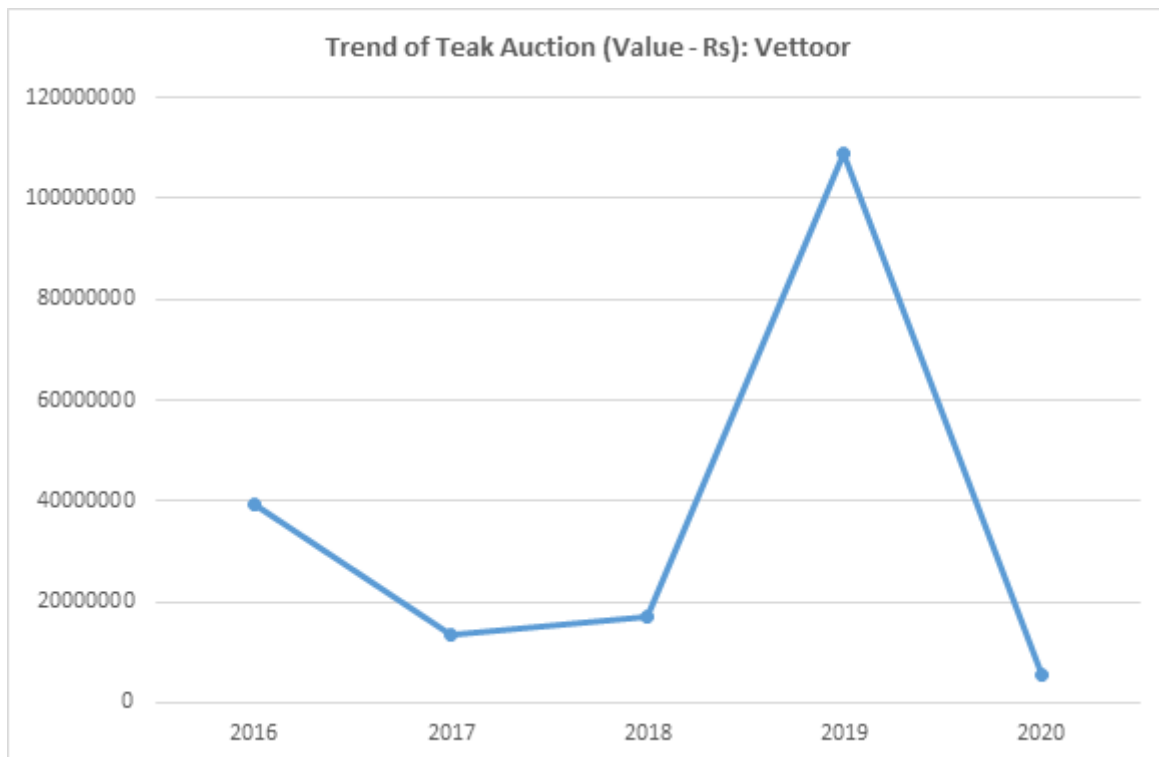


Figure 5.20 (g)

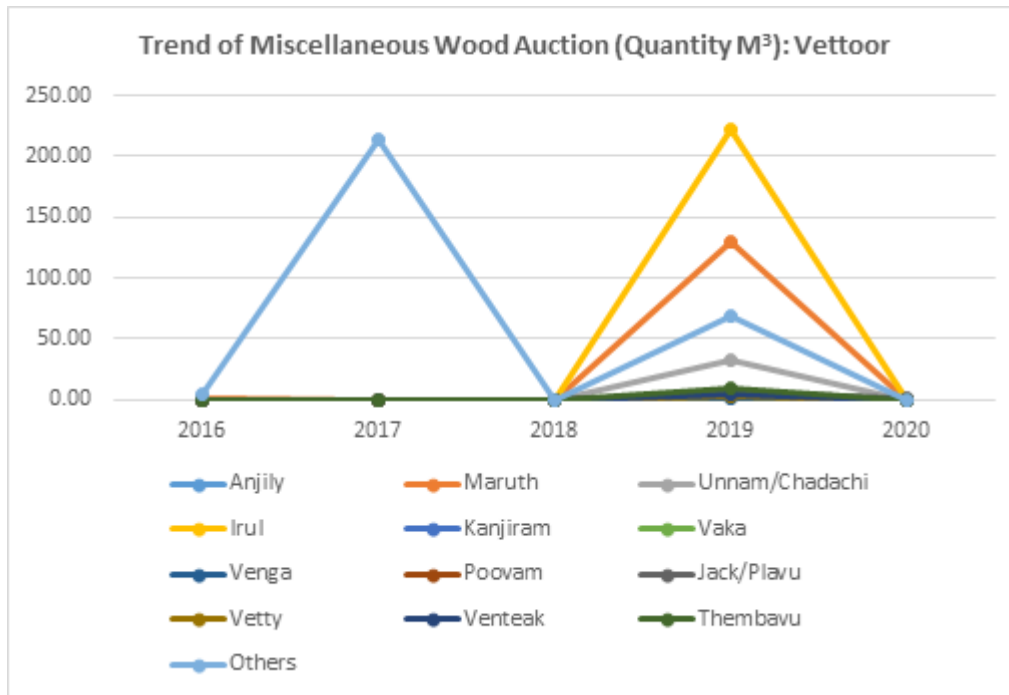
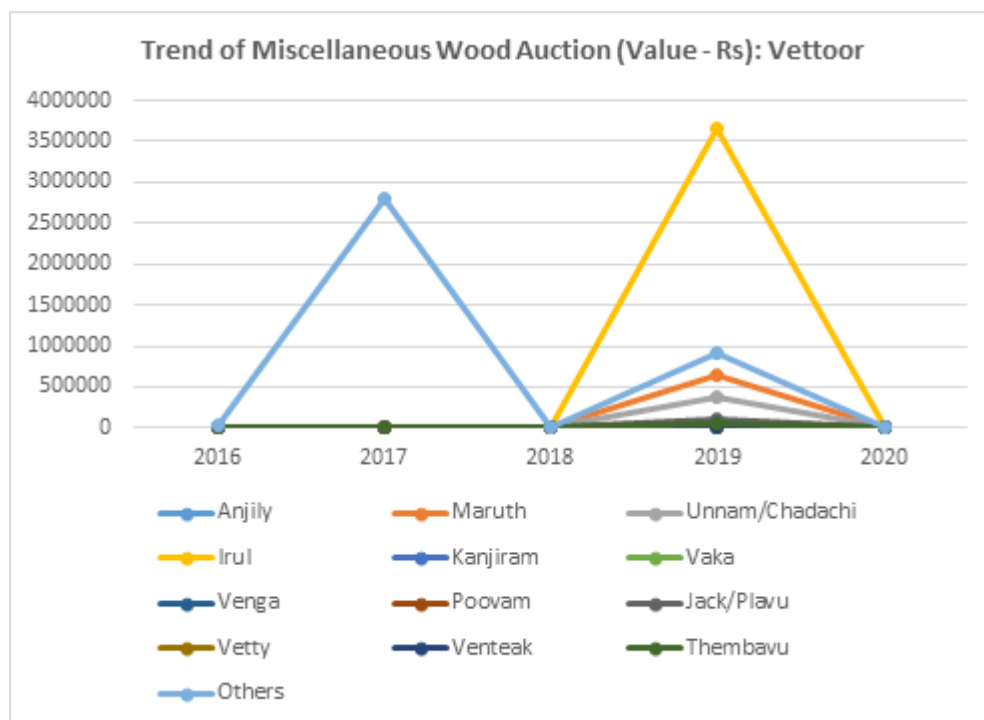


Figure 5.20 (h)



Palakkad Timber Sales Division

There are three Government timber depots under Palakkad timber sales division, which include: Nedunkayam, Aruvakkode and Walayar.

1. Nedunkayam Timber Depot

The Nedunkayam Government timber depot near Nilambur at Malappuram is well known for teak. The analysis of six years quantity and value data collected from Nedunkayam timber depot indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 2628.435 cubic meters (M3) that accounts 75.05% of the total timber supplied from Nedunkayam depot. The Nedunkayam depot had fetched Rs.21,48,96,092/- as revenue (cumulative annual average) to the Government. It accounts for 92.98% of the total revenue received at Nedunkayam depot.

The miscellaneous timbers account a quantity of 24.95% of the total timbers and it only contribute to 7.02% of total timber value (cumulative annual average). In miscellaneous timbers maruthu and irul predominates other timbers in cumulative quantity (10.10% and 9.50% respectively) and cumulative value (1.90% and 3.96% respectively).

The Nedunkayam timber depot conducted 304 auctions during the period 2015-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity and value of teak auctioned increased steadily from 2015-2017 reaching a maximum at 2017 (5223 M3 and Rs.40,86,05,358/-respectively), then recorded a decrease in 2018 (2173 M3 and Rs.17,87,79,287/- respectively) and 2019 (1149 M3 and Rs.9,05,96,586/- respectively) when compared to 2017. However the quantity and value (2674 M3 and Rs.20,26,49,950/-) increased again in 2020.

The trend of quantity and value of miscellaneous timbers showed that there is steadily decrease in the quantity and value of timbers in 2017 when compared to previous years, and then increased during 2018-2020 except Irul. Irul showed a decrease in quantity and value in 2020 when compared to 2019. Details are given in Tables 5.23 (a)&(b) and figures 5.21 (a)-(h).



Table 5.23 (a) Quantity and Value of Timber Auctioned from Nedunkayam

Species Name	2015 (34)		2016 (66)		2017 (80)		2018 (59)		2019 (28)		2020 (37)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak	1870.805	161712775	2799.452	247032598	5223.013	408605358	2173.033	178779287	1149.575	90596586	2674.734	202649950
Anjily	0.571	17882	0	0	0	0	0	0	0	0	0	0
Vaka	5.427	4955.226	6.795	215184	0	0	0	0	0	0	2.294	106126
Chadachi	6.106	65336	1.32	15196			3.307	44065	3.239	39090	2.677	35533
Venteak	91.035	1550890	31.548	474278	32.751	844662	0.438	4829	15.337	222238	13.353	149291
Venga	117.684	1932426	163.515	2909869	2.548	26234	0	0	47.238	683205	104.24	1853683
Poovam	7.583	23701	2.291	8017					4.846	29069	97.107	699340
Thanni	11.748	129653	0	0	0	0	0	0	0	0	0	0
Maruthu	652.862	7840990	627.395	8363183	283.557	1885414	12.386	197918	134.617	1647329	426.783	6361003
Irul	707.154	20135886	274.947	7060169	0	0	26.42	813431	495.705	13648079	171.694	4099821
IW Total	3470.975	193414494.2	3907.263	266078494	5541.869	411361668	2215.584	179839530	1850.557	106865596	3492.882	215954747
Others	77.322	471356	3.47	47435	3.172	105369	0	0	4.348	79197	26.031	256311
Grand total	3548.297	193885850.2	3910.733	266125929	5545.041	411467037	2215.584	179839530	1854.905	106944793	3518.913	216211058

Table 5.23 (b) Quantity and Value of Timber Auctioned from Nedunkayam (Cumulative Annual Average: 2015-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	2648.435	75.05	214896092.3	92.98
Anjily	0.571	0.02	17882	0.01
Vaka	4.838667	0.14	108755.1	0.05
Chadachi	3.3298	0.09	39844	0.02
Venteak	30.74367	0.87	541031.3	0.23
Venga	87.045	2.47	1481083	0.64
Poovam	27.95675	0.79	190031.8	0.08
Thanni	11.748	0.33	129653	0.06
Maruthu	356.2667	10.10	4382640	1.90
Irul	335.184	9.50	9151477	3.96
IW Total	3506.119	99.35	230938489.50	99.92
Others	22.8686	0.65	191933.6	0.08
Grand total	3528.987	100.00	231130423.10	100.00

Figure 5.21 (a)

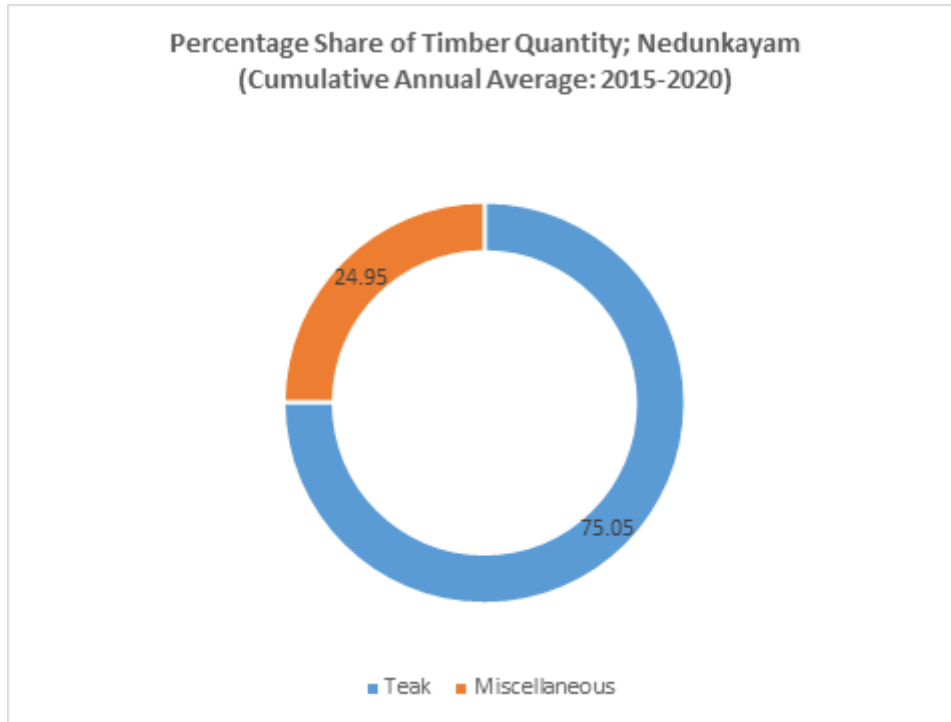


Figure 5.21 (b)

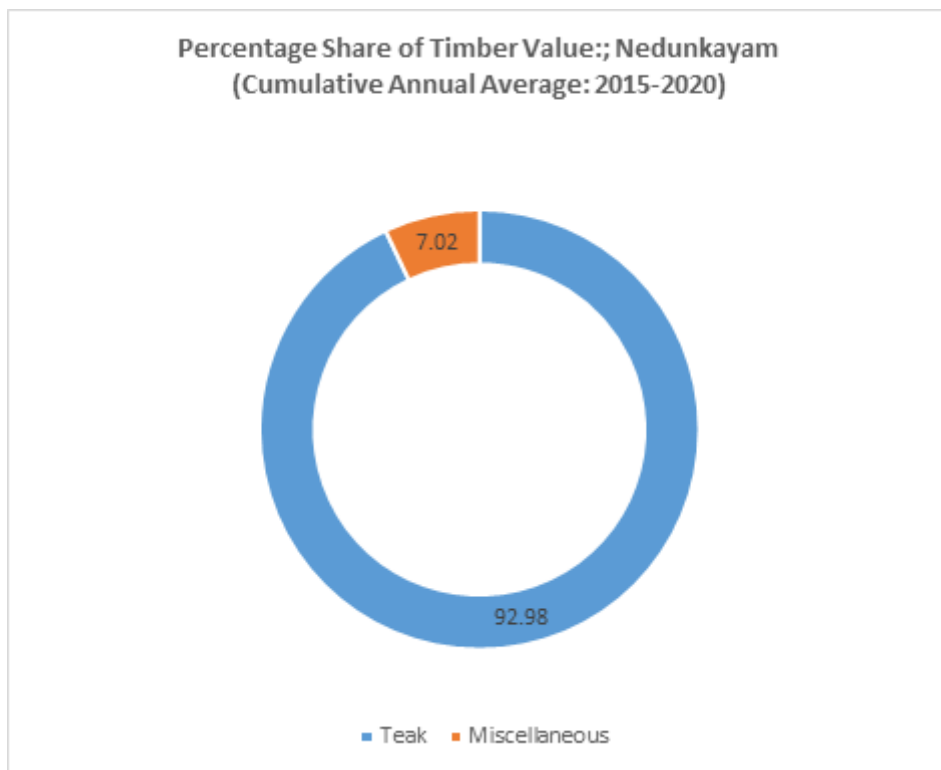


Figure 5.21 (c)

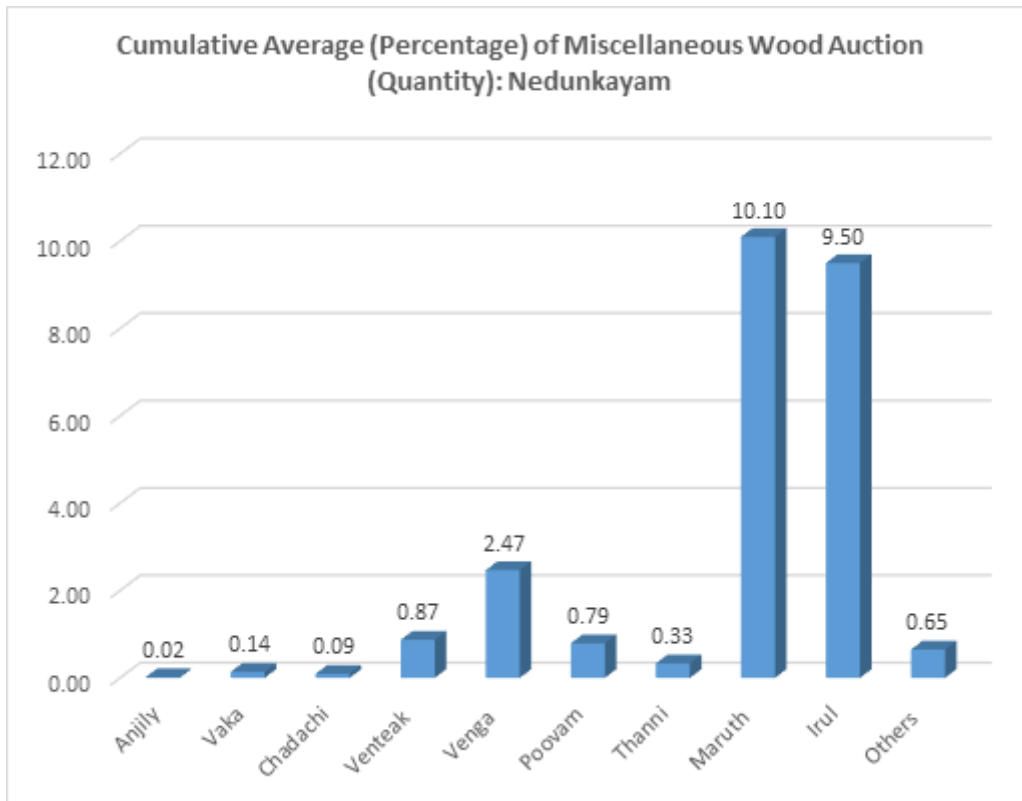


Figure 5.21 (d)

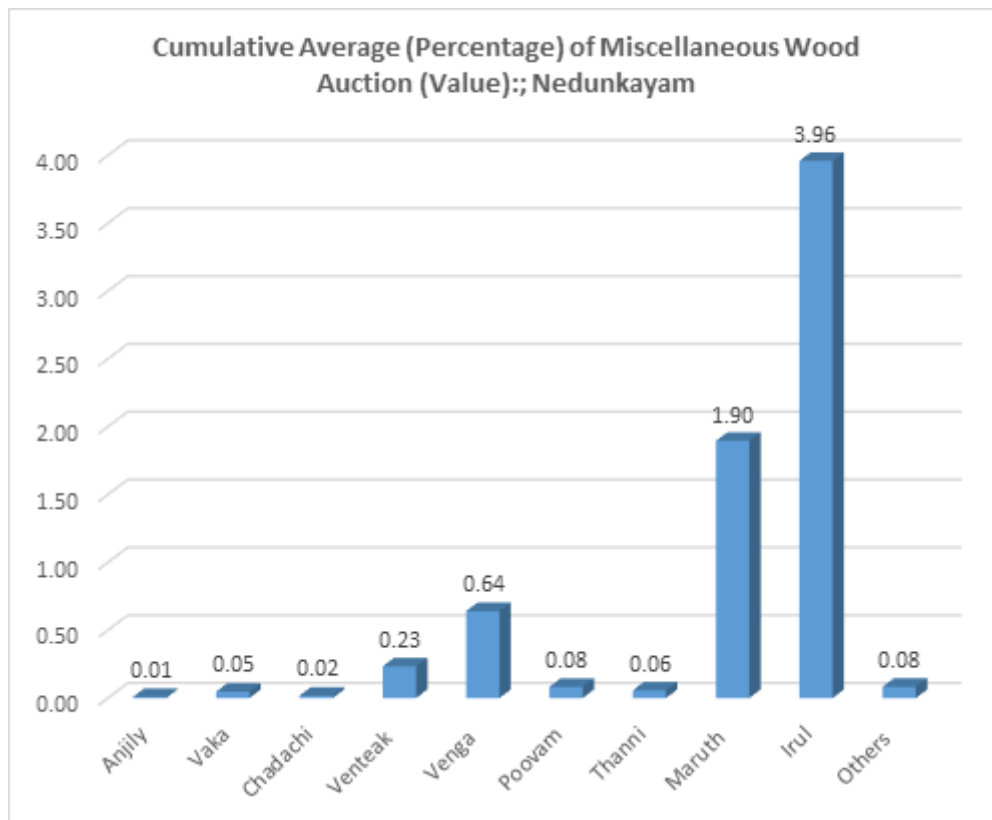


Figure 5.21 (e)

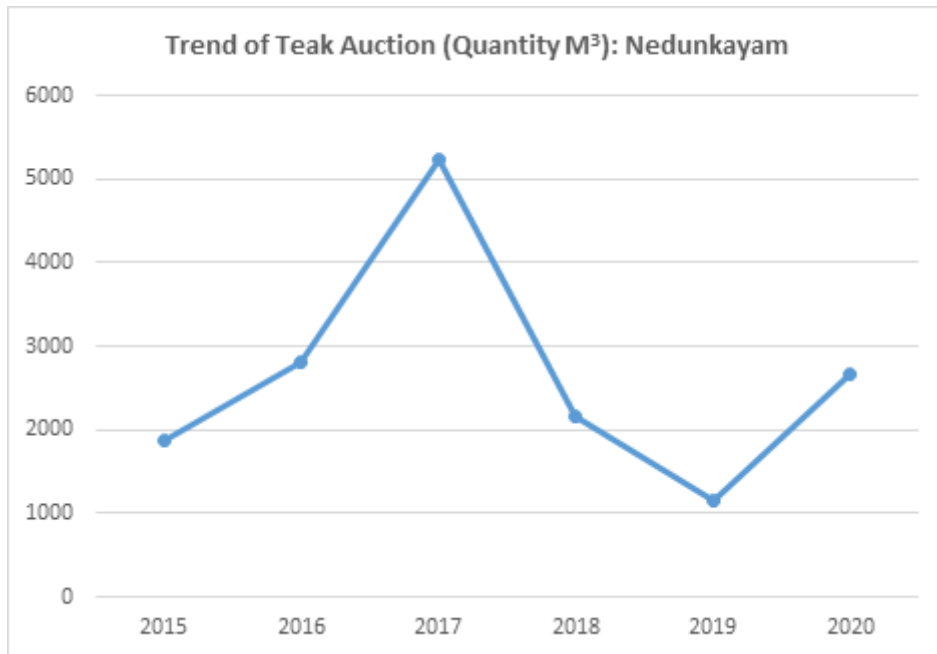


Figure 5.21 (f)

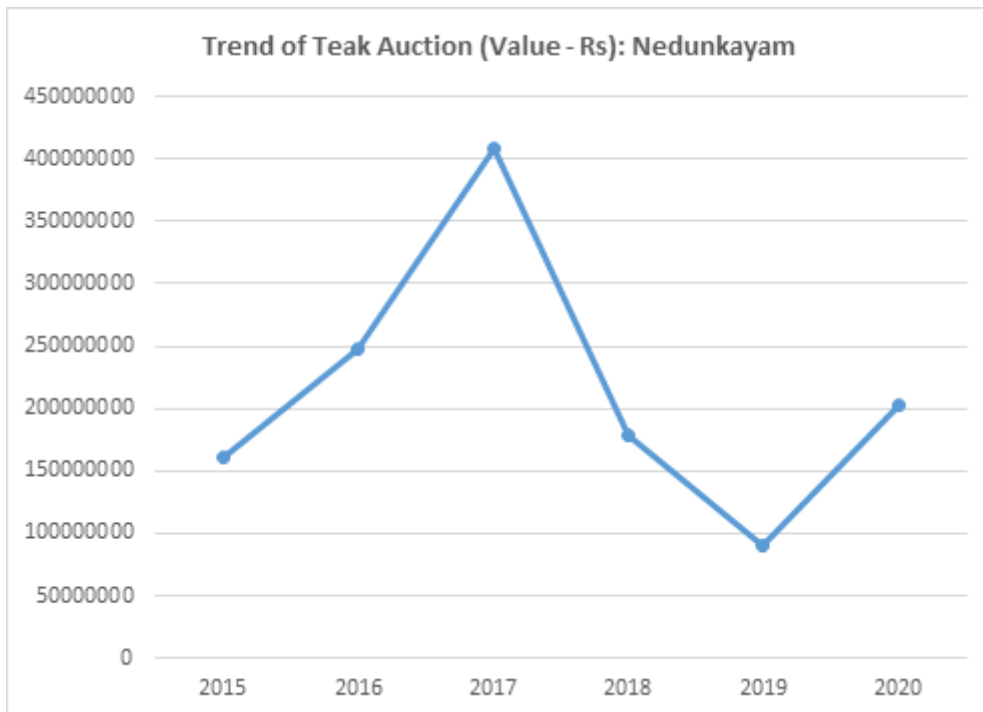


Figure 5.21 (g)

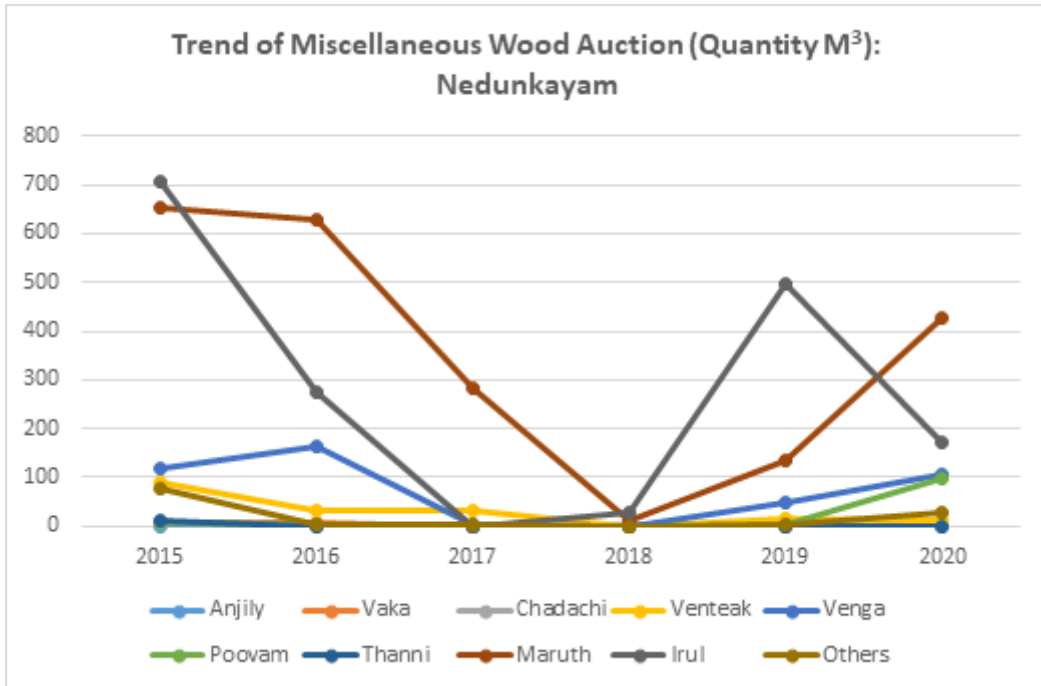
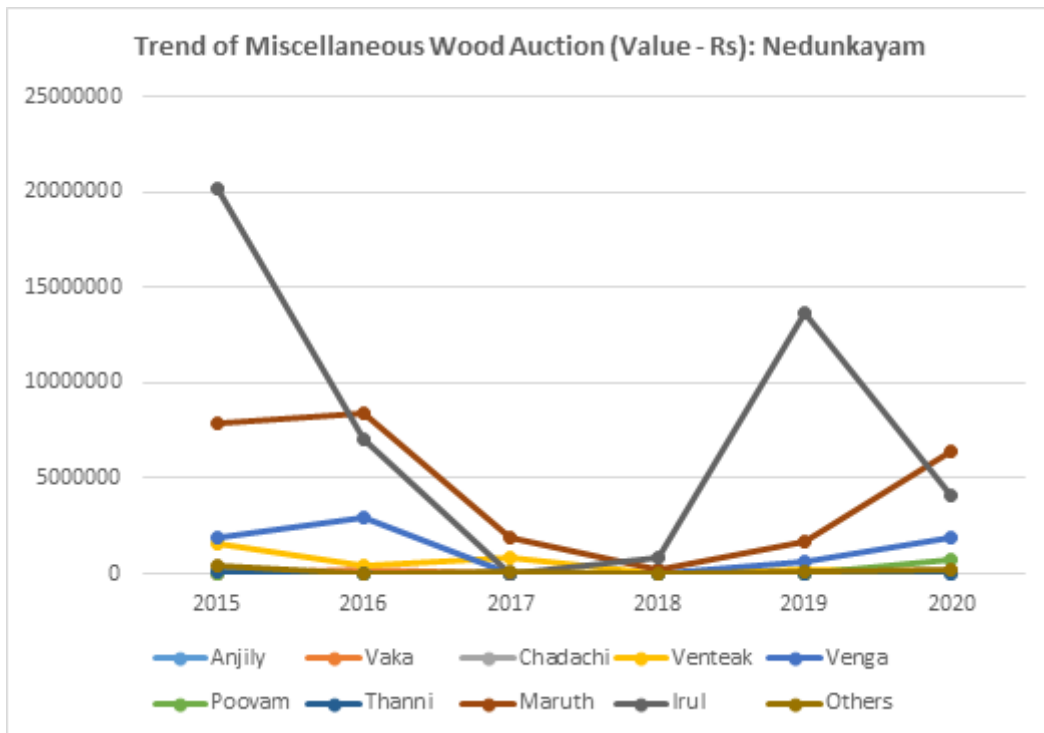


Figure 5.21 (h)



2. Aruvakode Timber Depot

The analysis of five years quantity and value data collected from Aruvakode Government timber depot near Nilambur at Malappuram indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 610.574 cubic meters (M³) that accounts 67.65% of the total timber in Aruvakode depot. The Aruvakode depot had fetched Rs.8,31,46,859.32/- revenue (cumulative annual average) to the Government. It accounts 86.37% of the total revenue received from Aruvakode depot.

The miscellaneous timbers account a quantity of 32.35% of the total timbers and it contribute to 13.63% of total timber value (cumulative annual average). In miscellaneous timbers rosewood, maruthu, irul predominate other timbers in cumulative quantity (5.80%, 10.22% and 8.06% respectively) and cumulative value (7.97%, 1.15% and 2.97% respectively).

The Aruvakode timber depot conducted 122 auctions during the period 2015-2020 (2019-No data, Kerala flood). The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity and value of teak (13.8970 M³ and Rs.6,44,77,541/- respectively) and maruthu (276.68 M³ and Rs.34,21,966/- respectively) auctioned in this depot reached a maximum in 2018 and that of rosewood in 2019 (105.50 M³ Rs.1,21,59,303/- respectively). The quantity and value of irul auctioned in Aruvakode depot significantly increased (doubled when compared to 2015) in 2020 (207.80 M³ and Rs.91,55,222/- respectively).

Details are given in Tables 5.24 (a)&(b) and figures 5.22 (a)-(j).

Table 5.24 (a) Quantity and Value of Timber Auctioned from Aruvakode (122)

Species Name	2015 (12)		2016 (15)		2017 (15)		2018 (54)		2019 (...)		2020 (26)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak	420.57	47192388	174.92	16880176	429.03	64477541	1389.7	204056742			638.65	83127450
Rosewood	34.66	5043922	34.51	7328046	105.5	12159303	25.64	3347972			61.5	10460231
Maruthu	15	171127	4.847	42697	72.5	795071	276.68	3421966			0	0
Venga	3.42	58629	0	0	1.757	45504	5.1	167547			12.06	241402
Venteak	14.154	186553	1.576	27785	0.925	12069	10.57	233245			0.874	20008
Poovam	15.25	138470										
Irul	114.94	3876535	17.161	312356	0.956	42493	22.983	913493			207.8	9155222
Vaka	9.85	363617			1.955	72001	9	225192				
Unnam/Chadachi	0	0	15.21	99539	0.612	9502	4.15	75205			21.57	467774
Jack/Plavu	0.89	39067	0	0	0	0	7.6	368537				
Kanjiram	1.93	3502	0									
TOTAL IW	630.664	57073809.6	248.224	24690599	612.623	77613484	1751.423	212809899			942.454	103472087
Others	77.134	967607	0	0	1.325	28143	22.274	1046879			1.703	87199
Grand Total	707.798	58041416.6	248.224	24690599	613.948	77641627	1773.697	213856778			944.157	103559286



Table 5.24 (b)
Quantity and Value of Timber (wood) from Forest
(Auction Depot: 2.Aruvakode) (122)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	610.574	67.65143248	83146859.32	86.3700177
Rosewood	52.362	5.801695302	7667894.8	7.96513801
Maruthuu	92.25675	10.22202271	1107715.25	1.15065544
Venga	5.58425	0.618733375	128270.5	0.13324286
Venteak	5.6198	0.622672305	95932	0.09965077
Poovam	15.25	1.689695836	138470	0.14383774
Irul	72.768	8.06267453	2860019.8	2.97088745
Vaka	6.935	0.768396106	220270	0.22880869
Unnam/Chadachi	10.2325	1.133758206	163005	0.16932383
Jack/Plavu	4.245	0.47034484	203802	0.21170231
Kanjiram	1.093	0.121104102	3502	0.00363775
TOTAL IW	876.9203	97.16252979	95735740.67	99.4469025
Others	25.609	2.837470207	532457	0.55309751
Grand Total	902.5293	100	96268197.67	100

(Cumulative Annual Average: 2015-2020)



Figure 5.22 (a)

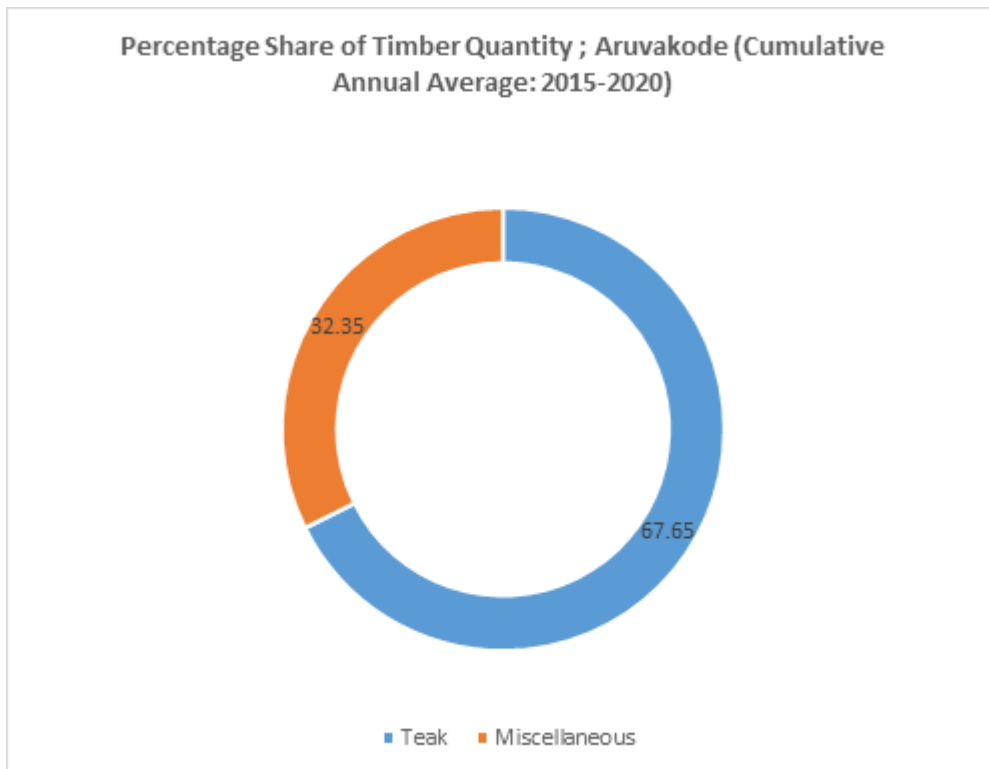


Figure 5.22 (b)

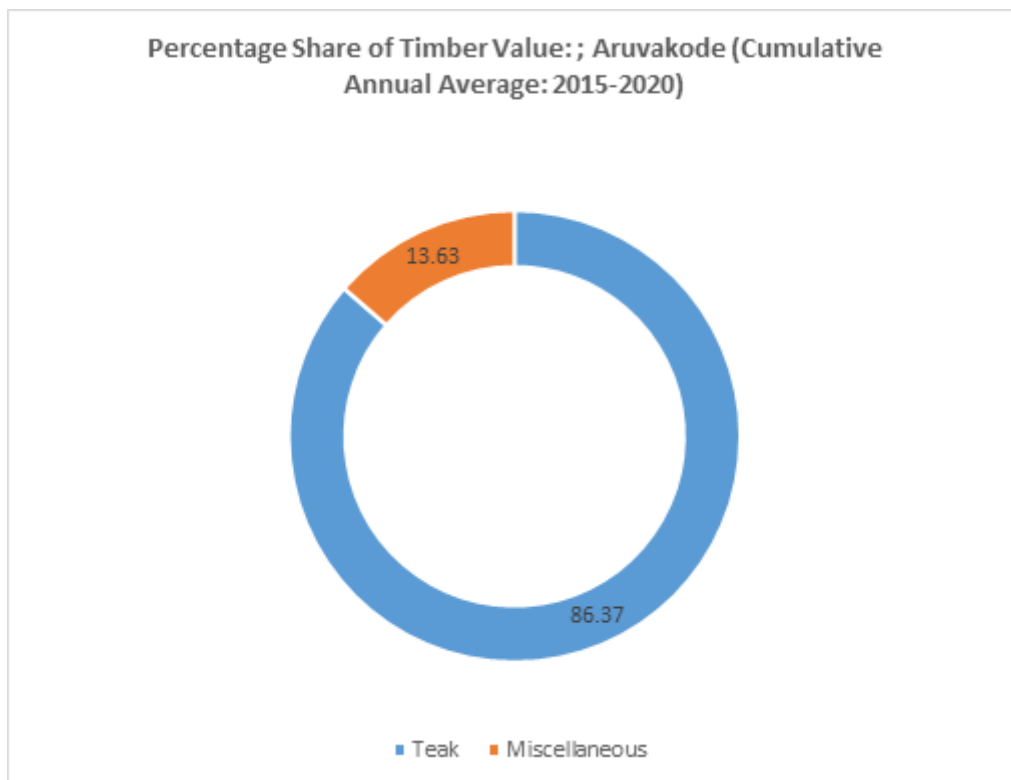


Figure 5.22 (c)

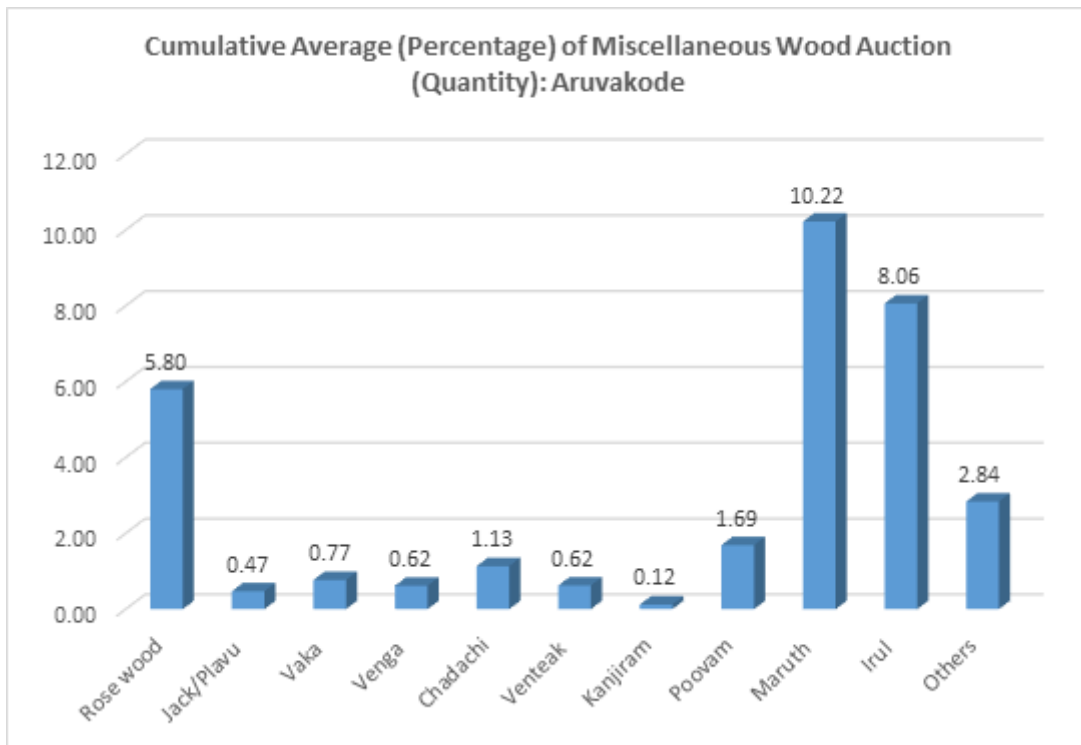


Figure 5.22 (d)

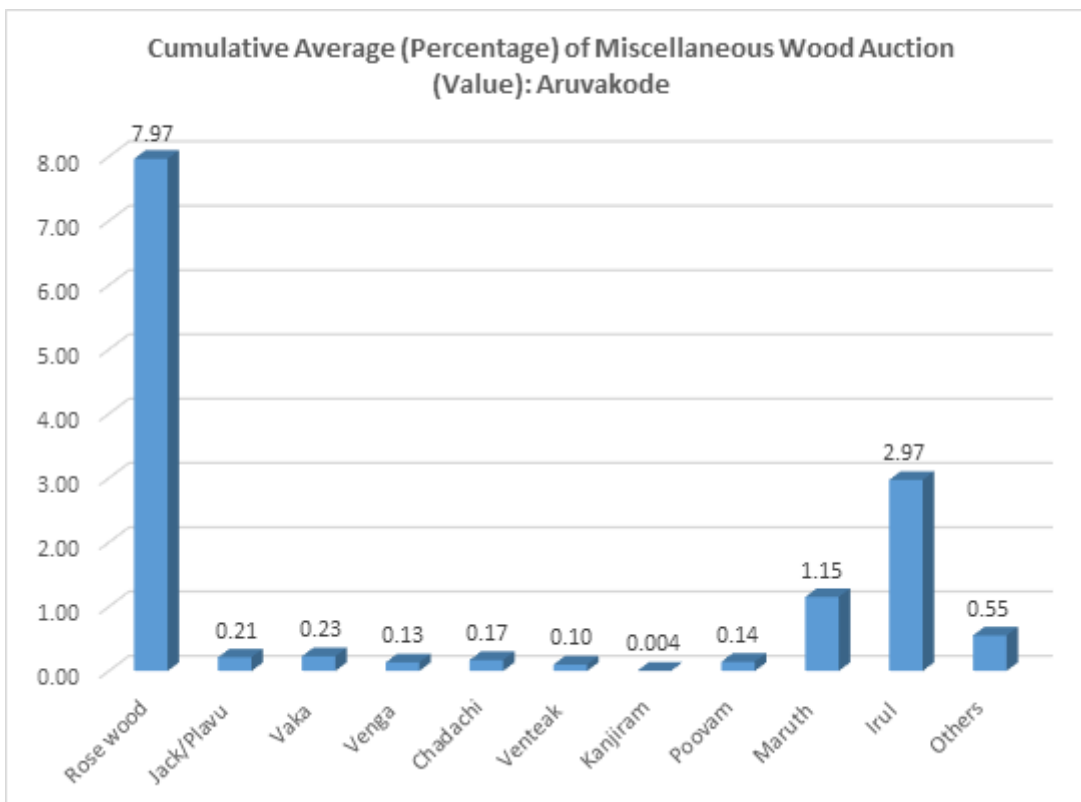


Figure 5.22 (e)

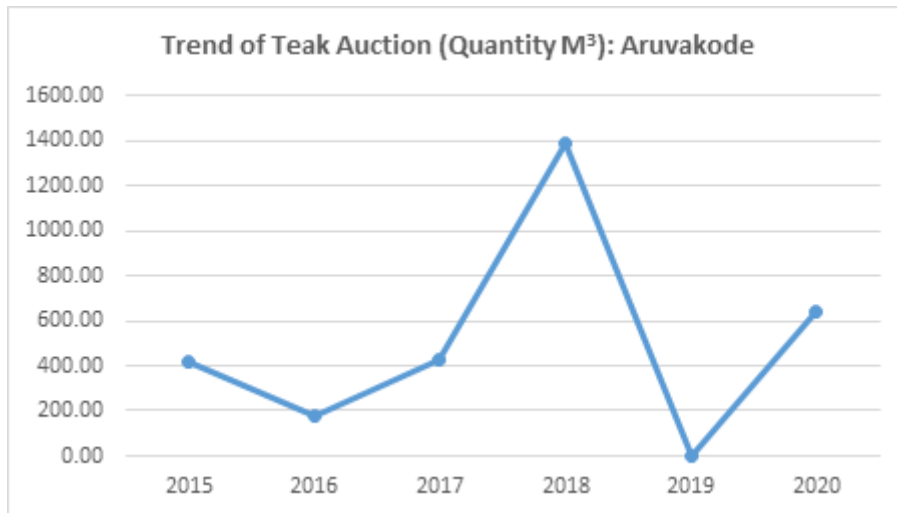


Figure 5.22 (f)

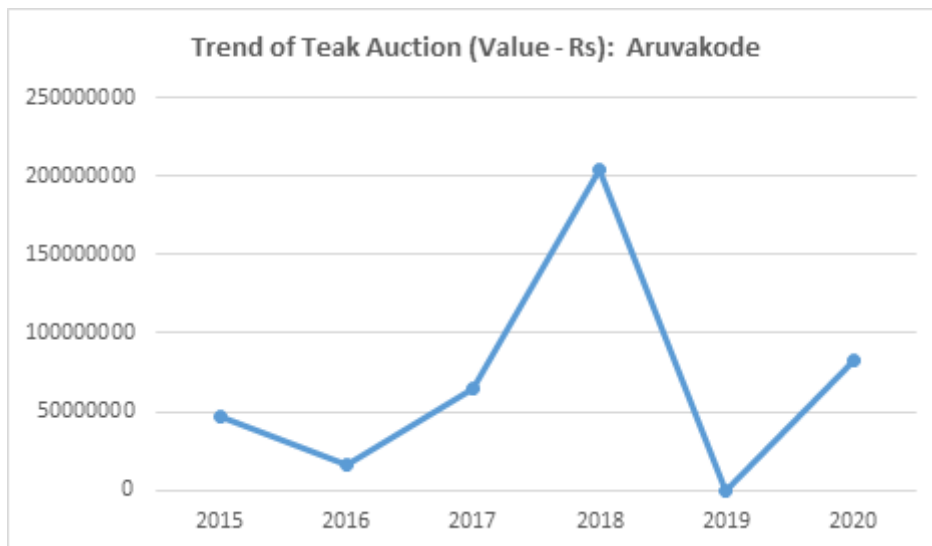


Figure 5.22 (g)

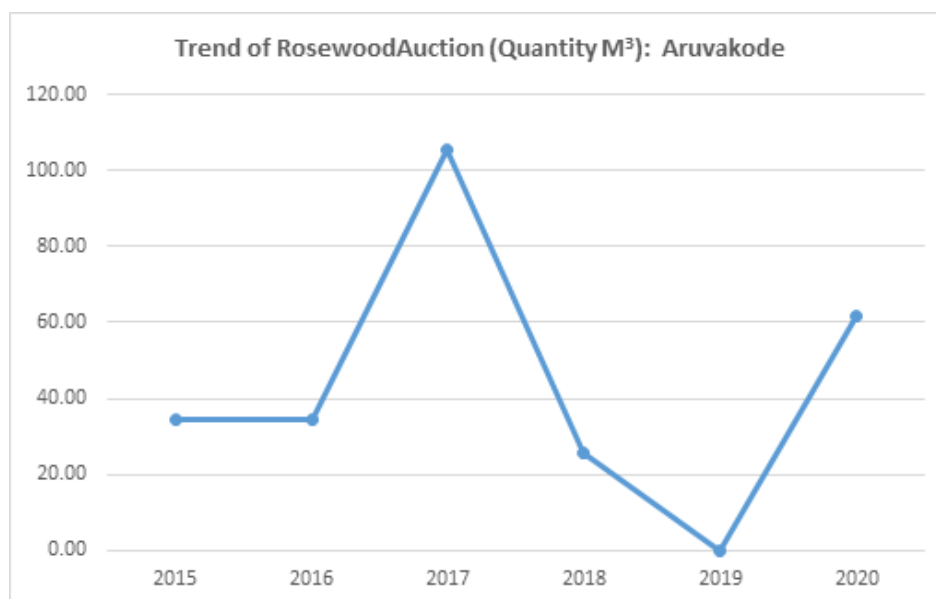


Figure 5.22 (g)

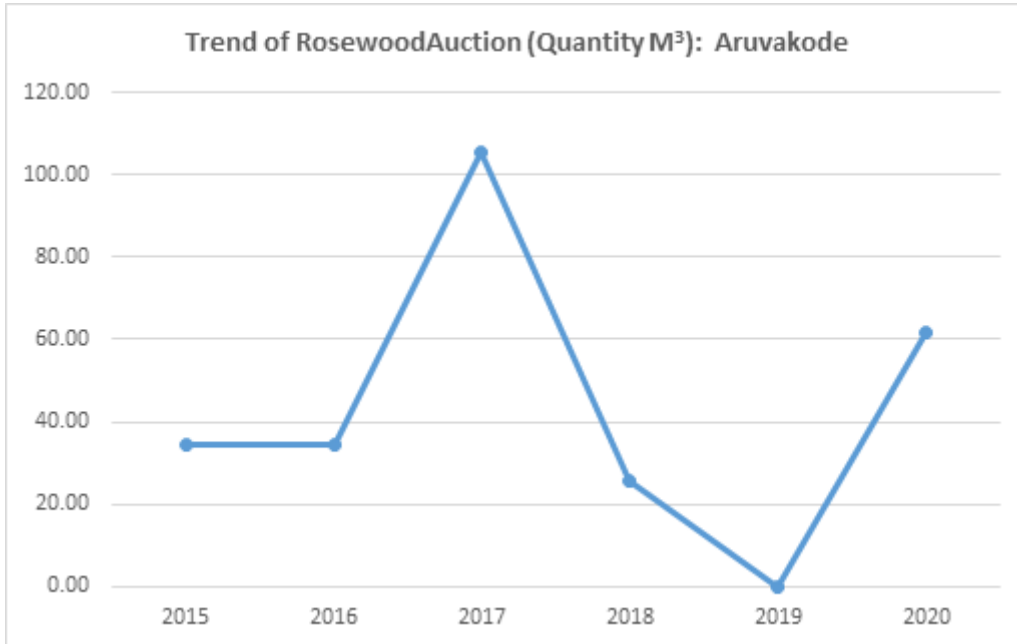


Figure 5.22 (h)

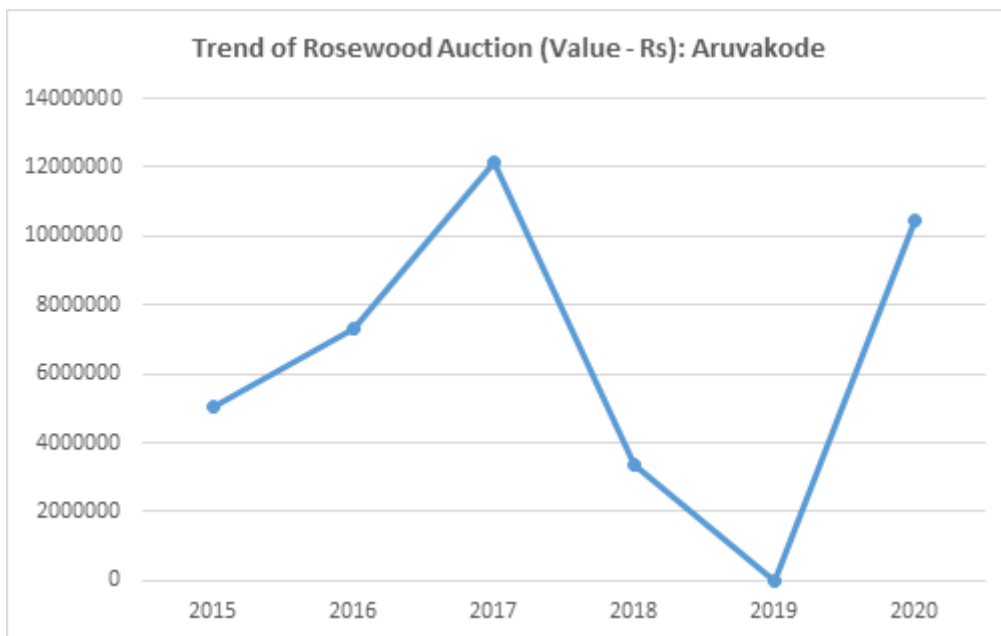


Figure 5.22 (i)

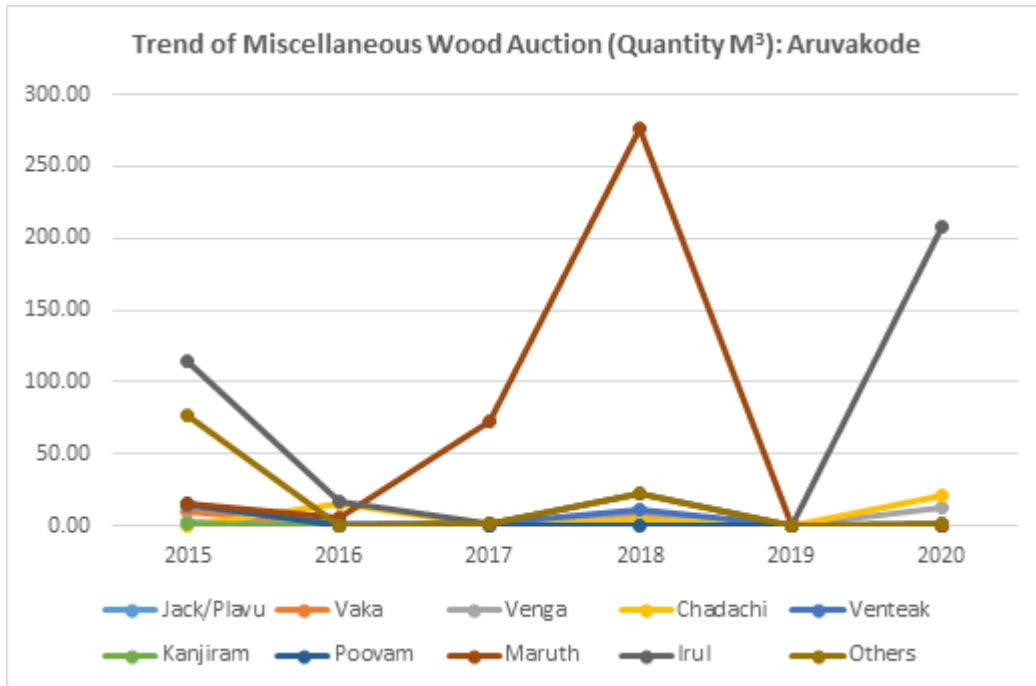
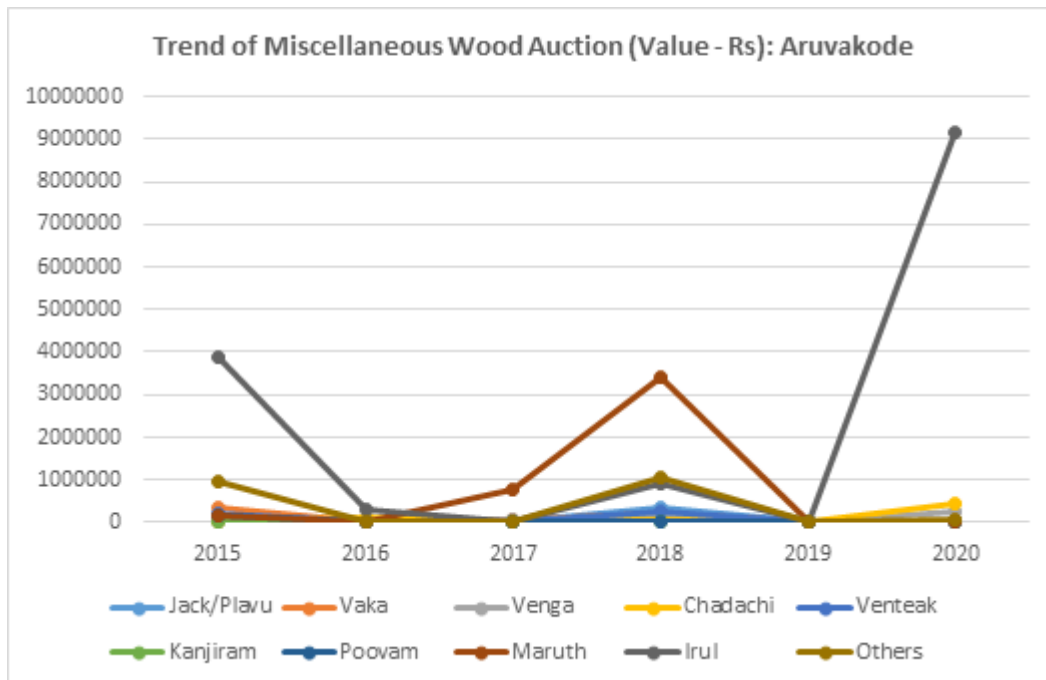


Figure 5.22 (j)



3. Walayar Timber Depot

The analysis of five years quantity and value data collected from Walayar Government timber depot at Palakkad indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 2718.9952 cubic meters (M3) that accounts 86.69% of the total timber in Walayar depot. The Walayar depot had fetched Rs.19,42,34,389/- in revenue (cumulative annual average) to the Government. It accounts 94.97% of the total revenue received from Walayar depot. The miscellaneous timbers account a quantity of 13.31% of the total timbers and it only contribute to 5.03% of total timber value (cumulative annual average). In miscellaneous timbers maruthu, vaka and venteak predominate other timbers in cumulative quantity (2.85%, 2.29% and 1.73% respectively) and cumulative value (0.64%, 1.08% and 0.44% respectively).

The Walayar timber depot conducted 258 auctions during the period 2016-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016-2020 are given in figures. The quantity and value of teak auctioned increased steadily from 2015-2017 reaching a maximum at 2017 (3997 M3 and Rs.31,39,63,456/-respectively), then recorded a decrease in 2018 (1461 M3 and Rs.10,61,74,512/- respectively) when compared to 2017 and then increased in 2019 (2253 M3 and Rs.11,74,55,337/- respectively). However the quantity (1972 M3) decreased and the value (Rs.15,76,49,121) increased again in 2020.

The quantity and value of poovam auctioned in Walayar depot decreased from 2016-2019 (143.954 M3 and Rs.26,70,78,7/- respectively in 2016; 7.345 M3 and Rs.47751/- respectively in 2017; 1.069 M3 and Rs.7387/- respectively in 2018; 0.901 M3 and Rs.2726/- respectively in 2019), then recorded an increase in 2020 (4.474 M3 and Rs.36049/- respectively).

The trend of quantity and value of miscellaneous timbers showed that there is a gradual decrease in the quantity and value of vaka(190.291 M3 and Rs.55,33,81,6/- respectively in 2016; 56.012 M3 and Rs.13,54,90,3/- respectively in 2017; 58.802 M3 and Rs.19,67,37,1/- respectively in 2018; 44.269 M3 and Rs.19,42,52,0/- respectively in 2019; 9.177 M3 and Rs.29,12,94/- respectively in 2020), maruthu (163.722 M3 and Rs.24,46,59,5/- respectively in 2016; 155.421 M3 and Rs.22,78,32,7/- respectively in 2017; 64.957 M3 and Rs.99,16,76/- respectively in 2018; 46.579 M3 and Rs.60,38,58/- respectively in 2019; 15.635 M3 and Rs.21,61,32/- respectively in 2020) and venteak (143.954 M3 and Rs.26,70,78,7/- respectively in 2016; 51.643 M3 and Rs.56,50,52/- respectively in 2017; 24.281 M3 and Rs.28,33,07/- respectively in 2018; 17.289 M3 and Rs.29,03,61/- respectively in 2019; 33.452 M3 and Rs.69,40,58/- respectively in 2020) during 2016 to 2020. The quantity and value of mahagony increased significantly in 2020 when compared to preceding years.

Details are given in Tables 5.25 (a)&(b) and figures 5.23 (a)-(l).



Table 5.25 (a) Quantity and Value of Timber Auctioned from Walayar (258

Species Name	2015 (...)		2016 (82)		2017 (62)		2018 (30)		2019 (45)		2020 (39)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			3909.546	275929521	3997.269	313963456	1461.865	106174512	2253.761	117455337	1972.535	157649121
Anjili					29.536	1508798					21.827	897165
Venga			25.895	823014	23.914	840177	28.612	911841	14.05	342428	31.205	1129237
Venteak			143.954	2670787	51.643	565052	24.281	283307	17.289	290361	33.452	694058
Maruthuu			163.722	2446595	155.421	2278327	64.957	991676	46.579	603858	15.635	216132
Irul			6.802	124427	24.11	680590	71.893	2444194	25.853	685371	7.599	263746
Unnam/Chadachi			108.319	2912869	60.467	1084932	12.754	267439	39.073	891129	44.177	1195545
Poovam			143.954	2670787	7.345	47751	1.069	7387	0.901	2726	4.474	36049
Vaka			190.291	5533816	56.012	1354903	58.802	1967371	44.269	1942520	9.177	291294
Mahagony			0.332	1438	7.659	176371	0	0	0.474	4799	113.932	3574128
Thanni			0.473	3027	0	0	0	0	0	0	0	0
TOTAL IW			4693.288	293116281	4413.376	322500357	1724.233	113047727	2442.249	122218529	2254.013	165946475
Others			2.948	107706	11.807	134027					12.895	496486
Grand Total			4696.236	293223987	4425.183	322634384	1724.233	113047727	2442.249	122218529	2266.908	166442961



**Table 5.25 (b) Quantity and Value of Timber
Auctioned from Walayar (258)**

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	2718.9952	86.68729	194234389.4	94.969
Anjili	25.6815	0.81878	1202981.5	0.588186
Venga	24.7352	0.78861	809339.4	0.395719
Venteak	54.1238	1.725581	900713	0.440395
Maruthuu	89.2628	2.845886	1307317.6	0.6392
Irul	27.2514	0.868832	839665.6	0.410546
Unnam/Chadachi	52.958	1.688413	1270382.8	0.621141
Poovam	31.5486	1.005836	552940	0.270355
Vaka	71.7102	2.286272	2217980.8	1.08446
Mahagony	30.59925	0.975569	939184	0.459205
Thanni	0.473	0.01508	3027	0.00148
TOTAL IW	3127.33895	99.70615	204277921.1	99.87969
Others	9.216666667	0.293847	246073	0.120315
Grand Total	3136.555617	100	204523994.1	100



Figure 5.23 (a)

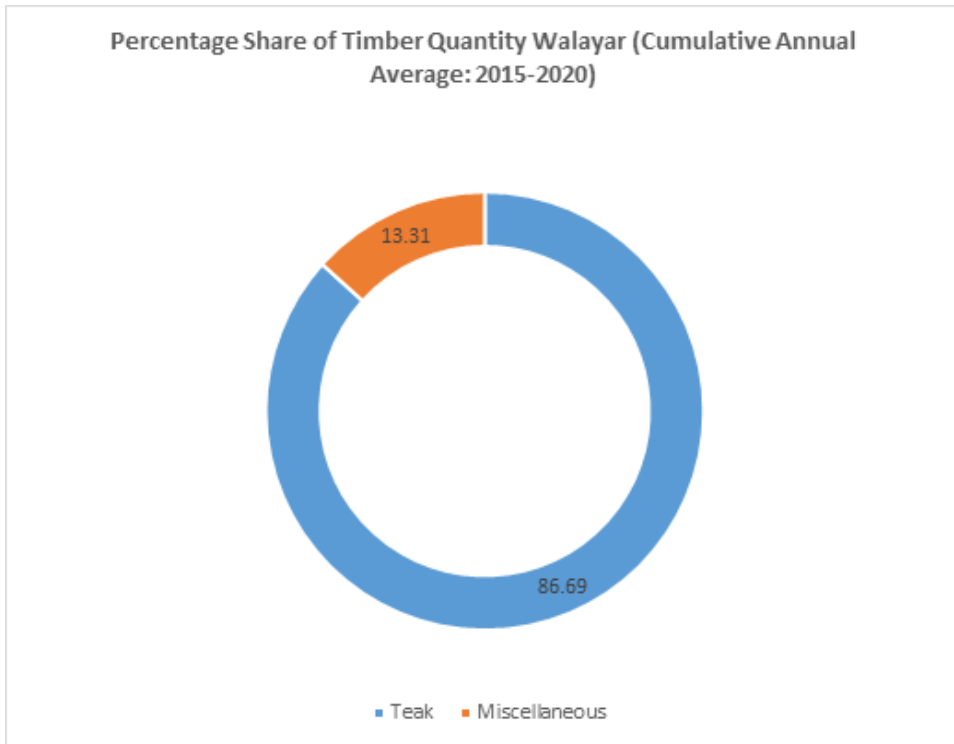


Figure 5.23 (b)

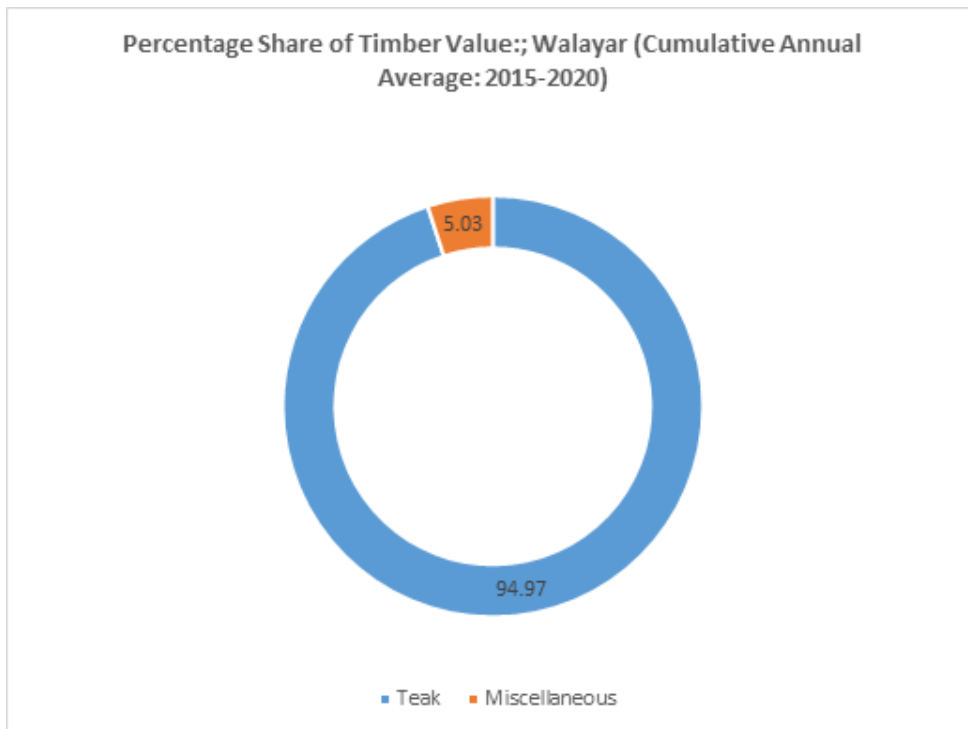


Figure 5.23 (c)

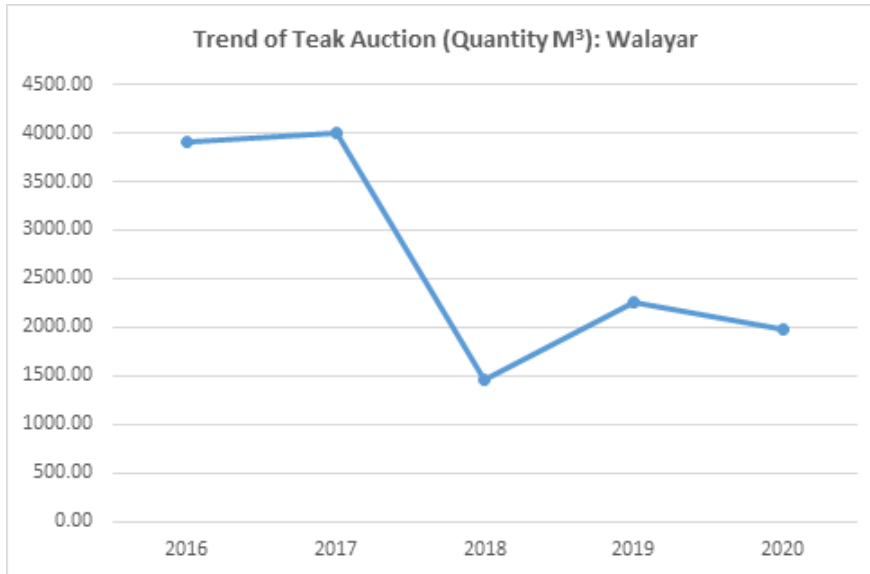


Figure 5.23 (d)

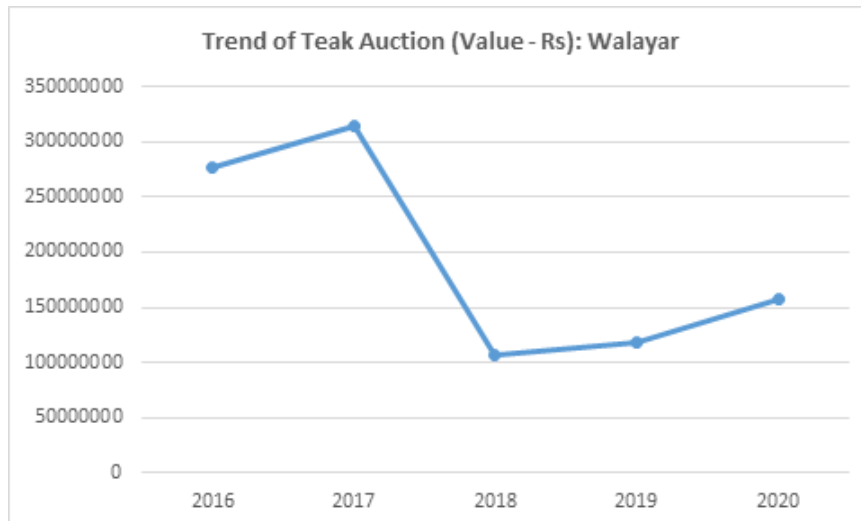


Figure 5.23 (e)

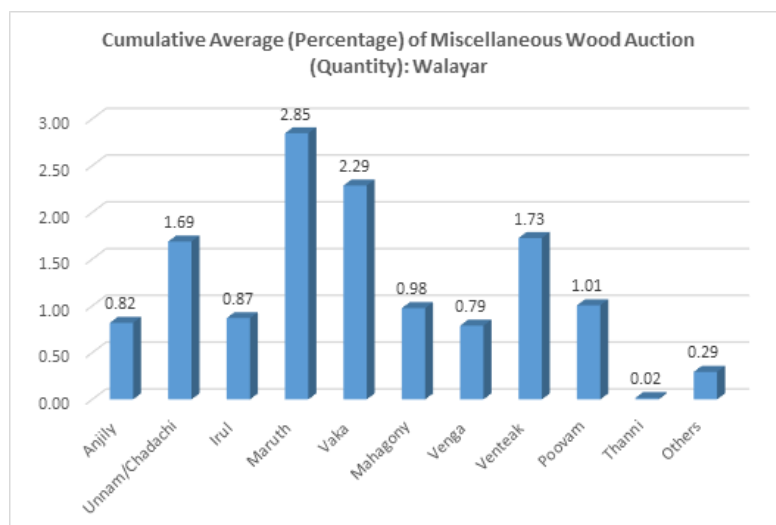


Figure 5.23 (f)

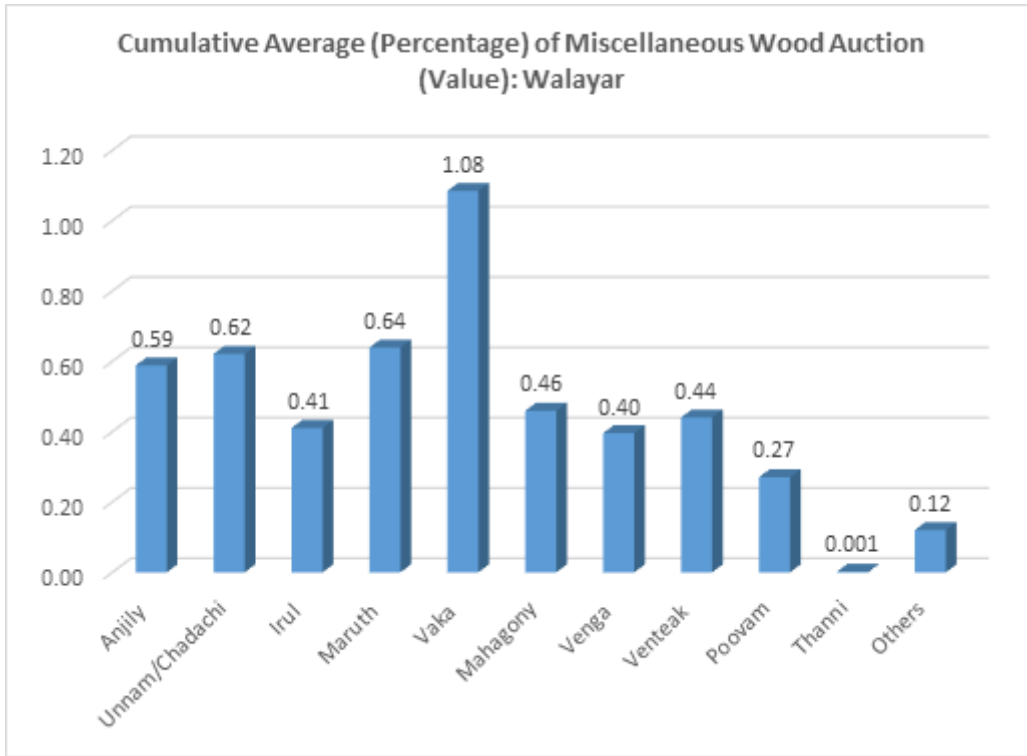


Figure 5.23 (g)

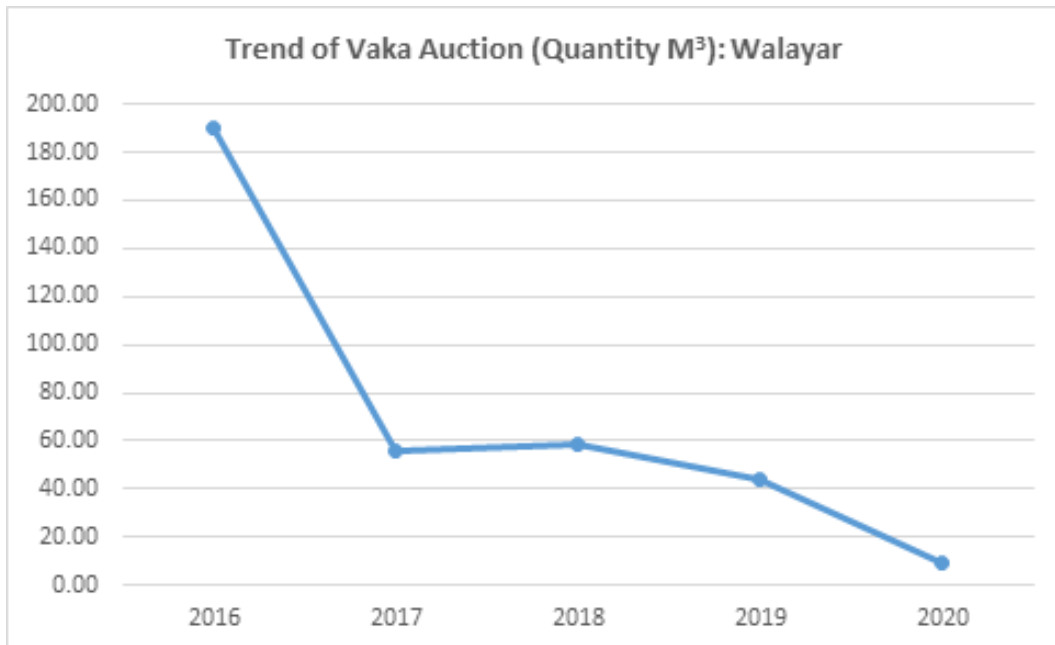


Figure 5.23 (h)

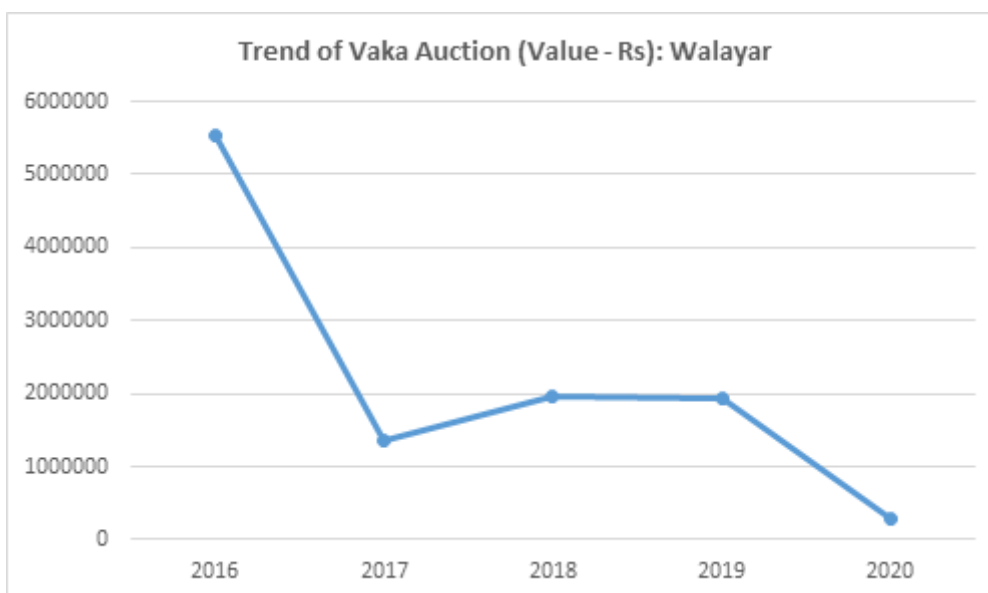


Figure 5.23 (i)

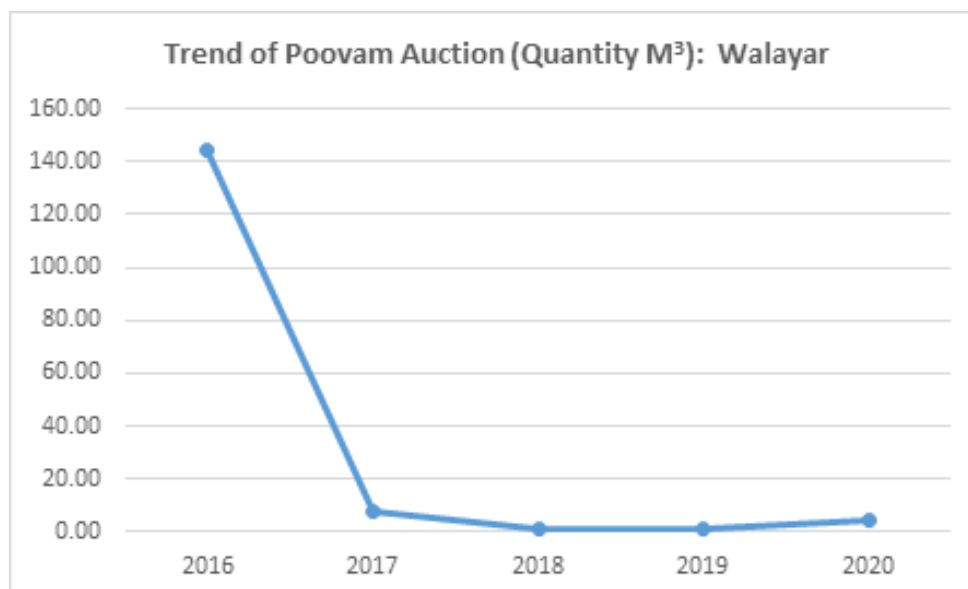


Figure 5.23 (j)

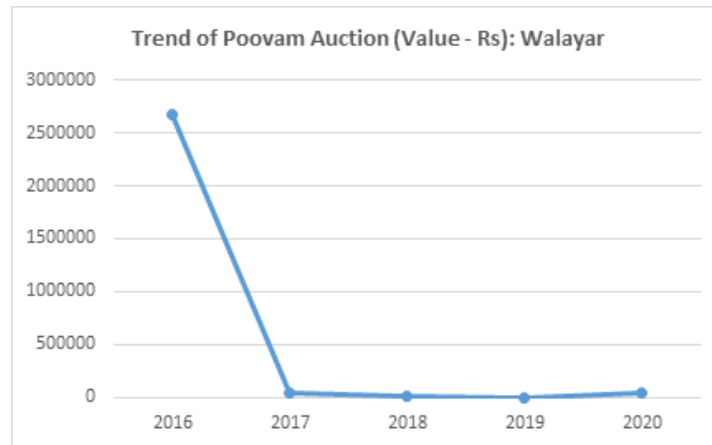


Figure 5.23 (k)

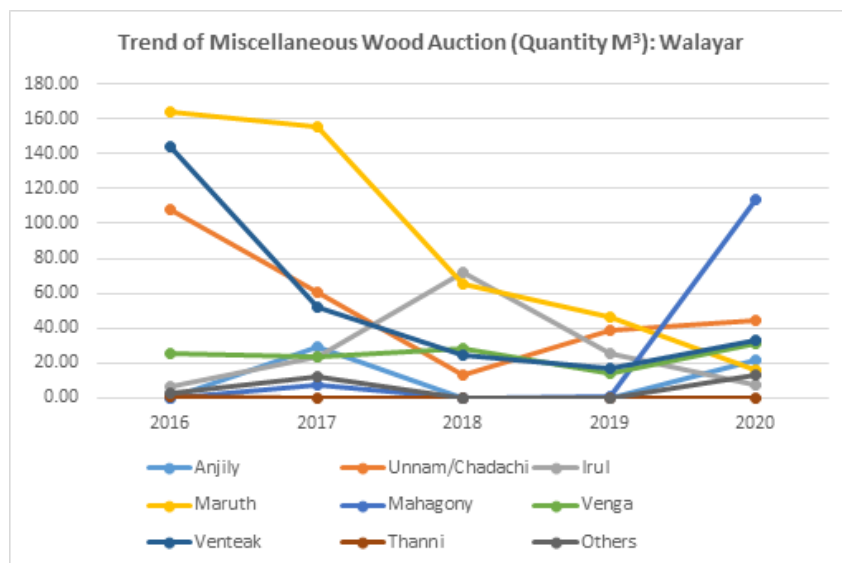


Figure 5.23 (l)

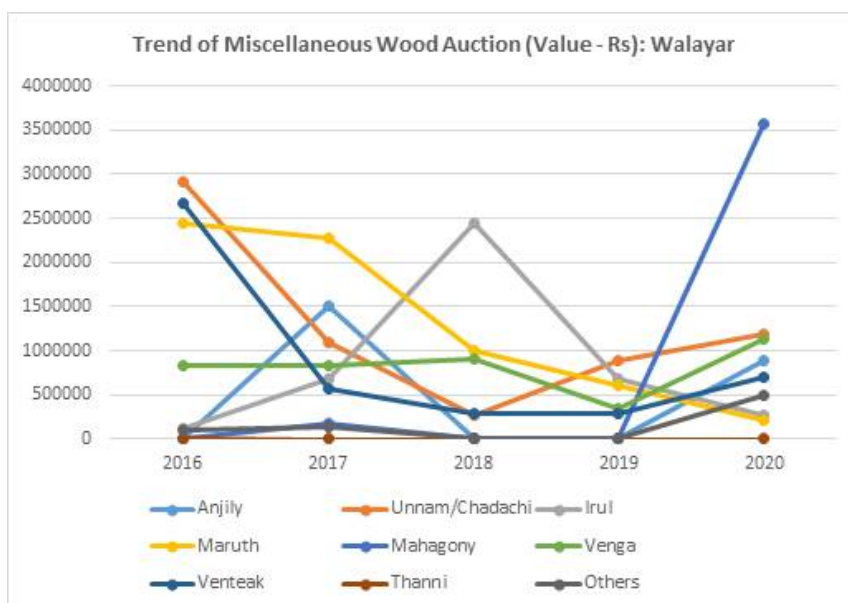


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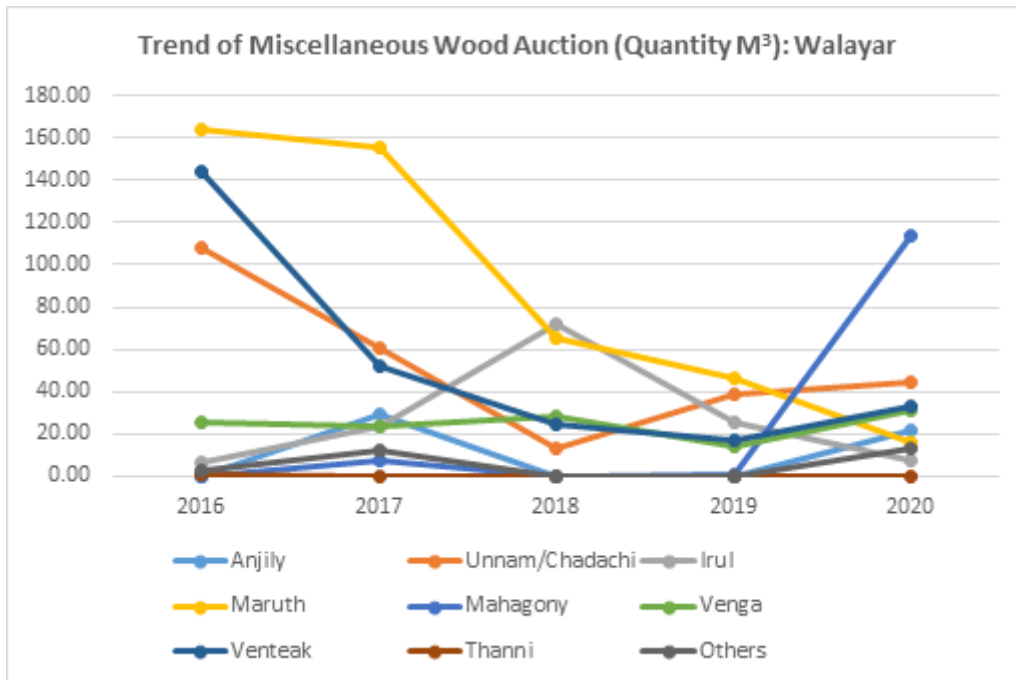
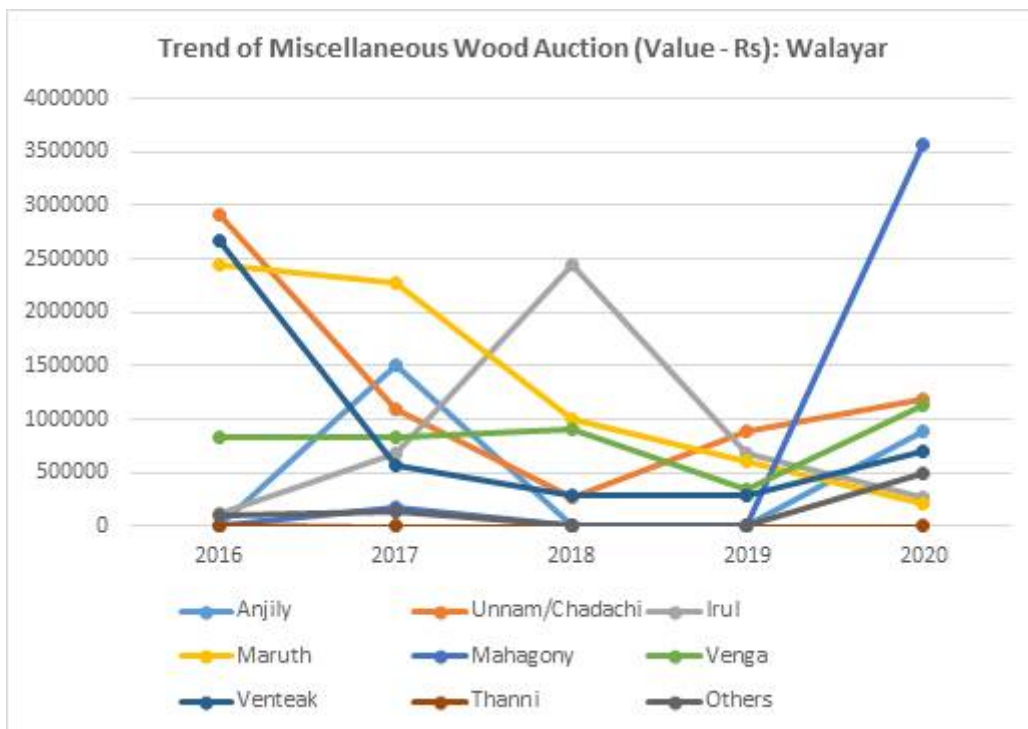


Figure 5.23 (l)



Kozhikode timber sales division

v

There are five Government timber depots under Kozhikode timber sales division.

1. Chaliyam Timber Depot

The analysis of six years quantity and value data collected from Chaliyam timber depot indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 444.323 cubic meters (M3) that accounts 63.84% of the total timber in Chaliyam depot. The Chaliyam depot had fetched Rs.4,40,34,403.67/- in revenue (cumulative annual average) to the Government. It accounts 78.07% of the total revenue received at this depot.

The miscellaneous timbers account a quantity of 36.16% of the total timbers and it contribute to 21.93% of total timber value (cumulative annual average). In miscellaneous timbers rosewood, maruthu and unnam/chadachi predominates other timbers in cumulative quantity (10.91%, 6.66% and 9.26% respectively). However, the percentage share in cumulative value of rosewood (17.77%) dominates over other miscellaneous timbers. Even though the unnam/chadachi auctioned comes in a considerable quantity (nearly that of rosewood) it only contributes a percentage share of 1.42% in cumulative value. The Chaliyam timber depot conducted 95 auctions during the period 2015-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity of teak auctioned decreased from 2015-2016 then increased considerably reaching a maximum at 2019 (597.784 M3), then recorded a decrease in 2020 (373.88 M3). The cumulative value decreased from 2015-2016 then increased considerably reaching a maximum at 2018 (Rs.8,92,23,102/-), then recorded a decrease in 2019 and again in 2020. The trend of quantity and value of rosewood steadily increased from 2017 to 2020 reaching a maximum at 2020 (182.225 M3). The quantity of rosewood auctioned was very less in 2015 (6.737 M3) when compared to 2020. The value of rosewood increased considerably over years reaching a maximum at 2019 (Rs.3,10,31,608/-), then showed a decrease in 2020.

The trend of quantity and value of miscellaneous timbers showed that there is a decrease in the quantity and value of timbers except maruthu. Maruthu showed a peak in both quantity and value in 2019 when compared to other years.

Details are given in Tables 5.26 (a)&(b) and figures 5.24 (a)-(j).



Table 5.26 (a)
Quantity and Value of Timber Auctioned from Chaliyam (95)

Species Name	2015 (10)		2016 (16)		2017 (17)		2018 (17)		2019 (18)		2020 (17)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak	477.299	38405888	157.201	13603128	496.497	45438624	563.281	89223102	597.784	52997140	373.88	24538540
Rosewood	6.737	352079	16.119	1296643	7.963	421545	88.224	914180	154.368	31031608	182.225	26126738
Vaka	18.787	332601			0.286	4576	0.187	1964				
Maruthu	57.478	888522	0	0	18.337	353312	44.586	663248	96.815	804540	14.552	51651
Venteak	42.738	552792			0.841	13456	1.838	28698	0.775	2403	1.387	4299
Veng	56.09	779362	0	0	4.782	130053	5.197	123639	1.992	11574	0	0
Chadachi	64.439	799245										
Anjily	11.779	344631										
Karimthakara	8.295	18550										
Mahagoy					0.439	15365	2.043	96631			1.556	8240
IW Total	743.642	42473670	173.32	14899771	529.145	46376931	705.356	91051462	851.734	84847265	573.6	50729468
Others Total	29.347	281891	2	820	0.472	6655						
Grand Total	772.989	42755561	175.32	14900591	529.617	46383586	705.356	91051462	851.734	84847265	573.6	50729468

Table 5.26 (b)
Quantity and Value of Timber Auctioned from Chaliyam (95)
(Cumulative Annual Average: 2015-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	444.3236667	63.84	44034403.67	78.07
Rosewood	75.93933333	10.91	10023798.83	17.77
Vaka	6.42	0.92	113047	0.20
Maruthu	46.3536	6.66	552254.6	0.98
Venteak	9.5158	1.37	120329.6	0.21
Venga	17.01525	2.44	261157	0.46
Chadachi	64.439	9.26	799245	1.42
Anjily	11.779	1.69	344631	0.61
Karimthakara	8.295	1.19	18550	0.03
Mahagoy	1.346	0.19	40078.66667	0.07
IW Total	685.42665	98.48	56307495.37	99.83
Others Total	10.60633333	1.52	96455.33333	0.17
Grand Total	696.0329833	100.00	56403950.7	100.00



Figure 5.24 (a)

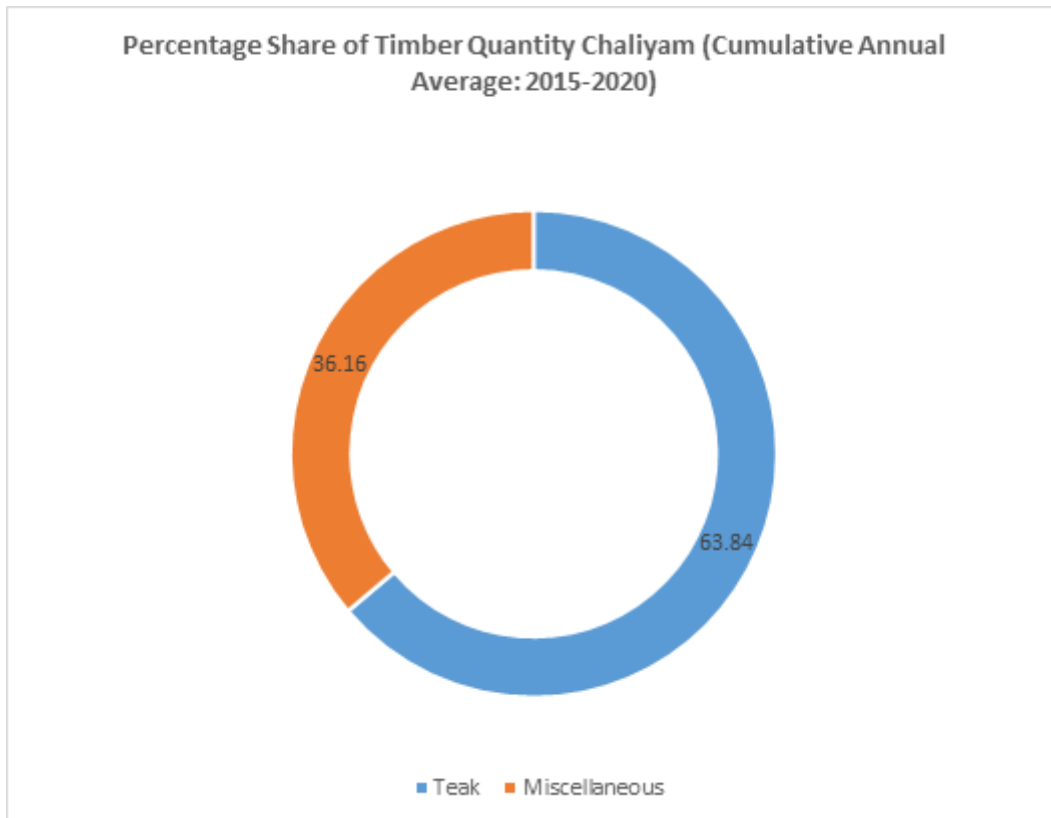


Figure 5.24 (b)

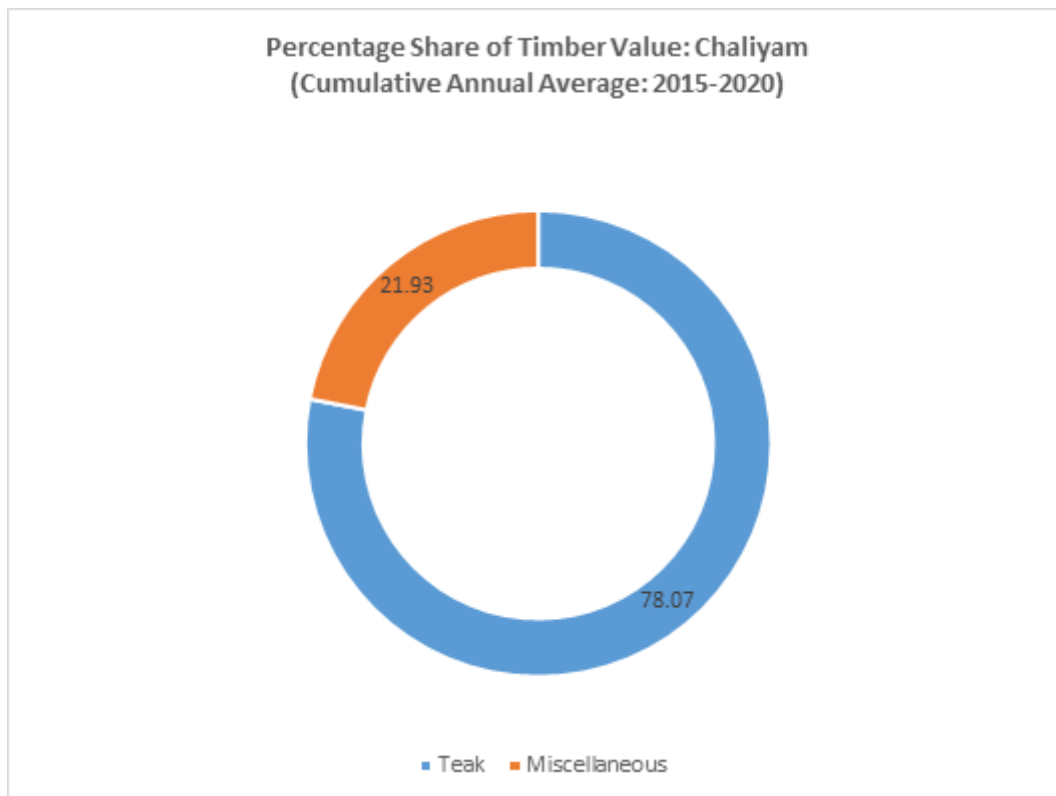


Figure 5.24 (c)

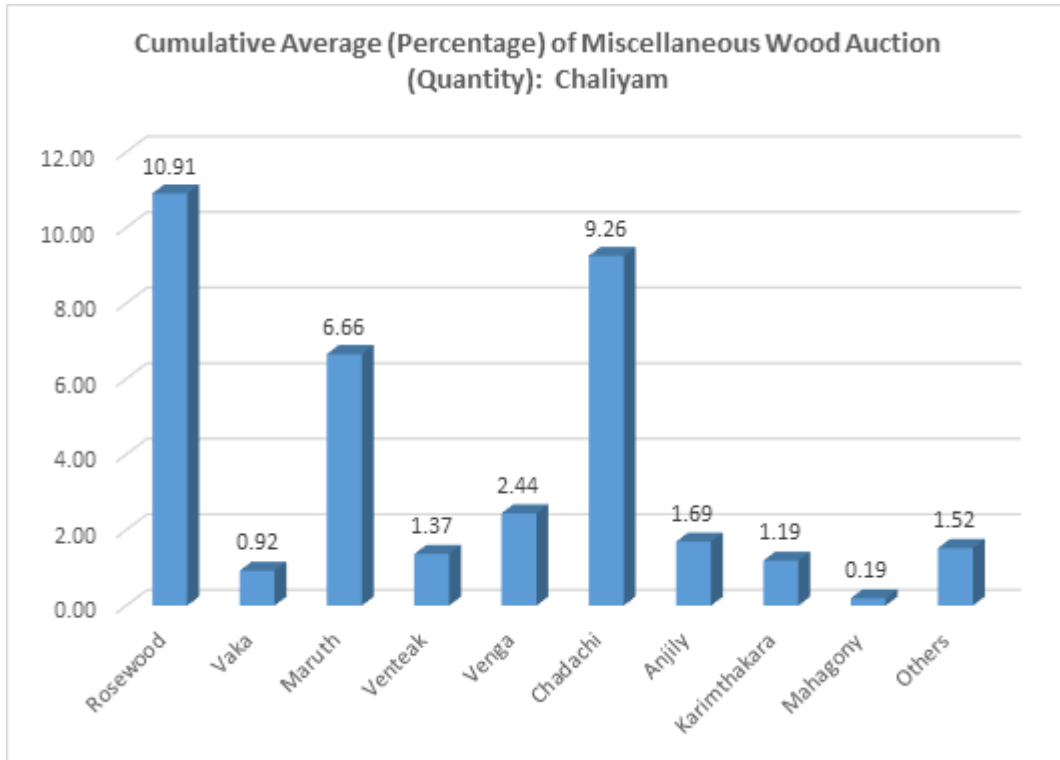


Figure 5.24 (c)

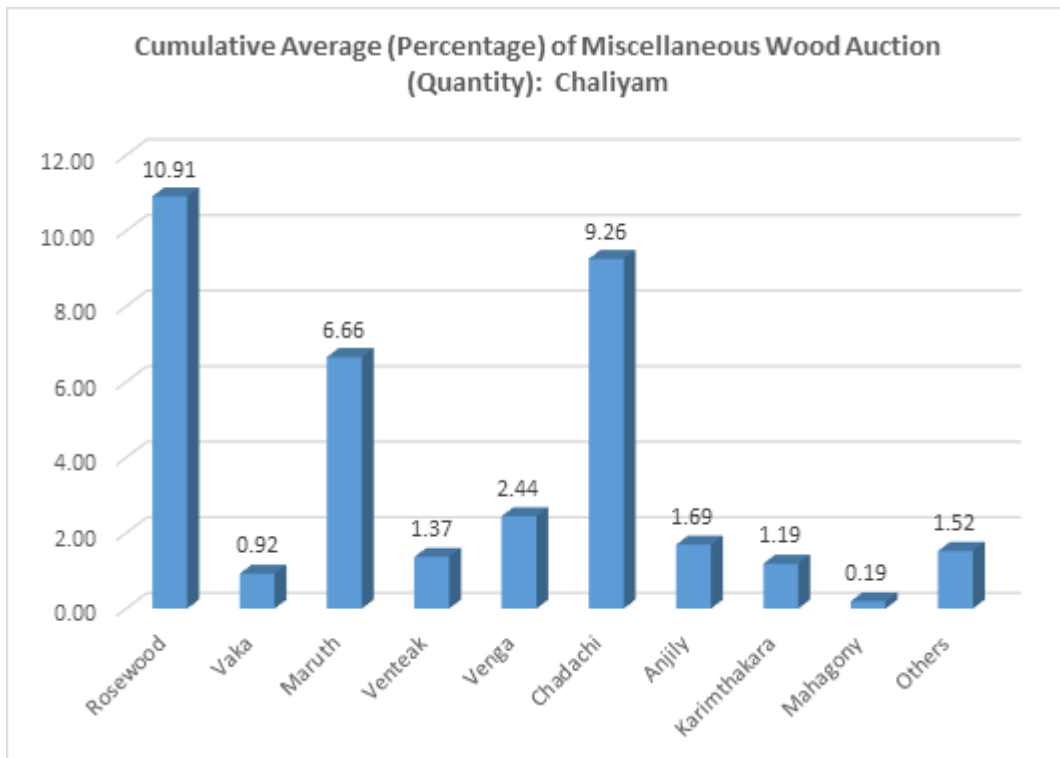


Figure 5.24 (d)

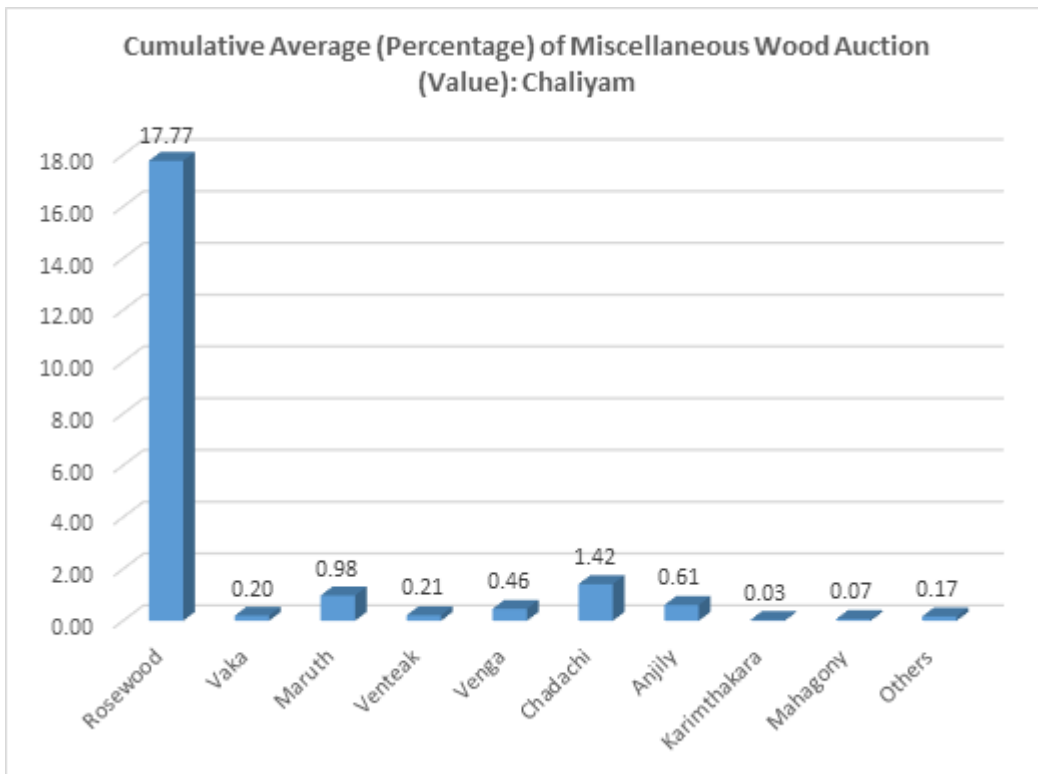


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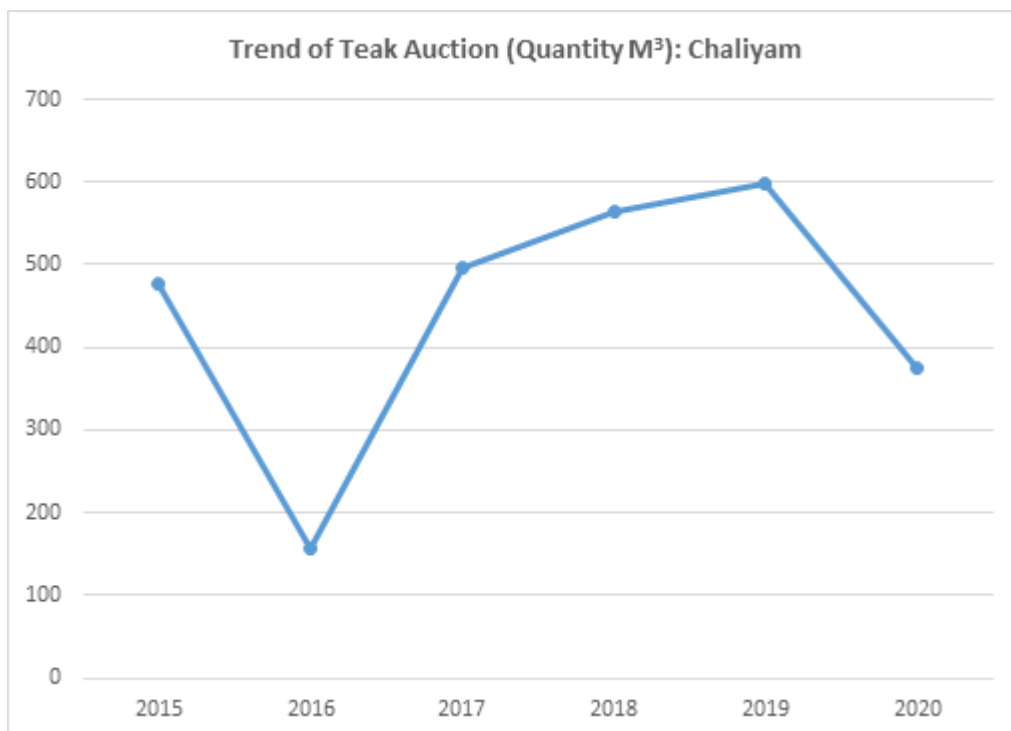


Figure 5.24 (f)

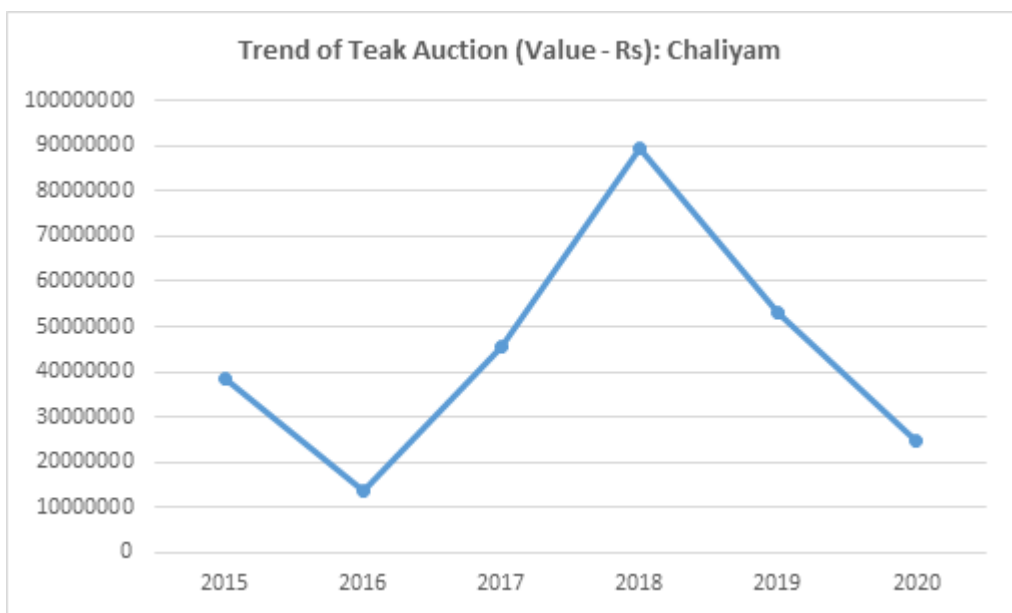


Figure 5.24 (g)

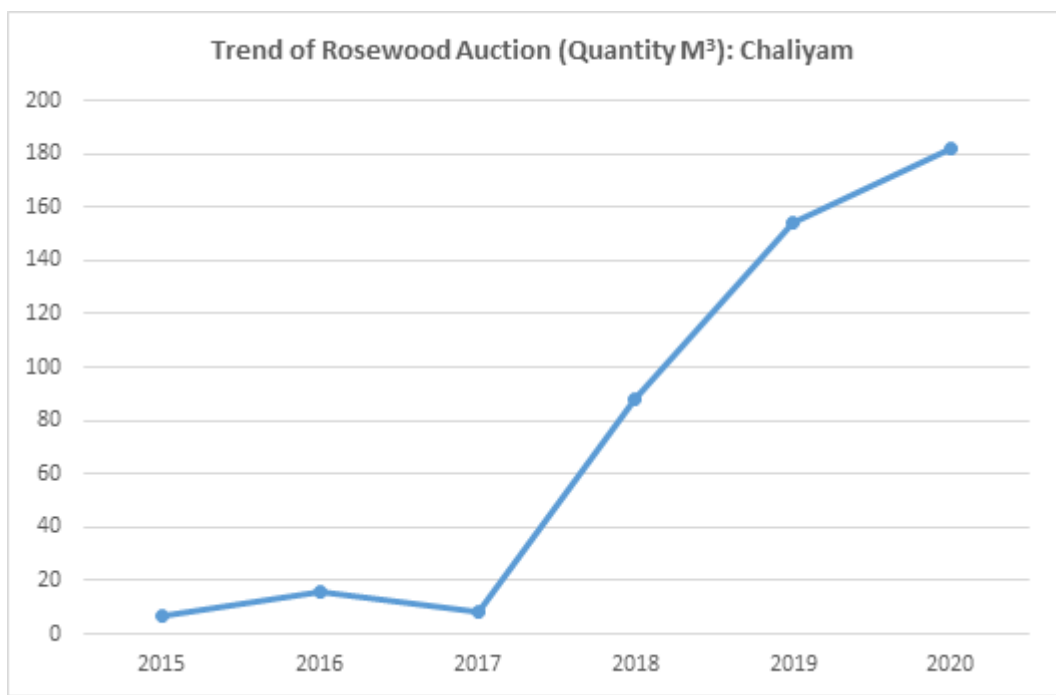


Figure 5.24 (h)

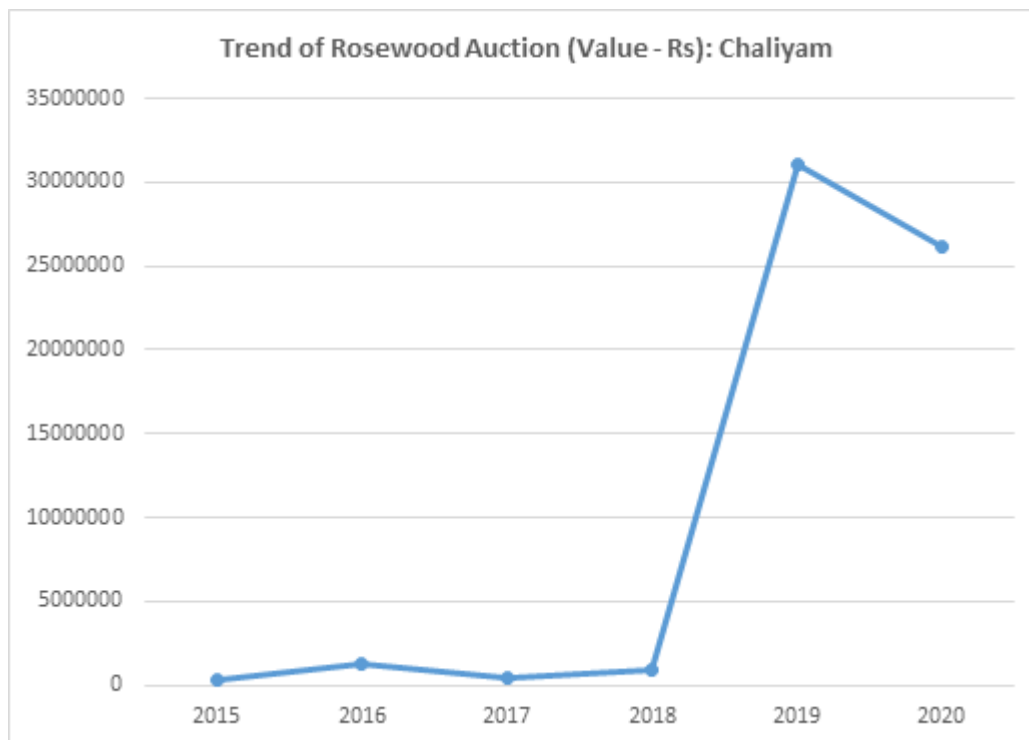


Figure 5.24 (h)

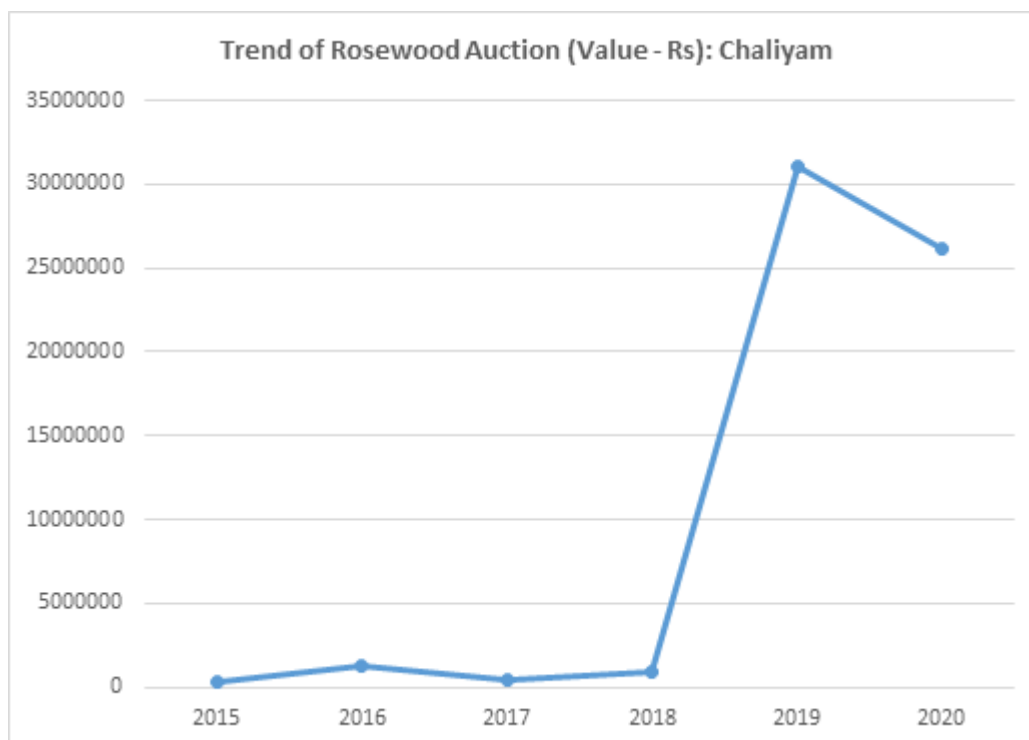


Figure 5.24 (i)

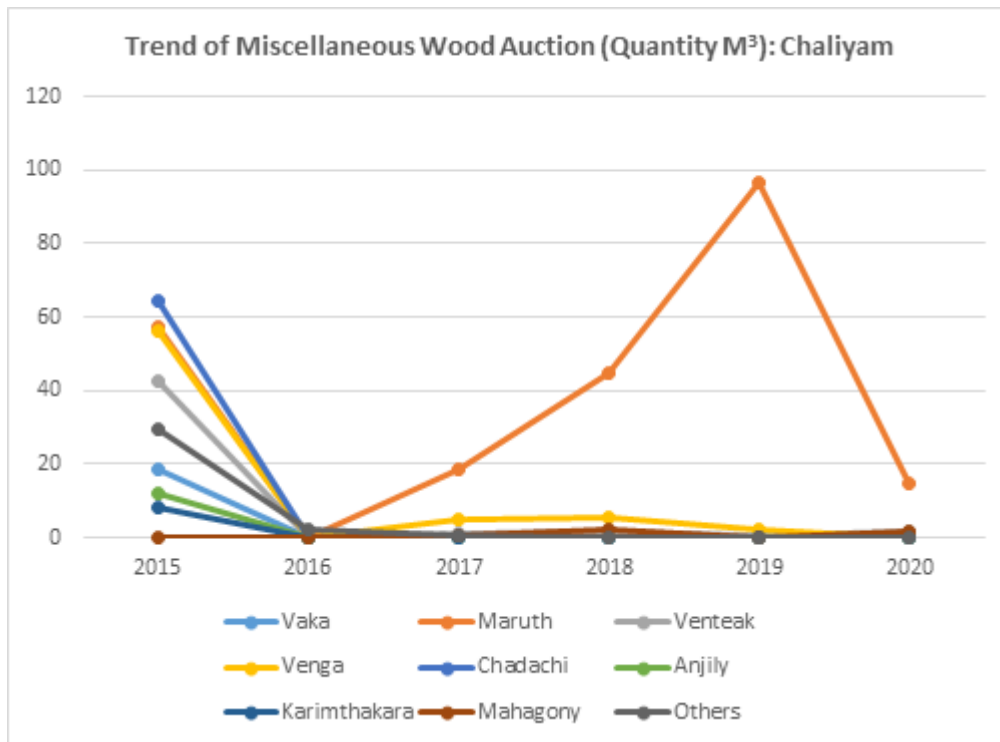
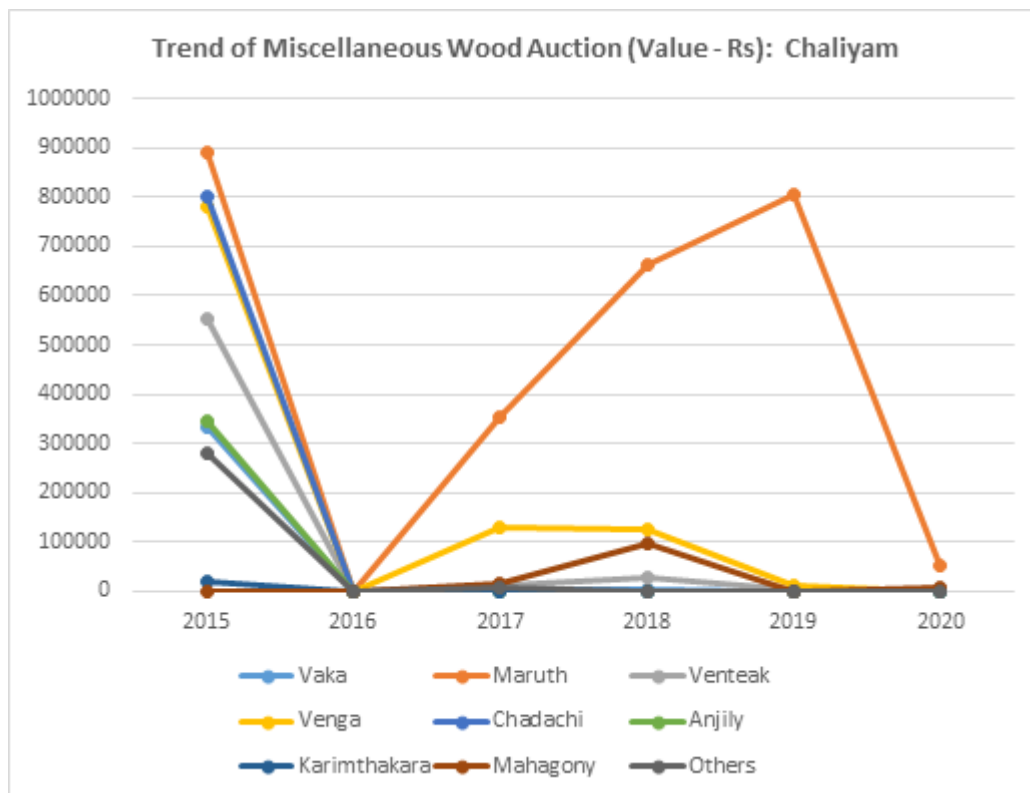


Figure 5.24 (j)



2. Kuppady Timber Depot

The analysis of five years quantity and value data collected from the Kuppady Government timber depot (established in 1923) near Sulthan Bathery at Wayanad indicates that the main timber species auctioned is teak and rose wood. Teak accounts with a cumulative annual average quantity of 351.963 cubic meters (M3) that shares 70.47% of the total timber in Kuppady depot. The Kuppady depot had fetched Rs.1,53,80,194/- in revenue (cumulative annual average) to the Government. It accounts 47.24% of the total revenue received at Kuppady depot. Rosewood accounts with a cumulative average quantity of 109.238 cubic meters (M3) that shares 21.87% of the total timber in Kuppady depot. The Kuppady depot had fetched nearly Rs.1,52,09,032.4/- in revenue (cumulative annual average) to the Government. It accounts 46.72% of the total revenue received at Kuppady depot. The miscellaneous timbers (other than rosewood) account a quantity of 7.66% of the total timbers and it only contribute to 6.04% of total timber value (cumulative annual average).



The Kuppady timber depot conducted 80 auctions during the period 2016-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2016-2020 are given in figures. The quantity and value of teak auctioned increased significantly from 2016 to 2020 reaching a maximum at 2020 (868.392 M3 and Rs.3,18,89,259/- respectively). In 2016, the quantity and value of teak auctioned was very less (19.762 M3 and Rs.8,34,746/-) when compared to 2020. The quantity and value of rosewood auctioned increased significantly from 2016 to 2019 reaching a maximum at 2019. The trend of quantity and value of miscellaneous timbers other than rosewood decreased significantly from 2016 to 2020.

Details are given in Tables 5.27 (a)&(b) and figures 5.25 (a)-(d).

Table 5.27 (a)
Quantity and Value of Timber Auctioned from Kuppady) (80)

Species Name	2015 (...)		2016 (12)		2017 (12)		2018 (14)		2019 (18)		2020 (24)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			19.762	834746	187.36	12102434	262.485	14970789	421.816	17103744	868.392	31889259
Rose wood			13.172	474002	43.848	6171149	134.909	23853197	169.04	27715648	185.225	17831166
TOTAL IW			32.934	1308748	231.208	18273583	397.394	38823986	590.856	44819392	1053.617	49720425
Others			119.009	9723956	28.682	26338	22.346	42560	1.364	10523	20.018	26583
Grand Total			151.943	11032704	259.89	18299921	419.74	38866546	592.22	44829915	1073.635	49747008

Table 5.27 (b)
Quantity and Value of Timber Auctioned from Kuppady) (80)
(Cumulative Annual Average: 2016-2020)

Species Name	2015 (...)		2016 (12)		2017 (12)		2018 (14)		2019 (18)		2020 (24)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			19.762	834746	187.36	12102434	262.485	14970789	421.816	17103744	868.392	31889259
Rose wood			13.172	474002	43.848	6171149	134.909	23853197	169.04	27715648	185.225	17831166
TOTAL IW			32.934	1308748	231.208	18273583	397.394	38823986	590.856	44819392	1053.617	49720425
Others			119.009	9723956	28.682	26338	22.346	42560	1.364	10523	20.018	26583
Grand Total			151.943	11032704	259.89	18299921	419.74	38866546	592.22	44829915	1073.635	49747008



Figure 5.25 (a)

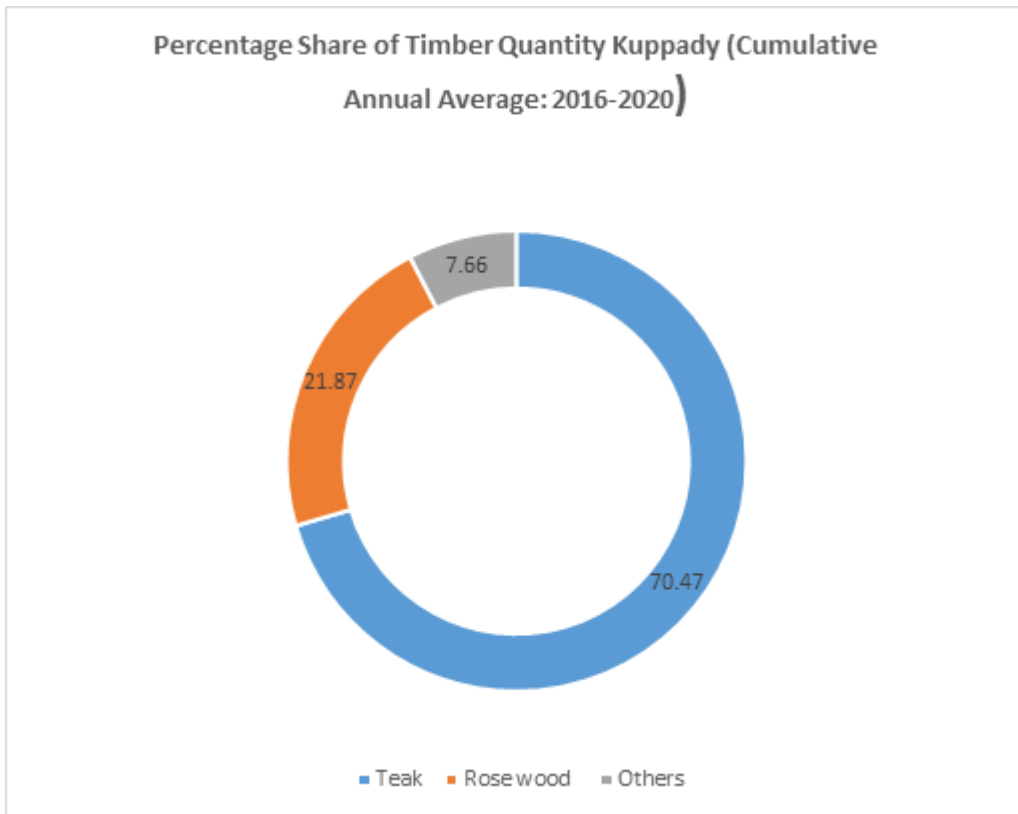


Figure 5.25 (b)

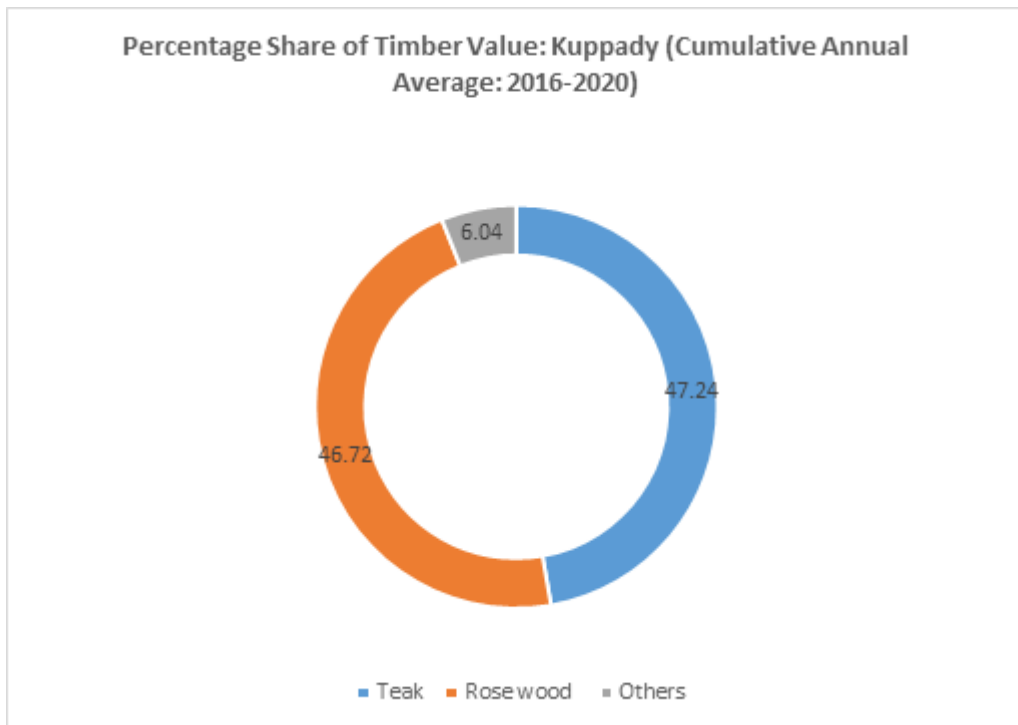


Figure 5.25 (c)

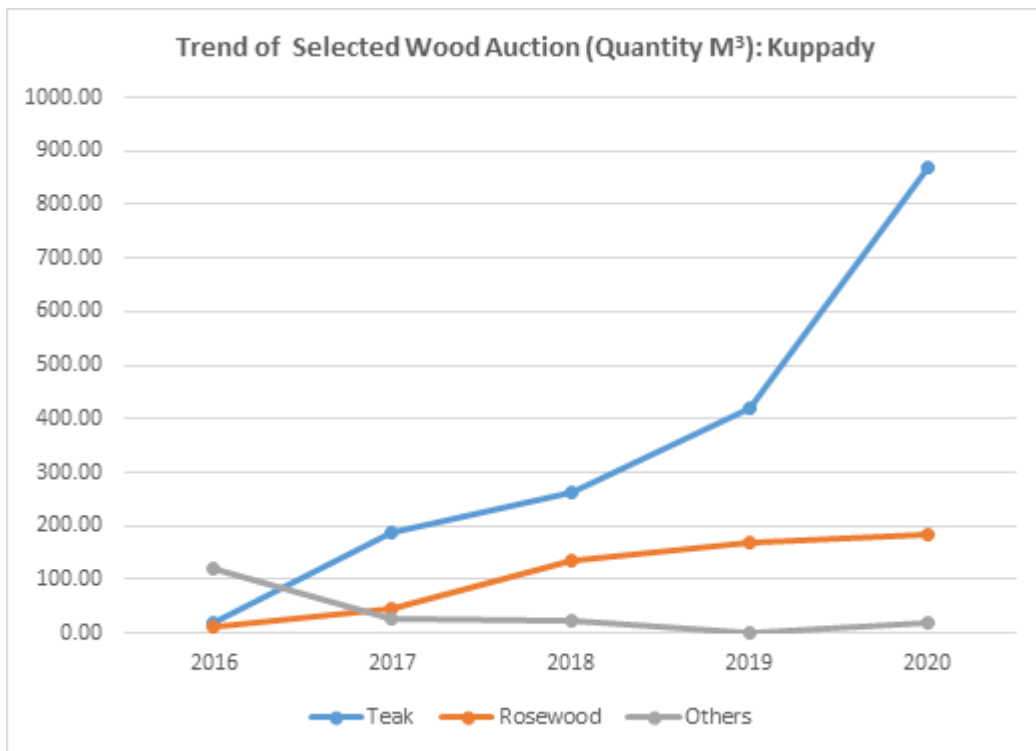
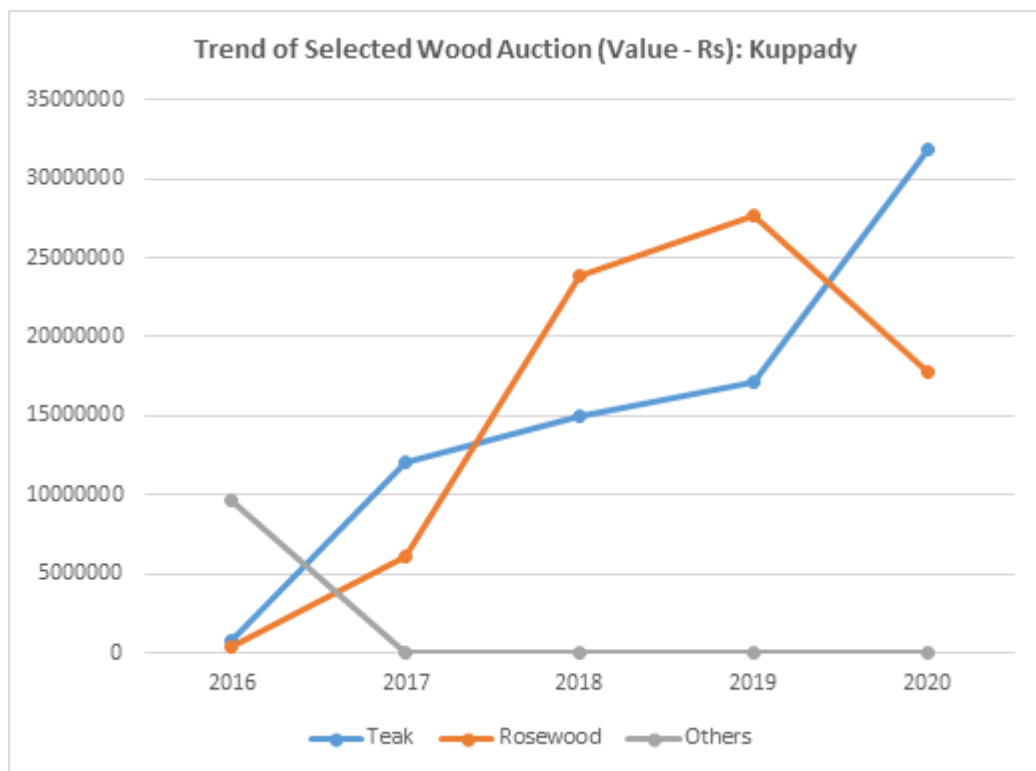


Figure 5.25 (d)



3. Baveli Timber Depot

The analysis of five years quantity and value data collected from the Baveli Government timber depot at Wayanad (established in 1957) indicates that the only timber species auctioned is teak with a cumulative annual average quantity of 583.23 cubic meters (M³) that accounts 99.9% of the total timber in Baveli depot. The Baveli depot had fetched nearly Rs.2,91,27,930.4/- in revenue (cumulative annual average) to the Government. It accounts 99.96% of the total revenue received at Baveli depot. In 2020, in addition to teak rosewood also auctioned (insignificant when compared to teak) from this depot with a quantity of 0.483 M³ and value of Rs.12,139/-. There is no auction for miscellaneous timbers in Baveli timber depot.

The Baveli timber depot conducted 74 auctions during the period 2016-2020. The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity of teak auctioned increased steadily from 2016 to 2020 reaching a maximum at 2020 (234.967 M³ and 1194.984 M³ respectively). The value of teak auctioned increased steadily from 2016 to 2019 reaching a maximum at 2019 (Rs.1,49,70,065/- and Rs. 4,91,28,547/-respectively) then showed a decrease in 2020 (Rs. 4,36,50,693/-). Details are given in Tables 5.27 (a)&(b) and figures 5.25 (a)-(d).

Table 5.27 (a)
Quantity and Value of Timber Auctioned from Baveli (74)

Species Name	2015 (...)		2016 (10)		2017 (11)		2018 (16)		2019 (19)		2020 (24)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			234.967	14970065	260.201	18325090	281.097	19565257	946.914	49128547	1192.984	43650693
Rosewood											0.484	12139
TOTAL IW			234.967	14970065	260.201	18325090	281.097	19565257	946.914	49128547	1193.468	43662832
Others												
Grand Total			234.967	14970065	260.201	18325090	281.097	19565257	946.914	49128547	1193.468	43662832



Table 5.27 (b)
Quantity and Value of Timber Auctioned from Bavely (74)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	583.2326	99.9170831	29127930.4	99.95834
Rosewood	0.484	0.08291695	12139	0.041657
TOTAL IW	583.7166	100	29140069.4	100

Figure 5.25 (a)

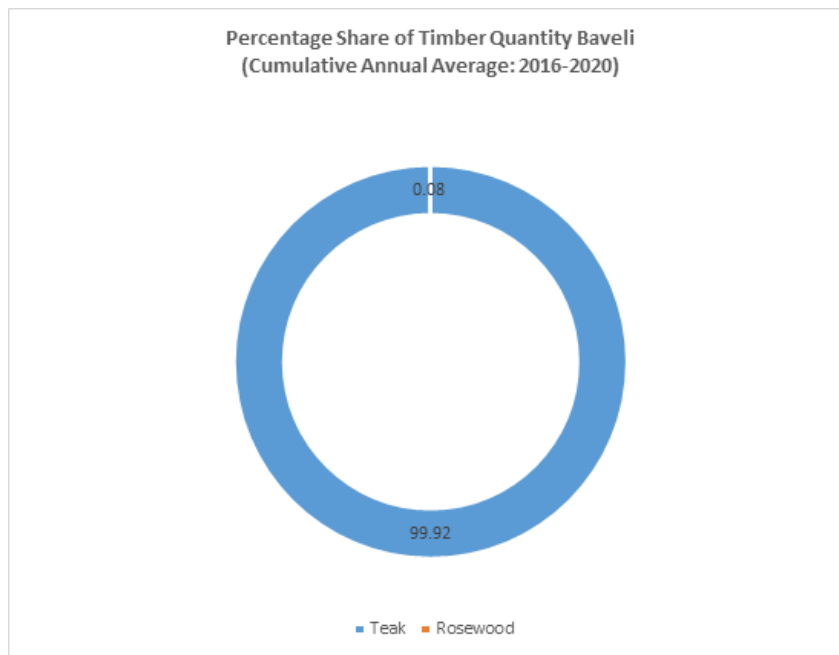


Figure 5.25 (b)

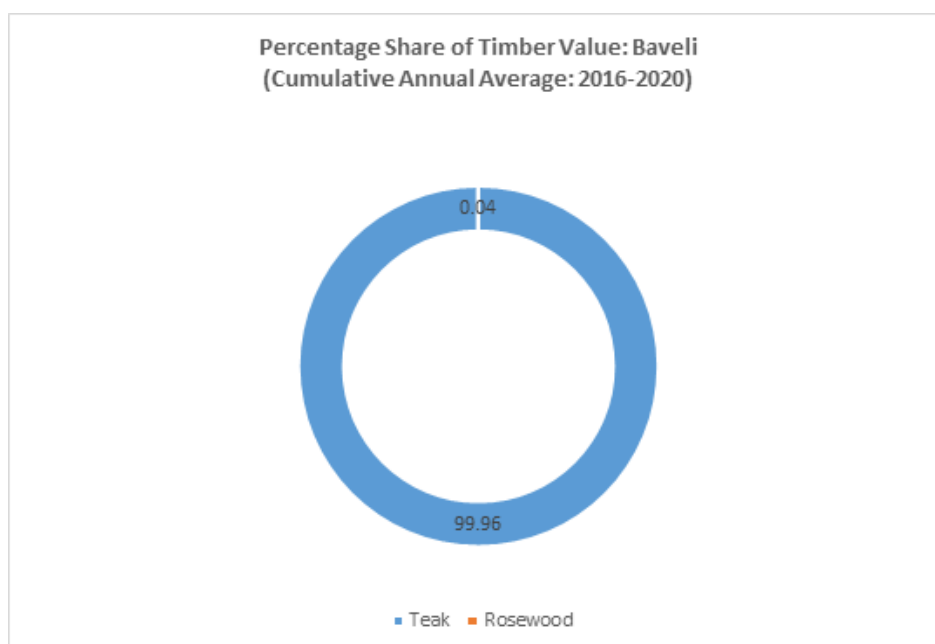


Figure 5.25 (c)

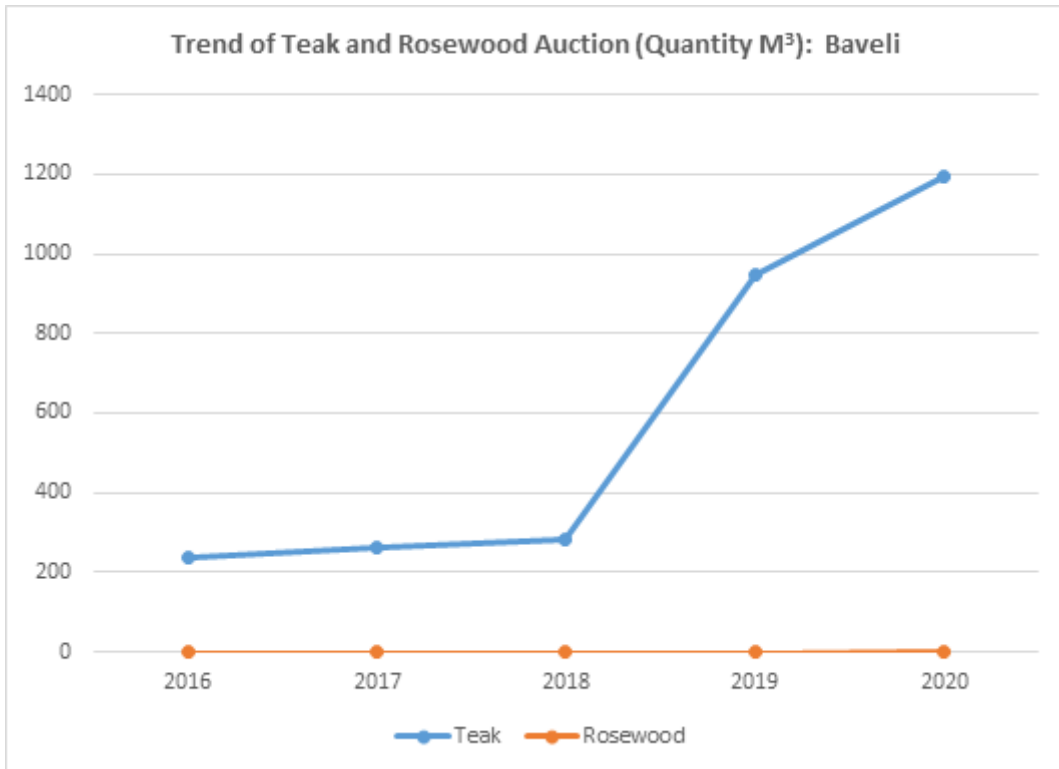
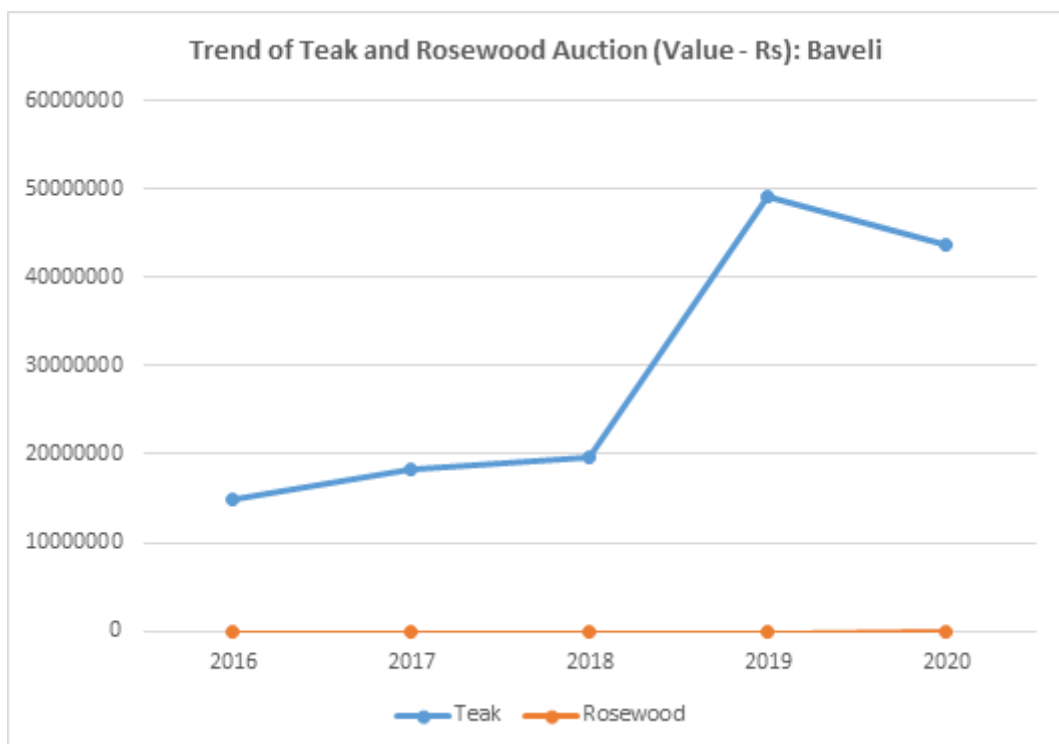


Figure 5.25 (d)



4. Kannavam Timber Depot

The analysis of five years quantity and value data collected from the Kannavam Government timber depot near Kolayad at Kannur, indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 516.66 cubic meters (M3) that accounts 84.22% of the total timber in Kannavam depot. The Kannavam depot had fetched nearly Rs.4,38,30,131.6/- in revenue (cumulative annual average) to the Government. It accounts 94.64% of the total revenue received at Kannavam depot.

The miscellaneous timbers account a quantity of 15.78% of the total timbers and it only contribute to 5.362% of total timber value (cumulative annual average). In miscellaneous timbers anjily and vaka predominate other timbers in cumulative quantity (2.89% and 3.34% respectively) and cumulative value (1.24% and 1.45% respectively).

The Kannavam timber depot conducted 109 auctions during the period 2016-2020. The trend of the quantity (M3) of timber auctioned and the revenue (Rs) received during 2015-2020 are given in figures. The quantity and value of teak auctioned increased steadily from 2016-2020 reaching a maximum at 2020 (782.33 M3 and Rs.5,29,98,105/-respectively). The trend of quantity and value of miscellaneous timbers showed that there is steadily decrease in the quantity and value of these timbers over the years. Details are given in Tables 5.28 (a)&(b) and figures 5.26 (a)-(h).



Table 5.28 (a) Quantity and Value of Timber Auctioned from Kannavam (109)

Species Name	2015 (...)		2016 (21)		2017 (20)		2018 (20)		2019 (21)		2020 (27)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			437.31	41354635	411.37	42170404	405.8	40315285	546.49	42312169	782.33	52998165
Mahogany			0.238	1473	0	0	0	0	1.148	24352	0	0
Anjili			27.056	1125825	24.52	574002	0	0	0	0	1.564	19279
Maruthuu			16.911	473248	0.531	9913	0.283	369	0	0	0	0
Venga			4.723	277972	0	0	0	0	0	0	0	0
Venteak			3.53	56707	0.7	3944	0	0	0	0	0	0
Unnam/Chadachi			1.46	17478	0	0	0	0	0	0	0	0
Vaka			13.259	343040	46.14	1621248	2.113	45577	0	0	0	0
Kanjiram			1.71	2589	0	0	0	0	0	0	0	0
Jack/Plavu			0.61	13313	0.118	1094	0	0	0	0	0	0
Irul			4.76	182169	14.91	487138	0	0	0	0	1.5	42849
TOTAL IW			511.567	43848449	498.289	44867743	408.196	40361231	547.638	42336521	785.394	53060293
Others			66.341	978094	2.845	11332	0	0	0	0	0	0
Total			577.908	44826543	501.134	44879075	408.196	40361231	547.638	42336521	785.394	53060293



Table 5.28 (b)
Quantity and Value of Timber Auctioned from Kannavam (109)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	516.66	84.21511	43830131.6	94.6351
Mahogany	0.693	0.112958	12912.5	0.02788
Anjili	17.71333333	2.887257	573035.3333	1.23726
Maruthuu	5.908333333	0.963053	161176.6667	0.348002
Venga	4.723	0.769845	277972	0.600179
Venteak	2.115	0.344743	30325.5	0.065477
Unnam/Chadachi	1.46	0.237979	17478	0.037737
Vaka	20.504	3.342133	669955	1.446522
Kanjiram	1.71	0.278728	2589	0.00559
Jack/Plavu	0.364	0.059332	7203.5	0.015553
Irul	7.056666667	1.15023	237385.3333	0.512547
TOTAL IW	578.9073333	94.36137	45820164.43	98.93185
Others	34.593	5.638628	494713	1.068151
Total	613.5003333	100	46314877.43	100

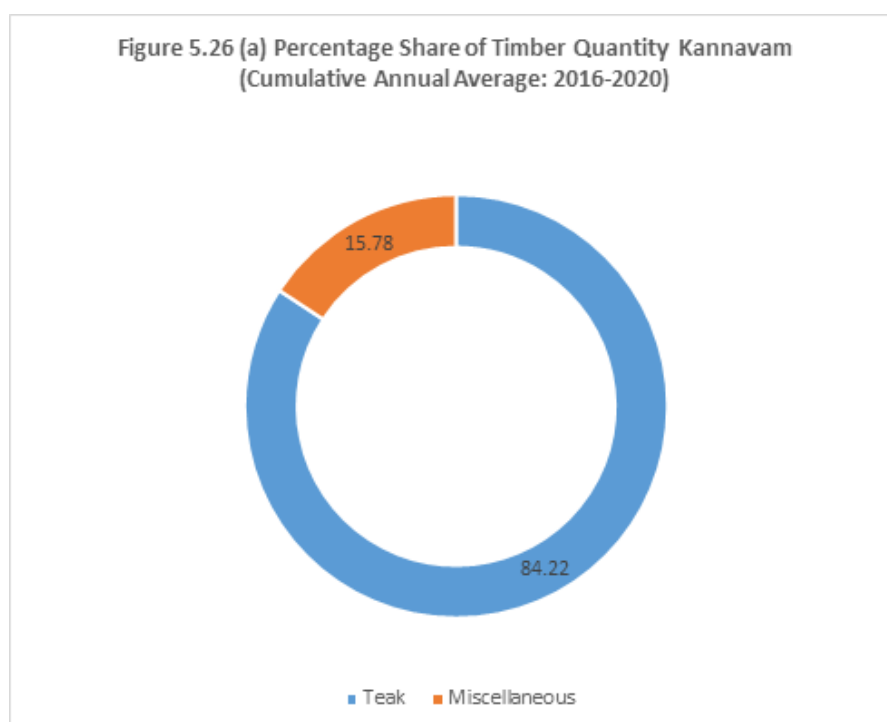


Figure 5.26 (b)

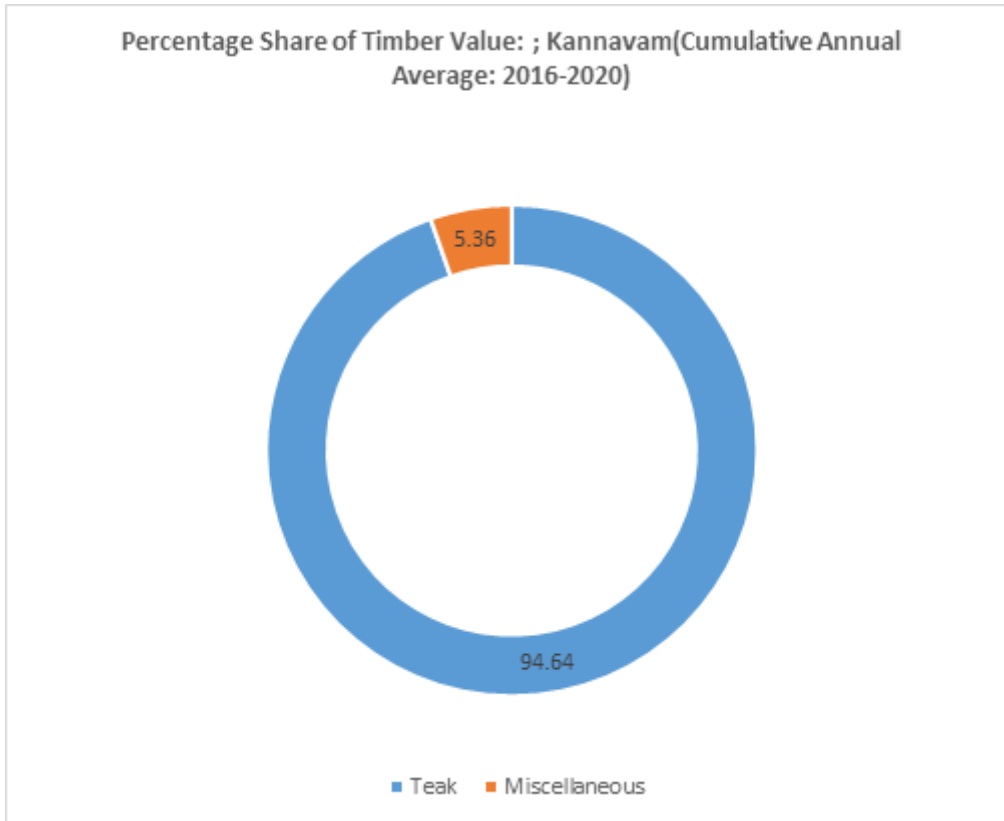


Figure 5.26 (c)

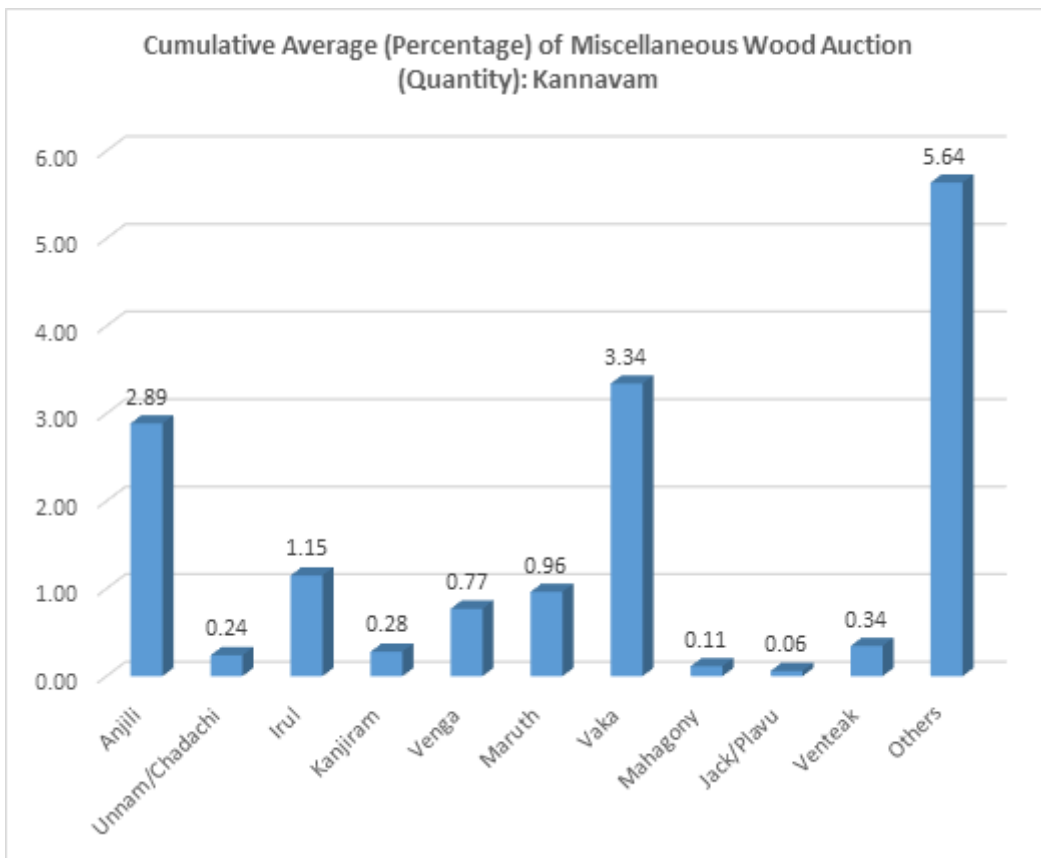


Figure 5.26 (d)

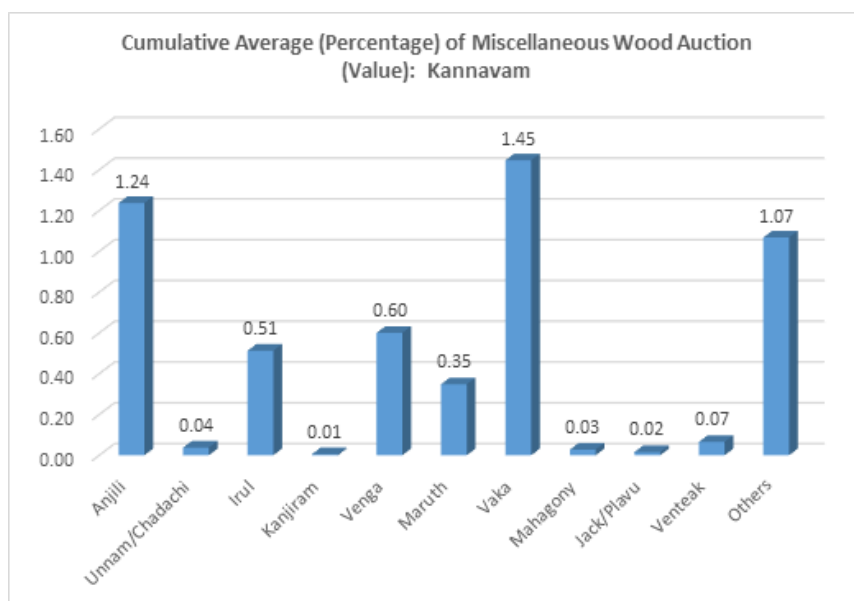


Figure 5.26 (e)

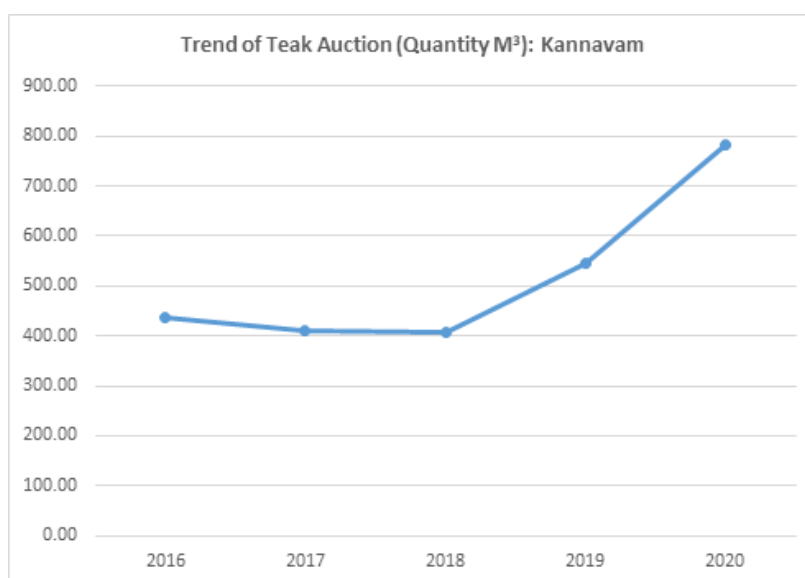


Figure 5.26 (f)

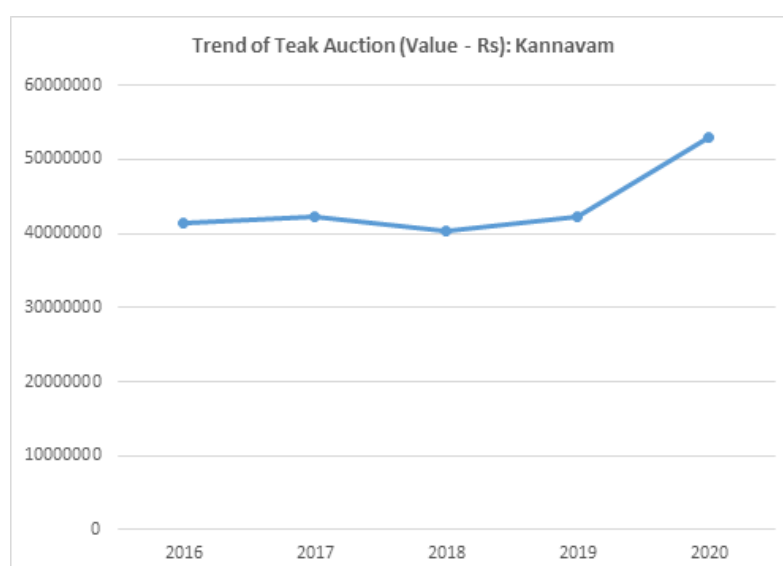


Figure 5.26 (g)

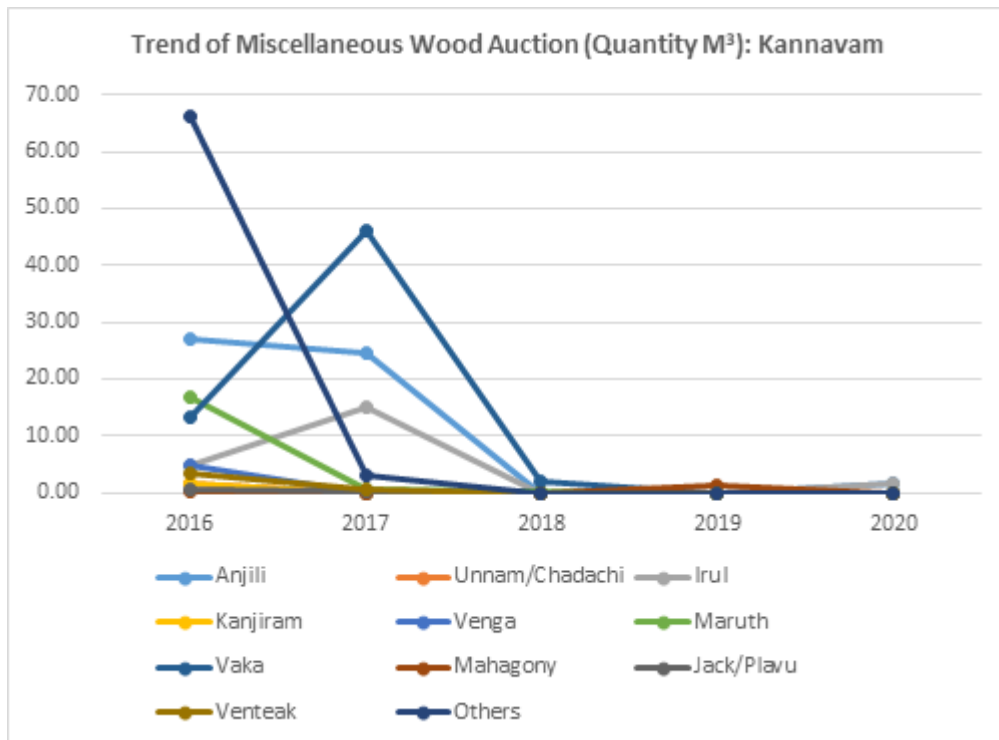
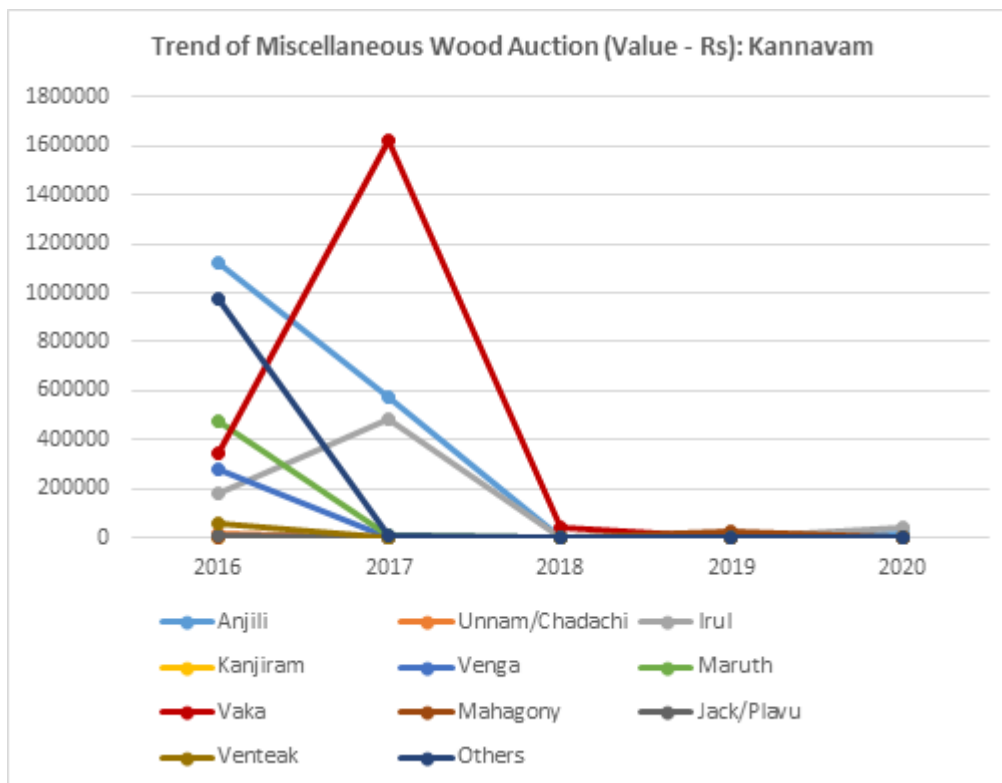


Figure 5.26 (h)



5. Parappa Timber Depot

The analysis of five years quantity and value data collected from The Parappa Government timber depot at Kasargod indicates that the main timber species auctioned is teak with a cumulative annual average quantity of 114.28 cubic meters (M³) that accounts 41.12% of the total timber in Parappa depot. The Parappa depot had fetched Rs.54,27,161.4/- in revenue (cumulative annual average) to the Government. It accounts 73.70% of the total revenue received at Parappa depot. The miscellaneous timbers account a quantity of 58.89% of the total timbers and it contribute to 26.30% of total timber value (cumulative annual average). In miscellaneous timbers kambakam, mahagony, maruthu and vaka predominates other timbers in cumulative quantity (2.95%, 7.58%, 2.42% and 1.87% respectively) and cumulative value (7.11%, 1.32%, 0.58% and 1.67% respectively).

The Parappa timber depot conducted 109 auctions during the period 2016-2020. The trend of the quantity (M³) of timber auctioned and the revenue (Rs) received during 2016-2020 are given in tables and figures. The quantity and value of teak auctioned showed an upward trend over years. The trend of quantity and value of miscellaneous timbers showed that there is steadily decrease in the quantity and value of timbers in 2020 when compared to 2016. Details are given in Tables 5.29 (a)&(b) and figures 5.27 (a)-(h).

Table 5.29 (a)
Quantity and Value of Timber Auctioned from Parappa (109)

Species Name	2015 (...)		2016 (21)		2017 (20)		2018 (20)		2019 (21)		2020 (27)	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
Teak			0.416	30721	119.078	6955218	79.811	4787766	208.002	11768120	164.078	3593982
Mahagony			49.28	227867	5.611	26718	8.302	36081	0	0	0	0
Kambakom			10.228	262254	9.465	373529	12.103	1453218	1	6100	0	0
Maruthuu			6.125	43716	11.076	102522	7.487	32240	4.933	26648	3.99	6804
Venteak			0.697	5611	0	0	0	0	0.164	332	0	0
Vaka			0.32	1152	8.738	237235	15.655	371492	0.637	2321	0.669	3077
Irul			1.738	43624	1.689	37918	1.247	8024	0	0	0.335	3350
TOTAL IW			68.804	614945	155.657	7733140	124.605	6688821	214.736	11803521	169.072	3607213
Others			32.641	470942	54.488	792233	346.653	2177501	170.285	2180031	0.103	886
Total			101.445	1085887	210.145	8525373	471.258	8866322	385.021	13983552	169.175	3608099

Table 5.29 (b)
Quantity and Value of Timber Auctioned from Parappa (109)
(Cumulative Annual Average: 2016-2020)

Species Name	Cumulative Annual Average			
	Qty. (M ³)	% Qty.	Value (Rs.)	% Value
Teak	114.277	41.1093361	5427161.4	73.7007
Mahogany	21.06433333	7.57755943	96888.66667	1.315745
Kambakom	8.199	2.94946005	523775.25	7.112853
Maruthuu	6.7222	2.41820471	42386	0.575601
Venteak	0.4305	0.15486554	2971.5	0.040353
Vaka	5.2038	1.87198442	123055.4	1.671089
Irul	1.25225	0.45047705	23229	0.315449
TOTAL IW	157.1490833	56.5318873	6239467.217	84.73179
Others	120.834	43.4681127	1124318.6	15.26821
Total	277.9830833	100	7363785.817	100

Figure 5.27 (a)

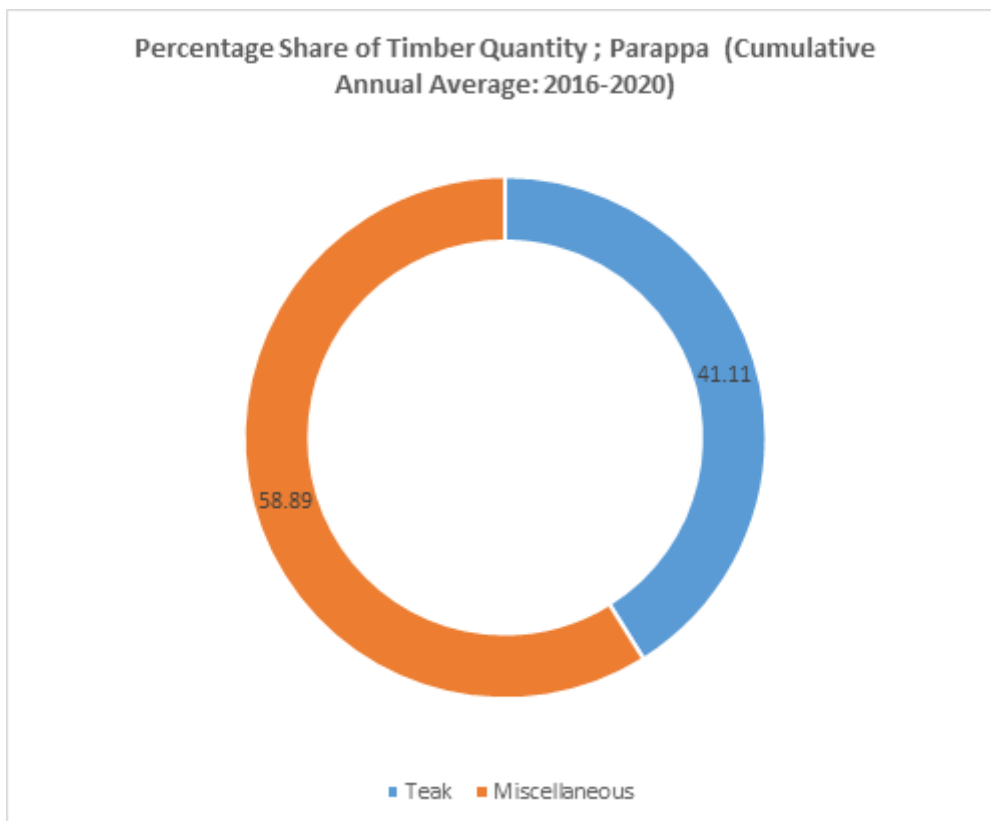


Figure 5.27 (b)

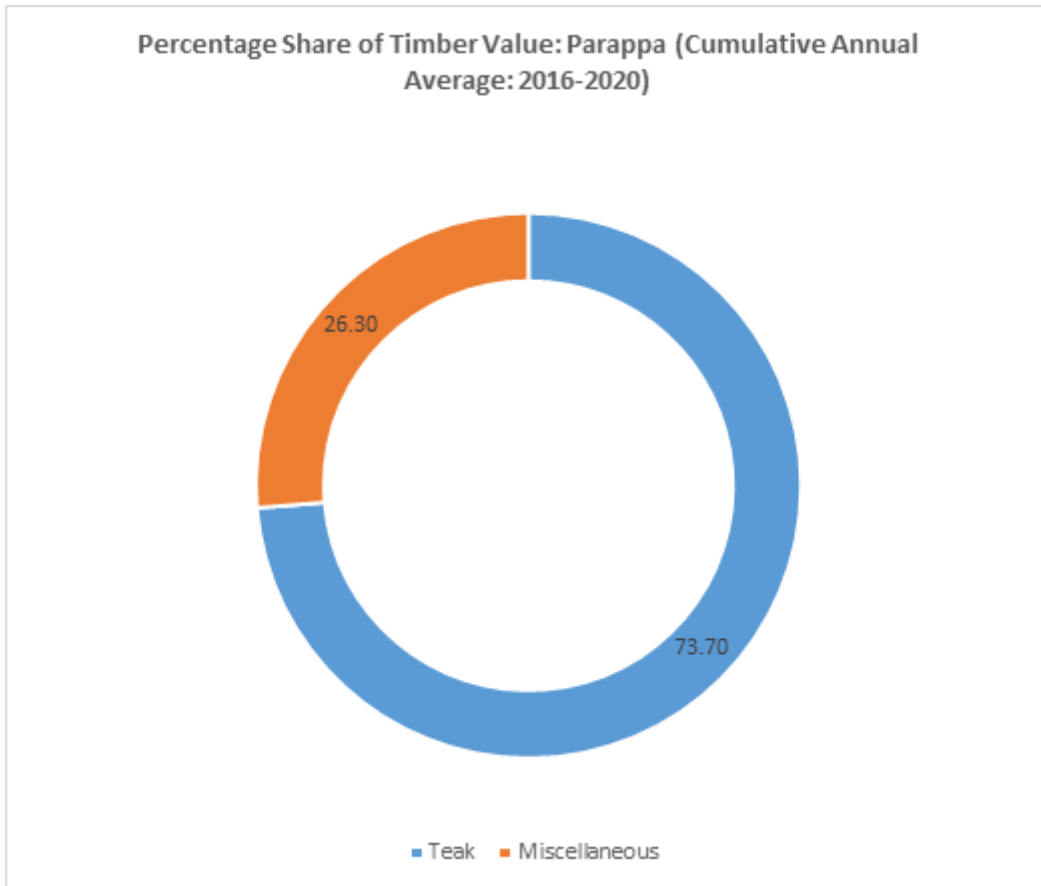


Figure 5.27 (c)

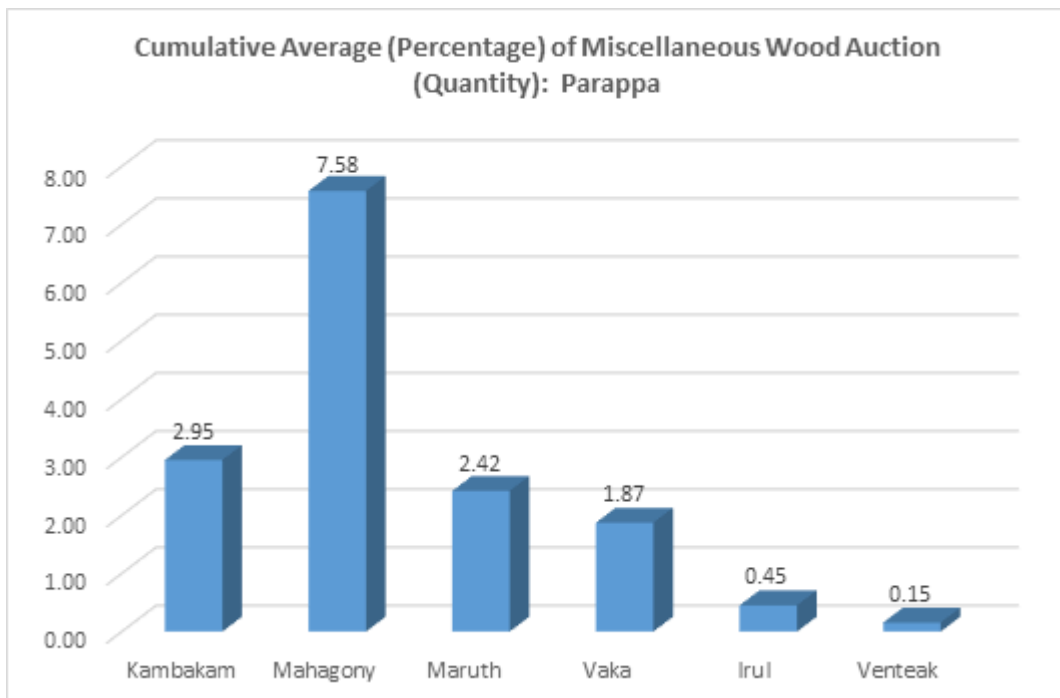


Figure 5.27 (d)

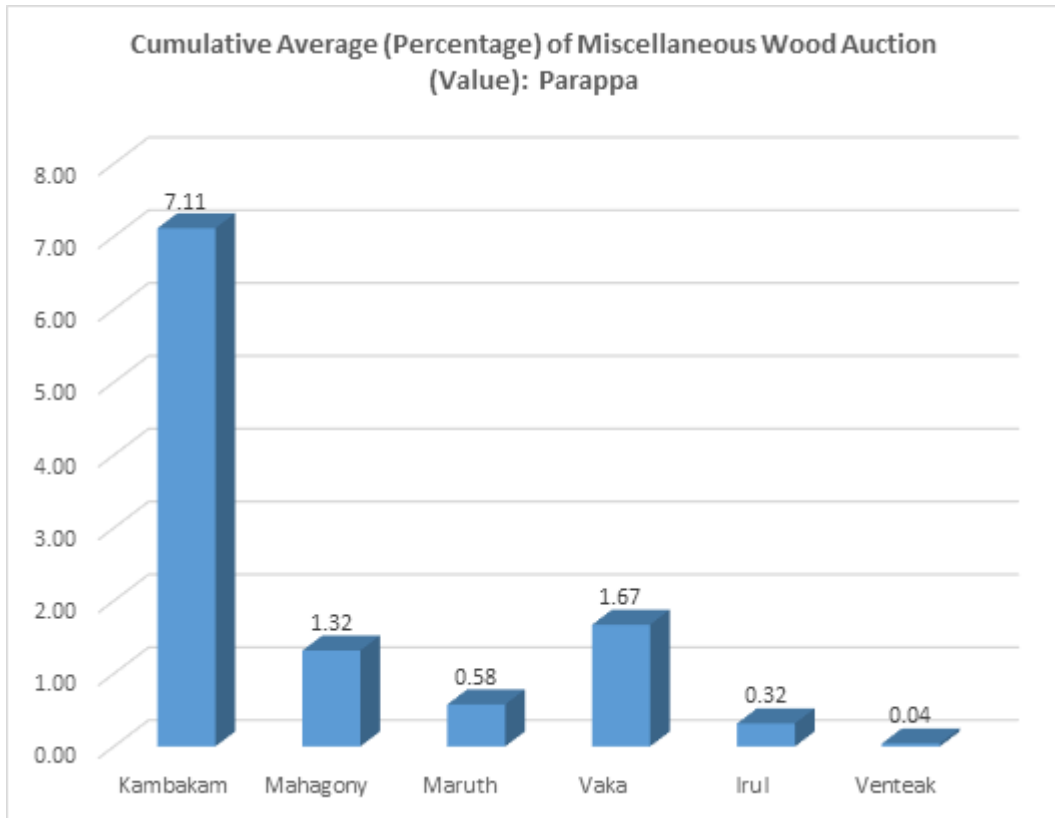


Figure 5.27 (e)

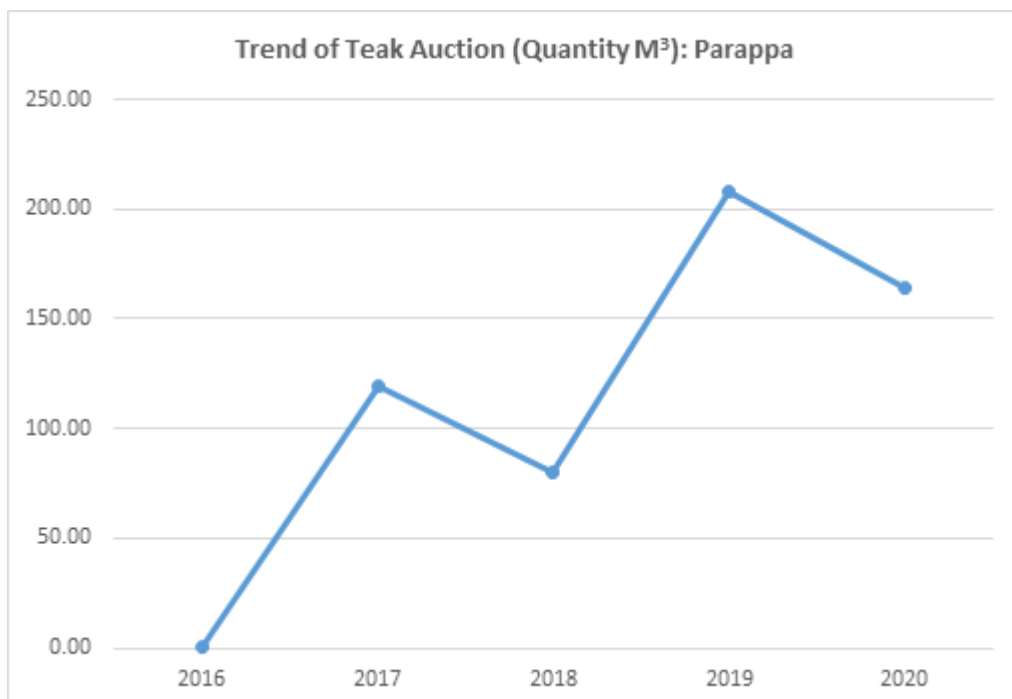


Figure 5.27 (f)

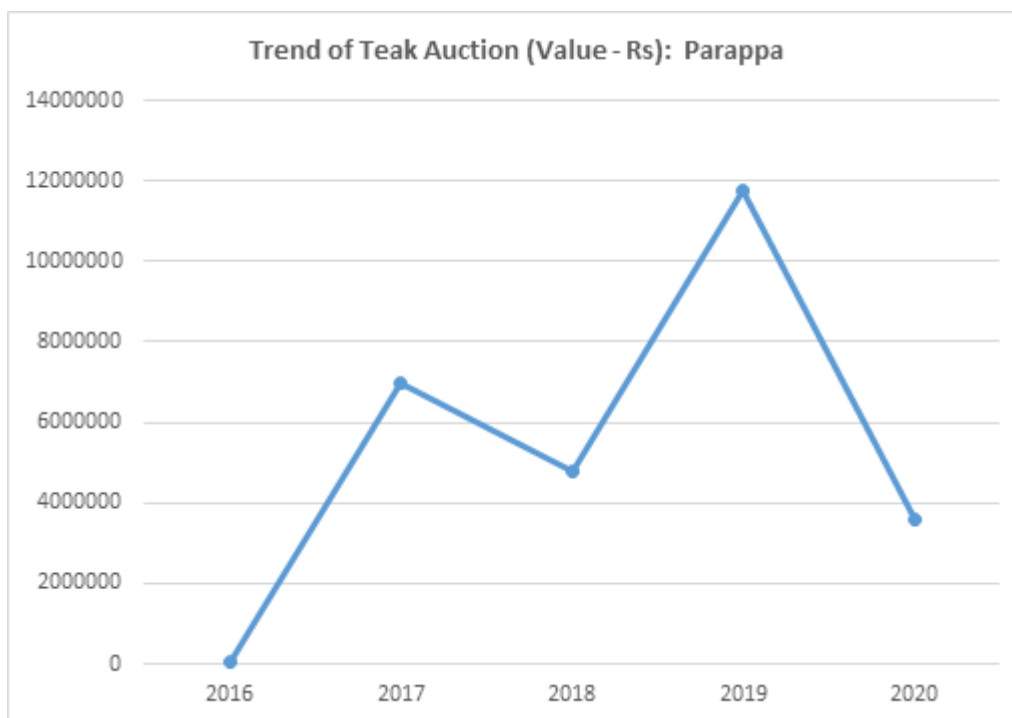


Figure 5.27 (g)

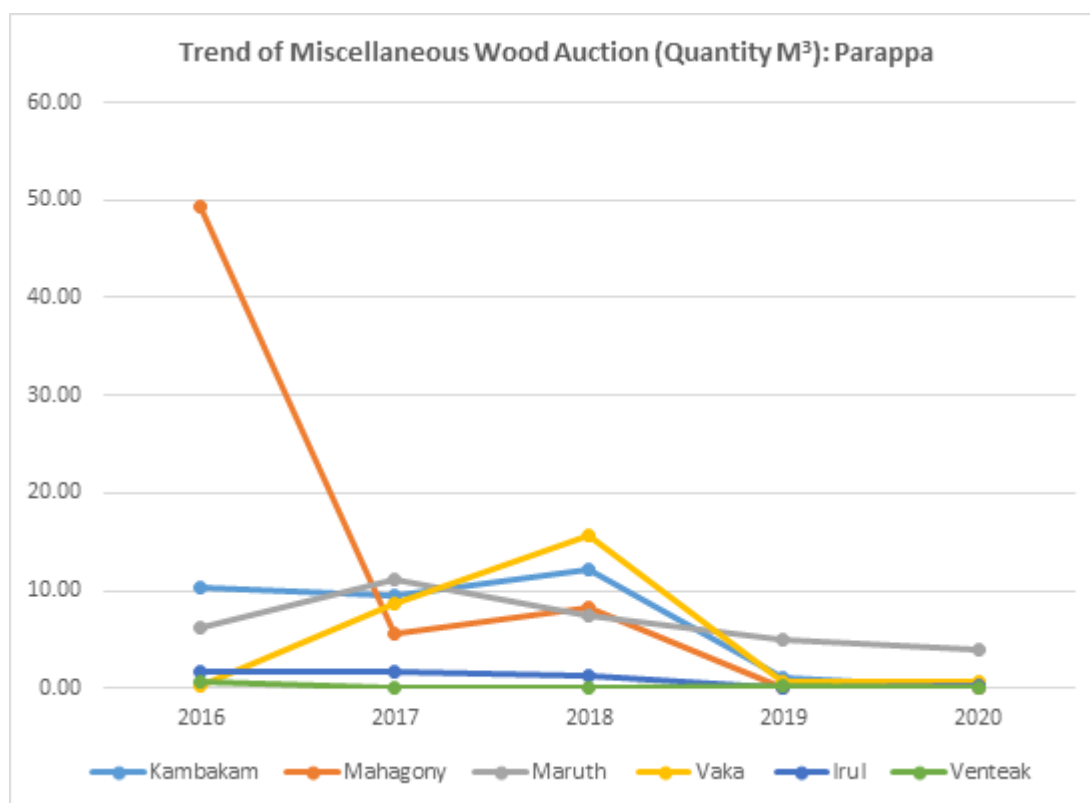
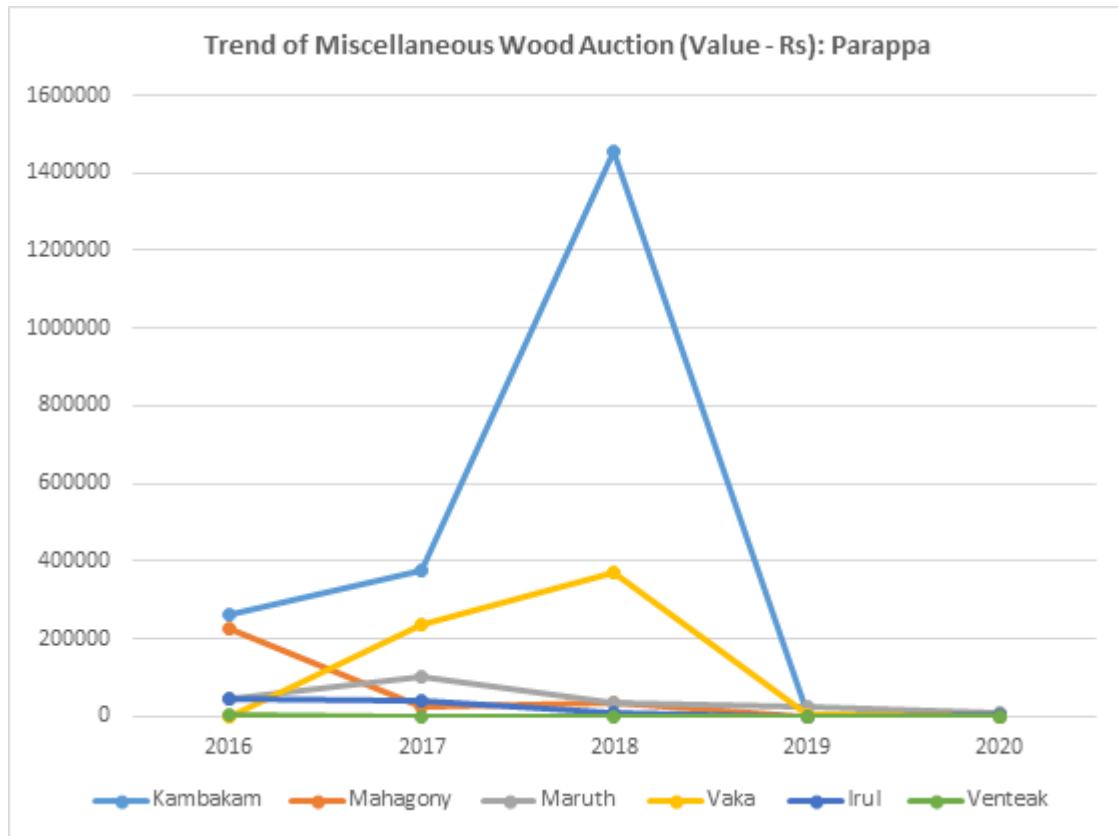


Figure 5.27 (h)



Timber Auctioned through Government Depots (State Total)

Total quantity and total value (cumulative annual average) of various timber auctioned through 27 Government Depots is provided or summarised below (Table 5.30)

Table 5.30
Total Quantity and Value (Cumulative Annual Average: 2015 - 2020) of Timber Supplied through Government Depots in Kerala

Timber Sales Division	Timber Depot	Quantity (M ³)	Value (Rs)
1. Thiruvananthapuram	1. Achencoil	3242.15	14,56,18,899
	2. Aryankavu	530.37	2,36,65,495
	3. Kulathupuzha	790.53	5,48,24,102
	4. Thenmala	421.29	2,63,42,098
2. Punalur	5. Pathanapuram	550.57	3,86,02,999
	6. Tuet	131.91	1,19,72,464
	7. Kadakkamon	679.96	4,92,93,964
	8. Areekkakkavu	1177.22	3,75,01,530
	9. Konni	1351.90	6,45,05,904
	10. Veeyapuram	183.79	7,06,92,657
3. Kottayam	11. Kothamangalam	558.66	2,85,92,526
	12. Thalakkode	872.51	3,36,76,579
	13. Vettikkad	1230.52	6,36,58,819
	14. Parampuzha	622.22	2,00,63,833
4. Perumpavoor	15. Chalakkudy	1042.79	4,04,01,108
	16. Chettikkulam	972.39	2,88,98,509
	17. Mudikkal	577.55	3,64,49,714
	18. Varappuzha	238.05	1,82,96,254
	19. Vettoor	1008.90	4,27,07,560
5. Palakkad	20. Nedunkayam	3528.99	23,11,30,423
	21. Aruvakkode	902.53	9,62,68,197
	22. Walayar	3136.56	20,45,23,994
6. Kozhikode	23. Chaliyam	696.03	5,64,03,950
	24. Kuppady	499.49	3,25,55,218
	25. Baveli	583.72	2,91,40,069
	26. Kannavam	613.50	4,63,14,877
	27. Parappa	277.98	73,63,785
	Grand Total	26422.07	1,53,94,65,539



Fig 5.28 Total Quantity (Cumulative Annual Average: 2015 - 2020) of Timber Supplied through Government Depots in Kerala

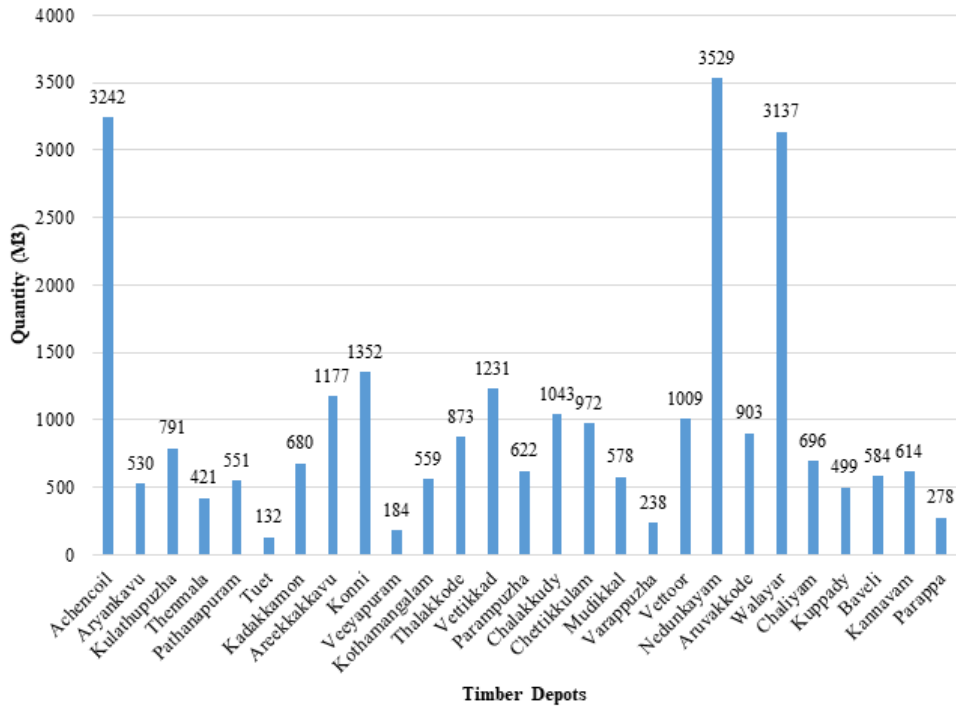
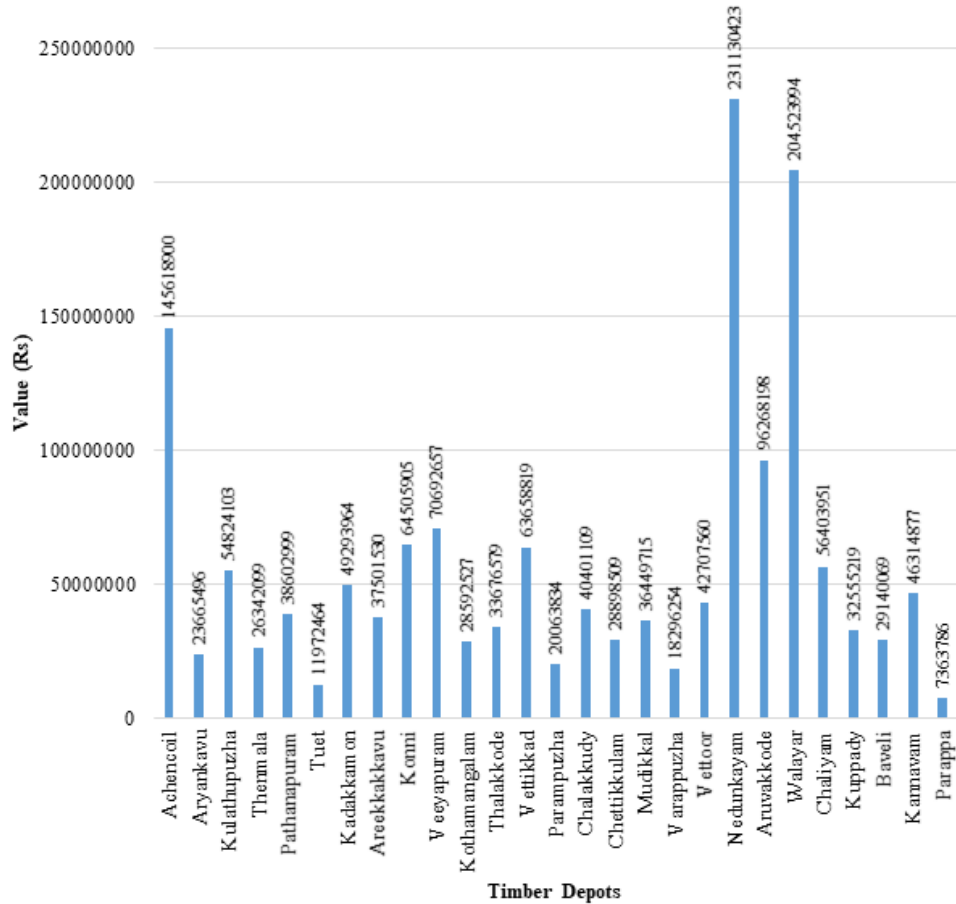


Fig 5.29. Total Value (Cumulative Annual Average: 2015 - 2020) of Timber Supplied through Government Depots in Kerala



The above table and figures represents the cumulative annual average of the total quantity and total value of timbers supplied through Government depots in Kerala. Nedunkayam, Walayar and Achencoil depots auctioned (supplied) more quantity of timbers and obtained high revenue. But, the minimum quantity supplied through Tuet, Varappuzha and Parappa. Other depots performed moderately. Teak is the major timber item auctioned from the depots and acquired maximum revenue.

Table 5.31
Species Wise Total Quantity and Value (Cumulative Annual Average: 2015-2020) of Timber Auctioned/Supplied through Government Depots in Kerala

S. No	Wood Species	Botanical Name	NTC	Quantity		Value	
				(M ³)	%	(Rs)	%
1	Teak	<i>Tectona grandis</i>	No	18,384.57	69.58	1,36,84,22,858.98	88.89
2	Irul	<i>Xylia xylocarpa</i>	No	849.17	3.21	2,10,79,849.22	1.37
3	Maruthu	<i>Terminalia arjuna</i>	No	2,090.34	7.91	2,23,86,564.50	1.45
4	Vaka	<i>Albizia sp.</i>	No	605.78	2.29	1,48,28,683.97	0.96
5	Venga	<i>Pterocarpus marsupium</i>	No	230.20	0.87	43,62,168.21	0.28
6	Anjily	<i>Artocarpus hirsutus</i>	No	223.72	0.85	72,31,899.02	0.47
7	Rosewood	<i>Dalbergia latifolia</i>	No	348.14	1.32	4,39,34,232.10	2.85
8	Mahagony	<i>Swietenia macrophylla</i>	No	124.32	0.47	27,86,130.73	0.18
9	Kambakam	<i>Hopea parviflora</i>	No	61.68	0.23	22,11,825.90	0.14
10	Thembavu	<i>Terminalia elliptica</i>	No	102.72	0.39	18,85,752.65	0.12
11	Venteak	<i>Lagerstroemia microcarpa</i>	No	471.23	1.78	65,19,291.31	0.42
12	Jack/Plavu	<i>Artocarpus heterophyllus</i>	Yes	38.97	0.15	7,71,471.69	0.05
13	Unnam/Chadachi	<i>Grewia tiliaefolia</i>	No	1,191.00	4.51	1,82,83,513.27	1.19
14	Thanni	<i>Terminalia bellerica</i>	No	169.04	0.64	19,30,217.63	0.13
15	Karimthakara	<i>Albizia procera</i>	No	8.30	0.03	18,550.00	0.00
16	Poovam	<i>Schleichera oleosa</i>	No	99.94	0.38	10,27,638.23	0.07
17	Kanjiram	<i>Anogeissus latifolia</i>	No	12.15	0.05	33,486.03	0.00



18	Elavu	<i>Bombax ceiba</i>	No	119.95	0.45	7,91,415.17	0.06
19	Kadamaram	<i>Xylia xylocarpa</i>	No	57.44	0.22	13,01,204.57	0.08
20	Kanikonna	<i>Cassia fistula</i>	Yes	12.13	0.05	9,65,843.00	0.06
21	Karavenga	<i>Pterocarpus marsupium</i>	No	14.94	0.06	2,54,277.45	0.02
22	Kulamavu	<i>Persea sp.</i>	No	67.65	0.26	6,62,279.00	0.04
23	Manjakkadambu	<i>Haldina cordifolia</i>	No	1.01	0.00	35,208.33	0.00
24	Mazhamaram	<i>Samanea saman</i>	No	18.06	0.07	1,37,743.78	0.01
25	Mulluvenga	<i>Bridelia crenulata</i>	No	96.30	0.36	12,41,464.06	0.08
26	Pala	<i>Alstonia scholaris</i>	No	7.83	0.03	35,844.78	0.00
27	Pulivaka	<i>Albizia sp.</i>	No	110.67	0.42	32,41,170.84	0.21
28	Uravu	<i>Persea sp.</i>	No	7.95	0.03	59,409.17	0.00
29	Thambakam	<i>Hopea parviflora</i>	No	0.82	0.00	1,488.00	0.00
30	Miscellaneous Wood			896.07	3.39	1,30,24,057.72	0.84
	Total			26,422.07	100.00	1,53,94,65,539.32	100.00

Forest Depot Officer's Interview

A survey was conducted among the Forest Depot Officials for authenticating the 'five years quantity and value' data collected from the forest timbers. The main objectives of the survey includes:

1. To know about the types, quantity and value of tradable timber species of Kerala Forests
2. To understand the functioning, including the bidding process, of timber depots of Kerala.
3. To assess the factors influencing timber price, price variation, types of bidders, transport including to other states in the country (also exports to other countries, if any) of timbers and its uses.
4. To examine the understanding of the scope of Access and Benefit Sharing (ABS) among the Depot officials as well as bidders.

During the survey 27 respondents (representing 27 timber depots in the State) were received from depot officers / range forest officers and section clerk / depot managers / section forest officers of the Kerala forest and wildlife department. The list of the respondents participated as well as the questionnaire used for the survey is provided in the Annexure - 4.

Following are the inferences from the survey:

- Under the Kerala forest and wildlife department, 27 timber depots (most of them established 50 years ago) comes under six timber sales divisions of different circles functioning to meet the extensive demand of people for forest timbers.
- The retail and wholesale of timbers, harvested from the forests are auctioned according to Government rules and regulations under the control of each depot.
- The major timber species auctioned/traded in the last five years from different timber depots of Kerala are: teak, rosewood, mahogany, anjily, kambakam, thembavu, karimaruthu, vengam, ventek, jack, myla, manimaruthu, irul, mulluvenga, unnam, thanni, karimthakara, pathiri, poovam, kunnivaka, kanjiram, maruthu etc.
- Teak (*Tectona grandis*), one of the most durable timbers of South Asia, is the major species auctioned in all timber depots. It is of different grades such as Teak IB, IIB, IIIB, IIIC, EXP etc.
- The exploitation of forest timbers occurs either through the selective felling system or



through the clear felling system.

- After the felling, the logs are grouped into lots at the depots based on species, quality and dimensions and then put up for e-auction at periodic intervals.
- The Government of Kerala has introduced e-auction for the sale of forest timbers from all the six timber sales divisions in the state from 2014.
- This has resulted in increasing transparency and adding more credibility to the auction procedures with maximum sale value has been achieved, which were not there in the traditional auction methods.
- The MSTC limited plays a crucial role in bidding procedures and serves as the selling agent of Kerala forest and wildlife department for the successful conduction of e-auction.
- Interested timber merchants / traders / end users or individuals can participate in the auction through online mode. The e-auction is governed by the general terms and conditions as well as buyer specific terms and conditions.
- To participate in MSTC's e-auction, buyers have to register on MSTC's website and pay a one-time, non-refundable registration fee by themselves and thereafter complete the offline registration formalities by submitting required documents.
- The timber logs will be sold in lots, which includes:
 1. Export class teak and rose wood
 2. All other classes of teak logs
 3. All other classes of rosewood logs
 4. All other logs
 5. Poles, billets, firewood and
 6. Other forest produces.
- The detailed e-auction sale notice/description of all lots will be available at the respective divisional forest offices. Based on this the bidders can inspect the timbers and quote their rates.
- An Earnest Money Deposit (EMD) has to be deposited before the start of e-auction, which vary depending on timber types.
- The EMD will be adjusted against the sale value and taxes of lots for successful bidders.
- For unsuccessful bidders the EMD will be returned to the bidders by the Divisional Forest Officer on request.
- Successful/highest bidder can pay through e-treasury of Government of Kerala or DD drawn from a nationalized bank payable at respective station in favour of Divisional Forest Officer or by cash in the respective treasury.
- The total number of auctions conducted in different forest timber depots varies mainly based on the availability of timbers.
- The number of auction details for the last five years in 27 timber depots of six timber sales divisions of Kerala is given in Table 5.32.
- The estimates show that the number of auctions increased significantly from 2015 to 2020.
- The timber depots (Walayar, Nedunkayam and Aruvakode) under Palakkad timber sales division conducted high number of timber auction during the last five years when compared to other timber sales divisions in Kerala.
- Veeyapuram, Kothamangalam, Chalakkudy, Chettikkulam, Varappuzha and Vettoor timber depots recorded less number of auctions relative to other timber depots.
- During timber auction considerable price variation occurs in each time (Figure 5.30).
- For class I teak (1m3) bid value ranges from Rs. 1,20,000 to Rs. 1,90,000. For class II Teak (1m3) bid value ranges from Rs. 1,00,000 to Rs. 1,50,000. For class III teak (1m3) bid value ranges Rs. 65,000 to Rs. 90,000.
- There are many factors that influence bid price variation of forest timbers. Price variation occurs mainly based on,



1. Size (Girth, length, class etc.)
 2. Quality specifications (Straight sound logs without any defects, logs with minor defects, logs with major defects etc)
 3. Demand (internal and external)
 4. Availability
 5. Type (Species)
 6. Number of bidders etc.
- The price details with variation are given in the following Figure 5.30.
 - The auctioned timbers are mainly used by furniture industries, saw mills, and in household sectors as well as construction purposes.
 - It is also used for “ara”, “uru” and “vyali” making.
 - According to forest officials, there is a high demand from other states such as Karnataka and Tamil Nadu for forest timbers of Kerala in addition to internal Government requirements.
 - Export of forest timbers (mainly rosewood and teak) also occurs.
 - The sale of forest timbers (teak along with others) is one of the major revenue sources, to the State Government as it brings annual revenue of over Rs. 200 crores.
 - The revenue generated from forest timber auction is generally deposited to state government treasury; Kerala and is used for multiple purposes.
 - From the amount 5% of the total material value is used for forest development as Forest Development Tax (FDT) along with GST.
 - The marketing / supply channels of Timber auctioned from Depots is as follows: Forest Department (Government) → Contractors / Bidders → Traders → Sawmills → Wood items Manufacturers → Consumers.
 - Most of the Depot officials are not aware about the Biological Diversity Act and ABS.
 - However, the ABS scope for high value timber used for commercial purpose is huge.

Fig 5.30 Price details of different grades of teak (per cubic metre) in Kerala



Price details of different grades of Teak, *Tectona grandis* (per cubic meter) in Kerala



Table 5.32 Number of auctions in different forest timber depots of Kerala

Name of timber sales division	Name of timber depot	Year						Total
		2015	2016	2017	2018	2019	2020	
I. Thiruvananthapuram	1. Achencoil	32	16	27	21	11		107
	2. Aryankavu	7	4	22	21	30		84
	3. Kulathupuzha	20	8	14	12	13		67
	4. Thenmala	6	5	9	13	13		46
Total		65	33	72	67	67		304
II. Punalur	1. Areekakavu	10	6	11	15	16	14	72
	2. Konni	10	9	16	14	19	16	84
	3. Pathanapuram	10	6	10	10	16	16	68
	4. Tuet		3	7	8	6	9	33
	5. Kadakkamon	13	7	11	11	12	14	68
	6. Veeyapuram	7	2	3	6	8	7	33
Total		50	33	58	64	77	76	358
III. Kottayam	1. Kothamangalam	-	-	4	8	8	7	27
	2. Thalakkode	-	-	-	13	18	19	50
	3. Vettikkad	-	18	19	14	22	16	89
	4. Parampuzha	-	20	16	16	23	15	90
Total		-	38	39	51	71	57	256
IV. Perumpavoor	1. Chalakkudy	-	9	12	6	9	5	41
	2. Chettikkulam	-	8	12	7	7	6	40
	3. Mudikkal	-	7	10	6	12	8	43
	4. Varappuzha	-	6	3	4	10	3	26
	5. Vettoor	-	7	4	7	11	7	36
Total		-	37	41	30	49	29	186
V. Palakkad	1. Nedunkayam	34	66	80	59	28	37	304
	2. Aruvakode	12	15	15	54	-	26	122
	3. Walayar	-	82	62	30	45	39	258
Total		46	163	157	143	73	102	684
VI. Kozhikode	1. Chaliyam	10	16	17	17	18	17	95
	2. Kuppady	-	12	12	14	18	24	80
	3. Bavely	-	10	11	16	19	18	74
	4. Kannavam	-	21	20	20	21	27	109
	5. Parappa	-	21	20	20	21	27	109
Total		10	80	80	87	97	113	467
Grand Total		171	384	447	442	434	377	2255

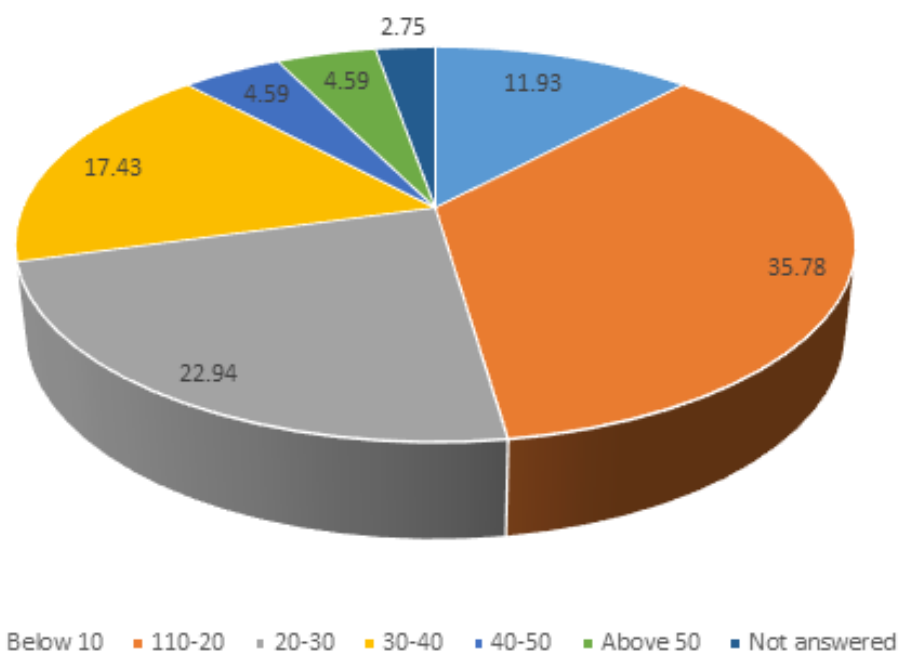
Bidder's Interview

An interview was conducted among the selected timber bidders who regularly participated in the auctions conducted by the Timber Depots. When we contacted the bidders (based on the list obtained from the Depots), 109 respondents reacted positively. The main objective of the interview / survey was to explore the marketing channel of forest timbers obtained through e-auction. Following are the major findings from the interviews:

- ◆ The bidders are predominantly timber merchants
- ◆ Among the bidders, 35.78% of the total have been involved in the timber business for 10-20 years. Around 22.94% bidders have been involved in the timber trade for 20-30 years and 4.59% of the total has been involved in timber auction for more than fifty years (Figure 5.31).



Figure 5.31
Year wise (percentage) experience of bidders in timber business



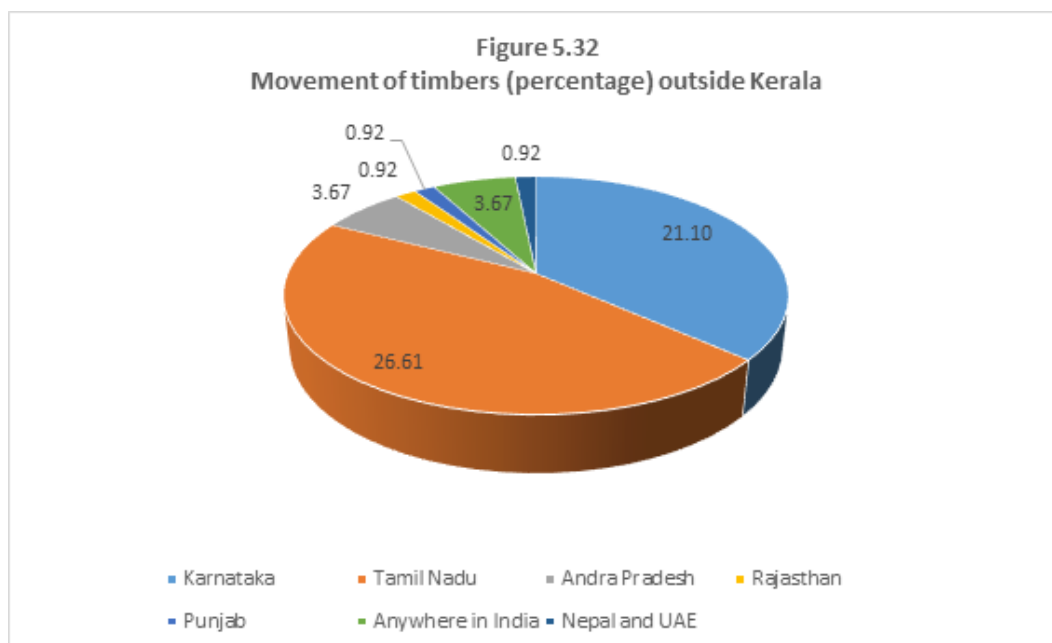
- ◆ Among the bidders 22.02% of the total clearly mentioned that they have been continuing timber business for years as family business and in some cases it is across many generations.
- ◆ Majority of the bidders depend on the depots adjacent to their business locations mainly for reducing transport cost (Figure 5.32).
- ◆ Some of the bidders were involved in auctions in all the timber depots of Kerala.
- ◆ The bidders from Southern circle of Kerala also depend on the timbers of Walayar, Nedunkayam and Aruvakode depots of Palakkad sales division (Eastern circle).
- ◆ Some of the bidders in Kerala also import timbers from Africa and Myanmar (Burma).
- ◆ Some bidders in Kerala prefer to source timbers from Karnataka and Tamil Nadu mainly due to the availability of timbers of their preference there, at comparatively low/affordable price which is easy and convenient to transport.
- ◆ In addition to the bidders in Kerala, bidders from other states are also participating in the e-auction of Kerala forest and wildlife department. For example, the bidders from Karnataka auction teak from Bavely and Kuppady depots of Wayanad and Parappa depot of Kasargod.
- ◆ After the timber auctioned from the Depots, transportation, road tax, loading and unloading are the major expenses before it reach to the saw mills.
- ◆ The timber loading charge for workers varies in different depots of Kerala. The average range of rates for loading timber to vehicle and tying it with ropes is given below.
 1. Rs. 1750 – Rs. 2600 - for cubic meter of log
 2. Rs. 17,500 – 5-8 cubic meters of log
 3. Rs. 28,000 – Rs. 30,000 - 14 cubic meters log
- ◆ For the transport of timbers within Kerala or to other states of India and for export, transit passes are required.
- ◆ A clearance order from Divisional Forest Officer/Assistant Conservator of Forest is essential for the transport of timbers.
- ◆ A transit permission/pass issued by Karnataka government is a must for the transportation

of timber from Karnataka to Kerala.

- ◆ The transportation charge varies according to the quantity of the timber load, distance travelled, availability of vehicle and fuel charge. The average range is given below:

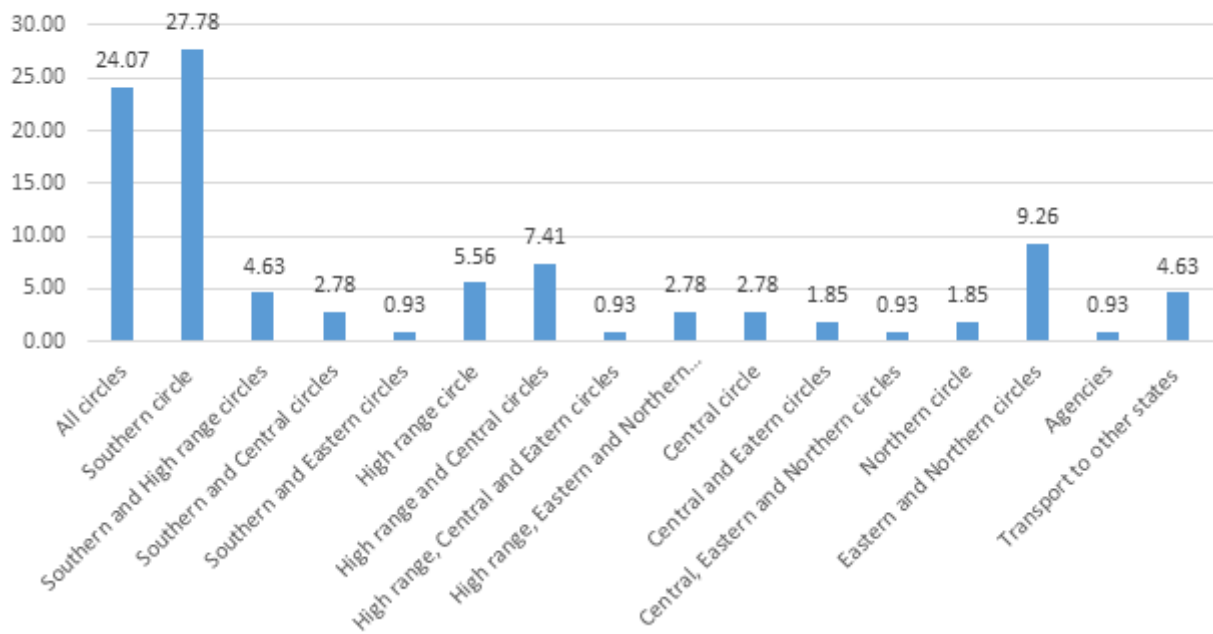
1. Rs. 15,000 – From Parappa to Kuthuparamba
2. Rs. 17,000 - Rs. 20,000 – From Parappa to Malappuram
3. Rs. 10,000 – Rs. 12,000 – From Thiruvananthapuram/Kollam to Malappuram (for return vehicle).
4. Rs. 5,000 – From Nilambur to Mukkam
5. Rs. 10,000 – From Kannur to Mukkam
6. Rs. 20,000 – From Parappa to Mukkam

- ◆ Timber merchants supplies timbers either to furniture industries (for making table, chair, bench, dressing table, alamara, door, window, pooja room-sets etc.) or resell timbers, mainly in Kerala.
- ◆ In addition to the resale of timbers in Kerala, timbers were also resold in other states of India and exports (Nepal, UAE etc) (Figure 5.32).



- ◆ In the survey 21.10% of respondents said that they transport timbers to Karnataka. Among the bidders, 26.61% of the total responded that they transport timbers to Tamil Nadu (especially Nagercoil, Pollachi, Madurai, Coimathore, Chennai, Selam etc.
- ◆ Kerala's timbers are also transported to Andhra Pradesh, Rajasthan and Punjab.
- ◆ In other states, timbers (Teak and sandal) from Kerala's forest are also used for making vyalees (upper part of temples – having high economic value - value ranges from Rs. 5000 to 2 lakhs), traditional chairs and temple doors in addition to other purposes.

Figure 5.33 Percentage of number of bidder's from each forest circle in Kerala who engage in timber auction



B) KERALA FOREST DEVELOPMENT CORPORATION

Kerala Forest Development Corporation (KFDC) was established as a joint venture of Government of India and State Government in 1975 with the intention of raising institutional finance by raising man-made forests to meet the domestic and industrial needs of Forest produce. The corporation raise plantations of industrial use mainly of cardamom, pepper, coffee, rubber, cashew, cocoa, etc. on acquired or taken over reserved forest, unreserved vested forests or other lands form Kerala Government and others. They manage the forests for maximizing production of timber and other produce and also carry out business involving buying, selling, exporting, importing, processing, distribution and dealing in all kinds of forests plants, trees and agricultural crops. The total area under KFDC is 10053.834 Ha falling in 6 KFDC Divisions which is spread in 11 Territorial Divisions of Kerala Forest Department. The divisions are:

1. Thiruvananthapuram
2. Punalur
3. Gavi
4. Munnar
5. Thrissur
6. Mananthavady.

Forestry Plantations

The forestry plantations of KFDC chiefly include Eucalyptus, Acacia, Teak, Albizia and other miscellaneous species. Totally 2600.969 Ha of Eucalyptus plantations are maintained in KFDC under Thiruvananthapuram, Punalur, Thrissur, Munnar and Gavi Divisions. Acacia auriculiformis and Acacia mangium are marketed as pulpwood, timber and fire wood. The total area under Acacia species maintained is 1892.007 ha. in Thiruvananthapuram, Punalur, Thrissur Divisions. During the earlier periods, teak was planted admixed with other softwood species such as Bombax and Ailanthus. However, the growing demand and market potential of softwood trees paved the way for pure teak plantations. At present, 1256.58 ha of teak plantation are managed under KFDC in Thiruvananthapuram, Punalur and Thrissur Divisions. Albizia species are maintained in 62.95 ha under Thiruvananthapuram and Punalur divisions. The yield and revenue generated through the sale of plantation timber during the past five years is summarized in Table 5.33.

Medicinal Plants (Trees with Medicinal Value)

Tree species of medicinal use like Gmelina arborea, Pterocarpus santalinus (Red sanders), Stereospermum colais (Pathiri), Santalum album (Sandal), Caesalpinia sappan (Pathimugham), etc. along with interplanted rare medicinal herbs were raised on experimental basis in a few Divisions funded by National Medicinal Plant Board (NMPB). In Thiruvananthapuram division, Gmelina arborea holds an extent of 19.564 ha, Red sanders in an area of 36.64 ha and Sandal in about 8 ha. Gmelina arborea was cultivated in an extent of 8.21 ha in the Punalur division. In Thrissur division, Gmelina arborea holds an extent of 20.89 ha, Stereospermum colais in about 1 ha and Red sanders in 54.307 ha.



Table 5.33
Details of Sale of Timber / Wood from plantations by KFDC (2015-2020)

Sl. No	Items	2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
		Quantity (MT)	Revenue (Rs)	Quantity (MT)	Revenue (Rs)	Quantity (MT)	Revenue (Rs)	Quantity (MT)	Revenue (Rs)	Quantity (MT)	Revenue (Rs)
1	<i>Accaciaauriculiformis</i>	1647.98	28128508.04	1158.91	17551033.00	643.31	7134558.00	853.82	20638616.62	109.09	8051545.13
2	<i>Accaciamanjium</i>	7140.50	13627167.00	1046.57	29423371.00	0.00	0.00	120.00	9463412.85	279.34	7159681.76
3	Eucalyptus	1519.60	10585850.00	2102.58	17743518.00	621.47	32025843.00	696.87	26260168.76	840.68	6418557.45
4	Teak* M3	5.74	138536.00	2.38	93891.00	-	-	16.82	685248.00	46.44	1810792.30
5	Albizia * M3	0.00	0.00	430.50	1731111.00	138.00	3915438.00	240.78	1027167.07	-	-
6	Eucalyptus lops & tops * M3	46.65	107955.22	834.36	390280.00	0.00	0.00	30.42	52297.24	-	-
7	Sandalwood	339.57	5776814.76	390.52	4802832.38	-	6567187.47	-	2650902.90	-	1368736.32
8	Red sanders	-	-	-	1004144.94	-	268110.46	-	105408.68	-	2664.99
9	Bamboo	-	-	-	2307556.00	-	311425.00	-	507787.00	-	0.00
10	Eucalyptus europphylla	-	159594.00	-	-	-	-	-	-	-	-
11	Acacia Firewood	-	-	-	-	-	4692.00	-	447038.00	-	304471.08
12	Cashew timber	-	-	-	2257101.00	-	-	-	-	-	-
13	Kumbil	-	-	-	-	-	296144.00	-	142117.00	-	-
14	Firewood	-	-	-	-	-	548521.00	-	395280.00	-	490126.01
15	Teak thinning	-	-	-	445657.00	-	-	-	-	-	-
16	Teak poles	-	-	-	-	-	821474.00	-	8620.00	-	2128606.93
	Total	10700.04	58524425.02	15385.02	77750495.32	8239.09	51893392.93	8230.54	62384064.12	4771.68	27735181.97



Table 5.34
Quantity and Value of Timber Sold by KFDC (2015-2020)
(Cumulative Annual Average: 2015-16 to 2019-20)

	Species Name	Cumulative Annual Average			
		Qty. (M ³)	% Qty.	Rev. (Rs.)	% Rev.
1	<i>Accaciaauriculiformis</i>	1079.02	11.14	16300852.16	27.63
2	<i>Accaciamanjium</i>	4103.95	42.38	11934726.52	20.23
3	Eucalyptus	3529.27	36.44	18606787.44	31.54
4	Teak* M3	14.27	0.15	545693.46	0.93
5	Albizia * M3	410.46	4.24	1334743.21	2.26
6	Eucalyptus lops & tops * M3	182.29	1.88	110106.49	0.19
7	Sandalwood	365.05	3.77	4233294.77	7.18
8	Red sanders	NA	NA	345082.27	0.58
9	Bamboo	NA	NA	781692.00	1.33
10	Eucalyptus europhylla	NA	NA	159594.00	0.27
11	Acacia Firewood	NA	NA	252067.03	0.43
12	Cashew timber	NA	NA	2257101.00	3.83
13	Kumbil	NA	NA	219130.50	0.37
14	Firewood	NA	NA	477975.67	0.81
15	Teak thinning	NA	NA	445657.00	0.76
16	Teak poles	NA	NA	986233.64	1.67
	Total	9684.30	100.00	58990737.16	100.00

Figure 5.34

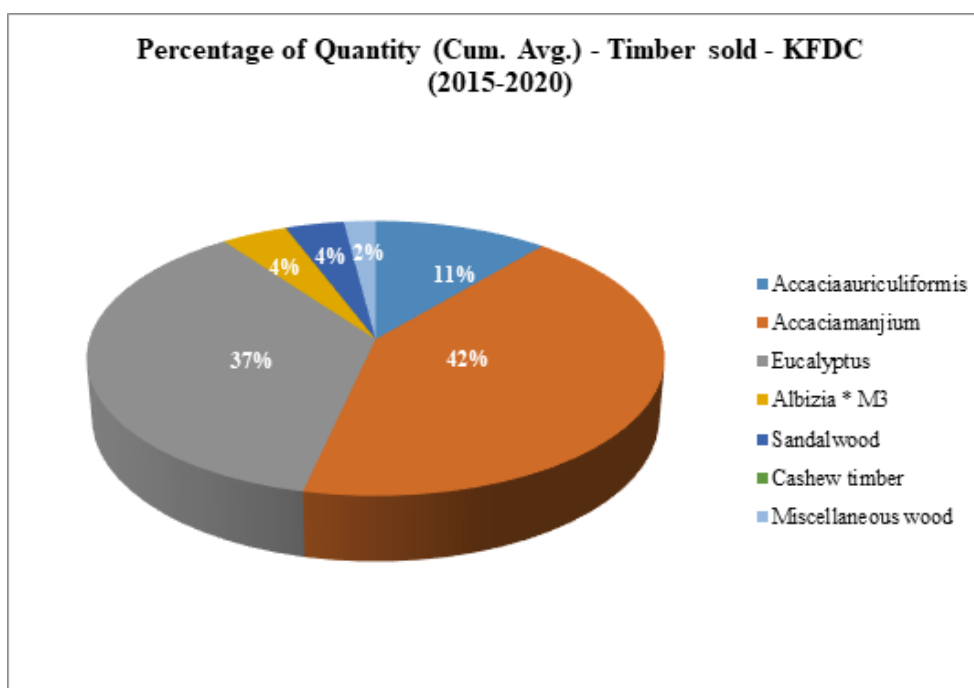


Figure 5.35

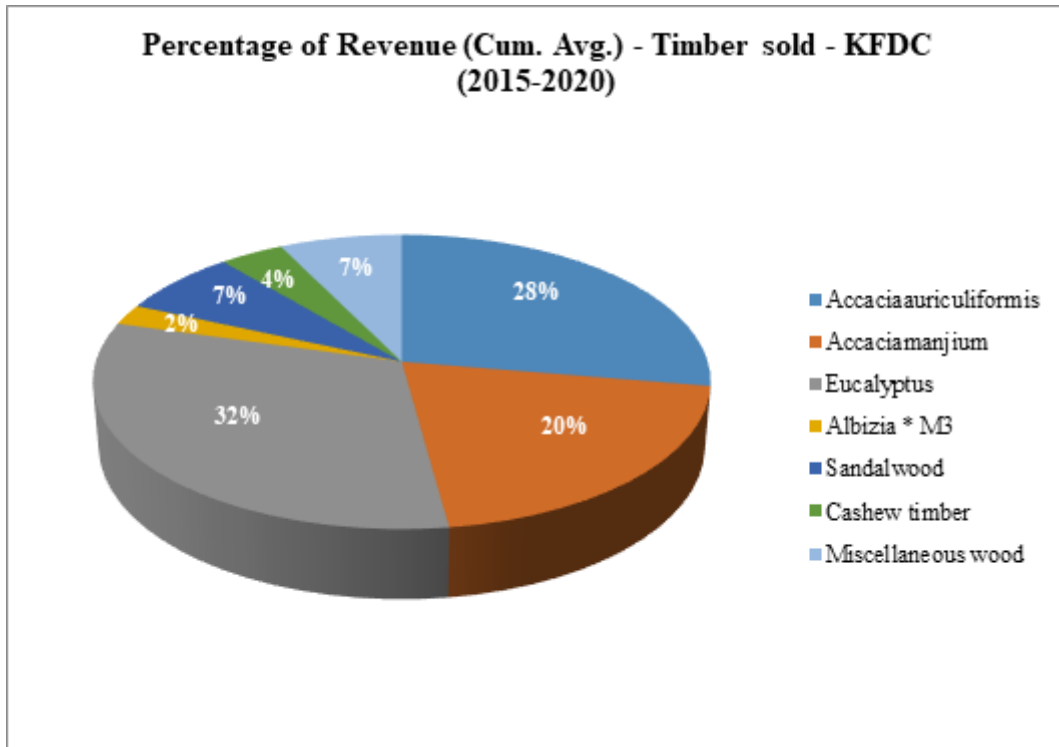
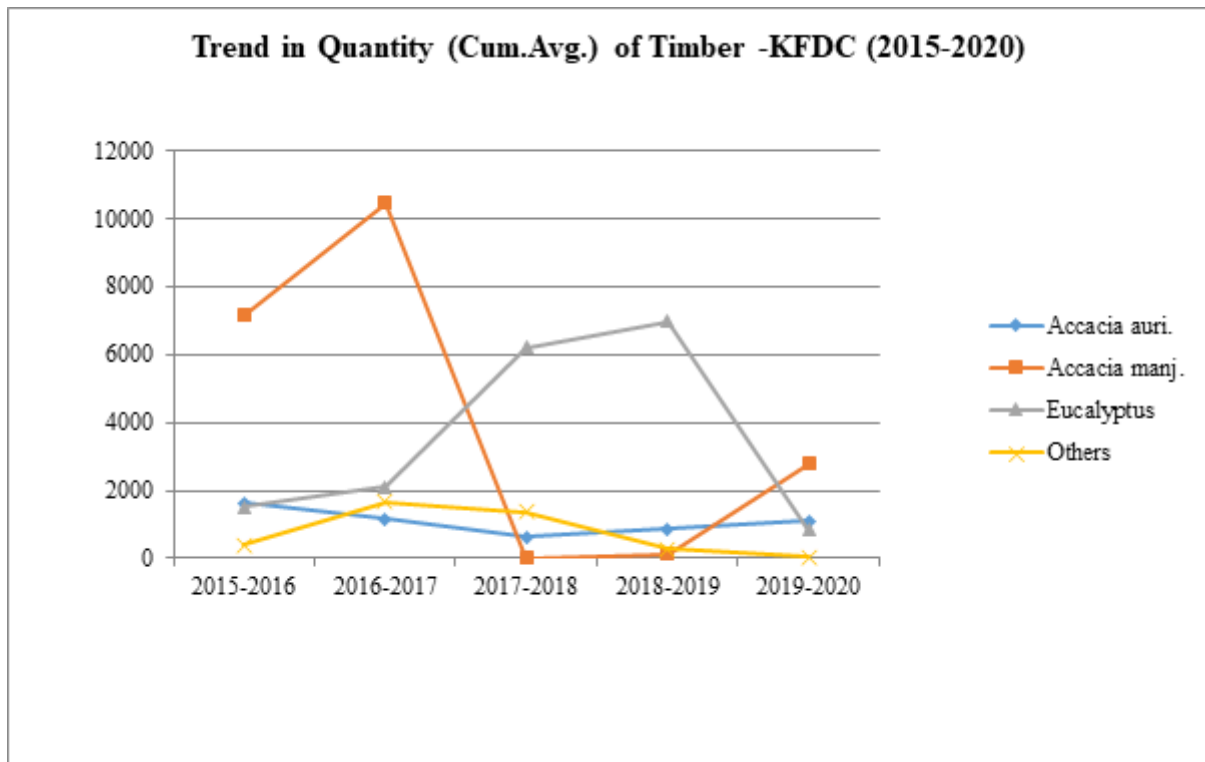


Figure 5.36





C) HIGH VALUE TIMBER -MARAYOOR SANDALWOOD

Sandalwood trees of Marayoor

Indian Sandalwood (*Santalum album* L.) may be considered as one of the world's most valuable commercial timber and is currently valued globally for its heartwood and oil. This species, which is listed as Vulnerable (VU) under the IUCN redlist, can grow up to 12 to 15 m in height, and is a partial root parasite. The species mainly occurs in lowland tropical forest and woodland. The essential oil obtained from the steam distillation of its heartwood is known as East Indian sandalwood oil. It is highly valued in perfumery and cosmetics industries.

The Marayoor sandalwood reserve in Kerala spread over 1,460.7 hectares is currently one of the very few natural high-quality sandalwood forests in India. With top quality wood and high oil content (also known as liquid gold), the Marayoor sandalwood is of high demand in the cosmetic and perfume industries in the international markets. The Institute of Wood Science and Technology (IWST) has branded the Marayoor sandalwood as the best quality sandalwood available in the country citing its high oil content and this is one of the main reasons for its growing demand in the cosmetic and perfume industries (Arunkumar et al., 2012).

Among eight potential sandal provenances of India, Marayoor sandal population has got the highest genetic diversity as revealed through RAPD and isozyme studies and it is the most adapted provenance for Kerala (Balasundaran, 2004). Marayoor population has been considered as genetically superior with highest oil content (Venkatesan et al., 1995). In the forests of Marayoor, sandal population has come down drastically during the last few years.

The total number of sandal trees above 30 cm GBH in the sandal reserves was 1,86,594 during 1976 (Varghese, 1976). The number has come down to less than 60,000 in 2004. Besides large-scale smuggling of superior trees and drying up of trees infected by spike disease, decrease in sandal population is caused by low seed setting, lack of natural regeneration and browsing by cattle and wild animals. The survival and growth of natural seedlings is also hampered by the hemi-parasitic nature of the plant and its shade requirement at varying intensity during different maturity periods of the seedlings. Poor seed setting and lack of seedling vigour observed in some pockets of seed stands also are 2 reasons for poor regeneration. The seedling population can be improved by sowing genetically superior seeds, providing optimum shade at various stages of seedling maturity and planting suitable host plants at appropriate growth period of sandal. (Balasundaran, 2010).

To understand the volume and value of the Marayoor sandalwood past 5-6 years, required information was collected from the Forest Department and compiled (Table 5.35)

Table 5.35
Quantity and Value / revenue from Marayoor Sandalwood
(Quantity in kg and Amount in Rs)

Class	2015		2016		2017		2018		2019		2020	
	Qty (kg)	Amt/ Price	Qty (kg)	Amt/ Price	Qty (kg)	Amt/ Price	Qty (kg)	Amt/ Price	Qty (kg)	Amt/ Price	Qty (kg)	Amt/ Price
I	-	-	-	-	33.5 5	4700 36	134. 6	2023 344	92.6	1390 852	399. 6	6001 992
II	109. 4	11025 78	-	-	61.1 5	9179 98	201. 75	2994 796	906. 2	1351 1442	119 9.1	1787 8581
III	116. 9	14070 56	16	2084 48	64.3	9113 52	149. 4	2121 422	239. 4	3401 874	193 0.75	2743 6384
IV	144. 85	17155 14	89.6	1163 080	101. 6	1347 490	264. 85	3678 096	142. 5	1983 911	221. 05	3074 806
V	886. 8	10156 508	670. 3	8644 780	454. 5	6305 012	333. 4	4862 825	117 8.5	1641 3779	233 7.3	3251 1843
VI	2133 6.6	22245 6180	1645 .25	2116 5097	377 9.5	4349 4787	147 5.45	1829 1757	240 99.7 5	2654 2223 7	606 8.45	6959 0375
VII	6122 .6	56524 503	0	0	0	0	701 0.8	9123 1932	0	0	573 3.6	7519 5160
VIII	3683 .74	30819 293	1532 .2	1798 5824	0	0	424 2.05	4670 9743	403. 2	4479 552	398 0.1	4418 9166
IX	3595 .42	29167 719.5	2047	2148 3291	107 0.8	1125 4108	264 5.95	2807 3530	380. 2	4071 942	383 2.5	4101 8167
X	1879 9.74	16304 2738	1225 1.4	1218 2132 1	548. 35	5346 890	191 39	1914 4304 8	672 0.2	7065 9398	232 91.5	2480 3870 7
XI	3081 .1	14626 790	3145 .95	1815 3705	146 5.1	9392 443	160 1.1	9808 001	856. 9	5584 796	273 5.65	1803 4801
XII	3549 4.95	14215 9394	1939 0.3	9232 8386	278 0.2	1254 6712	234 41	1057 9555 0	644 2.1	2991 3809	167 91.2 5	7836 5809
XIII	103. 85	28143 4	286. 15	8896 31	0	0	0	0	0	0	0	0
XIV	6000 .9	38012 70	9852 .2	6615 410	838 9.4	8341 220	347 1.3	2874 837	475 9.3	5030 595	422 2.7	4636 453
XV					398 7	5183 10	214 88	3705 555	672 3	1253 780	264 3	5153 85
Hw sp*	75.8	34445 8	-	-	-	-	-	-	-	-	-	-
S P*	204	86904 0	750	3505 140	0	0	0	0	0	0	0	0
AS *	-	-	-	-	-	-	430	5418 00	0	0	187 0	2356 200
Tot al	9975 6.65	67847 4476	5167 6.35	3139 6411 3	227 35.4 5	1008 4635 8	860 28.6 5	5141 5623 6	529 43.8 5	4231 1796 7	772 56.5 5	6688 4382 9

* Hwsp - Heartwood small pieces

* SP- Sandal Powder

* AS- African Sandal



The following table 5.36 provides the Cumulative Annual Average of Quantity and value of the Marayoor sandalwood.

Table 5.36
Marayur Sandal wood: Cumulative Annual Average (2015 – 2020)

Class	Cumulative Annual Average			
	Qty (kg)	%	Amt/ Price	%
I	165.09	0.23	2471556.00	0.50
II	495.52	0.68	7281079.00	1.46
III	419.46	0.57	5914422.67	1.19
IV	160.74	0.22	2160482.83	0.43
V	976.80	1.34	13149124.50	2.64
VI	9734.17	13.34	106736738.83	21.45
VII	6289.00	8.62	74317198.33	14.94
VIII	2768.26	3.79	28836715.60	5.80
IX	2261.98	3.10	22511459.58	4.52
X	13458.37	18.44	133392017.00	26.81
XI	2147.63	2.94	12600089.33	2.53
XII	17389.97	23.82	76851610.00	15.45
XIII	195.00	0.27	585532.50	0.12
XIV	6115.97	8.38	5216630.83	1.05
XV	8710.25	11.93	1498257.50	0.30
Hwsp*	75.80	0.10	344458.00	0.07
SP*	477.00	0.65	2187090.00	0.44
AS*	1150.00	1.58	1449000.00	0.29
Total	72990.99	100.00	497503462.52	100.00

The Cumulative annual average (based on last 6 years, 2015 to 2020 data) of quantity of Marayoor sandalwood extracted from forest or sold was 72,991 kg worth Rs. 49,75,03,463.

The following graphs (Figure 5.38 & 5.39) provide the trend of quantity and value generated from Marayoor sandalwood sale during the period of 2015 to 2020.



Figure 5.38

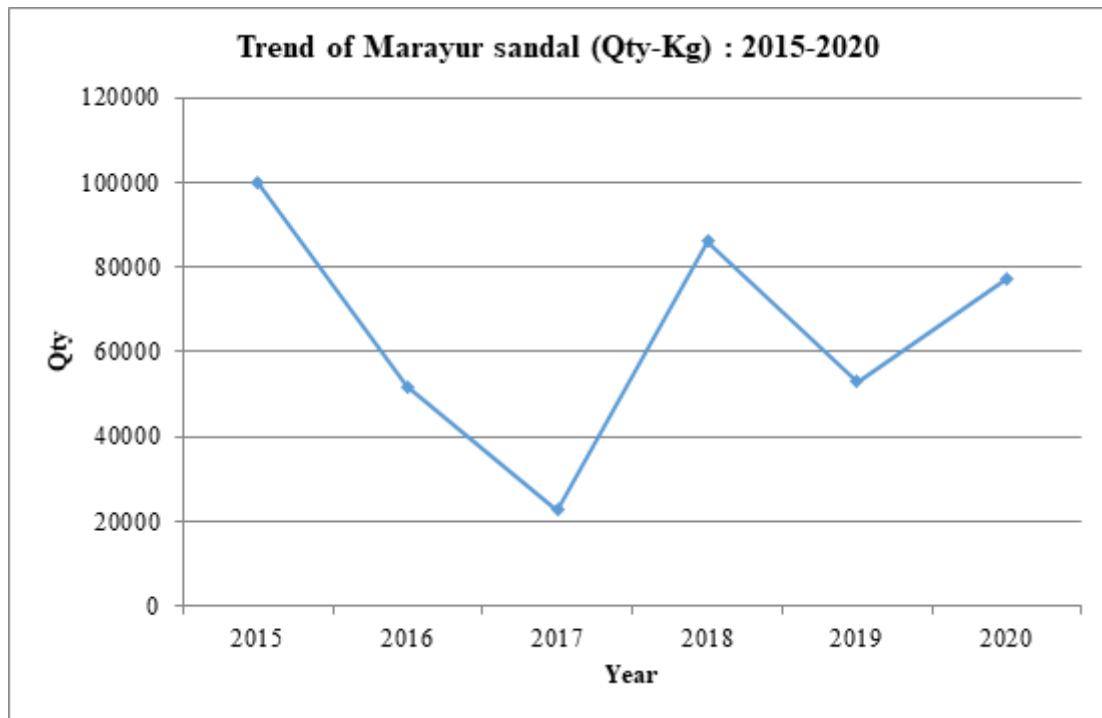
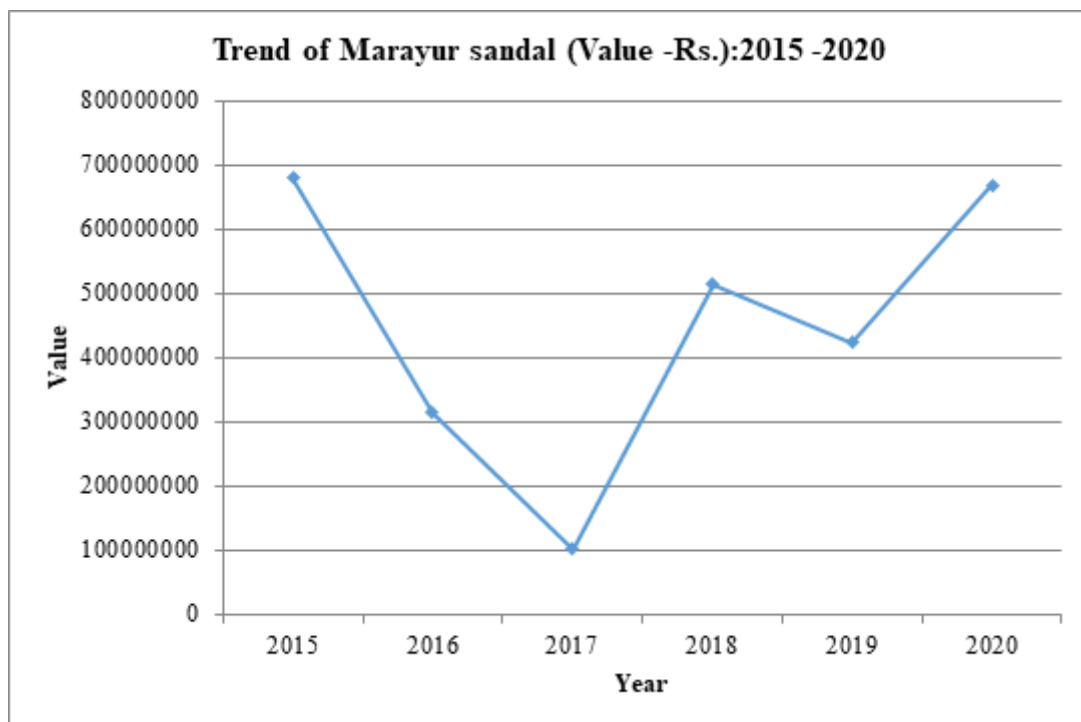


Figure 5.38



For understanding the trade and usage of Marayoor sandalwood, we collected the bidders details who auctioned the sandalwood over the last 6 years (2015 to 2020) with the quantity acquired and the amount/price paid. Following are the major inferences from the analysis of bidders' data.

Table 5.37
MARAYOOR SANDALWOOD: BIDDERS (2015

S. No	Bidder (Name)	Quantity (Kg)	Percentage (%)	Amount/ Price (Rs)	Percentage (%)
1	Rural Artisans, Salem	6880.54	6.90	61717383	9.10
2	Oushadhi, Thrissur	2599.4	2.61	8915942	1.31
3	MumiyooreDevaswom	308.35	0.31	2794529	0.41
4	Surya Handicrafts, Jaipur	4905.55	4.92	43415175	6.40
5	Flylite Luggage	610.65	0.61	5902227	0.87
6	ThiruvambadyDevaswom	378.4	0.38	4373561	0.64
7	KFDC, Munnar	455.85	0.46	4524089	0.67
8	SaiLalith Fragrance	6252.99	6.27	55437229	8.17
9	AnicadBhagavathyDevaswom	271.1	0.27	151816	0.02
10	Garg Brothers, Delhi	2014.47	2.02	15884628	2.34
11	KSDL, Bangalore	53482.95	53.61	344115071	50.72
12	Al Sana Fragrance	3390.8	3.40	29961219	4.42
13	Ambuja Research Ayurvedic	101	0.10	57570	0.01
14	SreeSeethaRamaswamyDevaswom	71.3	0.07	801606	0.12
15	Cochin Devaswom	288.9	0.29	2952025	0.44
16	Indian Perfumes, Lucknow	9	0.01	43650	0.01
17	KSHDC, Bangalore	4942	4.95	44736860	6.59
18	M.G.S.International, Chennai	2391.6	2.40	25289405	3.73
19	KadungalloorDevaswom, Aluva	49.7	0.05	571550	0.08
20	Ashok International, Chennai	328.95	0.33	3707667	0.55
21	ThrimandhankunnuDevaswom, Malapuram	118.8	0.12	1318002	0.19
22	U.N.A.Essential Oil Industries, Mehtapur	7260.35	7.28	20111112	2.96
23	KottacklaAryavaidhasala	2644	2.65	1692160	0.25
TOTAL		99756.65	100	678474476	100

- ◀ The largest bidder of Marayoor sandalwood in 2015 both in terms of quantity (53482.95 kg) and value (344115071 Rs.) was Karnataka Soaps and Detergents Limited (KSDL) which manufactures and markets the famous Mysore sandal soap
- ◀ More than half of the total auctioned sandalwood was bought by KSDL
- ◀ Other prominent bidders included Rural Artisans Salem, SaiLalith Fragrance Chennai, Al Sana Fragrance Delhi and Karnataka State Handicrafts Development Corporation (KSHDC), Bangalore all located outside Kerala
- ◀ Prominent bidders within Kerala include Oushadhi Thrissur, KFDC Munnar, Cochin Devaswom, Thiruvambady Devaswom etc.
- ◀ More than 90% of sandalwood in quantity and volume have been purchased by bidders from outside the state.



Table 5.38
MARAYOOR SANDALWOOD BIDDERS (2016)

S. No	Bidder (Name)	Quantity (Kg)	Percentage (%)	Amount/ Price (Rs)	Percentage (%)
1	KSDL, Bangalore	35052.6	67.83	242804621	77.34
2	Surya Handicrafts, Jaipur	1000	1.94	11239500	3.58
3	SaiLalith Fragrance, Chennai	1985.7	3.84	9880835	3.15
4	KottacklaAryavaidhasala	4124	7.98	2721840	0.87
5	Sree Hanuman Kovil Public Trust, Eranakulam	37.85	0.07	191150	0.06
6	Cochin Devaswom Board, Thrissur	256	0.50	2936525	0.94
7	SreeKadampuzhaBhagavathyDevaswom, Kadampuzha	700	1.35	6788415	2.16
8	SreeSeethaRamaswamyDevaswom, Thrissur	71	0.14	662220	0.21
9	KottiyoorDevaswom, Kottiyur	281.8	0.55	3555028	1.13
10	SreeDurga Devi Kshethram, Vaikom	539.8	1.04	474766	0.15
11	Ambujalinstitute of Ayurvedic Research and Documentation, Eranakulam	528	1.02	365270	0.12
12	AlathiyurPrumThrikovil	66.1	0.13	1105950	0.35
13	Navamukunda Temple	144.5	0.28	1896500	0.60
14	Cholayil PVT Ltd., Chennai	286.15	0.55	889631	0.28
15	Oushadhi, Thrissur	4611.85	8.92	11050497	3.52
16	Poompokar	122.2	0.24	1607182	0.51
17	Cochin ThirumalaDevaswom	418.6	0.81	317180	0.10
18	ThirumandhamkunnuBhagavathyDevaswom	113.9	0.22	1513809	0.48
19	KFDC, Munnar	267.3	0.52	3645520	1.16
20	Alsanana Fragrance, Delhi	915	1.77	9910264	3.16
21	KadungalloorDevaswom Trust, Aluva	129.6	0.25	98750	0.03
22	HMDP Sabha, Moothakunnam	24.4	0.05	308660	0.10
	TOTAL	51676.3	100	31396411	100

- The largest bidder of Marayoor sandalwood in 2015 both in terms of quantity (35052.6 kg) and value (242804621 Rs.) was Karnataka Soaps and Detergents Limited (KSDL).
- More than 65% of the total auctioned sandalwood in quantity was bought by KSDL.
- Other prominent bidders included Surya Handicrafts Jaipur, SaiLalith Fragrance Chennai, Al Sana Fragrance Delhi which are located outside Kerala
- The percentage of sandalwood bought by bidders within Kerala showed an increase, especially with Oushadhi Thrissur and various Devaswoms buying higher percentage of sandalwood, although this still remained less than 15% of total value.



Table 5.39
MARAYOOR SANDALWOOD BIDDERS (2017)

S. No	Bidder (Name)	Quantity (Kg)	Percentage (%)	Amount/ Price (Rs)	Percentage (%)
1	Cochin Devaswom Board	261.9	1.15	3498987	3.47
2	SreemathMuttathuThirumalaDevaswom	21.15	0.09	288630	0.29
3	KFDC, Munnar	11.45	0.05	153316	0.15
4	KSDL, Bangalore	2404.1	10.57	18867251	18.71
5	Poompuhar, Chennai	1412.35	6.21	15035856	14.91
6	TTK Devaswom, Thaliparambu	188.6	0.83	2914031	2.89
7	SreeSeetharamaswamy, Thrisur	68.8	0.30	969890	0.96
8	Oushadhi, Thrisuur	4624.3	20.34	11104889	11.01
9	TSR & CO. Madras	9065.8	39.88	5448483	5.40
10	KSTDC Shop	41.1	0.18	562193	0.56
11	MamiyurDevaswom	211.35	0.93	2687414	2.66
12	SreeDurga Devi Kshthram	5.8	0.03	71746	0.07
13	KashimathSamsthan, Varanasi	420.35	1.85	4934680	4.89
14	ThiruvambadyDevaswom	120.9	0.53	1551558	1.54
15	SaiLalith Fragrance, Chennai	1137.75	5.00	6893730	6.84
16	EadakkattilSree Dharma SasthaDevaswom	58.3	0.26	657551	0.65
17	HMDP Sabha, Moothakunnam	115.4	0.51	1449424	1.44
18	KHDC, Bangalore	2035.2	8.95	22916352	22.72
19	ManakkattuAyyappa Temple	10.15	0.04	117740	0.12
20	SreeNagareswara Siva KshethraParipalanaSamithy	15.8	0.07	178170	0.18
21	ThaliDevaswom	15.7	0.07	177567	0.18
22	KalarickalBhagavathyDevaswom	489.2	2.15	366900	0.36
	TOTAL	22735.45	100	100846358	100

- This year (2017) saw a sharp decrease in percentage of sandalwood bought by KSDL Bangalore (10.57%).
- Interestingly, TSR&CO Madras which is a new bidder compared to previous two years bought almost 40% of total quantity of sandalwood, but this formed only around 5.40% of total value of sandalwood auctioned.
- This may be due to the differences in classes of sandalwood bought by different bidders.
- Kashimath Samsthan, Varanasi was a significant new bidder in this year bagging almost 5% of total value.
- Other prominent bidders outside Kerala were KSHDC Bangalore, SaiLalith Fragrance Chennai and Poompuhar Chennai.
- Oushadhi Thrisur again increased its share this year with around 20% of total quantity forming 11% of total value of sandalwood.
- The percentage of quantity and value bought by bidders within Kerala therefore increased substantially in this year.



Table 5.40
MARAYOOR SANDALWOOD BIDDERS (2018)

S. No	Bidder (Name)	Quantity (Kg)	Percentage (%)	Amount/ Price (Rs)	Percentage (%)
1	KSDL, Bangalore	54726.3	63.61	448321632	87.20
2	TSR & CO., Madras	11897.5	13.83	2625541	0.51
3	Sri. VarahalakshmiNarasimhaSwamy Devasthanam	252.4	0.29	3094424	0.60
4	ThiruvampadyDevaswom	121.2	0.14	1485912	0.29
5	Handicrafts Development CO-operation Kerala	177.45	0.21	2239975	0.44
6	KFDC, Munnar	531.1	0.62	6509033	1.27
7	SreeDurga Devi Temple	117.2	0.14	220454	0.04
8	Cochin Devaswom Board	208.35	0.24	2607121	0.51
9	AryaVaidhayasala, Kottackal	278.8	0.32	223040	0.04
10	Nalpathenniswaram Temple	33.1	0.04	111284	0.02
11	KSTDC Shop, Kayamkulam	458.8	0.53	4918242	0.96
12	Surya Handicrafts, Jaipur	441.8	0.51	5291646	1.03
13	Al Sana Fragrance, Delhi	458.6	0.53	5573580	1.08
14	SaiLalith Fragrance, Chennai	745	0.87	3701250	0.72
15	SreeGuruvayurappanSamajam	15.6	0.02	215592	0.04
16	AjasthiyaSiddhaAyurvedhaOushadhasala	31.4	0.04	428748	0.08
17	Rural Artisans, Salem	210.3	0.24	3074060	0.60
18	Navamukunda Temple, Thirunavaya	274.1	0.32	3282305	0.64
19	Sundreswara Temple, Kannur	105.1	0.12	428099	0.08
20	TaliDevaswom, Tali	116.7	0.14	1685317	0.33
21	NedumparambilSreeDurga Devi Temple, Vaikom	215.85	0.25	257312	0.05
22	KottiyoorDevaswom, Kottiyoor	124.3	0.14	1747360	0.34
23	Oushadhi, Thrissur	14173.3	16.48	12018797	2.34
24	Cloud 9	258.4	0.30	3366952	0.65
25	KSTDC Shop, Alappuzha	56	0.07	728560	0.14
	TOTAL	86028.65	100	514156236	100

- KSDL returned to its original high bidding status in 2018, bagging more than 60% of total quantity which formed more than 80% of total value of sandalwood auctioned.
- TSR&Co Madras repeated its bidding strategy of buying high quantity (13.83% of total) but with relatively low value (0.51% of total).
- The previous prominent bidders outside Kerala such as Rural Artisans Salem, SaiLalith Fragrance Chennai etc reduced their bid amounts substantially although bidders like Al Sana Fragrance, Delhi and Surya Handicrafts, Jaipur rejoined the bidding action this year.
- Oushadhi, Thrissur reduced their percentage marginally compared to last year although it bought a substantial amount in quantity (16% of total) forming around 2% of total value.



**Table 5.41
MARAYOOR SANDALWOOD BIDDERS (2019)**

S. No	Bidder (Name)	Quantity (Kg)	Percent age (%)	Amount/ Price (Rs)	Percentage (%)
1	KSDL, Bangalore	29951	56.57	313908626	74.19
2	KSHDC, Bangalore	3286.9	6.21	39733323	9.39
3	Poompuhar, Chennai	560.7	1.06	7821765	1.85
4	Cochin Devaswom board, Thrissur	202.6	0.38	2261016	0.53
5	SreeGuruvayuramppanSamajam, Calcutta	21.1	0.04	299831	0.07
6	Aryavaidhyasala, Kottckkal	8015	15.14	2558700	0.60
7	Ambuja Institute and research Centre, Eranakulam	124.2	0.23	133721	0.03
8	KSTDC Shop, Alappuzha	290.8	0.55	3719958	0.88
9	SreeSeetharamaswamyDevaswom, Thrissur	65.9	0.12	936439	0.22
10	Adarcheh Trust	109.45	0.21	1207250	0.29
11	NedumparambilllSreeDurga Devi Kshethram, Vaikom	207	0.39	286180	0.07
12	ManakkattuAyyappa Temple Devaswom, Kottayam	251	0.47	267315	0.06
13	Aqsa Enterprises, Bangalore	233.6	0.44	3249376	0.77
14	SreeVaraha Lakshmi NarasimhaSwamyDevasthanam, Vishakapattanam	212	0.40	2948920	0.70
15	KalarickallBhagavathyDevaswom, Mulikulangara	903.7	1.71	1262151	0.30
16	Pharmaceuticalcoporation Ltd, (Oushadhi), Thrissur	6820.8	12.88	24545510	5.80
17	Al Sana Fragrance, Delhi	1265.8	2.39	14592778	3.45
18	KFDC, Munnar	422.3	0.80	3385108	0.80
	TOTAL	52943.85	100	423117967	100

- The year, 2019 saw KSDL Bangalore continuing its high bidding run consistently to acquire around 56% of total quantity amounting upto almost 74% of total value of sandalwood auctioned.
- KSHDC Bangalore also returned to bidding action with almost 6% of total quantity and 9% of total value.
- Prominent bidders outside Kerala included Al Sana Fragrance Delhi, Poompuhar Chennai and Sree Varaha Lakshmi Narasimha Swamy Devasthanam, Vishakapattanam although TSR&Co Madras was a notable absence in this year's bidders list.
- Oushadhi Thrissur reduced its share again this year, although quantity percentage remained above 10% with value percentage around 6%.
- A notable high quantity (15.14% of total) and low value (0.60% of total) bidder in this year was Aryavaidhyasala, Kottackkal.



**Table 5.42
MARAYOOR SANDALWOOD BIDDERS (2020)**

S. No	Bidder (Name)	Quantity (Kg)	Percentage (%)	Amount/ Price (Rs)	Percentage (%)
1	KSDL, Bangalore	66273	85.78	63,94,87,987	95.61
2	SreeGuruvayurappanSamajam, Calcutta	21.15	0.03	300753	0.04
3	Sri. Tricherumanan Alias KottiyoorDevaswom	146.6	0.19	2071246	0.31
4	Handicrafts Development Corporation, Thriuvananthapuram	31.5	0.04	447615	0.07
5	SreeVarahalakshmiNarasimhaSwamyDevasthanam, Visakapattinam	646.2	0.84	9634842	1.44
6	AryaVaidhyasala, Kottackkal	3229.6	4.18	1143047	0.17
7	KalarickalBhagavathiDevaswom, Mullikulangara	465.8	0.60	505609	0.08
8	HMDP Sabha, Moothakunnam	55.2	0.07	767832	0.11
9	SreemathMuttathuThirumalDevaswom, Cherthala	10.4	0.01	144664	0.02
10	Cochin Devaswom board, Thrissur	285.4	0.37	3252133	0.49
11	The Pharmaceutical Corporation IM Kerala Ltd, Thrissur (Oushadhi)	4172.8	5.40	8204907	1.23
12	NedumparambillamSreeDurga Devi Temple	5.5	0.01	76505	0.01
13	KSTDC Shop, Alapuzha	43.4	0.06	450489	0.07
14	SaiLalith Fragrance, Chennai	1870	2.42	2356200	0.35
	TOTAL	77256.55	100	668843829	100

- The last year to be considered for study, 2020 saw the consistent bidding performance of KSDL, Bangalore with an all-time high of around 85% of total quantity amounting to around 95% of total value of sandalwood auctioned.
- The only other prominent bidders were Oushadhi, Thrissur (5.4% of total quantity) and AryaVaidhyasala, Kottackkal (4.18% of total quantity).
- This year saw a dearth of bidders from outside Kerala other than KSDL, Bangalore and SaiLalith Fragrance, Chennai.
- The dominance of KSDL, Bangalore in the sandalwood market of Kerala is apparent from this data.
- The consistent bidding of relatively minute quantities of sandalwood by various Devaswoms of temples in Kerala is also noteworthy.



5.3.2. TIMBER OUTSIDE FOREST (ESTIMATION BASED ON SAW MILL DATA)

For obtaining an overall and comprehensive picture about the timber resources of the State, the timber coming out from the private land was also estimated. In this regard, the KSBB had done a thorough investigation with different Government Departments handling the timber, including the Forest Department. However, the data is not available with any of these Departments. Hence, with the advice of experts, we reviewed the "Report on Saw mills of Kerala (2014-15)" prepared by the 'Survey Design Division, Directorate of Economics and Statistics, Government of Kerala (published in September – 2016)'. In this report, consumption statistics of woods in Kerala from different categories / sources (such as forest wood, local wood, and imported wood) were provided.

The details of local wood discussed in the report are the wood/timber coming out from the private lands or timber outside forests is considered for analysis. A major limitation of this database is: it contains only one year data (2014-15). Hence, cumulative annual average is not estimated or considered for analysis. Further, the data is relatively out dated compared to the data we used (2015 – 2020) for other sectors in this report.

Following are the major findings from the report:

- ◆ Saw mills are classified into three types:
 1. Saw mills (firm in which only milling activity is carried out)
 2. Saw mills plus depots (firm in which both milling and sales of logs is carried out) and
 3. Saw mill plus others (Firm in which milling, sale of logs and other activities like manufacture and sales of furniture is carried out).
- ◆ Ply wood manufacturing units, match stick making units, packing box manufacturing units are excluded from this survey.
- ◆ The trees from which lumber is produced are classified as hard woods or soft woods according to their wood density.
- ◆ Hardwoods are generally more expensive than softwoods and are used for flooring, cabinetry, paneling, doors and framework. They are also extensively used to manufacture furniture.
- ◆ Softwoods are used for wall framing, rafters (internal framework of a roof), beams, posts, decking, sheathing (protective casing or covering) and subflooring.
- ◆ Bulk of the sawn wood originating from either domestic or imported timber passes through these units and thus the sawmills have a key role as an intermediary between the producers and the consumers.
- ◆ Mainly four sources could be identified for timber purchased by mill owners, viz., homesteads, imported, forest depots and estates. Other than direct purchase, customers also brought wood for sawing.
- ◆ A total of 3696 saw mills are working across the State. Kollam district tops with 11.6% (430) of the total number of Saw mills followed by Malappuram 11.4% (422), and Palakkad 11.1% (405).
- ◆ The least number of saw mills are functioning in Wayanad (43) which is only 1.2% of the total saw mills in the State.
- ◆ Out of 3696 units 2385 are saw mills, 789 are saw mills with depot and 522 are saw mills with wooden furniture units.
- ◆ Out of 3696 saw mills in the State, 3111 are functioning under proprietorship and 550 in partnership.
- ◆ The survey results show that use of hard wood from forest wood is 95034 m³, Local wood 1520433 m³ and Imported wood 172546 m³.
- ◆ This shows that in the major part of hard wood timber was used in furniture making, sawing and timber sales were from homesteads (85%),
- ◆ Use of soft wood from forest is 14972 m³, Local wood 735786 m³ and Imported wood 1535 m³. This shows that the major part of the soft timber used in timber sales were from homesteads (98%)
- ◆ Wood of about 26 species was processed by saw mills for direct sale and for making door, windows and furniture. The major forest timber species of hard wood used in timber sales and used for



making door, windows and furniture were teak (56.3%), Mahogany (8.3%), Eeti (Rose wood) (6.7%), Anjili (Aini) (6%) and Irul (Kadamaram) (5%). Out of the total hard wood timber from forest wood in timber mills, the above five species constitute about 82.3 percent. The most preferred species for house construction and furniture were teak and Mahogany.

- ◆ About 18 species of softwood from forest are processed in Sawmills. The most consumed items of forest timber species (Soft wood) Mavu (31.6%), Vatta (21.1%), Thanni (10.2%) Ezhilampala (7.3%) and Rubber (7.1%). Out of the total forest timber (Soft wood) used; about 77.2 percent were of these five species. The most preferred species are Mavu and Vatta.
- ◆ Wood from about 34 species of local wood (Hard wood) is processed by saw mills for direct and indirect sale. Jack (23%), Thengu (21%), Anjili (Aini) (19%), Teak (12%) and Mahogany (11%) are the major species of local species – Hardwood used for timber. About 86 percent were of these five species. The most preferred species are Jack and Thengu.
- ◆ Softwood of about 19 species from local wood were consumed by Sawmills for different purposes. The major Local species used (Soft wood) as timber were Mavu (45.4%), Rubber (19.5%), Vatta (8.4%), Mulmurukku (4.9%) and Kasumaavu (4.2%). Out of the total Local timber species (Soft wood) processed in sawmills about 82.5 percent were of these five species. The most preferred species are Mavu and Rubber
- ◆ Wood of about 17 imported species are consumed by saw mills for direct sale and for making doors, windows and furniture. wood of about 3 species soft wood are used by saw mills.
- ◆ The major imported species of hard wood timber were Pincoda (57.3%), Teak (18.3%) and soft wood timber were Pine (45.5%), Redwood (30.4%) and Spruce (23%) respectively.
- ◆ The survey results show that 1567122.7m³ wood received for further processing. Out of which 1375860.7 m³ hard wood and 191262 m³ Soft wood.
- ◆ The major by-products are firewood and saw dust.
- ◆ Survey results show that fire wood produced is 180321.85 tons and saw dust is 93287.39 tons.
- ◆ Total working capital as on the date of survey (January 2015) were Rs.43000.91 lakhs.
- ◆ Total monthly and yearly expenditure were Rs.8670.56 lakhs and Rs.122330.05 lakhs respectively. Expenditure incurring in a saw mills divided into expenditure for logs, fuel/lubricant charges, electricity charges, water charges, Telephone/internet charges, repair and maintenance charges, transportation, advertisement and marketing, stationary and postage, taxes license fee and insurance, other expenses, interest paid on the loan, rent paid and total emoluments to employees.
- ◆ Yearly expenditure incurred was collected and it is found that around 54% of the expenditure incurred was towards the expenditure on stock of logs. Around 24% of the expenditure was for emoluments to employees and 13% for fuel
- ◆ Total monthly and yearly incomes were Rs.11589.63 lakhs and Rs.145520.78 lakhs respectively. Income generated from saw mills are divided into income from sale of log, from log sawn, from planing, from fire wood, from sawn dust, from furniture and others etc.
- ◆ The total value of fixed assets as on the date of the survey was found to be Rs. 325081.08 lakhs. 91.7% of this amount is the share of land and buildings and 5.9% is that of machinery/tools.



Table 5.43
Annual Quantity and Value of Different Categories of Hardwood Obtained from Outside Forests or Private Land (Estimated Based on 2014-15 Data)

Sl.No.	Species Name	Botanical name	Hardwood				
			Rate/M ³	Quantity (m ³)	% Qty	Value	% Value
1	Jackwood (Plavu)	<i>Artocarpus heterophyllus</i>	14980.00	347676.00	22.87	5208186480.00	30.08
2	Anjili/Aini	<i>Artocarpus hirsutus</i>	15910.00	286919.00	18.87	4564881290.00	26.36
3	Teak	<i>Tectona grandis</i>	16200.00	183866.00	12.09	2978629200.00	17.20
4	Mahogani	<i>Swietenia macrophylla</i>	15430.00	161793.00	10.70	2496465990.00	14.42
5	Acacia	<i>Acacia sp.</i>	19260.00	53663.00	3.53	1033549380.00	5.97
6	Irul (Kadamaram)	<i>Xylia xylocarpa</i>	13040.00	22457.00	1.48	292839280.00	1.69
7	Rosewood (Eeti)	<i>Dalbergia latifolia</i>	41920.00	5119.00	0.34	214588480.00	1.24
8	Maruthu	<i>Terminalia arjuna</i>	9490.00	17127.00	1.13	162535230.00	0.94
9	Njaval	<i>Syzigium cumini</i>	4480.00	15319.00	1.01	68629120.00	0.40
10	Neermaruthu	<i>Terminalia sp.</i>	11610.00	5787.00	0.38	67187070.00	0.39
11	Elanji	<i>Mimusops elengi</i>	5400.00	12371.00	0.81	66803400.00	0.39
12	Kanjiram	<i>Strychnos nux-vomica</i>	4920.00	12557.00	0.83	61780440.00	0.36
13	Akil	<i>Dysoxylum glandulosum</i>	18290.00	2284.00	0.15	41774360.00	0.24
14	Thembavu	<i>Terminalia elliptica</i>	13110.00	873.00	0.06	11445030.00	0.07
15	Cheeni	<i>Acacia sinuata</i>	2770.00	3247.00	0.21	8994190.00	0.05
16	Azhunthal (Payyani)	<i>Pajenalia longifolia</i>	3570.00	2249.00	0.15	8028930.00	0.05
17	Kumbil	<i>Gmelina arborea</i>	8110.00	972.00	0.06	7882920.00	0.05
18	Pine	<i>Pinus sp.</i>	6850.00	906.00	0.06	6206100.00	0.04
19	Aval		4660.00	1164.00	0.08	5424240.00	0.03



20	Chella	<i>Aporosa lindleyana</i>	1920.00	2258.00	0.15	4335360.00	0.03
21	Kadambu	<i>Neolamarckia cadamba</i>	6600.00	372.00	0.02	2455200.00	0.01
22	Marotti	<i>Hydnocarpus laurifolia</i>	7640.00	215.00	0.01	1642600.00	0.01
23	Churuli	<i>Mesua ferrea</i>	7930.00	103.00	0.01	816790.00	0.00
24	Edana	<i>Olea dioica</i>	2710.00	152.00	0.01	411920.00	0.00
25	Balsa	<i>Ochroma pyramidale</i>	6600.00	37.00	0.00	244200.00	0.00
26	Kappukal	<i>Ceiba pentandra</i>	14.00	49.00	0.00	686.00	0.00
27	Karinjotta	<i>Quassia indica</i>		303.00	0.02		
28	Koovalam	<i>Aegle marmelos</i>		1937.00	0.13		
29	Manjium	<i>Acacia mangium</i>		31746.00	2.09		
30	Athi	<i>Ficus carica</i>		788.00	0.05		
31	Elappa			83.00	0.01		
32	Thambakam	<i>Hopea parviflora</i>		2647.00	0.17		
33	Thengu	<i>Cocos nucifera</i>		319573.00	21.02		
34	Cheelanthi(poovarasu/poopparuthi)	<i>Thespesia populnea</i>		18841.00	1.24		
35	Others (Firewood value)			4980.00	0.33		
	Total			15,20,433.00	100.00	17,31,57,37,886.00	100.00



Figure 5.40 Local Hard wood 2014-15 - Percentage of Quantity

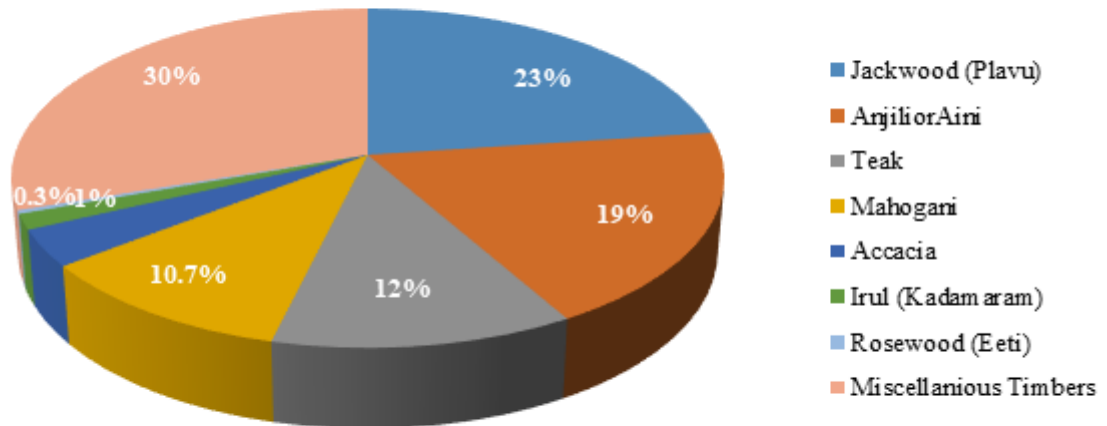
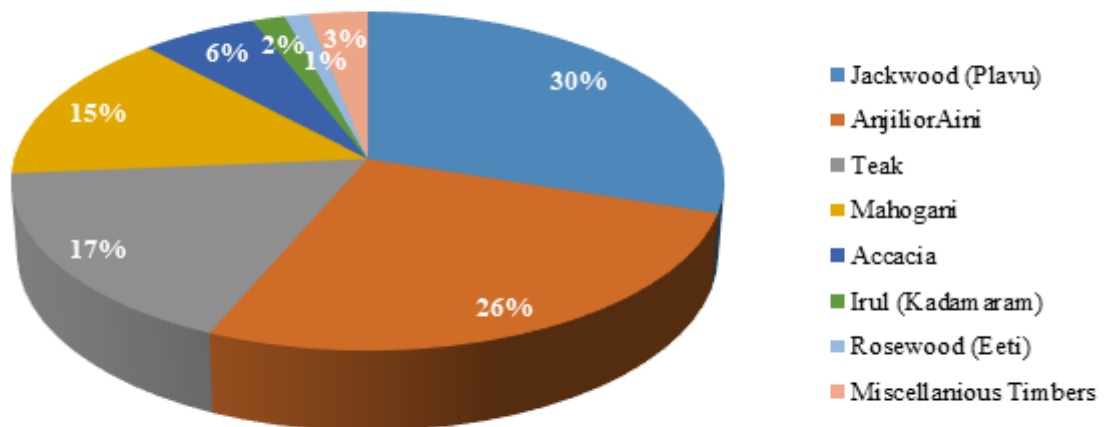


Figure 5.41 Local Hard wood 2014-15 - Percentage of Value



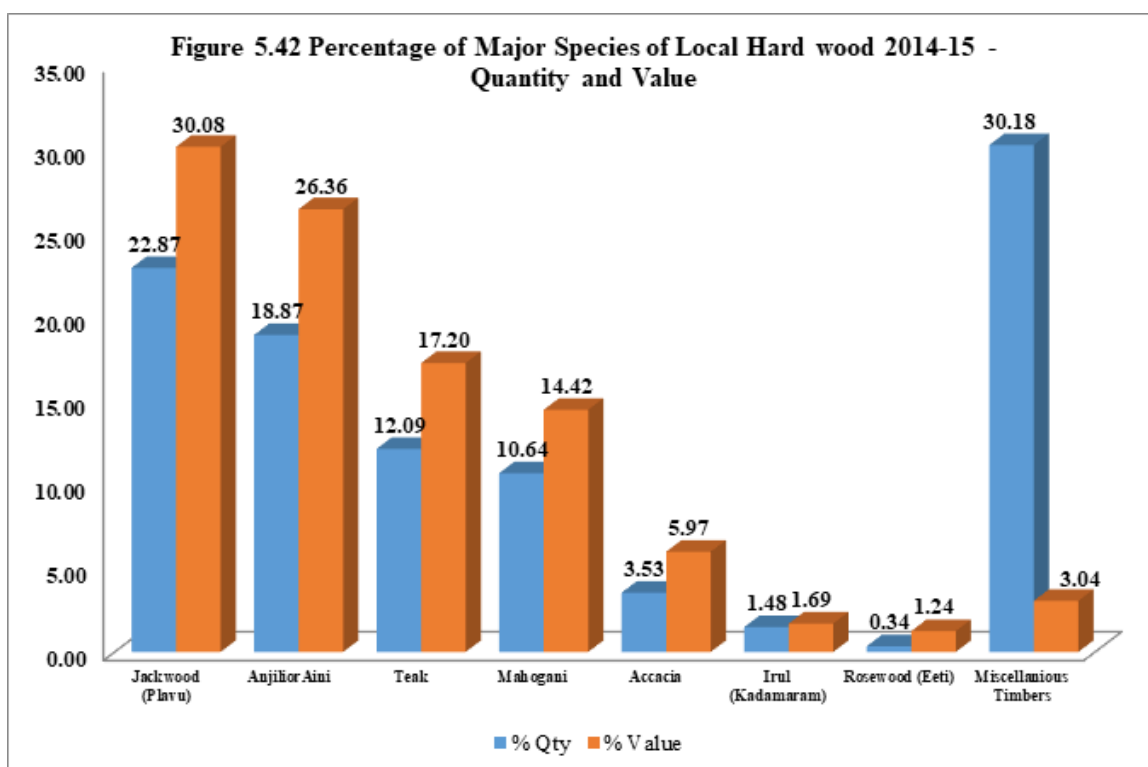


Table 5.44 Annual Quantity and Value of Different Categories of Softwood Obtained from Outside Forests or Private Land (Estimated Based on 2014-15 Data)

Softwood							
Sl.No	Species Name	Botanical name	Rate/M ³	Quantity	% Qty	Value	% Value
1	Mavu	<i>Mangifera indica</i>	4820.00	334260.00	45.43	1611133200.00	64.51
2	Rubber	<i>Hevea brasiliensis</i>	3300.00	143511.00	19.50	473586300.00	18.96
3	Kunnivaaka	<i>Albizia odoratissima</i>	8670.00	18932.00	2.57	164140440.00	6.57
4	Vatta	<i>Macaranga peltata</i>	2400.00	62313.00	8.47	149551200.00	5.99
5	Ezhilampala	<i>Alstonia scholaris</i>	2070.00	18603.00	2.53	38508210.00	1.54
6	Kulamavu	<i>Persea macrantha</i>	7060.00	4201.00	0.57	29659060.00	1.19
7	Kaara	<i>Elaeocarpus serratus</i>	5000.00	4121.00	0.56	20605000.00	0.82
8	Gulmohar	<i>Delonix regia</i>	1652.00	3409.00	0.46	5631668.00	0.23
9	Uthy	<i>Lannea coromandelica</i>	2080.00	940.00	0.13	1955200.00	0.08
10	Ooravu	<i>Persea spp.</i>	7060.00	205.00	0.03	1447300.00	0.06
11	Pezhu	<i>Careya arborea</i>	1600.00	901.00	0.12	1441600.00	0.06
12	Mulmurukku	<i>Erythrina indica</i>		36140.00	4.91		
13	Mullilavu	<i>Bombaax ceiba</i>		14834.00	2.02		
14	Vallabhavam	<i>Carallia brachiata</i>		6170.00	0.84		

15	Thanni	<i>Terminalia bellirica</i>		17856.00	2.43		
16	Perumaram	<i>Ailanthus excelsa</i>		25405.00	3.45		
17	Punna	<i>Calophyllum inophyllum</i>		7405.00	1.01		
18	Kasumavu	<i>Anacardium occidentale</i>		30662.00	4.17		
19	Ambazham	<i>Spondias pinnata</i>		1146.00	0.16		
20	Others			4772.00	0.65		
	Total			7,35,786.00	100.00	2,49,76,59,178.00	100.00

Figure 5.43 Local Soft wood 2014-15 - Percentage of Quantity

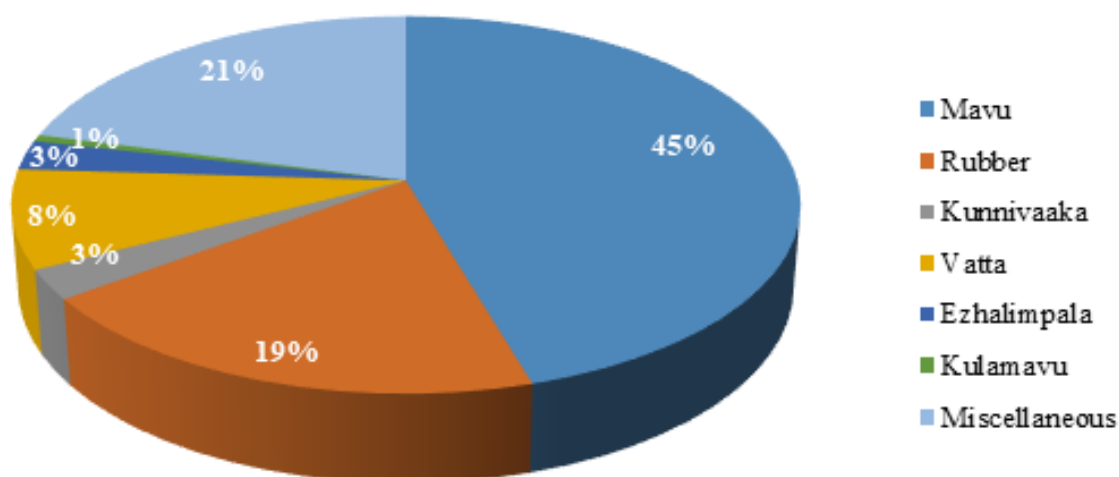
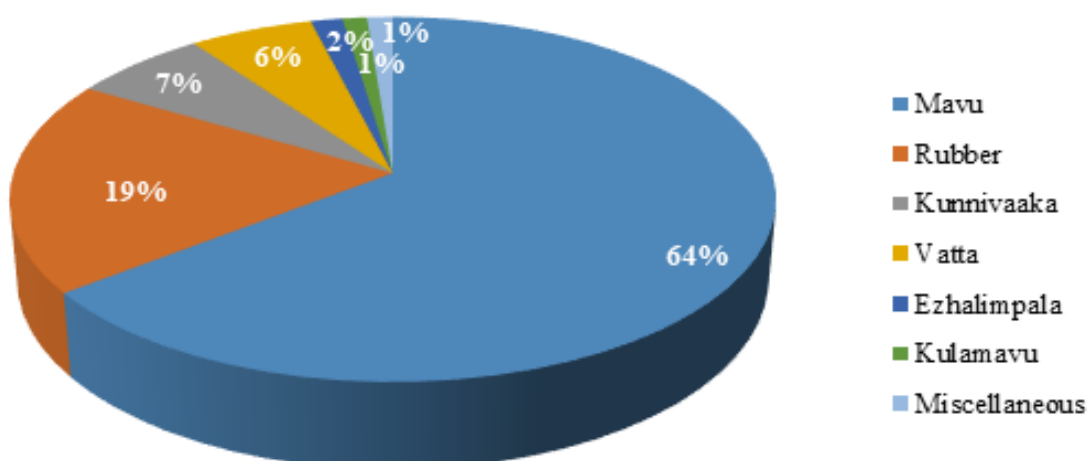


Figure 5.44 Local Soft wood 2014-15 - Percentage of Value



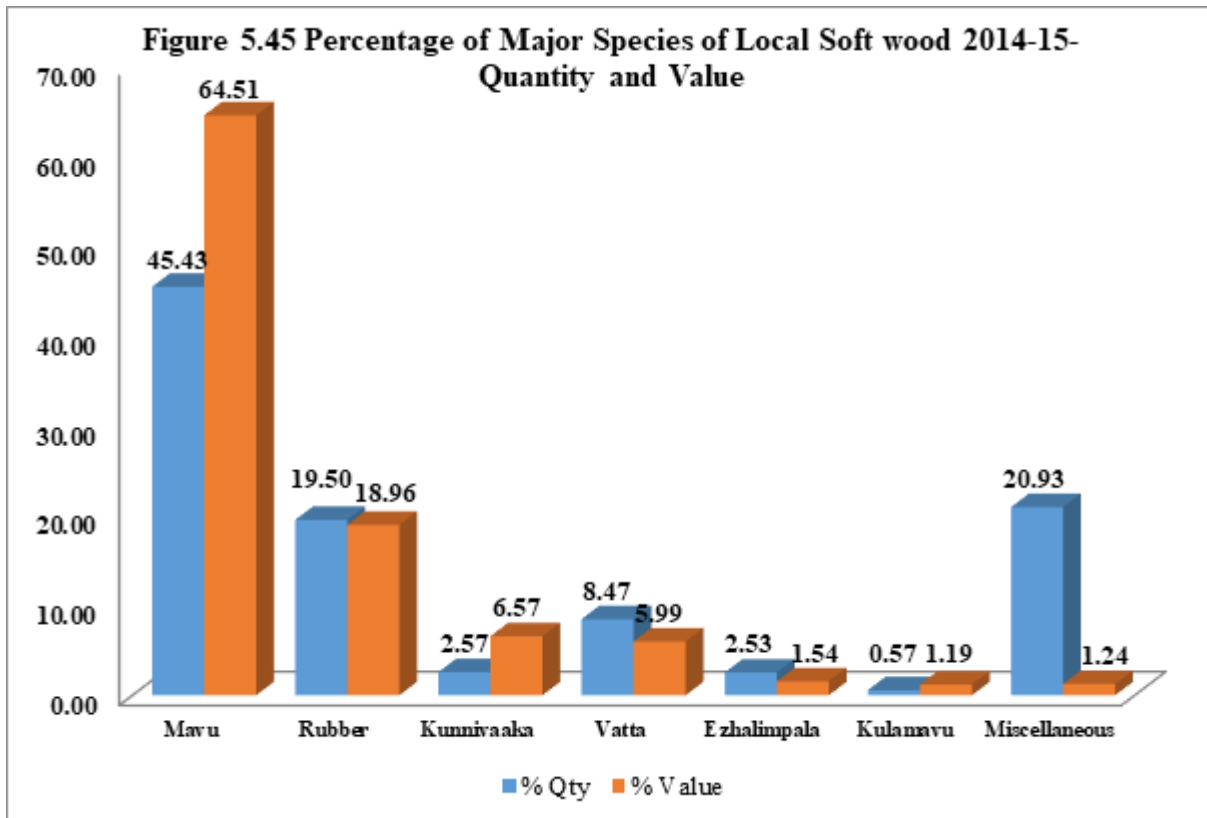


Table 5.45 Total Quantity and Value of Timber Outside Forest

Type of Wood / Timber	Quantity (M3)	Value
Hardwood	15,20,433.00	17,31,57,37,886.00
Softwood	7,35,786.00	2,49,76,59,178.00
Total	22,56,219.00	19,81,33,97,064.00



Conclusion

The modern scientific management of the forestry sector in India has been initiated since the middle of the 19th century. The rapid expansion of industries and railroads during the pre-independence period led to the sole objective of managing forests for production of timber. The production-oriented approach to forestry continued in the early post-independence phase setting goals for enhancing timber production and maximizing revenue from forest products, although protection goals were also emphasized through the aim to maintain one-third of geographical area under forests. Certain activities were banned and grazing restricted. Much of the original British policy was kept in place, such as the classification of forest land into two types, mainly reserved and protected forests.

The next 50 years saw development and change in people's thinking and attitude towards forests. A constructive attitude was brought about through a number of five-year plans. Until 1976, the forest resource was seen as a source of earning money for the state and therefore little was spent in protecting it or looking after it. In 1976, the governance of the forest came under the concurrent list. 'Development without destruction' and 'forests for survival' were the themes of the next two five-year plans, aiming at increasing wildlife reserves and at linking forest development with the tribal economy. Consequently, a slew of legislations focused on improving environmental quality and protection measures were enacted. The Indian Parliament passed the Wildlife Protection Act 1972, Water Act in 1974, Air Act in 1981, the Forest Conservation Act in 1980 and the Environment Protection Act in 1986.

The steady shift towards conservation, preservation, and protection translated itself into the forest management policy as well. Thus, the National Forest Policy was revised in 1988 with several changes in how forest management was to be approached. The preamble of the National Forest Policy 1988 captures this shift in priorities. It recognizes that forest resources have become severely depleted because of "relentless pressures arising from ever-increasing demand for fuelwood, fodder and timber; inadequacy of protection measures; diversion of forest lands to non-forest uses without ensuring compensatory afforestation and essential environmental safeguards; and the tendency to look upon forests as revenue-earning resource." The principal aim of the policy is to encourage environmental sustainability and ecological balance. The derivation of economic benefits from nature must be subordinated to this aim, according to the policy.

The rapidly depleting forest resources put a renewed focus on increasing forest cover. The policy reiterated the earlier target over covering 1/3 of the total land mass with forests and identified several avenues for afforestation. Afforestation was encouraged along roadsides, railway lines and canals and other unutilized land by both private and public entities. The policy encouraged social forestry on unused community land. The government was to provide the technical assistance and initial financial assistance to set up such programmes, and the benefits generated from social forestry were to go to the community through the panchayats. The policy also speaks about farm forestry. Individual farmers were encouraged to grow tree crops for industrial and fodder use. This change in policy towards forest management was also actively taken up in Kerala through the various custodian agencies of forests such as Kerala Forest Department (KFD) and Kerala Forest Development Corporation (KFDC). The Working Plan, 2014 also reflected this change in policy by including sustainable and participatory management for biodiversity conservation. Emphasis was laid on collection of majority of timber resources from plantations and non-forest areas, which would significantly shift the pressure of extraction from reserved and protected forests.

Considering this paradigm shift in forest management, it was imperative to understand the trend of timber resource extraction and utilisation from both forests and plantations as well as non-forest areas of Kerala. The quantification of timber resources extracted from a wide variety of species allows for an overall assessment of the trend of the quantity and value of these important bio-resources, which are extracted and utilised from different source areas. Such a comprehensive enumeration will also



aid in understanding the scope of ABS provisions that can be provided by buyers to the traditional knowledge holders, especially for high value-added species such as Sandalwood.

The methodology used to collate data on timber resources utilised in the state incorporated both backward and forward linkages through primary and secondary data collection from both the auctioneers (KFD and KFDC) as well as bidders, who form the intermediate link in the timber value supply chain. Thus, a holistic database creation and trend analysis was made possible through this method.

The data on timber extracted and auctioned by the KFD from forest areas was directly obtained from questionnaire interview of depot officers as well as timber depot records. The data on timber resources extracted from plantations was obtained directly from the KFDC records. The data on timber resources extracted and utilised from Trees Outside Forests (TOF) or private lands was obtained from the "Report on Saw Mills of Kerala, 2014-15". The data has been collated both in terms of quantity (m³) and value (Rs.) with calculation of cumulative average from 2015-20 (except saw mill data) thereby showing overall trend in productivity of various species auctioned. Percentage of cumulative average of each species in each depot was also calculated.

Until two decades ago, Kerala being home to 30 per cent of the planted teak (*Tectona grandis*) in India had a lead role in the teak trade. The boom was initiated during 1960-80 when most teak plantations in the state were raised. The area under teak doubled to 53,483 ha between 1957 and 1971, and touched the peak of 78,583 ha by 1988.

Then came the National Forest Policy of 1988, with an objective to increase forest and tree cover. It restricted felling of trees. This dissuaded private players from entering into the teak growing business. Around 20,000 ha of teak plantations have been reduced since. With 58,000 ha under teak plantations, the state now accounts for less than 10 per cent of the national teak production (Shrivastava et al., 2011).

Despite this decline in teak production and productivity, the major tree species auctioned by the KFD was Teak, which formed the highest percentage in both quantity and value among all the timber species auctioned from the 27 depots scattered across 6 timber sales divisions in 2015-20. Among the various depots, Nedunkayam (Palakkad), Walayar (Palakkad) and Achencoil (Thiruvananthapuram) depots auctioned (supplied) the highest quantities of timber and obtained a comparatively high revenue, while the lowest quantities and values were supplied through Tuet (Punalur), Varappuzha (Perumpavoor) and Parappa (Kozhikode). Other depots performed moderately. The percentage of quantity of teak (cumulative average) auctioned ranged from as low as 35% (64% in value) in Chettikulam depot to as high as 99.99% (99.99% in value) in Varappuzha depot. Overall, teak constituted 69.58% in quantity and 88.89% in value.

The prominent miscellaneous species of industrial wood other than teak include Mahogany (*Swietenia mahogaani*), Rosewood (*Dalbergia latifolia*), Maruthuu (*Terminalia arjuna*), Chadachi (*Grewia tiliaefolia*), Venteak (*Lagerstroemia microcarpa*), Venga (*Pterocarpus marsupium*), Anjili (*Artocarpus hirsutus*). These species also provide good quality timber especially for furniture, construction etc.

The forest depot officers' interview also gave an insight into the intricacies of the auction process, including methods and modes of auctioning, periodicity of auctions, division of timber classes and their pricing as well as payment modes. It was observed that e-auction process imparted more transparency and credibility to the auction process, while also simplifying it. The extraction of timber is mainly carried out through the selection system or clearfelling system. The information on major destinations of timber, especially external demand was also understood from the depot officers. The lack of awareness by depot officials on the details of Biological Diversity Act and ABS norms was also recorded, showing that the ABS potential of timber bioresources has not been tapped. However, the forest department did



levy 5% of total material value sold as Forest Development Tax (FDT). The highest number of auctions during the 5 year period of 2015-20 was conducted in Nedunkayam depot (304) of Palakkad division, while lowest number of auctions were held in Varappuzha depot (26) of Perumpavoor division.

The bidders interview provided valuable information on the major marketing channels, through which a broad idea of forward linkages of the timber sector can be obtained. The majority of bidders turned out to be timber merchants who have been involved in this trade for over 20 years. Bidders from Karnataka and Tamil Nadu also preferred to participate in some of the auctions of various depots. Due to the reduction in productivity of timber from the forests of Kerala, the native bidders expressed that they prefer to buy timber from other states, or even import them from other countries. Information on taxes and rates related to loading and transportation were also obtained from this interview. The bidding timber merchants mostly resell the timber to furniture industries in Kerala, transport them to other states (Tamil Nadu, Karnataka, Andhra Pradesh and Rajasthan), or even export them to industries outside India (Nepal and UAE).

The data from KFDC records (2015-2020) were also compiled and analysed to indicate the cumulative average of timber sold from different species grown and extracted from KFDC plantations. These included major species such as Eucalyptus, Acacia, Teak, Albizia and other miscellaneous species. Acacia mangium and Eucalyptus formed the highest percentage among timber sales by quantity and revenue respectively. Other miscellaneous species included high value species like Sandal and Red sanders, as well as species like Cashew, Kumil and bamboo. The KFDC plantations also marketed the wood grown in a few divisions by National Medicinal Plant Board (NMPB), where Sandal, Red Sanders, Kumil, Pathiri, Pathimugham etc. were grown.

The data on sales of Sandalwood bioresources of the Marayoor forest division was separately collected from the Government Sandal Depot Godown in Marayoor which is managed by the KFD. The cumulative average of sales between 2015-2020 were calculated according to different classes of wood. Among the different classes of timber, the Class XII timber formed the highest percentage of cumulative sales by quantity (23.82%), while Class X formed the highest percentage of cumulative sales by revenue (26.81%). Heartwood small pieces, sandal powder and African sandal also formed a minute quantity of total sales from the Marayoor depot. The information on bidders who had bought the sandalwood from 2015-2020 was collected to understand the nature of end users in the value chain of this precious commodity. It was observed that the Karnataka Soaps and Detergents Limited (KSDL) was the biggest bidder during all 5 years enumerated, except the year 2017 when Karnataka Handloom Development Corporation (KHDC) was the highest bidder. TSR&CO Madras, Al Sana Fragrance Delhi, Una Essential Oils Mehtapur and Oushadhi Thrissur, were some of the other prominent bidders of Marayoor Sandal. Thus, it is apparent that most of the Sandalwood is used to extract essential oils and other extracts used in perfumes, soaps, toiletries, as well as pharmaceutical products. It can also be observed that most of the highly valued sandalwood sourced from Marayoor in Kerala was bid for and bought by industries outside Kerala, showing an abysmal dearth of value-adding industries in Kerala. This signifies a huge potential for setting up of essential oil, perfume and pharmaceutical industries based on sandalwood in Kerala which can provide employment and contribute to the SGDP.

Additionally, according to the Biodiversity Act and Rules, in cases of biological resources having high economic value such as sandalwood, red sanders, etc. and their derivatives, the benefit sharing may include an upfront payment of not less than 5.0%, on the proceeds of the auction or sale amount, as decided by the NBA or SBB, as the case may be, and the successful bidder or the purchaser shall pay the amount to the designated fund, before accessing the biological resource. There is hence a huge potential for collecting ABS revenue from industries which buy sandalwood for commercial utilisation. According to the latest Indian State of Forest Report (ISFR), 2021 by Forest Survey of India (FSI), the extent of Trees Outside Forest (TOF) is around 11,574 sq.km (Forest cover outside green wash), out of the total forest cover of 21,253 sq.km in Kerala. Combined with a tree cover of 2820 sq.km, the total extent



of TOF increases to 14,394 sq.km (ISFR, 2021). Hence, it is clear that TOF forms an important component of forestry sector in India, which are grown mostly in private lands like plantations and homegardens. The importance of TOF was reinforced by the analysis of data from the “Report on Saw Mills of Kerala (2014-15)” which was the only credible source for getting information on timber resources extracted from TOF. Four major sources were identified in the report, homesteads, imported, forest depots and estates. However, this data suffers from the lacunae of only providing data of one year, as opposed to five year cumulative data in the cases of KFD and KFDC.

Compared to the annual quantity of timber auctioned from the forest area by KFD (26,422.07 m³) and from plantations by KFDC (9684.30 m³), the annual quantity of timber sourced from TOF was a mammoth total of 22,56,219.00 m³. The value of timber sourced from TOF was also comparatively very high compared to timber from other sources. This data complements the above stated importance of TOF in providing timber. The timber was classified according to hardwood and softwood species in the saw mill report. This classification was done on the basis of wood density, and should not be confused with the classical differentiation of hardwoods and softwoods. Among hardwoods, the species contributing highest percentage of timber in quantity and value was Jack (*Artocarpus heterophyllus*). Other major hardwood species included Anjili (*Artocarpus hirsutus*), Teak (*Tectona grandis*) and Mahogany (*Swietenia macrophylla*). The highest percentage of softwood timber was contributed by Maavu (*Mangifer indica*), and other major species included Rubber (*Havea brasiliensis*), Kunnivaaka (*Albizzia odoratissima*) and Vatta (*Macaranga peltata*).

The data on timber sourced from different areas like forest, plantations and private lands has thus been studied in a comprehensive manner through quantitative analysis and this has given a broad idea about the contributions of timber bioresources and provides a roadmap for studying the scope of extracting ABS from the commercial sales of timber.

In brief, the annual average value of timber (from forest ecosystem and outside forest areas) as a bio-resource is Rs. 2,190.94 Crore. A consolidated picture of the timber in Kerala is provided in the following table.

Table 5.46 Timber from Kerala (Forest and Outside Forest): A Consolidated Picture

Timber	Mode of Estimation	Quantity (M ³ /Kg)	Value (Rs. Crore)
FOREST			
27 Timber Depots	Cumulative Annual Average (2015-2020)	26422.07 (M ³)	153.95
KFDC	Cumulative Annual Average: 2015-16 to 2019-20	9684.30(M ³)	5.90
Marayoor Sandalwood	Cumulative Annual Average (2015-2020)	72,991 (Kg)	49.75
Forest (Total)			209.60
Outside Forest (Total)	Total (2014-15)	22,56,219.00 (M ³)	1,981.34
Grand Total			2,190.94



Annexure 1
Quantity and Value of Timber (wood) from Forest
(Auction Depot: 1.)

Species Name	2015		2016		2017		2018		2019		2020		Cumulative Annual Average	
	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)	Qty. (M ³)	Value (Rs.)
INDUSTRIAL WOOD														
Teak														
Rosewood														
Mahogany														
Anjili														
Kambakom														
Thembavu / Karimaruthuu														
Venga														
Venteak														
Jack/Plavu														
Myla														
Manimaruthuu														
Maruthuu														
Irul														
Mulluvengai														
Unnam/Chadachi														
Thanni														
Karimthakara														
Pathiri														
Poovam														
Kunnivaka														
Kanjiram														
TOTAL IW														
PLYWOOD														
MATCHWOOD														
BOBBINWOOD														



Annexure 2

Tradable Bio-resource Database

Interview Schedule

Forest Department/Auctioneer (Timber Auction Depots)

All the High Value Forest Resources Details should be collected from each and every Forest Department's storehouse/depot who engaged in Auction

S.No	Details	Remarks
1	Name of the Depot and Address	
2	Name of the respondent - Age - Sex - Mob No- Designation -	
3	How long this Depot involved in timber auction?	
4	What are the major timber items you auctioned during last 5 years	
5	Annually how many times auction take place?	
6	What are the criteria and steps in auctioning?	
7	<u>Auction Details during last 6 years*</u> 2015 2016 2017 2018 2019 2020 Each year we need: <ol style="list-style-type: none">1. Items auctioned2. Quantity3. Auction price / value4. Details of auction participants / bidders *if data provided in financial years (2015-16 to 2019-20) no issue collect and provide in the table accordingly	
8	Did considerable price variations occur on the timber auction in each time? If so: Range - Average value -	
9	Factors influences on price variation	
10	Do you have any idea about who are the ultimate users of the resources and for what purposes?	
14	Is the timber exports? If so available details of export	
15	Generally for what purpose the money obtained through timber auction uses?	
16	Did use for conservation of forests? If yes what percentage, how, where?	
17	ABS scope / potential of the timber	
18	Any other information	



Annexure 4**Details of Timber Depot Officials (Respondents)**

Sl.No.	Name of timber depot	Details of respondent
1	Achencoil	Mr. Santhosh, Male, 9446559773, Depot officer
2	Aryankavu	Mr. Mukeshkumar, Male, 9447931443, Depot officer
3	Kulathupuzha	Mr. Lathif A, Male, 8547601025, Depot Watcher
4	Thenmala	Mr. Sreejith .S, Male, 9047942209, Depot officer
5	Areekkakkavu	Mr. Krishna Kumar, 38 yrs, Male, Depot officer
6	Konni	Mr. AS. Ashok, 50 yrs, Male, Depot officer
7	Pathanapuram	Mr. Anilkumar, Male, 8547600766, Depot officer
8	Tuet	Mr. Anilkumar, Male, 8547600766, Depot officer
9	Kadakkamon	Mr. Viju. S., Male, 8547600762, Depot officer
10	Veeyampuram	Mr. Shuhaib .V.S., 36 yrs, Male, Deputy Range Officer, Depot officer
11	Kothamangalam	Mr. Siddique, Depo manager, Male, 9447915487
12	Thalakkode	Mr. Binish Kumar T.T , Depot Officer, 39yrs, Male, 9495790550, Deputy RFO
13	Vettikkadu	Mr. A.Girichandran , Depot Officer, 8547601572, Male, Deputy Range Officer (grade)
14	Parampuzha	Mr. Tomy M. T, 8547601571, Male, Depot Range Officer
15	Chalakkudy	Mr. Rajeev, 38, M, 9446050519, Senior clerk
16	Chettikkulam	Mr. Ravi, M, 45, 8113996282, Senior clerk,
17	Mudikkal	Mr. Ajith, 34, M, 9745671305, Depo watchman
18	Varampuzha	Mr. Satyamoorthy, 50, 8547604408, Depo manager
19	Vettoor	Mr. Gireesh,M, Depo watcher
20	Nedunkayam	Mr. Sajeevan, Male, 9526177039, SFO- Section Forest Officer
21	Aruvakode	Mr. Santhosh, Male, 9947103484, SFO- Section Forest Officer
22	Walayar	Depot Officer, 49, Male, Depot Officer
23	Chaliyam	Mr. Libesh, 51, Depot Officer
24	Kuppady	Mr. Pradeep, Male, 9497137225, Range Forest Officer
25	Bavely	Mr. Pradeep, Male, 9497137225, Range Forest Officer
26	Kannavam	Mr. Sajeevan, Male, 9526177039, SFO- Section Forest Officer
27	Parappa	Mr. BV Rajagopalan, Male, 9447652337, Timber Depot Officer



Annexure 5**Interview Schedule***Timber Depot Officer*

S.No	Details	Remarks
1	Name of the Depot and Address	
2	Name of the respondent - Age - Sex - Mob No- Designation -	
3	How long this Depot involved in timber auction?	
4	What are the major timber items you auctioned during last 5 years	
5	Annually how many times auction take place?	
6	What are the criteria and steps in auctioning?	
7	<u>Auction Details during last 6 years*</u> 2015 2016 2017 2018 2019 2020 Each year we need: 1. Items auctioned 2. Quantity 3. Auction price / value 4. Details of auction participants / bidders	
8	Did considerable price variations occur on the timber auction in each time? If so: Range - Average value -	
9	Factors influences on price variation	
10	Do you have any idea about who are the ultimate users of the resources and for what purposes?	
14	Is the timber exports? If so available details of export	
15	Generally for what purpose the money obtained through timber auction uses?	
16	Did it use for conservation of forests? If yes what percentage, how, where?	
17	ABS scope / potential of the timber	
18	Any other information	



Kerala's forest ecosystem is rich with Non Timber Forest Products (NTFPs). Hence, extraction, trade, commercial utilization and ABS scope of major and high value NTFPs has been considered in the purview of tradable bio-resources' documentation and the ambit of ABS.

A snapshot of major Non Timber Forest Products (NTFPs) during the year 2020 is given below (Table 6.1). The total quantity of minor forest produce of NTFP was 474003 kg.

Table 6.1 - Non- Wood Forest Produce (NWFP) 2020

Sl.No	Item	Quantity procured (kg)
1	Adalodakam Pacha	16374.00
2	Athithippali	3614.00
3	Broom Grass	43300.00
4	Cheenikka	64837.10
5	Chertuthekku	991.00
6	Cheruvazhuthana	20618.00
7	Cheruvazhuthana(Pacha)	20158.00
8	Cheruthen	543.00
9	Chittamruth (Dry)	191.00
10	Derba	543.00
11	Kakkumkai	3102.1
12	Kalpasam	6850.1
13	Karimkurinji	80671.0
14	Kasthurimanjal	564.5
15	Kattukurumulak vally	21629.10
16	Kattumanjal	108.00
17	Kattumulakinhand	12658.70
18	Kazhanchikkuru	75.00
19	Koppuvella	207.00
20	Kudampuli	171.00
21	Kunthirikkom	5196.50
22	Kurumthotti	15207.00
23	Kurumthotti (Pacha)	92944.00
24	Manjakoova	150.00
25	Malayinji	143.00
26	Marottikkuru	20.00
27	Moovila	5823.00

28	Manjavalli	417.00
29	Nannari/Naruneendi	42.60
30	Orila	3862.00
31	Orila Dry (Red)	300.00
32	Pachottipatta	13091.50
33	Padakizhangu	1336.85
34	Palmuthakku	112.00
35	Pathiripoovu	376.60
36	Pattincha/Incha	3180.00
37	Peenari	5030.00
38	Pollakai	83.00
39	Ponkorandi	1364.00
Sl.No	Item	Quantity procured (kg)
40	Rawhoney	2127.30
41	Sathavery	490.00
42	Seethari	42.00
43	Soappinkai	60.00
44	Thippali	63.00
45	Vanthen	25117.95
46	Vayanapoovu	100.00`
47	Wax (Bee wax)	118.30
	Total	474003,026

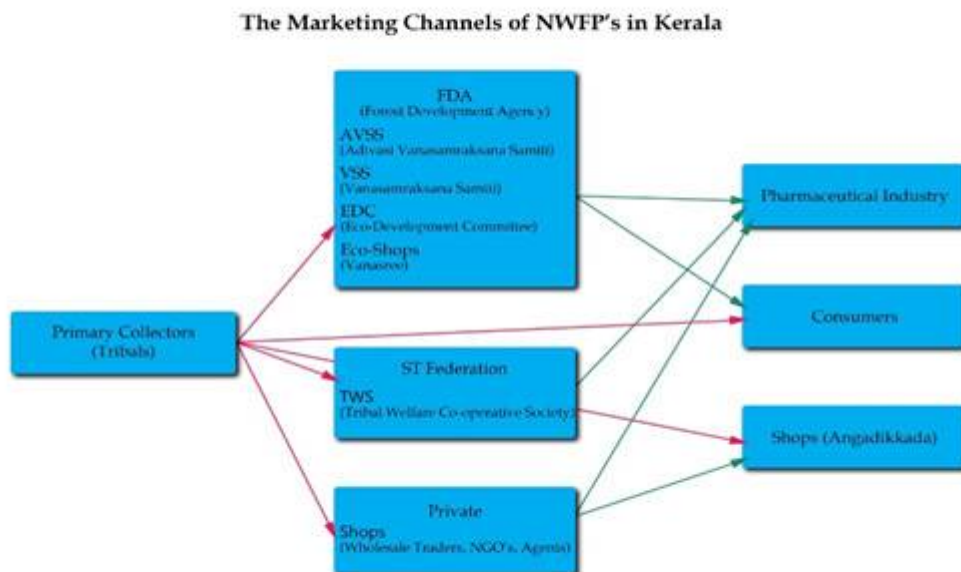
Source: Kerala State Federation of SC/ST Development Co-operative Ltd.

6.1 ESTIMATION OF THE VALUE OF NTFP FROM KERALA'S FOREST

The NTFP collected by the tribal and local community supply to the users through different channels and capturing its complete supply chain is a complicated process (see the following figure). Due to pandemic and other reasons, we did not carry out a detailed primary survey in this regard. Further, the possibilities for capturing the entire NTFPs collection (quantity and value) and immediate transfer through secondary data were limited. The only available secondary source is the SC / ST Federation. Hence, the available data from the SC / ST Federation was collected and analysed. Therefore, we are not in a position to capture the entire NTFPs collection in the State, whatever through SC/ST Federation is only a single channel, but a major one.



Figure 6.1



For economic analysis, species wise data from 2009 to 2020 was collected from SC/ST Federation and the analysis was broadly carried out for 2 separate periods / phases (2009-2014 and 2015- 2020). Since our other sectors emphasised for 2015- 2020, those years data was considered for the overall estimation for the State total.

Phase 1

6.2 SPECIES WISE NON-TIMBER FOREST PRODUCTS (NTFPS) IN KERALA (2009-2014)

This part of the report attempted to list out the non-timber forest products (NTFPs) collected by the tribes from the forest areas of Kerala and to examine its patterns/trend (collection and its value) during the years of 2009 to 2014 in Kerala. This six year's species wise quantity/value data is sourced from the available records of SC-ST Federation, Government of Kerala, which represents only one channel through which NTFPs are collected and marketed. For the analysis, species and year wise prioritisation/ listing of 10 major NTFPs (according to high volume and collection and high value) at state level were considered.



Table 6.2
Species Wise Collection of NTFP / MFP in Kerala: 2009-2010

SL. No	Species		Quantity		Value		Average or Unit Value/Price (Kg)
	Local Name	Botanical / Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	3235	0.38	22645	0.10	7
2	Adapathiyam	<i>Holostemma adakodien Schultes</i>	1.4	0	420	0	350
3	Amalpori	<i>Rauvolfia serpentina</i>	5	0	875	0	175
4	Athitippali	<i>Balanophora fungosa</i>	1649	0.19	50975	0.23	30.90
5	Cheenikka	<i>Acacia sinuate</i>	75559.50	8.84	3864299.50	17.35	51.10
6	Cherutheku	<i>Clerodendrum serratum</i>	8436	0.99	168426	0.76	19.95
7	Cheruthekku Veru	<i>Clerodendrum serratum</i>	8436	0.99	9912	0.04	12
8	Cheruthen	(Honey)	25258.5	2.96	3177642	14.27	125.80
9	Chittamrithu	<i>Tinospora cordifolia</i>	524	0.06	5240	0.02	10
10	Chool Pullu	<i>Thysanolaena latifolia</i>	51700	6.05	249800	1.12	4.85
11	Chunda	<i>Solanum spp</i>	20158	2.36	154726	0.69	7.65
12	Elakka	<i>Elettaria cardamomum</i>	358.80	0.04	57749.30	0.26	160.95
13	Kakkumkai	<i>Entada rheedii</i>	344.50	0.04	3475.50	0.02	10.10
14	Kalpasam	<i>Parmelia dialata</i>	9289	1.09	945362	4.24	101.75
15	Kadankooova	<i>Maranta arundinacea</i>	791.50	0.09	8400	0.04	10.60
16	Karimkuriinji	<i>Nilagirianthus ciliatus</i>	28234	3.30	374825	1.68	13.25
17	Kasthoorimanjal	<i>Curcuma aromatica</i>	54747	6.41	1452845.5	6.52	26.55
18	Kattukurumulaku	<i>Piper longum</i>	400	0.05	10560	0.05	26.4
19	Kattukurumulaku Vally	<i>Piper spp.</i>	2775	0.32	34202	0.15	12.3
20	Kattupadavalam	<i>Trichosanthes cucumerina</i>	1697	0.20	196133	0.88	115.5
21	Kolinchi	<i>Alpinia galanga</i>	1302	0.15	36456	0.16	28
22	Koppuvella	<i>Vateria spp.</i>	186	0.02	6360	0.03	34.2
23	Kudampuli	<i>Garcinia gummi-gutta</i>	2151.5	0.25	126667	0.57	58.9
24	Kumizhiveru	<i>Gmelina arborea</i>	831	0.10	10387.5	0.05	12.5
25	Kunthirikkam	<i>Canarium strictum</i>	9496.5	1.11	494413.5	2.22	52.05
26	Kurunthotti	<i>Sida cordifolia</i>	334125	39.1	2305118.5	10.35	6.9
27	Marottikkuru	<i>Hydnocarpus pentandra</i>	17570	2.06	667882	3	38
28	Moovila	<i>Zanthoxylum rhetsa</i>	47162	5.52	862826	3.87	18.30



29	Mullilam	<i>Zanthoxylum piperitum</i>	225	0.03	4500	0.02	20
30	Nagadandhi	<i>Couroupita guianensis</i>	1606	0.19	43821	0.2	27.3
31	Orilaveru	<i>Desmodium velunium</i>	22299	2.61	345697	1.55	15.5
32	Pachotti patta	<i>Symplocos cochinchinensis</i>	8908	1.04	250005	1.12	28
33	Padakkizhangu	<i>Cyclea peltata</i>	3611.8	0.42	392468.25	1.76	108.65
34	Palmuthakku	<i>Ipomoea mauritiana</i>	2721	0.32	23566	0.11	8.65
35	Pathirippovu	<i>Myristica malabarica</i>	1607	0.19	219665.5	0.99	136.65
36	Pattincha	<i>Acacia caesia</i>	5023	0.59	134770	0.61	26.85
37	Peenari	<i>Sterculia foetida</i>	9033	1.06	114745	0.52	12.7
38	Pollakuru	<i>Anamirta cocculus</i>	72.50	0.01	580	0	8
39	Putharichunda	<i>Solanum torvum</i>	22083	2.58	248263.5	1.11	11.25
40	Sathavari	<i>Asparagus racemosus</i>	6746	0.79	78846	0.35	11.7
41	Seethari	<i>Ipomoea spp.</i>	5	0	100	0	20
42	Thannikai	<i>Terminalia bellerica</i>	780	0.09	3120	0.01	4
43	Thalippovu	<i>Litsea coriacea</i>	178	0.02	5124	0.02	28.80
44	Thelli	<i>Vateria indica</i>	6706.1	0.78	218186.5	0.98	32.55
45	Thippali	<i>Piper longum</i>	1540	0.18	36184	0.16	23.50
46	Valampiri Edampiri	<i>Helicteres isora</i>	233	0.03	2543	0.01	10.90
47	Vanthen	(Honey)	54010.4	6.32	4789247	21.50	88.65
48	Bee Wax		746.5	0.09	59536	0.27	79.75
49	Mathurakurinji	<i>Strobilanthus spp.</i>	30	0	930	0	31
Total			854587.5	100	22270521.05	100	2254.9

Source: Kerala State federation of SC/ST development co-operatives Ltd, Kerala Forest Statistics 2010.

Table 6.3
Species Wise Collection of NTFP / MFP in Kerala: 2010-2011

Sl. No	Species		Quantity		Value		Average or Unit Value/Price (kg)
	Local Name	Botanical / Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	6138.00	0.5	42141.00	0.17	6.87
2	Adapathian	<i>Holostemma adakodien Schultes</i>	32.00	0	9600.00	0.04	300.00
3	Athithippali	<i>Balanophora fungosa</i>	9228.50	0.75	397753.00	1.62	43.10
4	Bee Wax		286.00	0.02	25068.00	0.10	87.47
5	Cheenikka	<i>Acacia sinuate</i>	42406.90	3.46	920653.50	3.75	21.71



6	Cheruthekkuveru	<i>Clerodendrum serratum</i>	9197.00	0.75	191324.00	0.78	20.80
7	Cheruthen	(<i>Honey</i>)	15161.80	1.24	2036842.00	8.30	134.34
8	Chittamrithu	<i>Tinospora cordifolia</i>	3310.00	0.27	34602.00	0.14	10.45
9	Chittaratha	<i>Alpinia calcarata</i>	34.00	0	1190.00	0	35.00
10	Chool pullu	<i>Thysanolaena latifolia</i>	28785.00	2.35	485931.00	1.98	16.88
11	Chunda	<i>Solanum spp</i>	242180.00	19.75	1483530.00	6.04	6.13
12	Edanapoovu	<i>Olea diocea</i>	2.00	0	210.00	0	105.00
13	Elakka	<i>Elettaria cardamomum</i>	420.00	0.03	53047.00	0.22	126.30
14	Kakkumkai	<i>Entada rheedii</i>	1852.00	0.15	20767.50	0.08	11.21
15	Kalpasam	<i>Parmelia dialata</i>	10314.50	0.84	1881667.00	7.67	182.43
16	Kannadivella	<i>Vateria spp.</i>	3.50	0	481.25	0	137.50
17	Karimkurinji	<i>Strobilanthes ciliatus</i>	136865.00	11.16	1111893.00	4.53	8.12
18	Kasthoorimanjal	<i>Curcuma aromatica</i>	34153.80	2.78	2594251.00	10.57	75.96
19	Kattukurumulaku	<i>Piper longum</i>	25.50	0	2295.00	0.01	90.00
20	Kattukurumulakuvally	<i>Piper spp.</i>	10915.00	0.89	135334.75	0.55	12.40
21	Kattupadavalam	<i>Trichosanthes cucumerina</i>	6935.90	0.57	693967.00	2.83	100.05
22	Kattumanjal	<i>Curcuma longa</i>	375.00	0.03	6750.00	0.03	18.00
23	Kazhanchikuru	<i>Caesalpinia bonduc</i>	229.00	0.02	1402.00	0.01	6.12
24	Kolinchi	<i>Alpinia galanga</i>	685.00	0.06	23975.00	0.10	35.00
25	Kodithoova	<i>Tragia involucrata</i>	3.00	0	90.00	0	30.00
26	Koppuvella	<i>Vateria spp.</i>	496.50	0.04	16389.00	0.07	33.01
27	Kumizhinveru	<i>Gmelina arborea</i>	4161.00	0.34	49932.00	0.2	12.00
28	Kunthirikkam	<i>Canarium strictum</i>	10214.00	0.83	608974.55	2.48	59.62
29	Kurunthotti	<i>Sida cordifolia</i>	423975.00	34.57	3358763.00	13.68	7.92
30	Maramanjal	<i>Coscinium fenestratum</i>	114.50	0.01	2748.00	0.01	24.00
31	Marottikkuru	<i>Hydnocarpus pentandra</i>	8238.30	0.67	358425.00	1.46	43.51
32	Moovila	<i>Zanthoxylum rhetsa</i>	79209.50	6.46	1691144.00	6.89	21.35
33	Nannari	<i>Hemidesmus indicus</i>	41.00	0	4920.00	0.02	120.00
34	Orilaveru	<i>Desmodium velunium</i>	34122.00	2.78	783715.50	3.19	22.97
35	Pachottipatta	<i>Symplocos cochinchinensis</i>	11233.00	0.92	394889.50	1.61	35.15
36	Padakkizhangu	<i>Cyclea peltata</i>	5358.30	0.44	986919.50	4.02	184.19
37	Palmuthakku	<i>Ipomoea mauritiana</i>	7640.00	0.62	91530.00	0.37	11.98
38	Pathirippovu	<i>Myristica malabarica</i>	5407.20	0.44	429565.10	1.75	79.44
39	Pattincha	<i>Acacia caesia</i>	5229.50	0.43	208811.50	0.85	39.93
40	Peenari	<i>Sterculia foetida</i>	7174.00	0.58	114876.00	0.47	16.01



41	Pollakkuru	<i>Anamirta cocculus</i>	61.50	0.01	492.00	0	8.00
42	Putharichunda	<i>Solanum torvum</i>	25539.00	2.08	486537.00	1.98	19.05
43	Sathavary	<i>Asparagus racemosus</i>	1340.00	0.11	18760.00	0.08	14.00
44	Seethari	<i>Ipomoea spp.</i>	1876.50	0.15	60445.00	0.25	32.21
45	Soapinkai	<i>Sapindus mukorossi</i>	2.30	0	27.60	0	12.00
46	Thalippovu	<i>Litsea coriacea</i>	47.00	0	1316.00	0.01	28.00
47	Thelli	<i>Vateria indica</i>	5189.00	0.42	184207.50	0.75	35.50
48	Thippali	<i>Piper longum</i>	2367.00	0.19	84196.00	0.34	35.57
49	Tharavella	<i>Spermacoce ocimoides</i>	919.50	0.07	10660.00	0.04	11.59
50	Valampiri Edampiri	<i>Helicteres isora</i>	210.50	0.02	3474.50	0.01	16.51
51	Vanthen	(Honey)	26640.40	2.17	2439747.50	9.94	91.58
52	Vayana Poovu	<i>Cinnamomum veerum</i>	10.00	0	100.00	0	10.00
Total			1226354.9	100	24546330.75	100	2645.93

Table 6.4
Species Wise Collection of NTFP / MFP in Kerala: 2011-2012

Sl. No	Species		Quantity		Value		Average or Unit Value/ Price (kg)
	Local Name	Botanical / Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	22146.00	1.64	170548.00	0.62	7.70
2	Adapathiyam	<i>Holostemma adakodien Schultes</i>	10.00	0	3300.00	0.01	330
3	Athithippali	<i>Balanophora fungosa</i>	18166.40	1.34	747860.00	2.72	41.17
4	Bee Wax		110.80	0.01	30190.50	0.11	272.48
5	Cheenikka	<i>Acacia sinuate</i>	56857.5	4.20	818016.00	2.98	14.39
6	Cheruthekku	<i>Clerodendrum serratum</i>	64.00	0	2560.00	0.01	40.00
7	Cheruthekku Veru	<i>Clerodendrum serratum</i>	4922.00	0.36	102076.00	0.37	20.74
8	Cheruthen		12509.20	0.92	1777010.00	6.47	142.06
9	Chittamrithu	<i>Tinospora cordifolia</i>	3369.00	0.25	36935.00	0.13	10.96
10	Chool pullu	<i>Thysanolaena latifolia</i>	117900.00	8.71	709500	2.58	6.02
11	Chunda	<i>Solanum spp</i>	219227.00	16.19	1537839	5.60	7.01
12	Elakka	<i>Elettaria cardamomum</i>	6598.00	0.49	204947	0.75	31.06
13	Eramkol	<i>Munrochloa ritchie</i>	165000.00	12.19	837500	3.05	5.08
14	Kadukkappoovu	<i>Terminalia chebula</i>	3000.00	0.22	51000	0.19	17
15	Kakkumkai	<i>Entada rheedii</i>	424.00	0.03	5088	0.02	12
16	Kalpasam	<i>Parmelia dialata</i>	12436.40	0.92	2115552	7.70	170.11
17	Karimkurinji	<i>Nilagirianthus ciliates</i>	86966.90	6.42	1828800	6.65	21.03



18	Kasthoorimanjal	<i>Curcuma aromatic</i>	34989.10	2.58	1810545.2	1.43	51.75
19	Kattukurumulaku	<i>Piper longum</i>	16665.50	1.23	392250	0.39	23.54
20	Kattukurumulaku Vally	<i>Piper spp.</i>	6781.00	0.50	105982	1.73	15.63
21	Kattupadavalam	<i>Trichosanthes cucumerina</i>	4764.90	0.35	474187	0.08	99.52
22	Kattumanjal	<i>Curcuma longa</i>	1066.00	0.08	21110	0.08	19.80
23	Kazhanchikkuru	<i>Caesalpinia bonduc</i>	48	0	1330	0	27.71
24	Kolinchi	<i>Zingiber zerumbet</i>	788	0.06	25391	0.09	32.22
25	Kooramkolli	<i>Centropus spp</i>	34550	2.55	345500	1.26	10
26	Koppuvella	<i>Vateria spp.</i>	286.5	0.02	8847	0.03	30.88
27	Kudampuli	<i>Garcinia gummy-gutta</i>	1332.4	0.10	200495	0.73	150.48
28	Kumizhinveru	<i>Gmelina arborea</i>	702	0.05	7020	0.03	10
29	Kunthirikkam	<i>Canarium strictum</i>	12122.1	0.90	652066.6	2.37	53.79
30	Kurumthotti	<i>Sida cordifolia</i>	279276	20.62	2721403.3	9.9	9.74
31	Mallippoovu	<i>Jasminum spp</i>	24	0	3072	0.01	128
32	Maramanjil	<i>Coscinium fenestratum</i>	46	0	1380	0.01	30
33	Marottikkuru	<i>Hydnocarpus pentandra</i>	3296.5	0.24	162530	0.59	49.3
34	Moovila	<i>Pseurarthria viscid</i>	75679	5.59	2388597	8.69	31.56
35	Mullilam	<i>Zanthoxylum piperitum</i>	760.5	0.06	22815	0.08	30
36	Nannari	<i>Hemidesmus indicus</i>	5152.3	0.38	516324	1.88	100.21
37	Orilaveru	<i>Desmodium velunium</i>	18614	1.37	564471.3	2.05	30.33
38	Pachanellicka	<i>Phyllanthus emblica</i>	150	0.01	2550	0.01	17
39	Pachottipatta	<i>Symplocos cochinchinensis</i>	25345.5	1.87	931108	3.39	36.74
40	Padakkizhangu	<i>Cyclea peltata</i>	2339.5	0.17	385235.8	1.4	164.67
41	Palmuthukku	<i>Ipomoea mauritiana</i>	3930	0.29	58950	0.21	15
42	Pathirippovu	<i>Myristica malabarica</i>	1633	0.12	309543	1.13	189.55
43	Pattincha	<i>Acacia caesia</i>	7695.6	0.57	284089	1.03	36.92
44	Peenari	<i>Sterculia foetida</i>	10834	0.80	218518	0.8	20.17
45	Pollakkuru	<i>Anamirta cocculus</i>	717.5	0.05	10514	0.034	14.65
46	Putharichunda	<i>Solanum torvum</i>	49738	3.67	989092	3.6	19.89
47	Sathavari	<i>Asparagus racemosus</i>	30	0	375	0	12.5
48	Seethari	<i>Ipomoea spp.</i>	308.5	0.02	12187.5	0.04	39.51
49	Soapinkai	<i>Sapindus mukorossi</i>	10	0	200	0	20
50	Thannikkai	<i>Terminalia bellerica</i>	3540	0.26	49560	0.18	14
51	Tharavella	<i>Spermacoce ocimoides</i>	1410	0.10	25380	0.09	18
52	Thippali	<i>Piper longum</i>	1101	0.08	37009	0.13	33.61
53	Valampiri Edampiri	<i>Helicteres isora</i>	422.5	0.03	6505	0.02	15.4
54	Vanthen	(Honey)	17217	1.27	2437098	8.87	141.55
55	Vayanappovu	<i>Cinnamomum veerum</i>	1031.5	0.08	319916	1.16	310.15
Total			1354104.	100	27481868	100	3202.5
			6		.2		8

Source: Kerala State federation of SC/ST development co-operatives Ltd, Kerala Forest Statistics 2012.

Table 6.5
Species Wise Collection of NTFP / MFP in Kerala: 2012-2013

Sl. No	Species		Quantity		Value		Average or Unit Value/Price (kg)
	Local Name	Botanical / Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	14000	1.07	107062	0.28	7.65
2	Adapathiyam	<i>Holostemma adakodien Schultes</i>	13.5	0	6285	0.02	465.56
3	Amalpori	<i>Rauvolfia serpentine</i>	0.35	0	28	0	80.00
4	Athithippali	<i>Balanophora fungosa</i>	425	0.03	18060	0.05	42.49
5	Bee Wax		110.8	0.01	30190.5	0.08	272.48
6	Cheenikka	<i>Acacia sinuate</i>	52911	4.03	949926.5	2.48	17.95
7	Cheruthen Veru	<i>Clerodendrum serratum</i>	15293	1.16	637062	1.66	41.66
8	Cheruthen	(Honey)	18700.02	1.42	2932664	7.66	156.83
9	Chittamrithu	<i>Tinospora cordifolia</i>	652	0.05	8303	0.02	12.73
10	Chool pullu	<i>Thysanolaena latifolia</i>	129100	9.83	1323750	3.46	10.25
11	Chunda	<i>Solanum spp</i>	152011	11.57	1490610	3.89	9.81
12	Elakka	<i>Elettaria cardamomum</i>	3664	0.28	73280	0.19	20
13	Eramkol	<i>Munrochloa ritchie</i>	3600	0.27	216000	0.56	60
14	Ekanayakam	<i>Salacia reticulate</i>	5	0	1500	0	300
15	Kadukkappoovu	<i>Terminalia chebula</i>	2108	0.16	35836	0.09	17
16	Kakkumkai	<i>Entada rheedii</i>	1283	0.10	17941	0.05	13.98
17	Kalpasam	<i>Parmelia dialata</i>	13147	1	2644250	6.90	201.13
18	Kannadivella	<i>Vateria spp</i>	175	0.01	875	0	5
19	Karimkunj	<i>Nilagirianthus ciliates</i>	211826.5	16.12	2873226.5	7.5	13.56
20	Kalloor vanchi	<i>Rotula aquatic</i>	38.5	0	2850	0.01	74.03
21	Kasthurimanjal	<i>Curcuma aromatic</i>	22277.5	1.70	1394037	3.64	62.58
22	Kattukurumulaku	<i>Piper longum</i>	98	0.01	15970	0.04	162.96
23	Kattukurumulaku valli	<i>Piper spp.</i>	43099	3.28	1300933	3.40	30.18
24	Kattupadavalam	<i>Trichosanthes cucumerina</i>	74.1	0.01	7781	0.02	105.01
25	Kazhanchikkuru	<i>Caesalpinia bonduc</i>	38	0	1140	0	30
26	Koppuvella	<i>Vateria spp.</i>	192	0.01	11520	0.03	60
27	Kudampuli	<i>Garcinia gummy-gutta</i>	493	0.04	55880	0.15	113.35
28	Kumizhinveru	<i>Gmelina arborea</i>	31759	2.42	436360	1.14	13.74
29	Kunthirikkam	<i>Canarium strictum</i>	11538.7	0.88	783564	2.05	67.91
30	Kurunthotti	<i>Sida cordifolia</i>	373297	28.41	7080051.3	18.49	18.97
31	Marattikkuru	<i>Hydnocarpus laurifolia</i>	1774	0.14	106621	0.28	60.10
32	Moovila	<i>Pseurarthria viscid</i>	50986	3.88	2440283	6.37	47.86
33	Mullilam	<i>Zanthoxylum piperitum</i>	105.5	0.01	3165	0.01	30
34	Nannari	<i>Hemidesmus indicus</i>	2950.7	0.22	341674	0.89	115.79
35	Nalpamaram		135	0.01	1080	0	8



36	Orilaveru	<i>Desmodium velunium</i>	6641	0.51	285025.8	0.74	42.92
37	Pachotti Patta	<i>Symplocos cochinchinensis</i>	10234.5	0.78	336835	0.88	32.91
38	Padakkizhangu	<i>Cyclea peltata</i>	3796.35	0.29	815966	2.13	214.93
39	Palmuthaku	<i>Ipomoea mauritiana</i>	2090	0.16	41800	0.11	20
40	Patta/Veru	<i>Cinnamomum veerum</i>	20	0	2000	0.01	100
41	Pathirippoovu	<i>Myristica malabarica</i>	1321.8	0.10	360785	0.94	272.95
42	Pattincha/Incha	<i>Acacia caesia</i>	3432	0.26	140760	0.37	41.01
43	Peenari	<i>Sterculia foetida</i>	15805.5	1.20	316100	0.83	20
44	Pollakuru	<i>Anamirta cocculus</i>	1800	0.14	32400	0.08	18
45	Poovanthari	<i>Schleichera oleosa</i>	413	0.03	78145	0.20	189.21
46	Pukamarunnu	<i>Tephrosia purpurea</i>	14.5	0	2175	0.01	150
47	Putharichunda	<i>Solanum spp</i>	62277	4.74	1782105	4.65	28.62
48	Sathavari	<i>Asparagus racemosus</i>	1594	0.12	21435	0.06	13.45
49	Seethari	<i>Ipomoea spp.</i>	1348	0.10	59610	0.16	44.22
50	Tharavella	<i>Spermacoce ocimoides</i>	1095	0.08	16425	0.04	15
51	Thippali	<i>Piper longum</i>	986	0.08	42653	0.11	43.26
52	Valampiri Edampiri	<i>Helicteres isora</i>	177	0.01	3975	0.01	22.46
53	Vanthen		42986.43	3.27	6609766.5	17.26	153.7640251
Total			1313913.25	100	38297720.1	100	4171.264025

Source: Kerala State federation of SC/ST development co-operatives Ltd, Kerala Forest Statistics 2013.

Table 6.6. Species Wise Collection of NTFP / MFP in Kerala: 2013-2014

Sl. No	Species		Quantity		Value		Average or Unit Value/Price (kg)
	Local Name	Botanical / Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	16732	1.4	185206	0.61	11.07
2	Adapathiyam	<i>Holostemma adakodien Schultes</i>	5.5	0	2475	0.01	450
3	Cheenikka	<i>Acacia sinuate</i>	51705	4.33	901184.5	2.98	17.43
4	Cheruthekku	<i>Clerodendrum serratum</i>	2791	0.23	111938	0.37	40.11
5	Cheruthen	(Honey)	18815	1.58	3198550	10.58	170
6	Chittamrithu	<i>Tinospora cordifolia</i>	278	0.02	2556	0.01	9.19
7	Chittaratha	<i>Alpinia calcarata</i>	20	0	900	0	45
8	Chool Pullu	<i>Thysanolaena latifolia</i>	178250	14.93	2156000	7.13	12.1
9	Chunda	<i>Solanum spp</i>	215907	18.09	3138017.5	10.38	14.53
10	Elakka	<i>Elettaria cardamomum</i>	7	0	600	0	85.71
11	Eramkol	<i>Munrochloa ritchie</i>	25000	2.09	160000	0.53	6.4
12	Kakkumkai	<i>Entada rheedii</i>	1059	0.09	17827	0.06	16.83
13	Kalpasam	<i>Parmelia dialata</i>	15300.5	1.28	3825125	12.65	250
14	Karimkuri	<i>Curcuma aromatic</i>	145304	12.17	1928747	6.38	13.27



15	Kasthurimanjal	<i>Curcuma aromatic</i>	3072	0.26	159435	0.53	51.9
16	Kattukodi	<i>Cocculus hirsutus</i>	400	0.03	10000	0.03	25
17	Kattukurumulaku Valli	<i>Piper longum</i>	2746	0.23	53184	0.18	19.37
18	Kattupadavalam	<i>Trichosanthes cucumeria</i>	231.3	0.02	24956	0.08	107.89
19	Kazhanchikkuru	<i>Caesalpinia bonduc</i>	25	0	625	0	25
20	Kolinchi	<i>Zingiber zerumbet</i>	906	0.08	49830	0.16	55
21	Koppuvella	<i>Vateria spp.</i>	7	0	560	0	80
22	Kudampuli	<i>Garcinia gummy-gutta</i>	50	0	7000	0.02	140
23	Kunthirikkam	<i>Canarium strictum</i>	6402.6	0.54	562629	1.86	87.88
24	Kurunthotti	<i>Sida cordifolia</i>	358617.5	30.04	5163714.6	17.08	14.40
25	Marattikkuru	<i>Hydnocarpus pentandra</i>	795	0.07	51802	0.17	65.16
26	Moovila	<i>Pseurarthria viscid</i>	22020	1.84	866645	2.87	39.36
27	Nannari	<i>Hemidesmus indicus</i>	232.9	0.02	46995	0.16	201.78
28	Orilaveru	<i>Desmodium velunium</i>	11234	0.94	385942.95	1.28	34.35
29	Pacha Nellikka	<i>Phyllanthus emblica</i>	40747	3.41	488964	1.62	12
30	Pachotti Patta	<i>Symplocos cochinchinensis</i>	9345	0.78	382575	1.27	40.94
31	Padakkizhangu	<i>Cyclea peltata</i>	2072.6	0.17	461932	1.53	222.88
32	Pattincha	<i>Acacia caesia</i>	500	0.04	22300	0.07	44.6
33	Peenari	<i>Sterculia foetida</i>	12635	1.06	362395	1.20	28.68
34	Pollakkuru	<i>Anamirta cocculus</i>	74	0.01	1384	0	18.7
37	Putharichunda	<i>Solanum torvum</i>	11085	0.93	208726	0.69	18.83
38	Sathavari	<i>Asparagus racemosus</i>	5228	0.44	86262	0.29	16.50
39	Seethari	<i>Ipomoea spp.</i>	755	0.06	37750	0.12	50
40	Tharavella	<i>Spermacoce ocimoides</i>	15	0	150	0	10
41	Thelli	<i>Canarium strictum</i>	7	0	245	0	35
42	Thippali	<i>Piper longum</i>	1317	0.11	51515	0.17	39.12
43	Urinchikai	<i>Cassia fistula</i>	52	0	1144	0	22
44	Valampiri Edampiri	<i>Helicteres isora</i>	482	0.04	9200	0.03	19.09
45	Wax (Bee Wax)		203	0.02	31670	0.10	156.01
46	Vayanappoovu	<i>Cinnamomum veerum</i>	500	0.04	150000	0.50	300
47	Vanthen	(Honey)	30861.9	2.59	4929008	16.30	159.712
Total			1193792.8	100	30237664.55	3282.792	100



Table 6.7
Species Wise Collection of NTFP / MFP in Kerala: 2014-2015

Sl. No	Species		Quantity		Value		Average or Unit Value/Price (kg)
	Local Name	Botanical / Scientific Name	kg	%	Value (Rs)	%	
1	Adalodakam	<i>Justicia adhatoda</i>	19863.00	1.56	198630	0.42	10
2	Adapathiyam	<i>Holostemma adakodien Schultes</i>	10	0	4500	0.01	450
3	Cheenikka	<i>Acacia sinuate</i>	96958	7.62	2746495	5.74	28.33
4	Athithippali	<i>Balanophora fungosa</i>	377	0.03	18850	0.04	50
5	Cheruthekk	<i>Clerodendrum serratum</i>	2902	0.23	134188	0.28	46.24
6	Cheruthen	(Honey)	21939.25	1.72	4393460	9.19	200.26
7	Chittamrithu	<i>Tinospora cordifolia</i>	3759	0.3	31871	0.07	8.48
8	Chool pullu	<i>Thysanolaena latifolia</i>	148198	11.64	2121168	4.44	14.31
9	Chunda	<i>Solanum spp</i>	300526	23.6	4746011	9.92	15.79
10	Kakkumkai	<i>Entada rheedii</i>	1503	0.12	18960	0.04	12.61
11	Kalpasam	<i>Parmelia dialata</i>	9219.6	0.72	2567140	5.37	278.44
12	Karimkurinji	<i>Strobilanthes spp.</i>	55186	4.33	867647	1.81	15.72
13	Kalloor vanchi	<i>Aquatic rotula</i>	10	0	1000	0	100
14	Kasthuri manjal	<i>Curcuma aromatic</i>	1772	0.14	131019	0.27	73.94
15	Kattukurumulaku valli	<i>Piper longum</i>	6174.5	0.48	142487	0.30	23.08
16	Kattupadavalam	<i>Trichosanthes cucumerina</i>	232	0.02	37564	0.08	161.91
17	Kazhanchikuru	<i>Caesalpinia bonduc</i>	2.5	0	45	0	18
18	Kodithuva	<i>Tragia involucrate</i>	25	0	2025	0	81
19	Kolinchi	<i>Zingiber zerumbet</i>	150	0.01	10500	0.02	70
20	Koppuvella	<i>Vateria spp.</i>	246	0.02	14760	0.03	60
21	Kudampuli	<i>Garcinia gummy-gutta</i>	500	0.04	80000	0.17	160
22	Kunthirikkam	<i>Canarium strictum</i>	8517.9	0.67	1770925	3.70	207.91
23	Kurumthotti	<i>Sida cordifolia</i>	444754	34.93	7196823	15.05	16.18
24	Marottikkuru	<i>Hydnocarpus pentandra</i>	2883	0.23	230480	0.48	79.94
25	Moovila	<i>Pseurarthria viscid</i>	38133	2.99	1682920	3.52	44.13
26	Mullilam	<i>Zanthoxylum piperitum</i>	250	0.02	12500	0.03	50
27	Nannari/Naruneendi	<i>Hemidesmus indicus</i>	1623.3	0.13	196292	0.41	120.92
28	Orilaveru	<i>Desmodium velunium</i>	13047.5	1.02	623944	1.30	47.82
29	Pachotti patta	<i>Symplocos cochinchinensis</i>	8544.5	0.67	388382.5	0.81	45.45
30	Padakkizhangu	<i>Cyclea peltata</i>	3202.65	0.25	944546	1.98	294.93
31	Palmuthakku	<i>Ipomoea mauritiana</i>	75	0.01	375	0	5
32	Pathirippovu	<i>Myristica malabarica</i>	738.1	0.06	253030	0.53	342.81



33	Pattincha/Incha	<i>Acacia caesia</i>	5293.5	0.42	215258	0.45	40.66
34	Peenari	<i>Sterculia foetida</i>	11877.5	0.93	355590	0.74	29.94
35	Pollakkuru	<i>Anamirta cocculus</i>	667	0.05	19465	0.04	29.18
36	Ponkurandi	<i>Salacia reticulate</i>	6	0	300	0.00	50
37	Puliyila	<i>Tamarindus indica</i>	1583	0.12	6332	0.01	4
38	Putharichunda	<i>Solanum torvum</i>	19490	1.53	323148	0.68	16.58
39	Sathavari	<i>Asparagus racemosus</i>	250	0.02	3000	0.01	12
40	Seethari	<i>Ipomoea spp.</i>	24	0	720	0	30
41	Soapinkai	<i>Sapindus mukorossi</i>	265	0.02	3080	0.01	11.62
42	Thannikkai	<i>Terminalia bellerica</i>	800	0.06	8000	0.02	10
43	Tharavella	<i>Spermacoce ocimoides</i>	616	0.05	9240	0.02	15
44	Thippali	<i>Piper longum</i>	1396	0.11	65656	0.14	47.03
45	Thazhuthama	<i>Boerhavia diffusa</i>	57	0	1710	0	30
46	Vanthen	(Honey)	39378.45	3.09	15184189	31.75	385.60
47	Wax (Bee Wax)		219.5	0.02	55717	0.12	253.84
Total			1273244.75	100	47819942.5	100	4098.65

Source: Kerala State federation of SC/ST development co-operatives Ltd, Kerala Forest Statistics 2015.

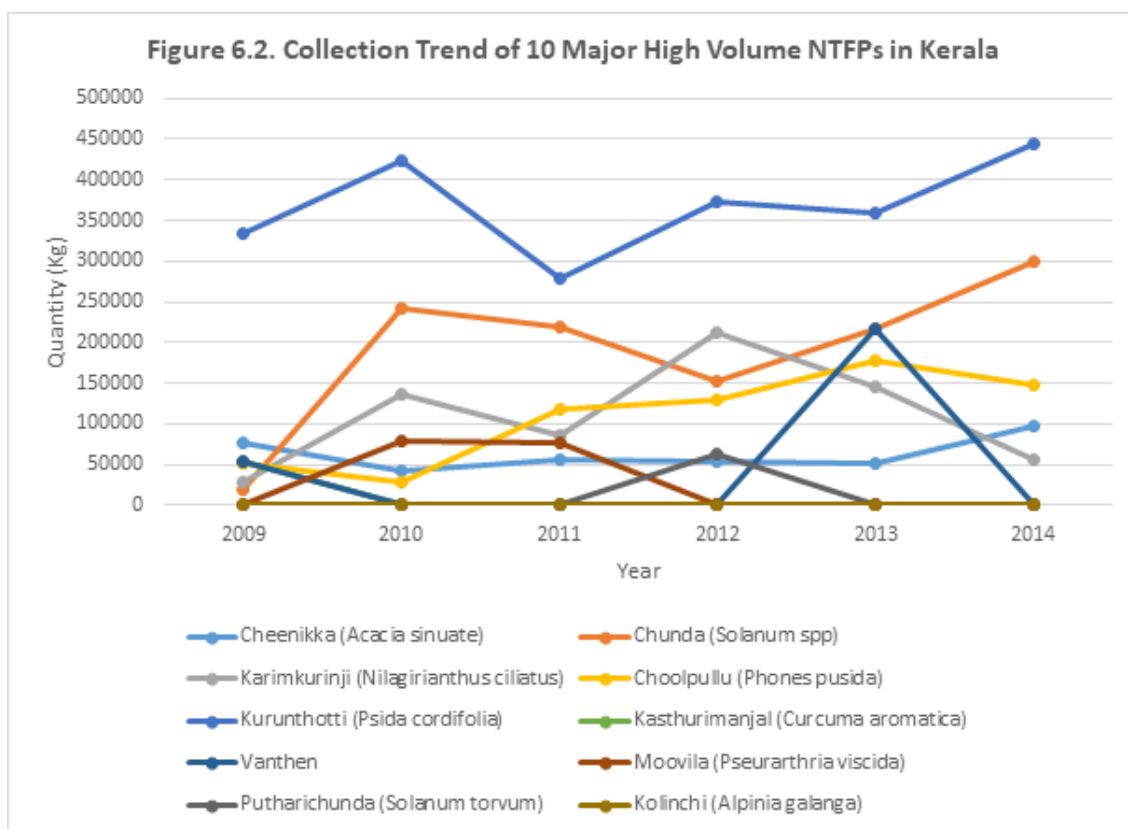
Collection Trend of 10 Major High Volume NTFPs in Kerala

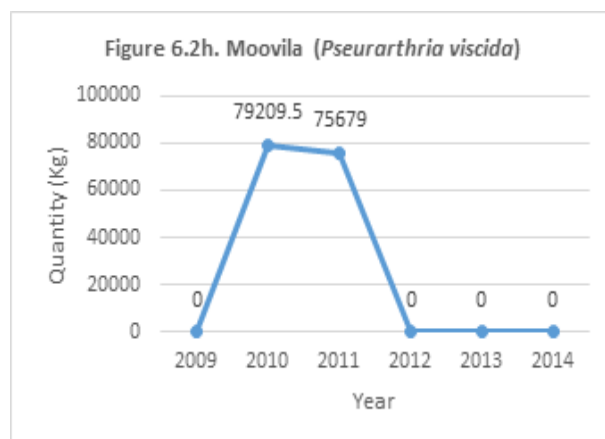
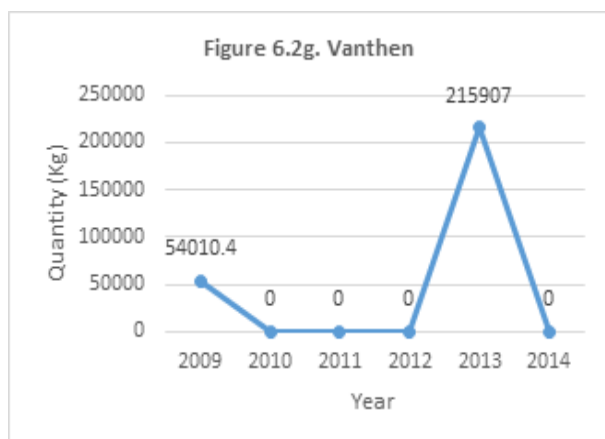
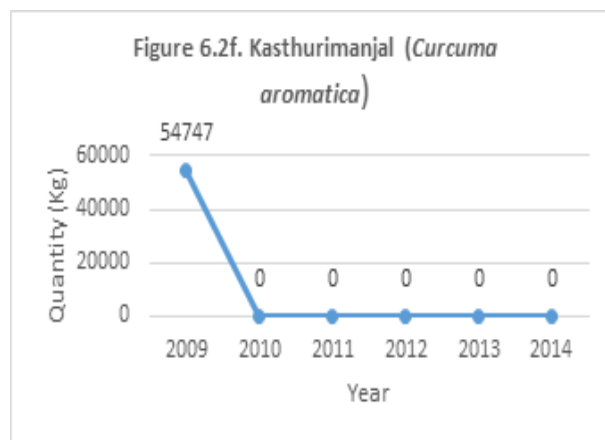
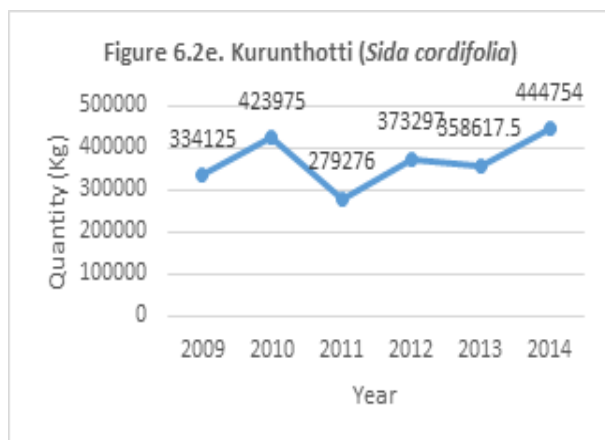
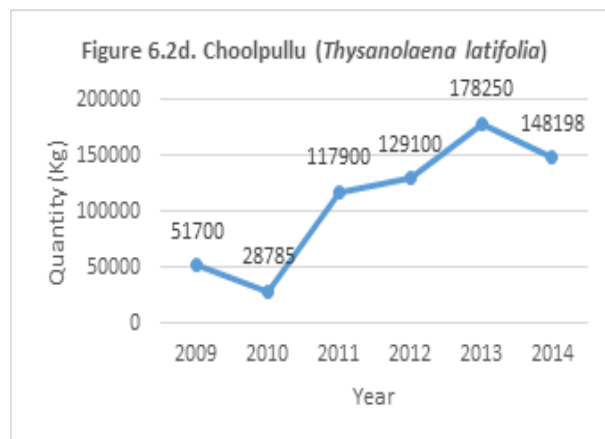
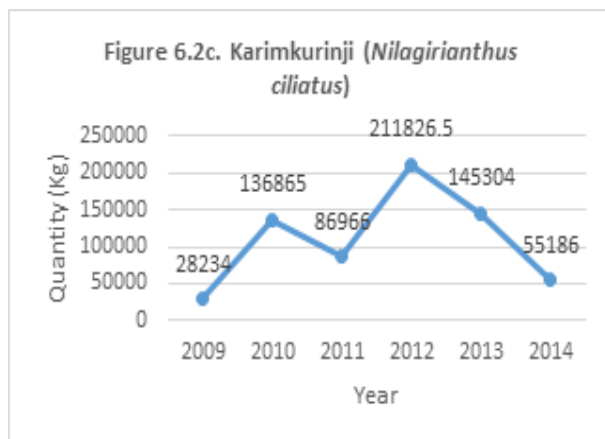
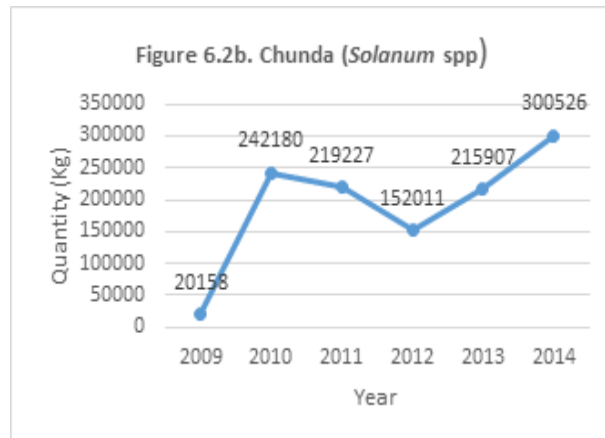
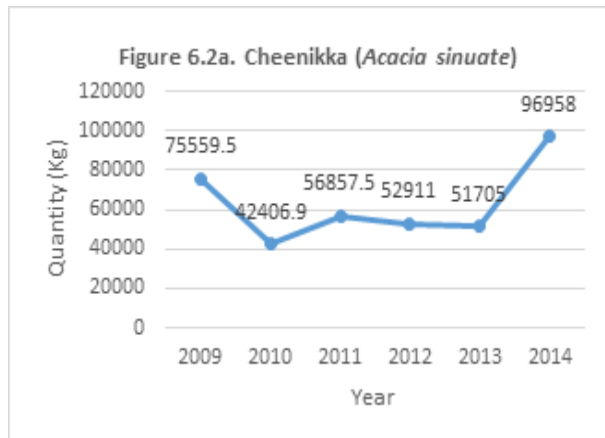
The following Table 6.8 shows the collection trend of high volume NTFPs in Kerala during the years 2009 to 2014. The ten selected high volume NTFPs are Cheenikka, Kurumthotti, Kasthurimanjal, Vanthen, Moovila, Karimkurinji, Chunda, Chooral, Putharichunda, Choolppullu and Kolinchi. The extraction pattern of Cheenikka, Choolpullu and Karimkurinji was more or less similar in all years. Chunda (*Solanum spp*) is the second most heavily collected species in all years except 2012. In 2009, Vanthen (Honey) collection was very high and it recorded 54,010.4 Kg of extraction. The collection of Moovila (relatively a high value NTFP) was recorded only in 2010 (79, 209 Kgs) and 2011 (75,679 Kgs).

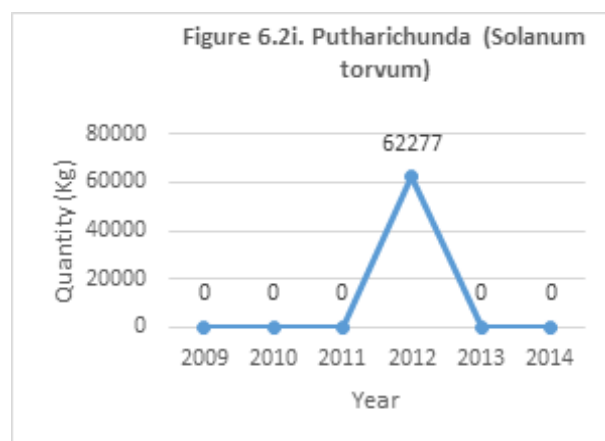
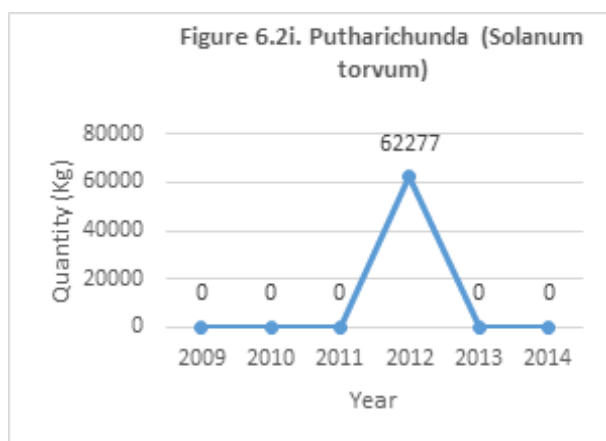


Table 6.8
Collection Trend of 10 Major High Volume NTFPs in Kerala (Quantity: in Kg)

S No	Species		2009	2010	2011	2012	2013	2014
	Local Name	Botanical (Scientific) Name						
1	Cheenikka	<i>Acacia sinuate</i>	75559.50	42406.90	56857.5	52911	51705	96958
2	Choolpullu	<i>Thysanolaena latifolia</i>	51700	28785	117900	129100	178250	148198
3	Kasthurimanjal	<i>Curcuma aromatica</i>	54747					
4	Kurunthotti	<i>Sida cordifolia</i>	334125	423975	279276	373297	358617.5	444754
5	Vanthen	Honey	54010.4	26640.40	17217	42986.43	30861.9	39378.45
6	Chunda	<i>Solanum spp</i>	20158	242180	219227	152011	215907	300526
7	Karimkuringi	<i>Nilagirianthus ciliatus</i>	28234	136865	86966	211826.5	145304	55186
8	Moovila	<i>Zanthoxylum rhetsa</i>		79209.50	75679			
9	Putharichunda	<i>Solanum torvum</i>				62277		
	Orilaveru		22299	11234	13047.5	34122	18614	6641







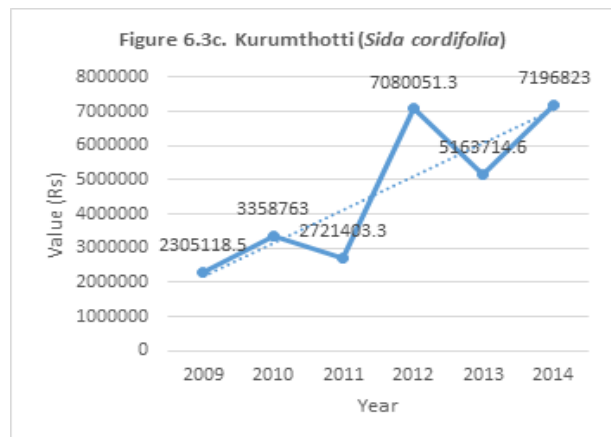
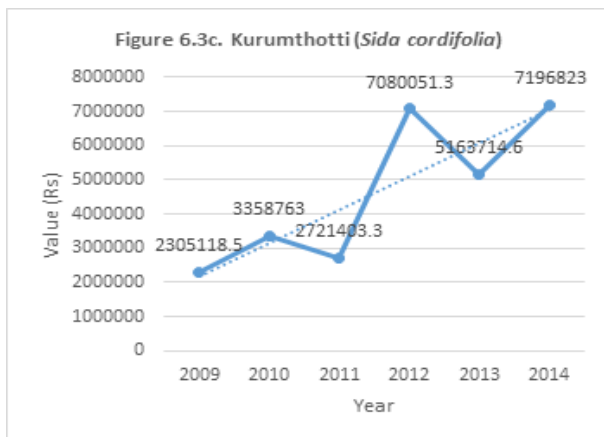
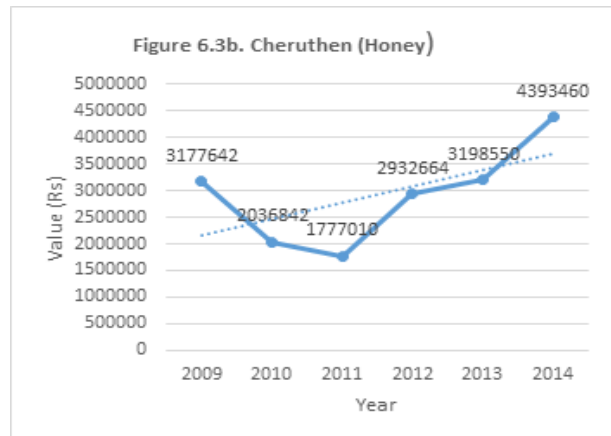
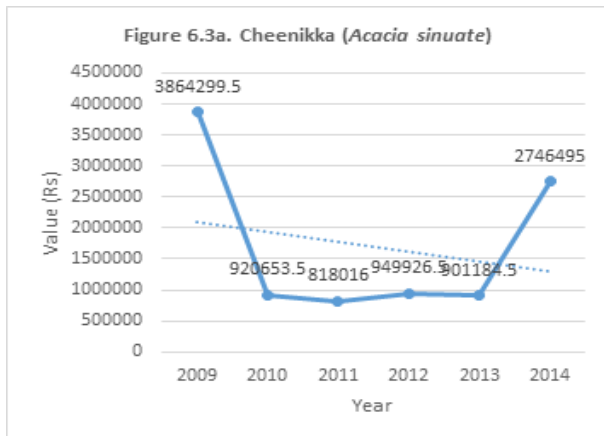
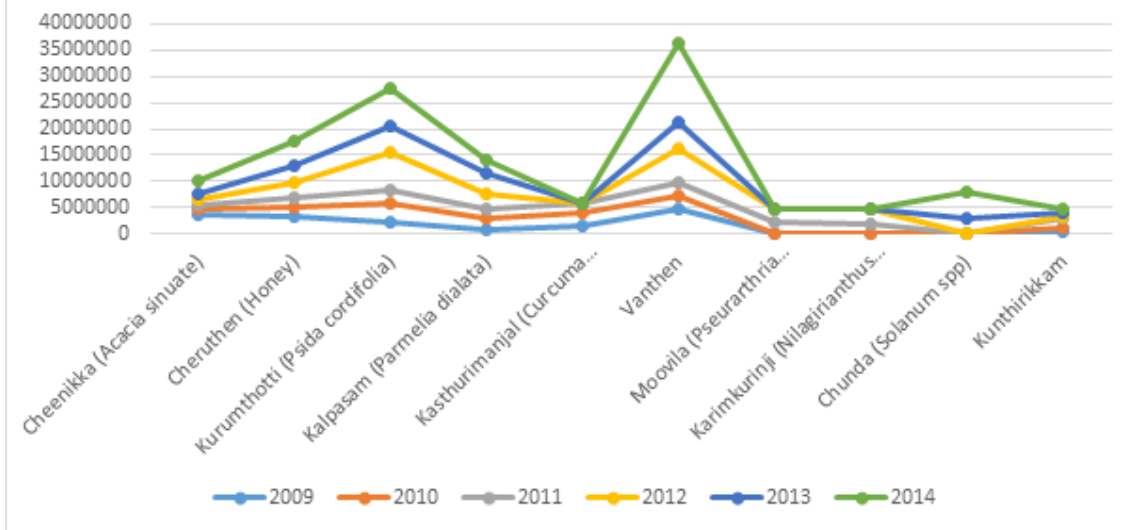
Collection Trend of 10 Major High Value NTFPs in Kerala

The following table 6.9 shows the collection trend of high value NTFPs in Kerala during the years 2009 to 2019. The 10 major high value species listed are Cheenikka, Cheruthen, Kurumthotti, Kalpasam, Karimkuri, Kasthurimanjal, Vanthen, Moovila, Karimkuri, Chunda, and Chooral. The total value of species varies year to year. Vanthen, Cheruthen and Kurumthotti are the top 3 high value species recorded among the ten selected NTFPs

Table 6.9. Collection Trend of 10 Major High Value NTFPs in Kerala (Unit: in Rs.)

Sl. No	Species		2009	2010	2011	2012	2013	2014
	Local Name	Botanical (Scientific) Name						
1	Cheenikka	<i>Acacia sinuate</i>	3864299.5	920653.50	818016	949926.5	901184.5	2746495
2	Cheruthen	(Honey)	3177642	2036842	1777010	2932664	3198550	4393460
3	Kasthoorimanjal	<i>Curcuma aromatica</i>	1452845.5	2594251	1810545.2			
4	Kurumthotti	<i>Sida cordifolia</i>	2305118.5	3358763	2721403.3	7080051.3	5163714.6	7196823
5	Vanthen	(Honey)	4789247	2439747.5	2437098	6609766.5	4929008	15184189
6	Kalpasam	<i>Parmelia dialata</i>	945362	1881667	2115552	2644250	3825125	2567140
7	Moovila	<i>Zanthoxylum rhetsa</i>			2388597	2440283		
8	Karimkuri	<i>Nilagiriathus ciliatus</i>			1828800	2873226.5		
9	Chunda	<i>Solanum spp</i>					3138017.5	4746011
10	Kunthirikkam	<i>Canarium strictum</i>	494413.5	562629	1770925	608974.55	652066.6	783564

Figure 6.3. Collection Trend of 10 Major High Value NTFPs in Kerala



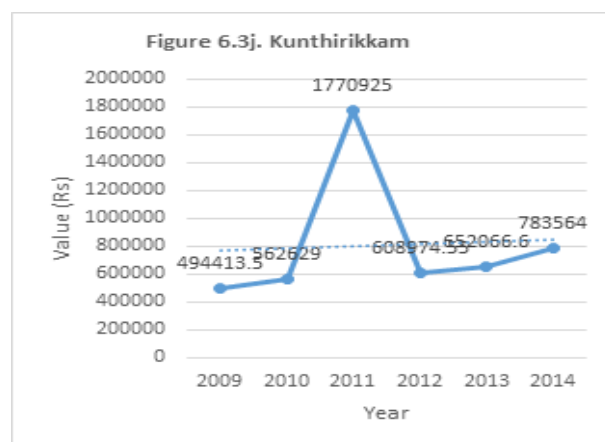
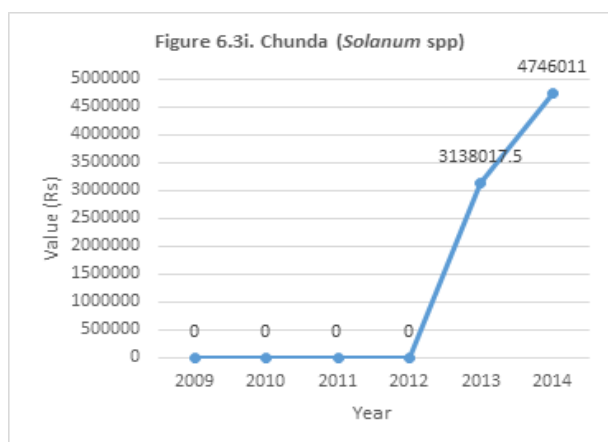
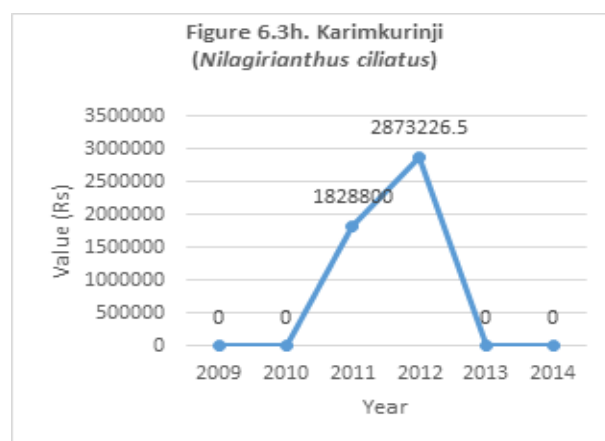
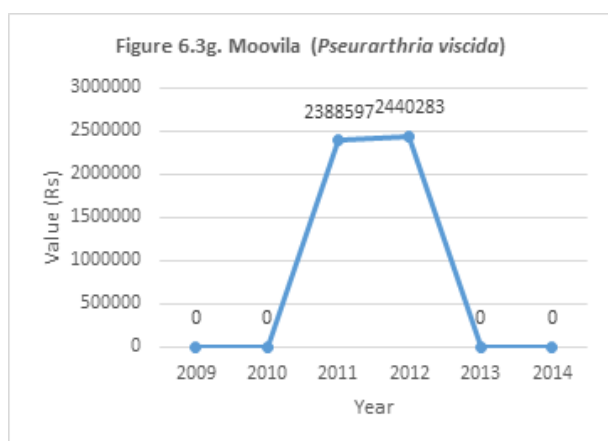
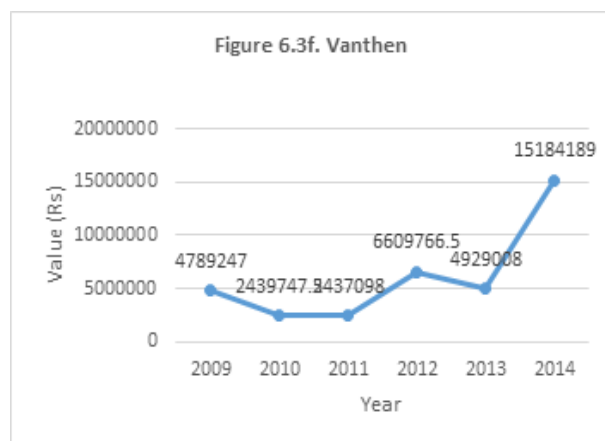
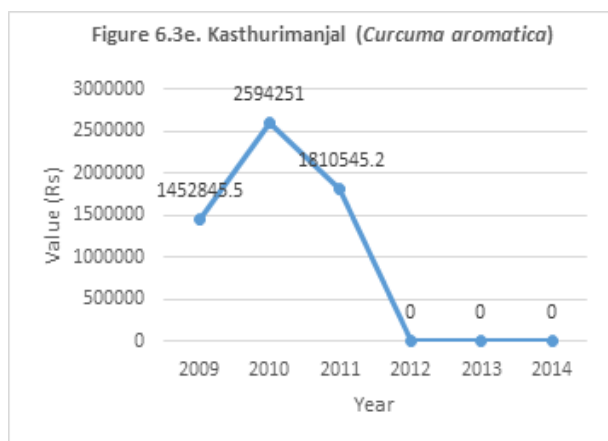


Table 6.10 State level – Total NWFP collected in Kerala; 2009-2014

Year	Quantity (Kg)	Value (Rs)
2009	854587.50	22270521.05
2010	1226354.90	24546330.75
2011	1354104.60	27481868.20
2012	1313913.25	38297720.10
2013	1193792.80	30237664.55
2014	1273244.75	47819942.50



Figure 6.4 NWFP collected in Kerala; Total Quantity (Kg)

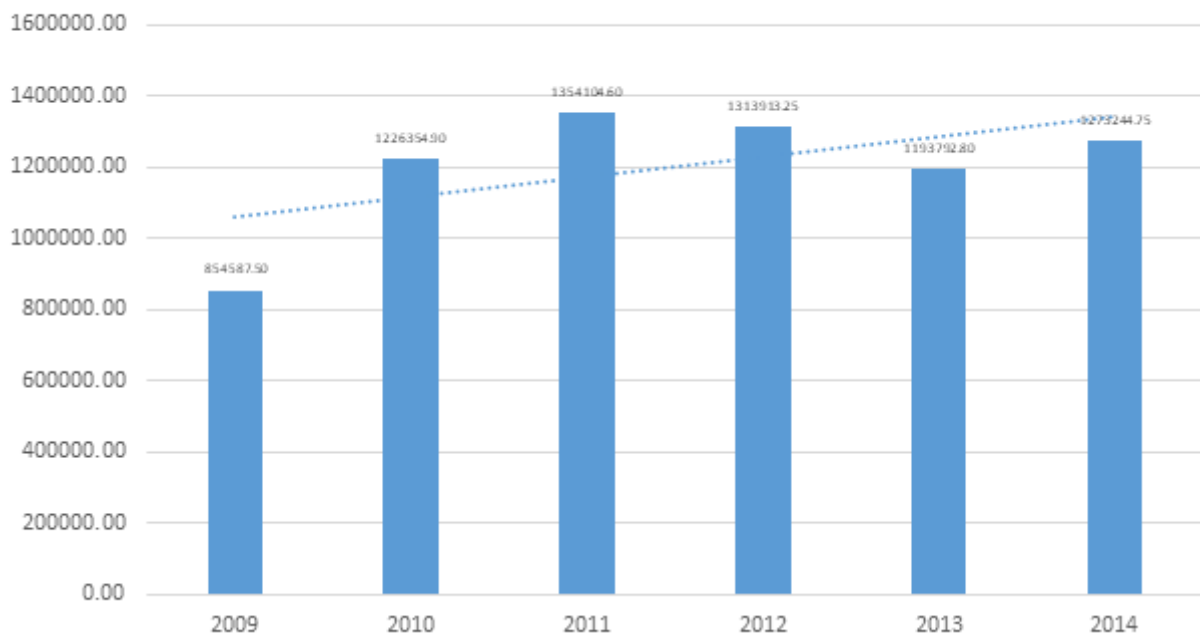
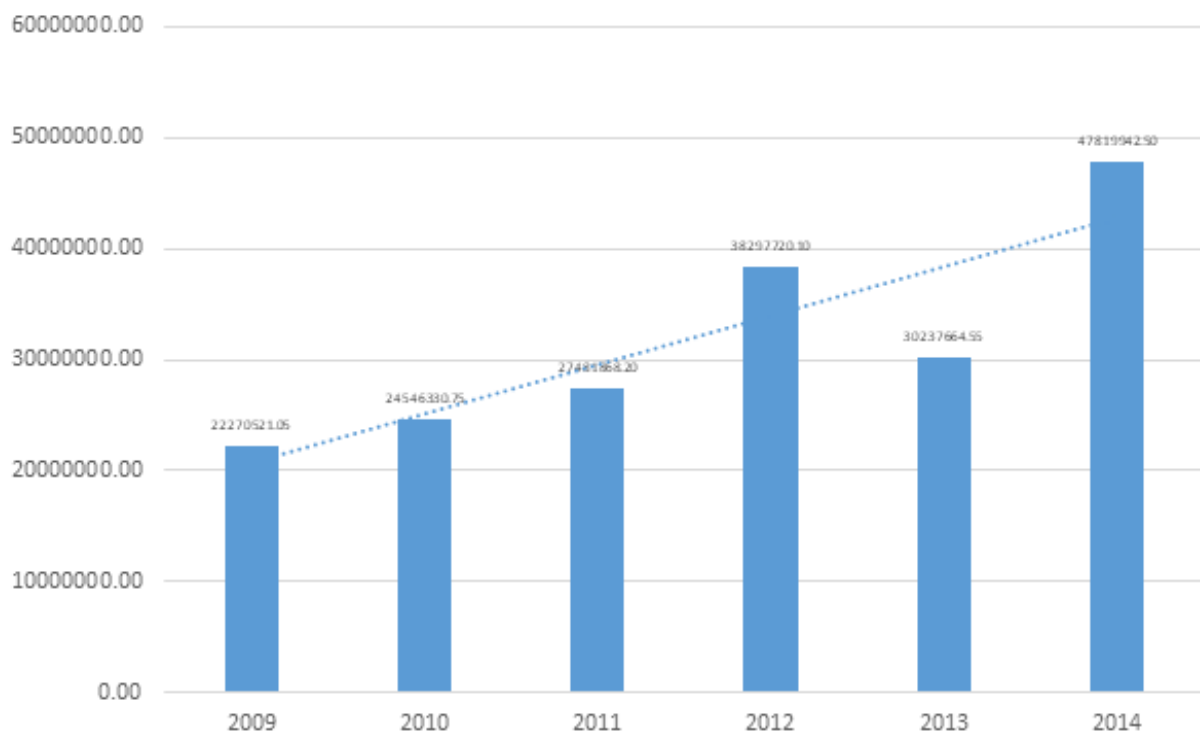


Figure 6.5 NWFP collected in Kerala; Total Value (Rs)



Phase 2

6.3 SPECIES WISE NON-TIMBER FOREST PRODUCTS (NTFPs) IN KERALA (2015-2019)

The following Tables (6.11-6.15) shows the collection trend of NTFPs in Kerala during the years 2015 to 2019. The tribal communities collected more than 60 species of NTFPs from the forest areas of Kerala during 2015 to 2019, according to the records of SC-ST Federation. The type of species, quantity and value of NTFPs collected vary significantly among these five years. The nature of collection details (fresh/dry/fruit/) of NTFPs such as adalodakam, chenchellyam, cheruvazhuthana, moovila, orila, pathirippovu, putharichunda etc is documented only in some years. The collection trend, both in quantity and value, was high in 2018 when compared to other years. In 2019, the collection trend, both in quantity and value, was minimum, when compared to other years.

VANASREE KONNI				വനശ്രീ -കോന്നി			
Sl.No.	Items	Weight	Rate	Sl.No.	Items	Weight	Rate
01.	Honey	1kg	600	01.	തേൻ		
02.	Honey	500gm	300	02.	തേൻ	1 കിലോ	500
03.	Honey	250gm	150	03.	തേൻ	500ഗ്രാം	300
04.	Dammer Honey	500gm		04.	ചെറുതേൻ	250ഗ്രാം	150
05.	Dammer Honey	250gm	375	05.	ചെറുതേൻ	500ഗ്രാം	225
06.	Dammer	100gm	50	06.	കുന്തിരിക്കം	250ഗ്രാം	375
07.	Kasthuri Manjal Powder	100gm	60	07.	കസ്തുരിമഞ്ഞൾ	100ഗ്രാം	50
08.	Lemongrass Oil	100gm	240	08.	പുൽത്തൈലം	100ഗ്രാം	60
09.	Eucaliptus Oil	100gm	170	09.	യുക്കാലി	100ഗ്രാം	240
10.	Denthapala Oil	100gm	80	10.	ദന്തപ്പാല ഓയിൽ	100ഗ്രാം	170
11.	Pain Balm	10gm	40	11.	പെയിൻ ബാം	10ഗ്രാം	80
12.	Lip Balm	10gm	40	12.	ലിപ് ബാം	10ഗ്രാം	40
13.	Jointpain Balm	10gm	40	13.	ജോയിന്റ് പെയിൻ ബാം	10ഗ്രാം	40
14.	Footcrack Relief	10gm	40	14.	ഫുട്ട് ക്രാക്ക് ബാം	10ഗ്രാം	40
15.	Mosquito Repellent	10gm	40	15.	കൊതുക് നിവാരണി	10ഗ്രാം	40
16.	Kudampuli	200gm		16.	കുടംപുളി	200ഗ്രാം	
17.	Kudampuli	500gm	200	17.	കുടംപുളി	500ഗ്രാം	200
18.	Organic Pepper	100gm	100	18.	കുരുമുളക്	100ഗ്രാം	100
19.	Cardamom	100gm	15	19.	ഏലയ്ക്ക	100ഗ്രാം	15
20.	File Board	1		20.	ഫയൽ ബോർഡ്	1	15
21.	Sandal Oil	2gm		21.	ചന്ദനതൈലം	2ഗ്രാം	
22.	Sandal Wood	1gm	180	22.	ചന്ദനത്തടി	1ഗ്രാം	180
23.	Sandal Soap	3 in 1	177	23.	ചന്ദനസോപ്പ്	Trio	177
24.	Sandal Soap	150 gm	56	24.	ചന്ദനസോപ്പ്	3 in 1	177
25.	Sandal Soap	150 gm	56	25.	ചന്ദനസോപ്പ്	150ഗ്രാം	56
26.	Sandal Soap	150 gm	65	26.	വേപ്പ് സോപ്പ്	300ഗ്രാം	65

Table 6.11 Species Wise Collection of NTFP / MFP in Kerala: 2015

Sl. No.	Species		Quantity		Value		Unit Value (Rs/Kg)
	Local Name	Botanical/Scientific name	Kg	%	Value (Rs)	%	
1.	Adalodakam Pacha	<i>Justicia adhatoda</i>	10819	1.15	111998	0.29	10.35
2.	Athithippali	<i>Balanophora fungosa</i>	9056	0.96	543390	1.40	60
3.	Broom grass	<i>Thysanolaena latifolia</i>	127693	13.52	2243163	5.79	17.57
4.	Cheevakkai/Cheenikkai	<i>Acacia sinuate</i>	73253	7.75	2180145	5.62	29.76
5.	Cheruthekku	<i>Clerodendrum serratum</i>	1835	0.19	85992	0.22	46.86
6.	Cheruvazhuthana	<i>Solanum spp</i>	27136	2.87	1362515	3.51	50.21
7.	Chittamruth	<i>Tinospora cordifolia</i>	136	0.01	816	0.002	6
8.	Chunda	<i>Solanum spp</i>	99891	10.57	1241968	3.20	12.43
9.	Elakka	<i>Elettaria cardamomum</i>	2	0.0002	665	0.002	332.5
10.	Ekanayakam/ponkorandi	<i>Salacia reticulata</i>	1500	0.16	22500	0.05	15
11.	Eramkol	<i>Munrochloa ritchie</i>	-		-		-
12.	Vanthen (Honey)		31501.9	3.33	7714634	19.90	244.89
13.	Cheruthen (Honey)		24675	2.61	5700860	14.71	231.04
14.	Honey wax		272.4	0.03	77140	0.19	283.19
15.	Kakkumkai	<i>Entada rheedii</i>	25	0.002	448	0.001	17.92
16.	Kalpasam	<i>Parmelia dialata</i>	9755.7	1.03	2879462	7.43	295.16
17.	Karimkurinji	<i>Nilagirianthus ciliatus</i>	87454	9.26	1999311	5.16	22.86
18.	Kasthurimanjal	<i>Curcuma aromatica</i>	1147	0.12	72079	0.19	62.84
19.	Kattukurumulakinthandu	<i>Piper spp.</i>	8361	0.89	330361	0.85	39.51
20.	Kattupadavalam	<i>Trichosanthes cucumerina</i>	34.3	0.004	2596	0.01	75.69
21.	Kattuthippeli	<i>Piper longum</i>	151	0.02	4832	0.01	32
22.	Kolinchi	<i>Zingiber zerumbet</i>	118	0.01	7670	0.01	65
23.	Koppuvella	<i>Vateria spp</i>	28	0.003	1691	0.004	60.39
24.	Kurumthotti	<i>Sida cordifolia</i>	266384	28.20	4574753	11.80	17.17
25.	Nannari/Naruneendi	<i>Hemidesmus indicus</i>	10.5	0.001	2625	0.01	250
26.	Orila	<i>Desmodium spp</i>	17117	1.81	837561	2.16	48.93
27.	Pachotti Patta	<i>Symplocos cochinchinensis</i>	13963	1.48	673036	1.74	48.2
28.	Padakkizhangu	<i>Cyclea peltata</i>	430.5	0.05	83786.5	0.22	194.63
29.	Pulmuthakku	<i>Ipomoea mauritiana</i>	4390	0.46	64451	0.17	14.68
30.	Pathirippovu I	<i>Myristica malabarica</i>	598.1	0.06	227057.63	0.59	379.63
31.	Pattincha/Incha	<i>Acacia caesia</i>	4938	0.52	276169	0.71	55.93
32.	Peenari	<i>Sterculia foetida</i>	8591	0.91	289688	0.75	33.72
33.	Putharichund Pacha	<i>Solanum torvum</i>	41687	4.41	593929	1.53	14.25
34.	Seethari	<i>Ipomoea spp.</i>	1015	0.11	86641	0.22	85.36



35.	Tharavella	<i>Spermacoce ocimoides</i>	253	0.03	7210	0.02	28.5
Total			944661	100	38767344.13	100	3489.85

Table 6.12 Species Wise Collection of NTFP / MFP in Kerala: 2016

Sl. No	Species		Quantity		Value		Unit Value (Rs/Kg)
	Local Name	Botanical/Scientific name	Kg	%	Value (Rs)	%	
1	Adalodakam Pacha	<i>Justicia adhatoda</i>	5000	0.98	50000	0.11	10
2	Adapathiyan	<i>Holostemma adakodien</i>	18.7	0.004	10098	0.02	540
3	Athithippali	<i>Balanophora fungosa</i>	9769	1.91	649557.5	1.48	66.49
4	Broom grass	<i>Thysanolaena latifolia</i>	128855	25.22	2176370	4.97	16.89
5	Chakkarakolli	<i>Gymnema sylvestre</i>	2750	0.54	38500	0.09	14
6	Cheevakkai/Cheenikka	<i>Acacia sinuate</i>	38592.5	7.55	2131800	4.87	55.24
7	Cheruthekku	<i>Clerodendrum serratum</i>	4992	0.97	306292	0.70	61.36
8	Cheruvazhuthana	<i>Solanum spp</i>	35569	6.96	1920726	4.39	54
9	Chittaratha	<i>Alpinia calcarata</i>	60	0.01	4200	0.01	70
10	Chunda	<i>Solanum spp</i>	39944	7.8	1868624	4.27	46.78
11	Eramkol	<i>Munrochloa ritchie</i>	6850	1.34	89050	0.20	13
	Vanthen (Honey)		33922.7	6.64	10363883	23.69	305.52
	Cheruthen (Honey)		10166	1.99	11182600	25.56	1100
	Honey wax		1609	0.31	482816	1.10	300.07
12	Kalpasam	<i>Parmelia dialata</i>	29286	5.73	3143024	7.18	107.32
13	Karimkunj	<i>Nilagirianthus ciliatus</i>	34455	6.74	815592	1.86	23.67
14	Kasthurimanjal	<i>Curcuma aromatica</i>	1499	0.29	88174	0.20	58.82
15	Kattukurumulakin thandu	<i>Piper spp.</i>	19465	3.81	907769.5	2.07	46.64
16	Kattupadavalam	<i>Trichosanthes cucumerina</i>	245.4	0.05	24748	0.06	100.85
17	Kattuthippeli	<i>Piper longum</i>	350	0.07	15750	0.04	45
18	Koppuvella	<i>Vateria spp.</i>	80	0.02	2560	0.01	32
19	Kunthirikkam I	<i>Canarium strictum</i>	8305.1	1.63	883010.8	2.02	106.32
20	Kurumthotti	<i>Sida cordifolia</i>	30233.5	5.92	1974809	4.51	65.32
21	Marottikkuru	<i>Hydnocarpus pentandra</i>	500	0.10	46000	0.10	92
22	Moovila	<i>Zanthoxylum rhetsa</i>	29698	5.81	1815415	4.15	61.13
23	Mullilam	<i>Zanthoxylum rhetsa</i>	1000	0.19	50000	0.11	50
24	Nannari/Naruneendi	<i>Hemidesmus indicus</i>	25	0.005	7500	0.02	300
25	Orila	<i>Desmodium spp</i>	9035	1.77	453179	1.04	50.16



Pachotti Patta	<i>Symplocos cochinchinensis</i>	3898	0.76	236176	0.54	60.59
Padakkizhangu	<i>Cyclea peltata</i>	1451.05	0.28	543208	1.24	374.36
Pathirippovu I	<i>Myristica malabarica</i>	1277.9	0.25	564868	1.30	442.03
Pattincha/Incha	<i>Acacia caesia</i>	9127.5	1.79	426163.4	0.97	46.69
Peenari	<i>Sterculia foetida</i>	7737	1.51	276882	0.63	35.79
Pollakkai	<i>Anamirta cocculus</i>	400	0.07	16000	0.04	40
Putharichunda	<i>Solanum torvum</i>	3177	0.62	130740	0.30	41.15
Putharichund Pacha		570	0.11	17100	0.04	30
Seethari	<i>Ipomoea spp.</i>	190	0.03	13300	0.03	70
Tharavella	<i>Spermacoce ocimoides</i>	712	0.14	18328	0.04	25.74
Undakkai	<i>Solanum torvum</i>	38	0.01	870	0.002	22.89
Total		510853	100	43745683.20	100	4981.81

Table 6.13 Species Wise Collection of NTFP / MFP in Kerala: 2017

Sl. No.	Species		Quantity		Value		Unit Value (Rs/Kg)
	Local Name	Botanical/Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam Dry	<i>Justicia adhatoda</i>	678	0.07	16950	0.04	25
	Adalodakam Pacha		23011	2.25	230110	0.53	10
2	Adapathiyam	<i>Holostemma adakodien</i>	5.9	0.001	3186	0.01	540
3	Amalpori	<i>Rauvolfia serpentine</i>	45	0.004	2660	0.01	59.11
4	Athithippali	<i>Balanophora fungosa</i>	9465	0.93	612209	1.41	64.68
5	Broom grass	<i>Thysanolaena latifolia</i>	53060	5.19	1087800	2.50	20.5
6	Cheevakkai/Cheenikkai	<i>Acacia sinuate</i>	71239	6.97	3090015	7.09	43.38
7	Cheruthekku	<i>Clerodendrum serratum</i>	2454.5	0.24	148240	0.34	60.4
8	Chittaratha	<i>Alpinia calcarata</i>	159	0.02	14767	0.03	92.87
9	Chunda	<i>Solanum spp</i>	194406	19.02	3744202	8.59	61.34
10	Vanthen (Honey)		37721.3	3.69	11611818	26.64	307.83
11	Cheruthen (Honey)		4008.2	0.39	1515080	3.48	378.01
12	Honey wax		429	0.04	120275	0.28	280.36
13	Kadukkathode	<i>Terminalia chebula</i>	820	0.08	35260	0.08	43
14	Kakkumkai	<i>Entada rheedii</i>	1763.6	0.17	50334	0.11	28.54
15	Kalpasam	<i>Parmelia dialata</i>	10712	1.05	3559000	8.17	332.24
16	Kanjirakkuru	<i>Strychnos nuxvomica</i>	241	0.02	16026.5	0.04	66.5
17	Karimkurinji	<i>Nilagirianthus ciliates</i>	71111	6.96	1321416	3.03	18.58
18	Kasthurimanjal	<i>Curcuma aromatic</i>	1231	0.12	90923	0.21	73.86



19	Kattukurumulakin thandu	<i>Piper spp.</i>	20041	1.96	816963	1.87	40.76
20	Kattuchena	<i>Amorphophallus paeoniifolius</i>	25	0.00 2	594	0.00 1	23.76
21	Kattupadavalam ()	<i>Trichosanthes cucumerina</i>	5792.6	0.57	963127	2.21	166.27
22	Kattuthippeli	<i>Piper longum</i>	804	0.08	32160	0.07	40
23	Kayanthikkuru	<i>Caesalpinia bonduc</i>	44	0.00 4	4180	0.01	95
24	Kolinchi	<i>Zingiber zerumbet</i>	16	0.00 2	1444	0.00 3	90.25
25	Koppuvella	<i>Vateria spp.</i>	31	0.00 3	11780	0.03	380
26	Kooramkolli	<i>Gymnema spp.</i>	1250	0.12	18125	0.04	14.5
27	Kudampuli	<i>Garcinia gummy-gutta</i>	55	0.00 5	14987.5	0.03	272.5
28	Kunthirikkam I ()	<i>Canarium strictum</i>	9099	0.89	1071448	2.46	117.74
29	Vellakkunthirikkam	<i>Vateria indica</i>	32	0.00 3	15200	0.03	280.36
30	Kurumthotti	<i>Sida cordifolia</i>	41122	40.2 3	7357995	16.8 8	17.89
31	Marottikkuru	<i>Hydnocarpus pentandra</i>	745.8	0.07 3	111546	0.26	149.57
32	Moovila	<i>Pseurarthria viscid</i>	35193	3.44	1892183	4.34	53.77
33	Nagagandhi	<i>Couroupita guianensis</i>	57	0.00 6	4560	0.01	80
34	Njavanappovu ()	<i>Syzigium cumini</i>	19	0.00 2	6317	0.01	332.47
35	Orila ()	<i>Desodium spp</i>	403	0.04	6045	0.01	15
	Orila Red		3350	0.33	134000	0.31	40
	Orila Dry		12058	1.18	617085	1.42	51.18
36	Pachotti Patta	<i>Symplocos cochinchinensis</i>	8266	0.81	561994	1.29	67.99
37	Padakkizhangu	<i>Cyclea peltata</i>	3561	0.35	1236228	2.84	347.1
38	Peenari	<i>Celtis philipensis</i>	6315	0.62	251791	0.58	39.87
39	Pulmuthakku	<i>Ipomoea mauritiana</i>	2373	0.23	80949	0.19	34.11
40	Pathirippovu I	<i>Myristica malabarica</i>	1015	0.10	330979	0.76	325.9
41	Pattincha/Incha	<i>Acacia caesia</i>	10965	1.07	641375	1.47	58.49
42	Putharichunda	<i>Solanum torvum</i>	5040	0.49	81510	0.19	16.17
43	Soapinkai/Urinchikkai	<i>Sapindus mukorossi</i>	20	0.00 2	500	0.00 1	25
44	Thannikaithode	<i>Terminalia bellerica</i>	1028	0.10	24415	0.06	23.75
45	Tharavella	<i>Spermacoce ocimoides</i>	764	0.07	26044	0.06	34.09
	Total		102214 6	100	43585796.5 0	100	5934.3 3



Table 6.14 Species Wise Collection of NTFP / MFP in Kerala: 2018

Sl. No.	Species		Quantity		Value		Unit Value (Rs/Kg)
	Local Name	Botanical/Scientific Name	Kg	%	Value (Rs)	%	
1	Adalodakam Dry ()	<i>Justicia adhatoda</i>	333	0.02	6678	0.01	20.05
	Adalodakam Pacha		9082	0.71	108984	0.17	12
2	Athithippali	<i>Balanophora fungosa</i>	6581	0.52	351140	0.57	53.36
3	Broom grass	<i>Thysanolaena latifolia</i>	83125	6.56	1913375	3.15	23.02
4	Cane	<i>Calamus spp.</i>	52951	4.18	2475728	4.07	46.76
5	Cheevakkai/Cheenikka i	<i>Acacia sinuate</i>	466116	36.82	3546933	5.84	7.61
6	Chenchelyam	<i>Shorea robusta</i>	907.5	0.07	102136	0.16	112.5
	Chenchelyam II		1416.5	0.11	128439	0.21	90.67
	Chenchelyam III		144.9	0.01	11592	0.01	80
7	Cheruthekku	<i>Clerodendrum serratum</i>	1428.5	0.11	86350	0.14	60.45
8	Cheruvazhuthana	<i>Solanum spp</i>	41537	3.28	2157675	3.55	51.95
	Cheruvazhuthana Pacha		17987	1.42	251738	0.41	14
9	Chittaratha	<i>Alpinia calcarata</i>	94	0.01	11280	0.02	120
10	Chunda	<i>Solanum spp</i>	13118	10.3	1250628	2.05	9.53
11	Derba	<i>Desmostachya bipinnata</i>	538.5	0.04	40388	0.06	75
12	Ekanayakam/ponkorandi	<i>Salacia reticulate</i>	2260	0.17	40680	0.06	18
13	Eramkol	<i>Munrochloa ritchie</i>	21300	1.68	138450	0.22	6.5
14	Vanthen (Honey)		37606.9	2.97	13851356	22.81	368.32
15	Cheruthen (Honey)		1414.4	0.11	1223924	2.02	865.33
16	Honey wax		244.8	0.02	67536	0.11	275.88
17	Incha	<i>Acacia spp</i>	990	0.07	45200	0.07	45.66
18	Kadukkathode	<i>Terminalia chebula</i>	150	0.01	4500	0.01	30
19	Kakkumkai	<i>Entada rheedii</i>	1631.4	0.12	47435	0.07	29.08
20	Kalpasam	<i>Parmelia dialata</i>	130	0.01	12700	0.02	97.69
21	Kanjiramtholi	<i>Strychnos nux-vomica</i>	251	0.02	17910	0.02	71.35
22	Karimkurinji	<i>Nilagirianthus ciliates</i>	88482	6.99	1988698	3.27	22.48
23	Kasthurimanjal	<i>Curcuma aromatic</i>	41068	3.24	618174	1.01	15.05
24	Kattukurumulakin thandu	<i>Piper spp.</i>	10761	0.85	407840	0.67	37.9
25	Kattupadavalam	<i>Trichosanthes cucumerina</i>	8483.5	0.67	12642104	20.80	1490.2
26	Kattuthippeli	<i>Piper longum</i>	3696	0.29	7983054	13.10	2159
27	Kayanthikkuru	<i>Caesalpinia bonduc</i>	11	0.001	1100	0.002	100
28	Kolinchi	<i>Zingiber zerumbet</i>	433	0.03	8615	0.01	19.9



29	Koppuvella	<i>Vateria spp.</i>	108.5	0.01	16275	0.03	150
30	Kudampuli	<i>Garcinia gummy-gutta</i>	8529	0.67	202550	0.33	23.75
31	Kumil	<i>Gmelina arborea</i>	3804	0.30	68472	0.11	18
32	Kunthirikkam II	<i>Canarium strictum</i>	838	0.06	86313	0.14	103
	Kunthirikkam III		1644	0.13	145826	0.24	88.7
	Kunthirikkam I		3398.91	0.27	543284	0.89	159.84
33	Kurumulaku vally	<i>Piper spp.</i>	314	0.02	13422	0.02	42.75
34	Kurumthotti	<i>Sida cordifolia</i>	998	0.08	33932	0.05	34
	Kurumthotti Pacha		14811.5	1.17	424850	0.70	28.68
35	Marottikkuru	<i>Hydnocarpus pentandra</i>	124804	9.86	2940179	4.84	23.56
	Marottikkuru 2		3715	0.29	55725	0.09	15.00
36	Moovila	<i>Pseurarthria viscid</i>	698	0.06	32370	0.05	46.38
	Moovila Pacha		14262.8	1.13	852462	1.40	59.77
37	Mullilam	<i>Pseurarthria viscid</i>	26.9	0.00	21520	0.04	800.00
38	Nagagandhi	<i>Couroupita guianensis</i>	10768	0.85	600055	0.99	55.73
39	Orila	<i>Desmodium spp</i>	8128	0.64	207645	0.34	25.55
	Orila Red		5347	0.42	289392	0.48	54.12
40	Pachotti Patta	<i>Symplocos cochinchinensis</i>	20366.	1.61	1727999	2.85	84.85
41	Padakkizhangu	<i>Cyclea peltata</i>	1125	0.09	70211	0.12	62.41
42	Pulmuthakku	<i>Ipomoea mauritiana</i>	491	0.04	10150	0.02	20.67
43	Pathirippovu I	<i>Myristica malabarica</i>	8.9	0.42	289392	0.48	54.12
	Pathirippovu III		1173.0	1.61	1727999	2.85	84.85
44	Pattincha/Incha	<i>Acacia caesia</i>	5916	0.09	70211	0.12	62.41
45	Peenari	<i>Sterculia foetida</i>	615	0.04	10150	0.02	20.67
46	Pollakkai	<i>Anamirta cocculus</i>	798	0.42	289392	0.48	54.12
47	Putharichunda	<i>Solanum torvum</i>	380	0.03	12600	0.02	33.16
48	Seethari	<i>Ipomoea spp.</i>	84.2	0.01	77450	0.13	919.83
49	Tharavella	<i>Spermacoce ocimoides</i>	315	0.02	9135	0.02	29.00
	Total		1265807	100	60725189.00	100	8493.22



Table 6.15 Species Wise Collection of NTFP / MFP in Kerala: 2019

Sl. No	Species		Quantity		Value		Unit Value (Rs/Kg)
	Local Name	Botanical/Scientific Name	Kg	%	Value (Rs.)	%	
1	Adalodakam Dry	<i>Justicia adhatoda</i>	338	0.09	8450	0.03	25
	Adalodakam Pacha		45687	11.73	548247	2.20	12
2	Athithippali	<i>Balanophora fungosa</i>	1035	0.27	43470	0.17	42
3	Broom grass	<i>Thysanolaena latifolia</i>	36680	9.42	909200	3.66	24.79
4	Cheevakkai/Cheenikkai	<i>Acacia sinuate</i>	32124	8.25	1371860	5.52	42.7
5	Cheruthekku	<i>Clerodendrum serratum</i>	679	0.17	36750	0.14	54.12
6	Cheruvazhuthana	<i>Solanum spp</i>	36826	9.46	1033927	4.16	28.08
7	Chittamruth	<i>Tinospora cordifolia</i>	191	0.05	5730	0.02	30
8	Chunda	<i>Solanum spp</i>	36826	9.46	1033927	4.16	28.08
9	Derba	<i>Desmostachya bipinnata</i>	543	0.14	3010	0.01	5.54
10	Ekanayakam/ponkorandi	<i>Salacia reticulate</i>	1278	0.33	84940	0.34	66.46
11	Vanthen (Honey)		25961	6.67	9484651	0.10	365.3
12	Cheruthen (Honey)		588.8	0.15	1022170	4.11	1736
13	Honey wax		67	0.017	21775	0.08	325
14	Kakkumkai	<i>Entada rheedii</i>	3643.	0.94	100502	0.40	27.58
15	Kalpasam	<i>Parmelia dialata</i>	6723	1.73	2059589	8.29	306.3
16	Karimkurinji	<i>Nilagirianthus ciliates</i>	49271	12.65	967950	3.89	19.65
17	Kasthurimanjal	<i>Curcuma aromatic</i>	14.5	0.004	1113	0.004	76.76
18	Kattukurumulakin thandu	<i>Piper spp.</i>	6067	1.56	234995	0.95	38.73
19	Kattupadavalam	<i>Trichosanthes cucumerina</i>	7686	1.97	1606618	6.47	209.01
20	Kattuthippeli	<i>Piper longum</i>	62	0.02	2520	0.01	40.65
21	Kolinchi	<i>Zingiber zerumbet</i>	95	0.02	4400	0.02	46.32
22	Kudampuli	<i>Garcinia gummy-gutta</i>	1710	0.44	42280	0.17	24.73
23	Kunthirikkam II	<i>Canarium strictum</i>	112	0.03	15020	0.06	134.11
	Kunthirikkam III		218	0.06	18620	0.07	85.41
	Kunthirikkam I		3263	0.84	929240.8	3.74	284.77
24	Kurumthotti	<i>Sida cordifolia</i>	12924	3.32	629805	2.54	48.73
	Kurumthotti Pacha		87027	22.34	1479459	5.95	17
25	Manjakkova	<i>Curcuma zanthorrhiza</i>	150	0.04	11250	0.04	75
26	Moovila	<i>Pseurarthria viscid</i>	3256	0.84	198380	0.79	60.93
27	Orila	<i>Desmodium spp</i>	2481	0.64	125570	0.50	50.61



Collection Trend of 10 Major High Volume NTFPs in Kerala

The following table (6.16) provides the collection trend of major 10 high volume NTFPs in Kerala during the years 2015 to 2019

Table 6.16
Collection Trend of 10 Major High Volume NTFPs in Kerala (Quantity: in Kg)

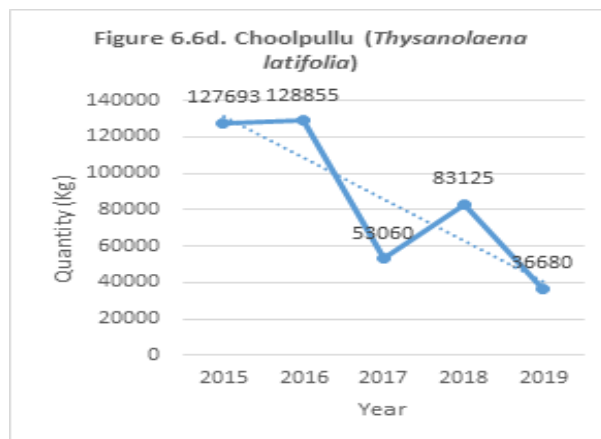
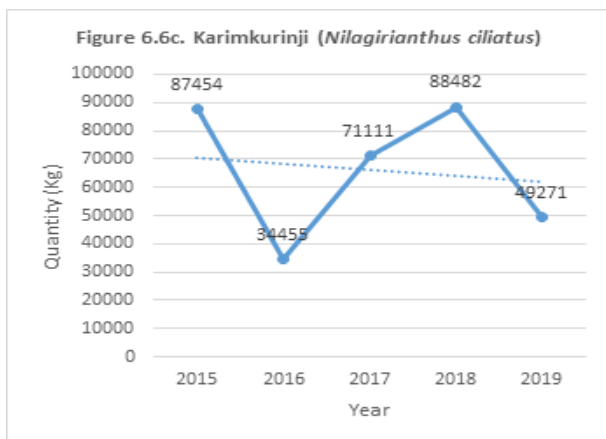
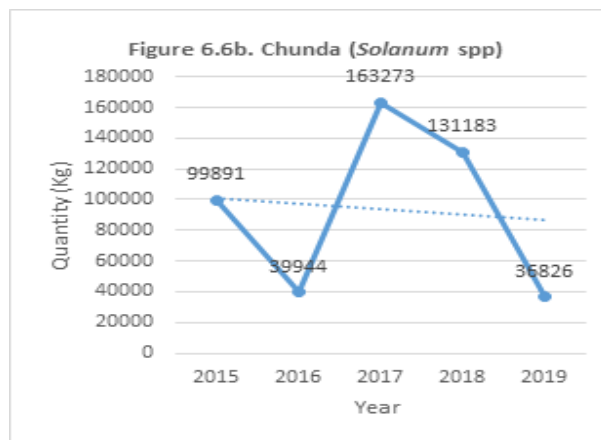
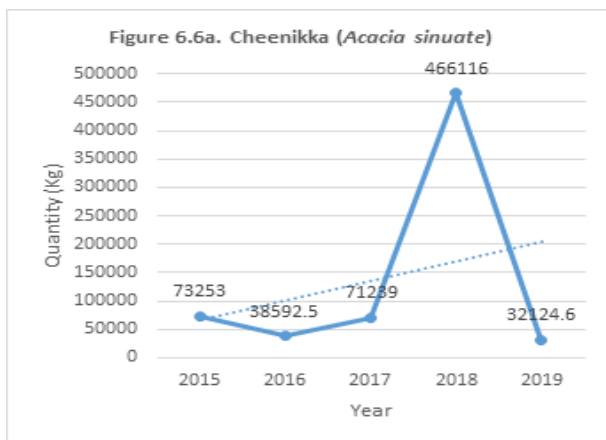
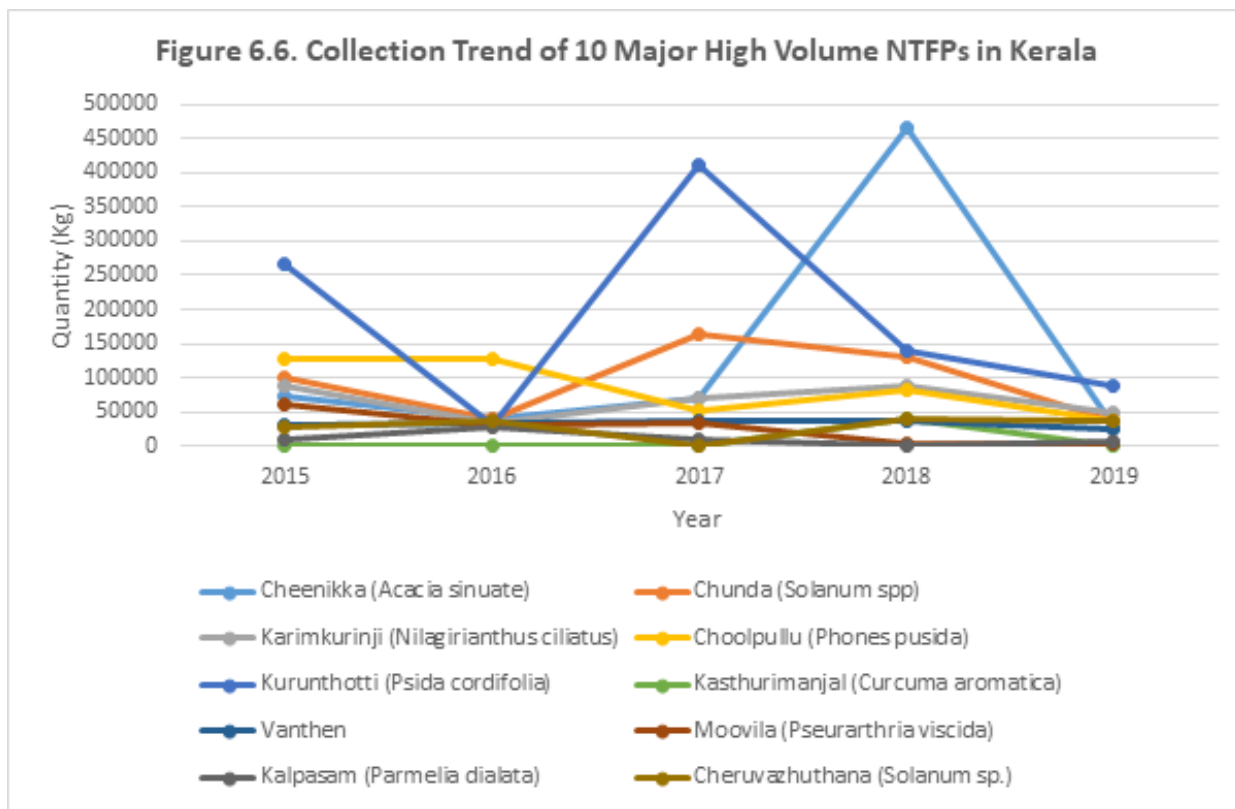
Sl. No.	Species		2015	2016	2017	2018	2019
	Local Name	Botanical (Scientific Name)					
1	Cheenikka	<i>Acacia sinuate</i>	73253 (7.75%)	38592.5 (7.55%)	71239 (6.97%)	466116 (36.82%)	32124.6 (8.28%)
2	Choolpullu	<i>Thysanolaena latifolia</i>	127693 (13.52%)	128855 (22.22%)	53060 (5.19%)	83125 (6.57%)	36680 (9.46%)
3	Kasthurimanjal	<i>Curcuma aromatica</i>	1147 (0.12%)	1499 (0.29%)	12311 (0.12%)	41068 (3.24%)	14.5 (0.01%)
4	Kurunthotti	<i>Sida cordifolia</i>	266384 (28.2%)	30233.5 (5.92%)	411221 (40.23%)	14811.5 (1.2%)	87027 (25.7%)
5	Vanthen	Honey	31501.90 (3.33%)	33922.65 (0.31%)	37721.30 (3.69%)	37606.85 (2.97%)	25961.1 (6.69%)
6	Chunda	<i>Solanum spp</i>	99891 (10.57%)	39944 (7.82%)	163273 (19%)	131183 (10.36%)	36826 (9.49%)
7	Karimkurinji	<i>Nilagirianthus ciliatus</i>	87454 (9.26%)	34455 (6.74%)	71111 (6.96%)	88482 (6.99%)	49271 (12.7%)
8	Kalpasam	<i>Parmelia dialata</i>	9756 (1.03%)	29286 (5.73%)	10712 (1.05%)	130 (0.01%)	6723 (1.73%)
9	Moovila	<i>Zanthoxylum rhetsa</i>	61844 (6.55%)	29698 (5.81%)	35193 (3.44%)	3715 (0.29%)	3256 (0.84%)
10	Cheruvazhuthana	<i>Solanum</i>	27136 (2.87%)	35569 (6.96%)	0 (0)	41537 (4.6%)	36826 (9.49%)

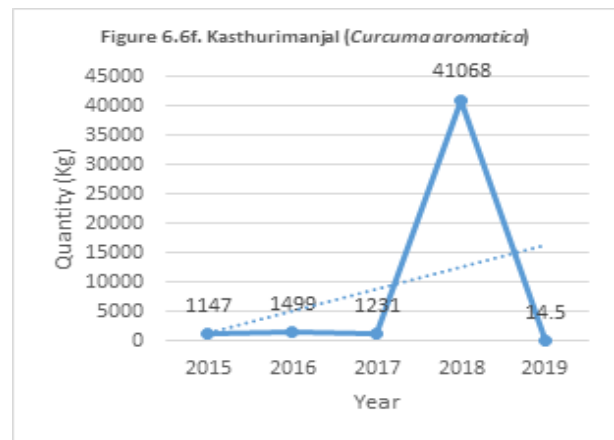
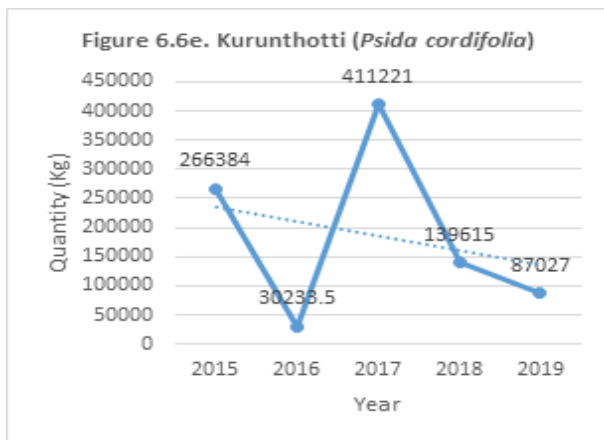
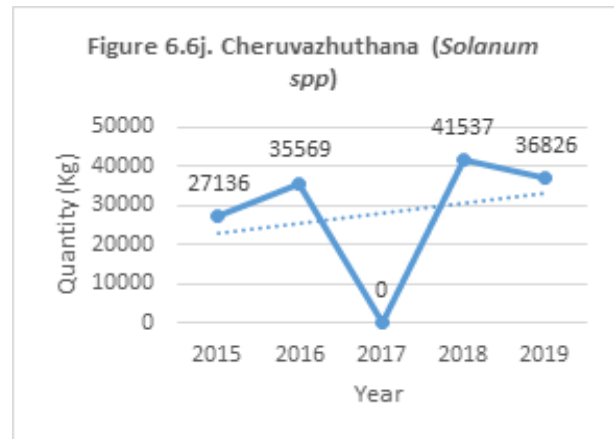
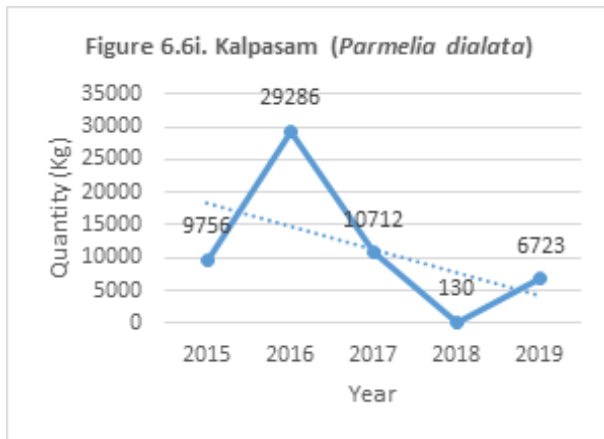
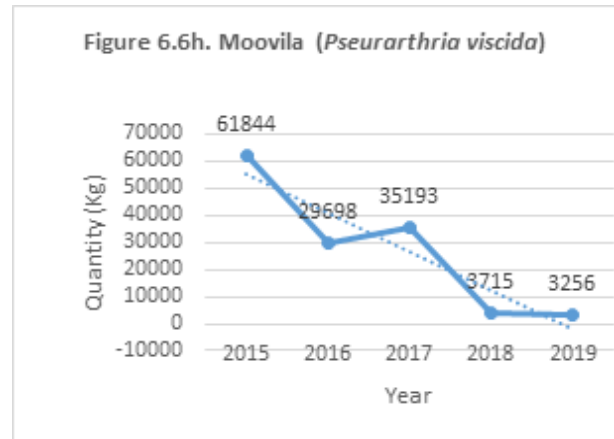
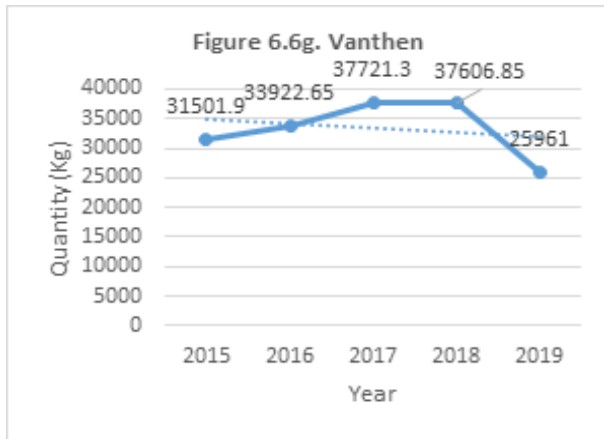
The inferences from the data include:

- The ten selected high volume NTFPs were cheenikka, choolpullu, kasthurimanjal, kurumthotti, vanthen, chunda, karimkurinji, kalpasam, moovila and cheruvazhuthana.
- Kurumthotti (*Sida cordifolia*) was the most heavily collected species in 2015, 2017 and 2019. In 2016 and 2018, significant reduction in kurumthotti collection was recorded.
- There was significant increase in the collection of cheenikka (*Acacia sinuate*) in 2018 and choolpullu (*Thysanolaena latifolia*) in 2016 when compared to other years.
- The extraction pattern of vanthen (honey) was more or less similar in all years.
- The collection of karimkurinji (*Nilagirianthus ciliatus*) doubled in 2019 when compared to other years.
- Chunda (*Solanum spp*) was the second most heavily collected species in 2017 and 2018.



Collection Trend of 10 Major High Volume NTFPs in Kerala is represented in the following figures (consolidated as well as individually):





Collection Trend of 10 Major High Value NTFPs in Kerala

Table 6.17 shows the collection trend of 10 major high value NTFPs in Kerala during the years 2015 to 2019

Table 6.17
Collection Trend of 10 Major High Value NTFPs in Kerala (Unit: in Rs.)

Sl. No	Species		2015	2016	2017	2018	2019
	Local Name	Botanical (Scientific Name)					
1	Cheenika	<i>Acacia sinuate</i>	2180145 (5.62%)	2131800 (4.87%)	3090015 (7.09%)	3546933 (5.84%)	1371860 (5.53%)
2	Cheruthen	(Honey)	5700860 (14.71%)	11182600 (25.56%)	3090015 (3.48%)	1223924 (2.02%)	1022170 (4.12%)
3	Kurumthotti	<i>Sida cordifolia</i>	4574753 (11.8%)	1974809 (4.51%)	7357995 (16.88%)	458782 (0.7%)	1479459 (8.5%)
4	Vanthen	(Honey)	7714634 (19.9%)	10363883 (23.69%)	1161181 8 (26.64%)	1385135 6 (22.81%)	9484651 (38.2%)
5	Kalpasam	<i>Parmelia dialata</i>	2879462 (7.43%)	3143024 (7.18%)	3559000 (8.17%)	12700 (0.02%)	2059589 (8.3%)
6	Moovila	<i>Zanthoxylum rhetsa</i>	3836646 (9.9%)	1815415 (4.15%)	1892183 (4.34%)	55725 (0.1%)	198380 (0.80%)
7	Karimkuri	<i>Nilagirianthus ciliatus</i>	1999311 (5.16%)	815592 (2.08%)	1321416 (3.03%)	1988698 (3.27%)	967950 (3.9%)
8	Chunda	<i>Solanum torvum</i>	1241968 (3.2%)	1868624 (4.27%)	3744202 (8.5%)	1250628 (2.06%)	1033927 (4.16%)
9	Choolpullu	<i>Thysanolaena latifolia</i>	2243163 (5.79%)	2176370 (4.98%)	1087800 (2.5%)	1913375 (3.15%)	909200 (3.66%)
10	Cheruvazhuthana	<i>Solanum spp</i>	1361515 (3.51%)	1920726 (4.39%)	0 (0)	2157675 (3.55%)	1033927 (4.16%)

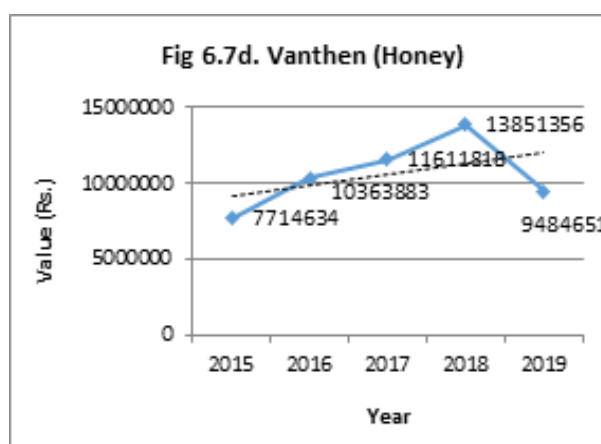
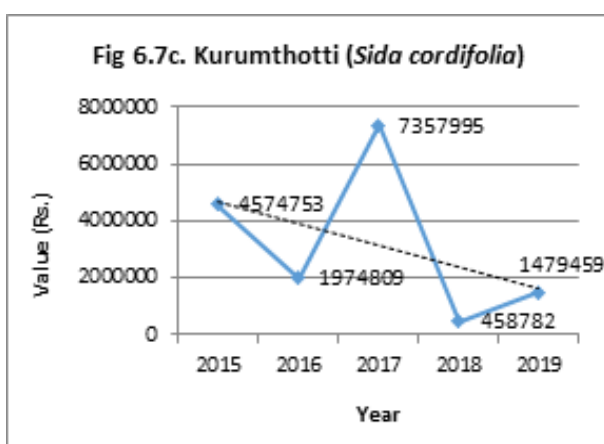
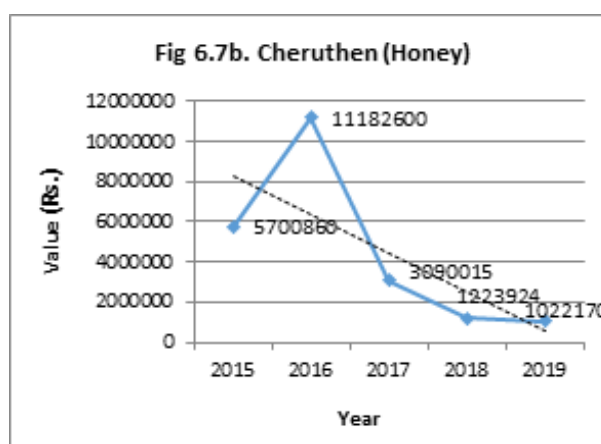
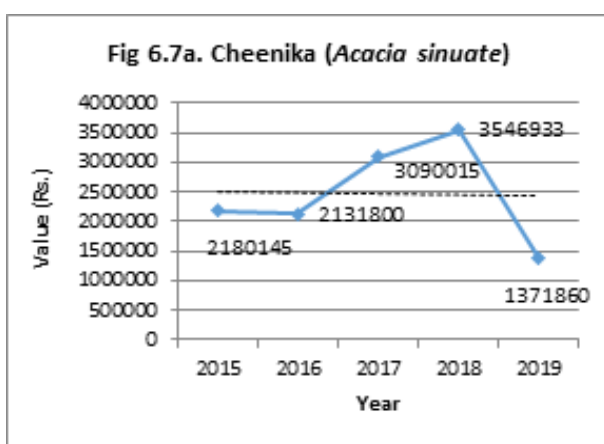
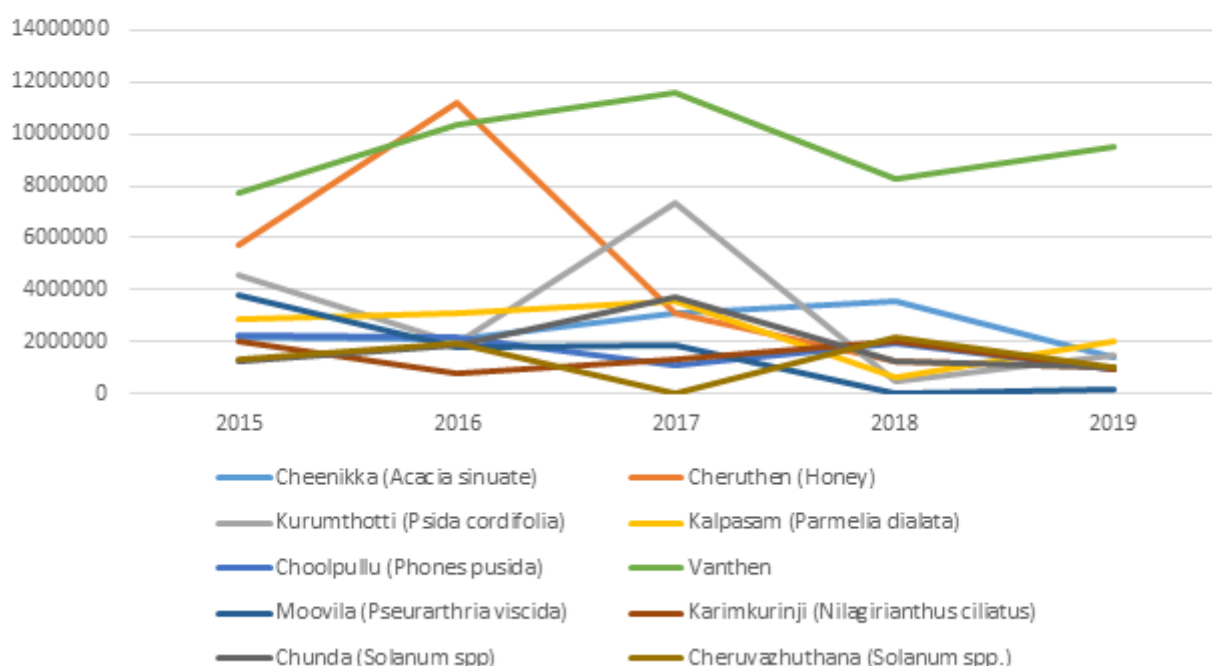
Following are the major inferences:

- The 10 major high value species listed are cheenikka, cheruthen, kurumthotti, vanthen, kalpasam, moovila, karimkuri, chunda, choolpullu and cheruvazhuthana.
- The total value of species varies year to year.
- Vanthen is the top high total value species in all years except 2016 and its value increased significantly in 2019 when compared to other years.
- In 2016, cheruthen (honey) was the top high total value species.
- Kurumthotti (*Sida cordifolia*) was the most heavily collected species in 2015, 2017 and 2019 and also showed a high total value. In 2016 and 2018 significant reduction in kurumthotti collection and total value was recorded.



The following figures (consolidated and individual) also explain the trend of value generated:

Figure 6.7. Collection Trend of 10 Major High Value NTFPs in Kerala



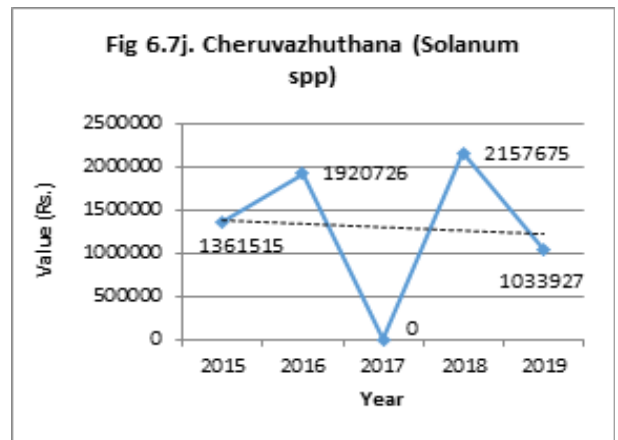
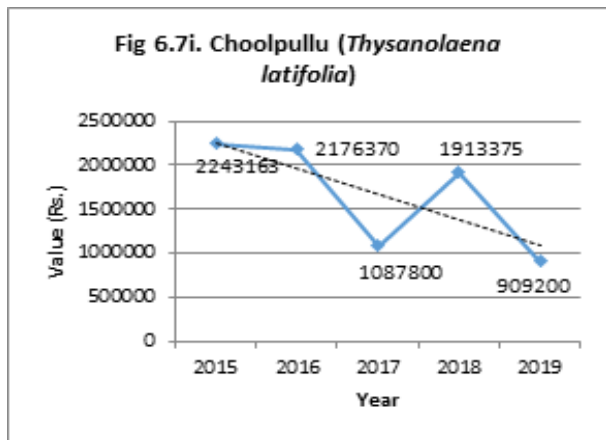
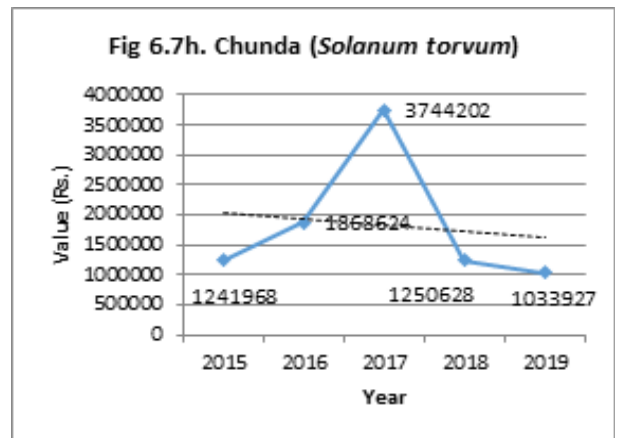
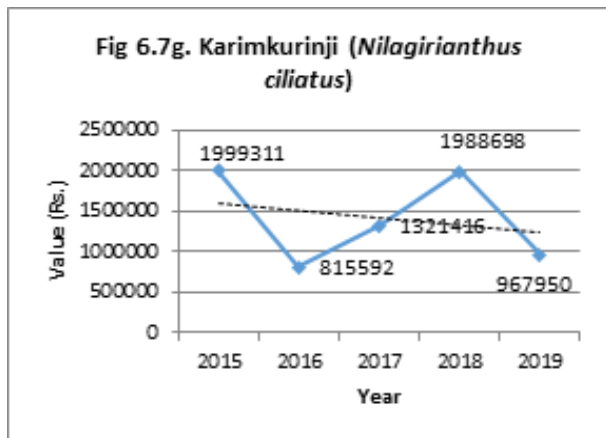
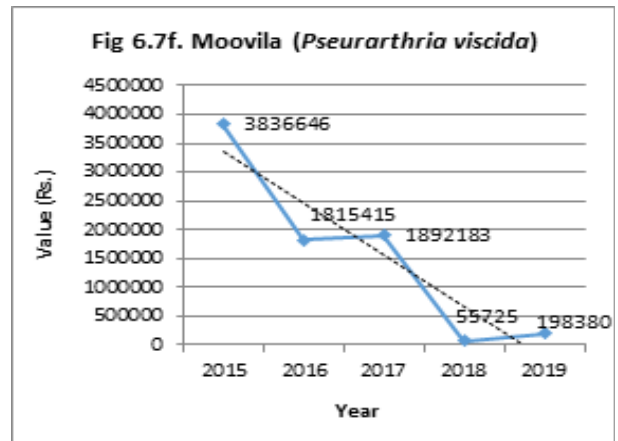
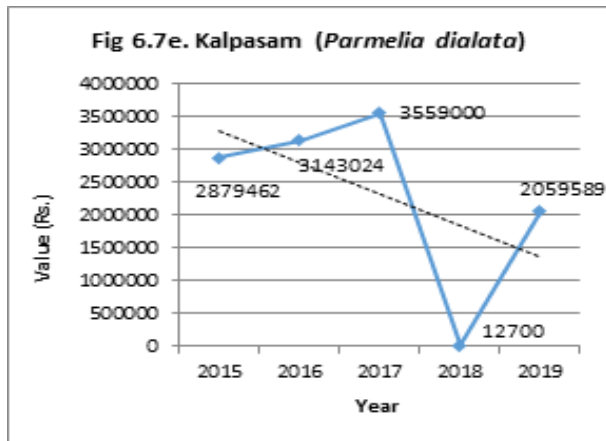
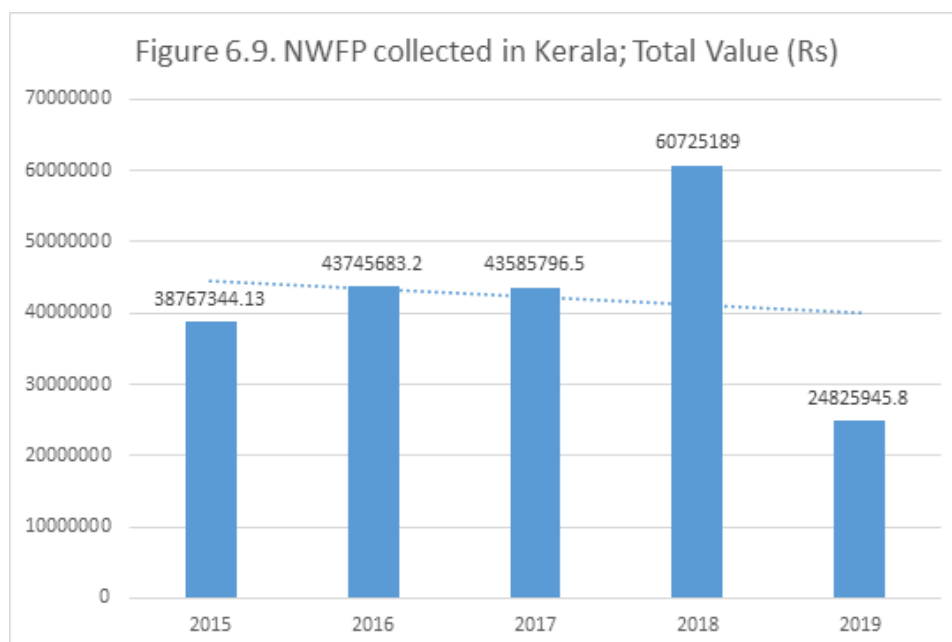
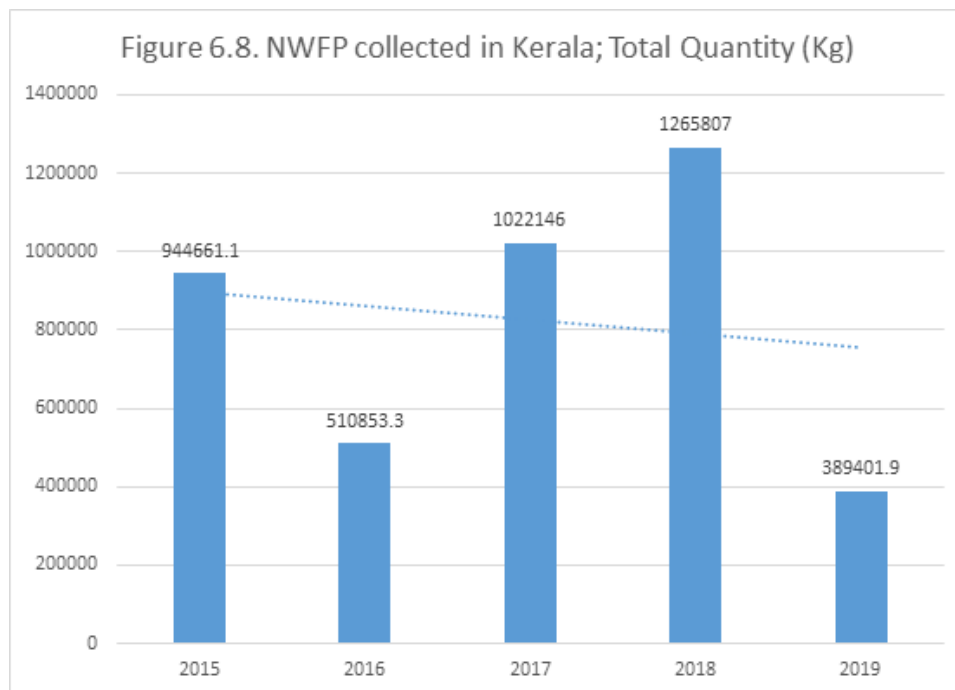


Table 6.18
State level – Total NWFP collected in Kerala; 2015-2019

Year	Quantity (Kg)	Value (Rs)
2015	944661.10	38767344.13
2016	510853.30	43745683.20
2017	1022146.00	43585796.50
2018	1265807	60725189
2019	389401.90	24825945.80

The total quantity of NTFP collected in Kerala increased from 2016 to 2018, then decreased in 2019. The total value of NTFP collected in Kerala have increased from 2015 to 2018, then decreased in 2019.



6.19 State Total of NWFP collected in Kerala: 2009-2019

Year	Quantity (Kg)	Value (Rs.)
2009	854587.50	22270521.05
2010	1226354.90	24546330.75
2011	1354104.60	27481868.20
2012	1313913.25	38297720.10
2013	1193792.80	30237664.55
2014	1273244.75	47819942.50
2015	944661.10	38767344.13
2016	510853.30	43745683.20
2017	1022146.00	43585796.50
2018	1265807	60725189
2019	389401.90	24825945.80



Conclusion

The diversity of flowering plants in Kerala is recorded to be 5094 species, which is about 28% of Indian flowering plants. Around 849 species of plants are having medicinal value and used commercially in Kerala. There are about 462 NWFPs with medicinal value traded as medicinal plants in Kerala. The Kerala Forests and Wildlife Department has notified 145 species as NTFPs, About 28 species that are traded at quantities more than 100 MT per annum at national market are found in Kerala. The Kerala Biodiversity Board has notified 26 plants under the section 38 of Biological Diversity Act as species on the verge of extinction.

The Forest Department had undertaken a resource assessment and based on that quotas for collection of different NTFPs have been fixed. Kerala State Federation of SC/ST Development Cooperatives Ltd. – the apex organization of Tribal Cooperative Societies - holds rights of procurement and trade of 145 NTFPs. A total of 30 Tribal Cooperative Societies under Trivandrum, Thirssur and Kalpetta branch are actively involved in purchasing NTFPs from the primary collectors and they are functioning under SC/ST Federation. These societies are given permission every year by the Forest Department to collect the notified NTFPs. The primary collectors involved in the collection and value addition of NTFPs include vanasamrakshana samitis (VSSs) and Eco- Development Committees (EDCs).

The value-added products are sold through various channels including bulk supply to different industries and sales outlets of the Federation. The Federation runs an ayurvedic medicine manufacturing unit in Thrissur under the brand name of Ayurdhara and some of the NTFPs are supplied to this unit. There are more than 600 registered ayurvedic drug manufacturing units in the state and they are the



major buyers of different medicinal plants. Vanasree with 37 outlets is an initiative of the Kerala Forest Department for value addition and sale of different forest products. The department has collection centres where the material is purchased from the primary collector and value added and sold through the vanasree outlets. Vanasree markets its NTFP items through Ecoshops, which are located at locations of tourist attraction. The trade of NTFPs involve:

(1) primary collectors: Tribal community or SC community, , members of community institutions like VSS, EDC, cooperative society and tribal cooperatives.

(2) community institutions: Vana Samrakshana Samitis (VSSs), Eco-Development Committees (EDCs) and SC/ST primary cooperative society.

(3) Formal market: There are four key players in the NTFP formal market at state level. They are Vanasree, SC/ST federation, Kerala Forest Development Corporation (KFDC) and Kudumbashree society. KFDC, the government of Kerala undertaking company, deals with fewer numbers of NTFP based items and procures most of them except Honey, Kudumpuli and Kunthirikkum from their own plantation areas. Kudumbashree is another institution in the formal market, involved in processing, value addition and marketing of NTFP products through Neighborhood groups (NHGs).

(4) Informal market: This segment involves number of players in the channel starting from agents at village level to traders at primary market and wholesale markets.

The data of NWFP collection as per the records of SC/ST Federation was analysed for 10 years. During the period 2009-2014 the ten selected high volume NWFPs are Cheenikka, Kurumthotti, Kasthurimanjal, Vanthen, Moovila, Karimkurinji, Chunda, Chooral, Putharichunda, Choolpullu and Kolinchi. Kurumthotti, Chunda and Choolpullu are the three high volume NWFPs collected during the period 2010-2014. The 10 major high value species listed are Cheenikka, Cheruthen, Kurumthotti, Kalpasam, Karimkurinji, Kasthurimanjal, Vanthen, Moovila, Karimkurinji, Chunda, and Chooral. Vanthen, Cheruthen and Kurumthotti are the top 3 high value species recorded among the ten selected NTFPs. The value of NWFP collected from forests of Kerala during the year 2014-15 was Rs 47819942/-.

The ten selected high volume NTFPs during the period 2015 to 2019 are cheenikka, choolpullu, kasthurimanjal, kurumthotti, vanthen, chunda, karimkurinji, kalpasam, moovila and cheruvazhuthana. Kurumthotti (*Sida cordifolia*) is the most heavily collected species. In 2016 and 2018 significant reduction in kurumthotti collection was recorded. The 10 major high value species listed are cheenikka, cheruthen, kurumthotti, vanthen, kalpasam, moovila, karimkurinji, chunda, choolpullu and cheruvazhuthana. Vanthen is the top high total value species in all years except 2016 and its value increased significantly in 2019 when compared to other years. Considering unit value cheruthen is having the highest value with Rs 1736 /kg during 2019-20 which is a considerable increase from Rs 125/kg during 2009-10. It may be noted that the price of other high valued species such as Adapathian (Rs 350/kg during 2009) had remained almost stagnant (Rs 450/kg during 2019). The collection of NWFP shows a decline from 12,73,244 kg with a total value of Rs 47819942/- during 2014- 15 to 389401 kg with a total value of Rs 24825945/-. Although the value of NWFP in comparison to Timber, is much lower, NWFP plays an important role in tribal economy and also provides employment to tribal people.

Providing support for converting the NWFP collected into semi processed value added products will generate additional income and employment to the local tribal communities. Honey being one of the high value species support for stingless bee cultivation in forest fringe areas can be promoted. Other innovative livelihood generating programs need to be implemented utilizing the fund agenerated through ABS. One of the successful models of ABS is the initiative of the BMC of Raipassa, Tripura in signing an agreement with the commercial users of Broom grass. According to the agreement, 5 percent of the total proceeds from the sale is transferred to the Joint Forest Management Committee,



responsible for collecting the resource. The villagers collect about 50 tonnes of broom grass per season, and sell it at Rs. 22/Kg. The BMC and the Local Biodiversity Fund share 2 percent of the proceeds, while 1 percent is transferred to the state biodiversity fund. In Kerala, during 2014-15, about 148198 kg of broom grass was collected which has reduced to 36680 during 2019-20. The sustainability of resources has to be ensured by appropriate planting in wastelands.

SC/ ST Federation has fixed a threshold limit for harvesting of NTFPs. For 2020-21 a total quantity of 502117 kg has been fixed with 145676 kg to Adimali society, Adimali, Neriyananglam, Anakulam, Mankulam and 19886 kg to Tirunelli society. Begur range which together constitutes 32.9 % of the total amount of NWFP. Sustainable harvesting of NTFPs and medicinal plants is the key to biodiversity conservation. The current scenario of NTFPs traded in the open market also needs to be captured to ensure sustainability of the resources.



7.1 MARINE FISHERIES

Kerala is situated on the southwest coast of the Indian sub continent with an area of about 38,863 square kilometres, which makes about 1.27% of the Indian Territory. The state is separated from the rest of India by the western Ghats in the east and the Arabian Sea in the west. Kerala has a Coastline of around 590 kilometres, where the 41 east flowing rivers are meeting with the Arabian Sea. All these river mouths (estuaries) are backwaters, a special ecosystem with number of unique floras and faunas.

Kerala's coastline (590 kilometres) forms 10% of India's total coastline. With a coastline of 590 Km., and an Exclusive Economic Zone (EEZ) of 2,18,536 Sq km, Kerala has a significant marine fisheries sector that has long been an important source of occupation and livelihood for the coastal population of the state. It is estimated that about 8 lakh people earn their livelihood from capture and allied works in marine fisheries in the 222 fishing villages situated along the coastline of the state. The coastal line spread over nine districts of the State. The marine districts of Kerala are: Thiruvananthapuram, Kollam, Alappuzha, Ernakulam, Trissur, Malappuram, Kozhikkode, Kannur, Kasaragod. In addition to this, the state is blessed with 44 rivers, 49 reservoirs, 9 fresh water lakes, more than 65,000 hectares of brackish water, more than 46,000 hectares of backwaters and a number of ponds, irrigation tanks, streams etc. which contribute a rich resource of inland production (Kerala State Planning Board, 2020).

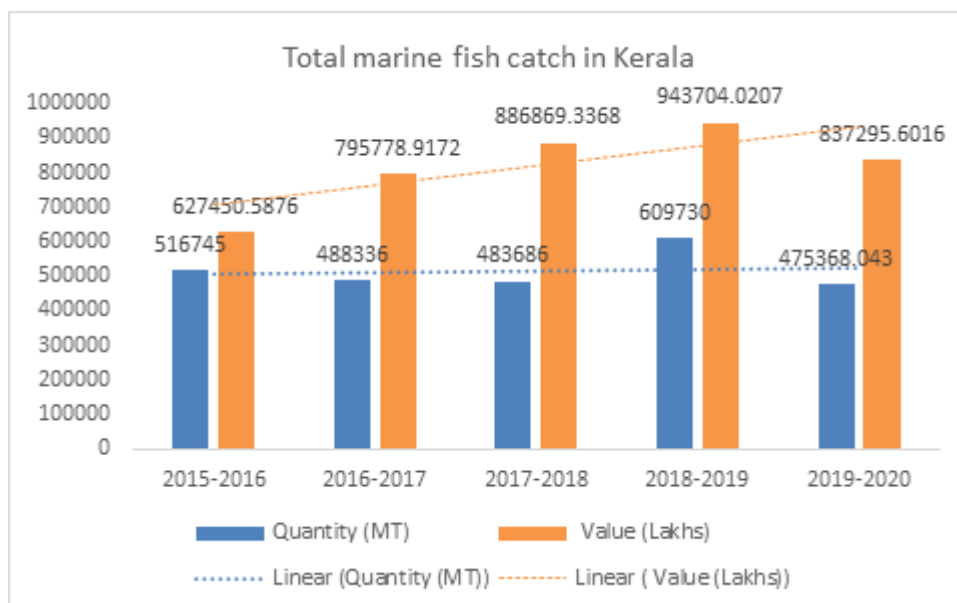
The state exports fish products worth approximately rupees 5020.0 crores (2019-20) accounting for roughly three per cent of the state revenue. Kerala's share in the national marine fish production is around 13%. A very rich marine wealth with a large variety of fish and a highly skilled population of fishermen has made Kerala a leading producer and consumer of fish. The high rainfall and a large number of rivers make the Kerala coast especially fertile for fish. One speciality of the Kerala coast is the mud-banks, known as chakara in Malayalam. It is the formation of clay and organic matters on the coast that after monsoon with the sea remaining calm, thus resulting in good harvest of fish.

The following part examine the economics of fisheries with consider fish as a tradable bio-resources. In this respect the analysis emphasises on the species wise quantity of fish catch from different districts in Kerala, its market/trade value, unit value, export and foreign exchange earning etc. based on the data (last five years from 2015-16 to 2019-20) collected from the Fisheries Department. Marine fish landings of India in 2019-20 was 3.73 million tonnes. Among the states Gujarat was the highest contributor followed by Tamil fourth position with a production of 4.75 lakh tonnes. The high value species among the fish catches are still few and prominent among them are seer fish, prawns, ribbon fish and mackerel. During 2020-21 marine landings were 390597 MT.

Table 7.1 Marine Fish Landings in Kerala (Metric tonnes)

Sl. No.	Year	Quantity	Value (Rs. Lakh)
1	2015-16	516745	627450.6
2	2016-17	488336	795778.9
3	2017-18	483686	886869.3
4	2018-19	609730	943704.0
5	2019-20	475368	837295.6

Figure 7.1 Total marine fish catch in Kerala; 2015-16 to 2019-20



- The quantity of marine fish catch has a decreasing trend from 2015-16 to 2017-18 periods. 2018-19 witnessed a big hike in fish catch quantity, but in 2019-20, quantity has decreased.
- The value of marine fish catch in Kerala has showed a study increasing trend from 2015-16 to 2018-19. But, during 2019-20, the value has decreased from the previous year, in proportion to the reduction in the quantity or fish catch.
- The value and catch was highest during the year 2018-19.



Table 7.1.a District wise fish production in Kerala 2020-21 (lakh tonnes)

District	Marine Fish Production	Inland Fish Production	Total Fish Production
Thiruvananthapuram	0.57	0.02	0.59
Kollam	0.97	0.06	1.03
Alappuzha	0.12	0.53	0.65
Pathanamthitta	0	0.046	0.05
Kottayam	0	0.55	0.55
Ernakulam	0.98	0.28	1.26
Idukki	0	0.02	0.02
Thrissur	0.2	0.15	0.35
Palakkad	0	0.057	0.06
Malappuram	0.23	0.035	0.27
Kozhikkode	0.54	0.027	0.57
Wayanad	0	0.013	0.01
Kannur	0.095	0.015	0.11
Kasargode	0.19	0.44	0.63
Kerala	3.90	2.24	6.14

Directorate of Fisheries



Table 7.2 Marine Fish Catch in Kerala (2015-16)

Sl.No.	Name of species	Quantity		Value		Unit price
		(MT)	%	(Lakh)	%	(Rs./Kg)
1	Elasmobranchs	4464	0.86	4329.56	0.69	96.99
2	Eels	679	0.13	394.46	0.06	58.09
3	Cat Fish	1112	0.22	736.47	0.12	66.23
4	Chirocentrus	733	0.14	421.82	0.07	57.55
5(a)	Oil Sardines	72257	13.98	22613.98	3.60	31.30
5(b)	Lesser Sardines	30873	5.97	17827.63	2.84	57.75
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	0	0.00	0.00	0.00	0.00
5(e)	Anchovilla	37063	7.17	15942.26	2.54	43.01
5(f)	Trisocles	8037	1.56	3422.09	0.55	42.58
5(g)	Other Clupeids	2165	0.42	4185.30	0.67	193.32
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	3560	0.69	2032.85	0.32	57.10
7	Hemirhamphus & Belone	146	0.03	125.50	0.02	85.96
8	Flying Fish	0	0.00	0.00	0.00	0.00
9	Perches	30780	5.96	22487.27	3.58	73.06
10	Red Mulletts	572	0.11	432.34	0.07	75.58
11	Polynemids	1224	0.24	806.21	0.13	65.87
12	Sciaenids	8015	1.55	3937.36	0.63	49.12
13	Ribbon Fish	16256	3.15	14250.19	2.27	87.66
14(a)	Caranx	9691	1.88	12789.55	2.04	131.97
14(b)	Chorinemus	55	0.01	37.80	0.01	68.73
14(c)	Thachynotus	0	0.00	0.00	0.00	0.00
14(d)	Other Carangids	19021	3.68	16539.08	2.64	86.95
14(e)	Coryphaena	0	0.00	0.00	0.00	0.00
14(f)	Elacate	0	0.00	0.00	0.00	0.00
15(a)	Leiognathus	2662	0.52	1771.75	0.28	66.56
15(b)	Gazza	0	0.00	0.00	0.00	0.00
16	Lactrious	706	0.14	1325.25	0.21	187.71
17	Pomfrets	6948	1.34	19452.67	3.10	279.98
18	Mackerel	77891	15.07	40412.04	6.44	51.88
19	Seer Fish	10395	2.01	27695.00	4.41	266.43
20	Tunnis	30767	5.95	30841.36	4.92	100.24
21	Sphyraena	791	0.15	526.29	0.08	66.53
22	Mugil	6	0.00	2.94	0.00	49.06
23	Bregmaceros	0	0.00	0.00	0.00	0.00
24	Soles	10613	2.05	5420.28	0.86	51.07
25(a)	Penaid Prawn	51971	10.06	207500.00	33.07	399.26



25(b)	Non Penaid Prawn	9829	1.90	22074.00	3.52	224.58
25(c)	Lobsters	0	0.00	0.00	0.00	0.00
25(d)	Crabs	12789	2.47	11211.66	1.79	87.67
25(e)	Stomatopodes	0	0.00	0.00	0.00	0.00
26	Cephalopodes	43794	8.47	108872.63	17.35	248.60
27	Miscellaneous	10880	2.11	7033.01	1.12	64.64
TOTAL		516745	100.00	627451.59	100.00	

- ◆ During the year 2015-16, major high quantity marine catches were Mackerel (15.07%), Oil Sardines (13.98%), Penaid Prawn (10.06%), Cephalopodes (8.47%), and Anchovilla (7.17%). Other fish species quantity (catch) were relatively low.
- ◆ Major high value marine catches were Penaid Prawn (33.07%), Cephalopodes (17.35%), Mackerel (6.44%), Tunnis (4.92%) and Seer fish (4.41%).
- ◆ The contribution of these species in value generation comes to around 65% of the total marine fish catch value.
- ◆ Unit price (Rs. per kg.) was highest for Penaid Prawn (Rs.399.26), Pomfrets (Rs.279.98), Seer fish (Rs.266.43), Cephalopodes (Rs.248.60), and Non penaid prawn (Rs.224.58).

Table 7.3 Marine Fish Catch in Kerala (2016-17)

Sl.No.	Name of species	Quantity		Value		Unit price (Rs./Kg)
		(MT)	%	(Lakh)	%	
1	Elasmobranchs	7051	1.44	14837.43	1.86	210.43
2	Eels	662	0.14	649.79	0.08	98.16
3	Cat Fish	1456	0.30	1683.40	0.21	115.62
4	Chirocentrius	0	0.00	0.00	0.00	0.00
5(a)	Oil Sardines	34073	6.98	37350.30	4.69	109.62
5(b)	Lesser Sardines	23372	4.79	21471.99	2.70	91.87
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	0	0.00	51.52	0.01	0.00
5(e)	Anchovilla	18027	3.69	16790.50	2.11	93.14
5(f)	Trisocles	5098	1.04	4090.53	0.51	80.24
5(g)	Other Clupeids	3027	0.62	2826.64	0.36	93.38
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	8127	1.66	6528.98	0.82	80.34
7	Hemirhamphus & Belone	10	0.00	10.69	0.00	106.87
8	Flying Fish	0	0.00	0.00	0.00	0.00
9	Perches	53286	10.91	54445.06	6.84	102.18
10	Red Mulllets	1429	0.29	2334.94	0.29	163.40
11	Polynemids	20	0.00	0.00	0.00	0.00
12	Sciaenids	11849	2.43	14045.13	1.76	118.53
13	Ribbon Fish	16776	3.44	16602.26	2.09	98.96
14(a)	Caranx	513	0.11	734.73	0.09	143.22
14(b)	Chorinemus	427	0.09	796.40	0.10	186.51
14(c)	Thachynotus	0	0.00	0.00	0.00	0.00



14(d)	Other Carangids	22269	4.56	33205.62	4.17	149.11
14(e)	Coryphaena	0	0.00	0.00	0.00	0.00
14(f)	Elacate	0	0.00	0.00	0.00	0.00
15(a)	Leiognathus	6277	1.29	6625.88	0.83	105.56
15(b)	Gazza	0	0.00	0.00	0.00	0.00
16	Lactrious	496	0.10	9.30	0.00	1.88
17	Pomfrets	8902	1.82	26973.69	3.39	303.01
18	Mackerel	59890	12.26	65458.52	8.23	109.30
19	Seer Fish	17021	3.49	59888.43	7.53	351.85
20	Tunnis	26984	5.53	54417.82	6.84	201.67
21	Sphyraena	634	0.13	1005.55	0.13	158.60
22	Mugil	2	0.00	1.78	0.00	89.00
23	Bregmaceros	0	0.00	0.00	0.00	0.00
24	Soles	6717	1.38	7009.04	0.88	104.35
25(a)	Penaid Prawn	56667	11.60	139798.45	17.57	246.70
25(b)	Non Penaid Prawn	238	0.05	0.00	0.00	0.00
25(c)	Lobsters	6809	1.39	53611.80	6.74	787.37
25(d)	Crabs	13625	2.79	16305.21	2.05	119.67
25(e)	Stomatopodes	0	0.00	0.00	0.00	0.00
26	Cephalopodes	56530	11.58	107181.64	13.47	189.60
27	Miscellaneous	20072	4.11	29035.87	3.65	144.66
TOTAL		488336	100.00	795778.92	100.00	

- During the year 2016-17, five major high quantity marine catches were Mackerel (12.26%), Penaid Prawn (11.60%), Cephalopodes (11.58%), Perches (10.91%), and Oil Sardines (6.98%).
- Major high value marine catches include Penaid Prawn (17.57%), Cephalopodes (13.47%), Mackerel (8.23%), Seer fish (7.53%), and Tunnis (6.84%).
- Unit price was highest for Lobsters (Rs.787.37), Seer fish (Rs.351.85), Pomfrets (Rs.303.01), Penaid Prawn (Rs.246.70), and Elasmobranchs (Rs.210.43).



Table 7.4 Marine Fish Catch in Kerala (2017-18)

Sl.No.	Name of species	Quantity		Value		Unit price
		(MT)	%	(Lakh)	%	(Rs./Kg)
1	Elasmobranchs	5226	1.08	11073.81	1.25	211.90
2	Eels	2006	0.41	1165.24	0.13	58.09
3	Cat Fish	477	0.10	539.15	0.06	113.03
4	Chirocentrius	127	0.03	0.00	0.00	0.00
5(a)	Oil Sardines	60251	12.46	56767.91	6.40	94.22
5(b)	Lesser Sardines	12094	2.50	10161.21	1.15	84.02
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	0	0.00	0.00	0.00	0.00
5(e)	Anchovilla	9843	2.03	8259.82	0.93	83.92
5(f)	Trisocles	2179	0.45	1633.48	0.18	74.96
5(g)	Other Clupeids	1554	0.32	351.70	0.04	22.63
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	4010	0.83	2736.33	0.31	68.24
7	Hemirhamphus & Belone	583	0.12	5.97	0.00	1.02
8	Flying Fish	89	0.02	0.00	0.00	0.00
9	Perches	37550	7.76	43813.81	4.94	116.68
10	Red Mulletts	130	0.03	199.06	0.02	153.12
11	Polynemids	221	0.05	0.00	0.00	0.00
12	Sciaenids	4950	1.02	8308.91	0.94	167.86
13	Ribbon Fish	16132	3.34	15126.21	1.71	93.77
14(a)	Caranx	1053	0.22	1149.02	0.13	109.12
14(b)	Chorinemus	886	0.18	1638.22	0.18	184.90
14(c)	Thachynotus	0	0.00	0.00	0.00	0.00
14(d)	Other Carangids	29107	6.02	43290.63	4.88	148.73
14(e)	Coryphaena	1559	0.32	0.00	0.00	0.00
14(f)	Elacate	0	0.00	0.00	0.00	0.00
15(a)	Leiognathus	1807	0.37	2286.25	0.26	126.52
15(b)	Gazza	0	0.00	0.00	0.00	0.00
16	Lactrious	68	0.01	0.73	0.00	1.08
17	Pomfrets	3892	0.80	13151.93	1.48	337.92
18	Mackerel	49070	10.15	52033.46	5.87	106.04
19	Seer Fish	18005	3.72	82245.92	9.27	456.79
20	Tunnis	55420	11.46	137957.87	15.56	248.93
21	Sphyrana	1058	0.22	884.90	0.10	83.64
22	Mugil	58	0.01	0.62	0.00	1.07
23	Bregmaceros	1428	0.30	0.00	0.00	0.00
24	Soles	5304	1.10	4775.03	0.54	90.03
25(a)	Penaid Prawn	63366	13.10	167422.39	18.88	264.21
25(b)	Non Penaid Prawn	5978	1.24	16533.05	1.86	276.56



25(c)	Lobsters	5185	1.07	41797.27	4.71	806.12
25(d)	Crabs	3394	0.70	4689.21	0.53	138.16
25(e)	Stomatopodes	1	0.00	0.00	0.00	0.00
26	Cephalopodes	69945	14.46	143237.07	16.15	204.79
27	Miscellaneous	9680	2.00	13633.16	1.54	140.84
TOTAL		483686	100.00	886869	100.00	

- During the year 2017-18, five major high quantity marine catches were Cephalopodes (14.46%), Penaid Prawn (13.10%), Oil Sardines (12.46%), Tunnis (11.46%), and Mackerel (10.15%).
- Five major high value marine catches were Penaid Prawn (18.88%), Cephalopodes (16.15%), Tunnis (15.56%), Seer fish (9.27%), and Oil Sardines (6.40%).
- Unit price was highest for Lobsters (Rs.806.21), Seer fish (Rs.456.79), Pomfrets (Rs.337.92), Non Penaid Prawn (Rs.276.56), Penaid Prawn (Rs.264.21), Tunnis (Rs.248.93), Elasmobranchs (Rs.211.90), Cephalopodes (Rs.204.79) and Chorinemus

Table 7.5 Marine Fish Catch in Kerala (2018-19)

SI.No.	Name of species	Quantity		Value		Unit price
		(MT)	%	(Lakh)	%	(Rs./Kg)
1	Elasmobranchs	7645	1.25	11213.96	1.19	146.68
2	Eels	593	0.10	540.37	0.06	91.12
3	Cat Fish	30	0.00	29.12	0.00	97.05
4	Chirocentrus	23	0.00	0.40	0.00	1.72
5(a)	Oil Sardines	87331	14.32	96927.50	10.27	110.99
5(b)	Lesser Sardines	19337	3.17	11020.17	1.17	56.99
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	0	0.00	0.00	0.00	0.00
5(e)	Anchovilla	33242	5.45	30927.54	3.28	93.04
5(f)	Trisocles	8444	1.38	5283.39	0.56	62.57
5(g)	Other Clupeids	6177	1.01	1793.35	0.19	29.03
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	14215	2.33	15819.64	1.68	111.29
7	Hemirhamphus & Belone	9581	1.57	0.00	0.00	0.00
8	Flying Fish	3818	0.63	0.00	0.00	0.00
9	Perches	34962	5.73	42522.99	4.51	121.63
10	Red Mulletts	463	0.08	43.38	0.00	9.37
11	Polynemids	3925	0.64	0.00	0.00	0.00
12	Sciaenids	16519	2.71	27518.14	2.92	166.58
13	Ribbon Fish	10617	1.74	15634.32	1.66	147.26
14(a)	Caranx	5412	0.89	393.66	0.04	7.27
14(b)	Chorinemus	1427	0.23	197.10	0.02	13.81
14(c)	Thachynotus	1814	0.30	0.00	0.00	0.00
14(d)	Other Carangids	56389	9.25	104769.02	11.10	185.80
14(e)	Coryphaena	881	0.14	0.00	0.00	0.00
14(f)	Elacate	16	0.00	0.00	0.00	0.00
15(a)	Leiognathus	1761	0.29	2296.27	0.24	130.40
15(b)	Gazza	233	0.04	0.00	0.00	0.00
16	Lactrious	246	0.04	0.00	0.00	0.00
17	Pomfrets	4624	0.76	16091.35	1.71	348.00



18	Mackerel	127419	20.90	187763.34	19.90	147.36
19	Seer Fish	6230	1.02	25753.46	2.73	413.38
20	Tunnis	29810	4.89	63772.13	6.76	213.93
21	Sphyraena	3131	0.51	5813.13	0.62	185.66
22	Mugil	25	0.00	0.00	0.00	0.00
23	Bregmaceros	0	0.00	0.00	0.00	0.00
24	Soles	8547	1.40	5913.87	0.63	69.19
25(a)	Penaid Prawn	52331	8.58	147021.19	15.58	280.94
25(b)	Non Penaid Prawn	8613	1.41	24769.14	2.62	287.58
25(c)	Lobsters	172	0.03	1425.63	0.15	828.86
25(d)	Crabs	2777	0.46	3098.35	0.33	111.57
25(e)	Stomatopodes	0	0.00	0.00	0.00	0.00
26	Cephalopodes	30679	5.03	86793.82	9.20	282.91
27	Miscellaneous	10271	1.68	8558.29	0.91	83.32
TOTAL		609730	100.00	943704.02	11213.96	

- During the year 2018-19, five major high quantity marine catches were Mackerel (20.90%), Oil Sardines (14.32%), Other Carangids (9.25%), Penaid Prawn (8.58%), and Perches (5.73%),.
- Major high value marine catches were Mackerel (19.90%), Penaid Prawn (15.58%), Other Carangids (11.10%), Oil Sardines (10.27%) and Cephalopodes (9.20%).
- Unit price was highest for Lobsters (Rs.828.86), Seer fish (Rs.413.38), Pomfrets (Rs.348.00), Non Penaid Prawn (Rs.287.58), Cephalopodes (Rs.282.91), Penaid Prawn (Rs.281.94), Tunnis (Rs.213.93), Other Carangids (Rs.185.80) and Sphyraena (Rs.185.66).

Table 7.6 Marine Fish Catch in Kerala (2019-20)

Sl.No.	Name of species	Quantity		Value		Unit price (Rs./Kg)
		(MT)	%	(Lakh)	%	
1	Elasmobranchs	2764	0.58	6854.06	0.82	248.01
2	Eels	878	0.18	1771.82	0.21	201.83
3	Cat Fish	259	0.05	330.97	0.04	127.82
4	Chirocentrus	108	0.02	60.02	0.01	55.51
5(a)	Oil Sardines	44500	9.36	58418.84	6.98	131.28
5(b)	Lesser Sardines	33199	6.98	33905.74	4.05	102.13
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	312	0.07	269.52	0.03	86.49
5(e)	Anchovilla	58490	12.30	63718.87	7.61	108.94
5(f)	Trisocles	7376	1.55	7534.12	0.90	102.15
5(g)	Other Clupeids	5803	1.22	6365.39	0.76	109.69
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	17444	3.67	21579.21	2.58	123.70
7	Hemirhamphus & Belone	739	0.16	1148.14	0.14	155.39
8	Flying Fish	8	0.00	27.66	0.00	361.30
9	Perches	40956	8.62	65948.79	7.88	161.03
10	Red Mullets	443	0.09	876.20	0.10	197.98
11	Polynemids	8	0.00	8.18	0.00	96.82
12	Sciaenids	5406	1.14	5816.22	0.69	107.59
13	Ribbon Fish	5425	1.14	9023.96	1.08	166.33



14(a)	Caranx	2322	0.49	5970.06	0.71	257.11
14(b)	Chorinemus	268	0.06	446.95	0.05	166.54
14(c)	Thachynotus	10	0.00	9.71	0.00	94.72
14(d)	Other Carangids	37776	7.95	73046.22	8.72	193.37
14(e)	Coryphaena	1046	0.22	3419.33	0.41	326.79
14(f)	Elacate	287	0.06	689.68	0.08	240.72
15(a)	Leiognathus	2943	0.62	4089.71	0.49	138.99
15(b)	Gazza	0	0.00	0.00	0.00	0.00
16	Lactrious	839	0.18	863.07	0.10	102.84
17	Pomfrets	2146	0.45	7115.60	0.85	331.52
18	Mackerel	35895	7.55	56955.64	6.80	158.67
19	Seer Fish	4328	0.91	18752.18	2.24	433.24
20	Tunnis	16793	3.53	40000.04	4.78	238.19
21	Sphyraena	3480	0.73	7683.85	0.92	220.83
22	Mugil	54	0.01	98.19	0.01	181.38
23	Bregmaceros	0	0.00	0.00	0.00	0.00
24	Soles	14196	2.99	17817.23	2.13	125.51
25(a)	Penaid Prawn	39905	8.39	112024.26	13.38	280.73
25(b)	Non Penaid Prawn	2515	0.53	7933.91	0.95	315.43
25(c)	Lobsters	41	0.01	375.69	0.04	906.87
25(d)	Crabs	5079	1.07	6909.17	0.83	136.03
25(e)	Stomatopodes	488	0.10	1398.88	0.17	286.40
26	Cephalopodes	35686	7.51	110938.74	13.25	310.87
27	Miscellaneous	45152	9.50	77099.76	9.21	170.76
TOTAL		475368	100.00	837295.60	100.00	

- During the year 2019-20, five major high quantity marine catches were Anchovilla (12.30%), Oil Sardines (9.36%), Perches (8.62%), Penaid Prawn (8.39%), and Other Carangids (7.95%). In this year, miscellaneous items comprised 9.50% of total quantity.
- Major high value marine catches were Penaid Prawn (13.38%), Cephalopodes (13.25%), Other Carangids (8.72%), Perches (7.88%), and Anchovilla (7.61%). Around 9% of total value was contributed by miscellaneous items.
- High unit price (per kg.) was observed for: Lobsters (Rs.906.87), Seer fish (Rs.433.24), Flying fish (Rs.361.30), Pomfrets (Rs.331.52), Coryphaena (Rs.326.79), Non Penaid Prawn (Rs.315.43), Cephalopodes (Rs.310.87), Stomatopodes (Rs.286.40), Penaid Prawn (Rs.280.73), Caranx (Rs.257.11), Elasmobranchs (Rs.248.01), Elacate (Rs.240.72), Tunnis (Rs.238.19), Sphyraena (Rs.220.83), Eels (Rs.201.83), Red Mullet (Rs.197.98) and Other Carangids (Rs.193.37).



Cumulative Annual Average of Marine Fish Catch in Kerala

The following Table provide the Cumulative annual Average of Marine Fish Catch in Kerala.

Table 7.7 Cumulative Annual Average of Marine Fish Catch in Kerala (2015-2019)

S No.	Name of species	Quantity		Value		Unit price (Rs./Kg)
		MT	%	Lakh	%	
1	Elasmobranchs	5430	1.05	9661.76	1.16	182.80
2	Eels	964	0.19	904.34	0.11	101.46
3	Cat Fish	667	0.13	663.82	0.08	103.95
4	Chirocentrius	248	0.05	160.75	0.02	57.39
5(a)	Oil Sardines	59682	11.50	54415.71	6.54	95.48
5(b)	Lesser Sardines	23775	4.58	18877.35	2.27	78.55
5(c)	Hilsa Ilisha	0	0.00	0.00	0.00	0.00
5(d)	Other Hilsa	312	0.06	160.52	0.02	86.49
5(e)	Anchovilla	31333	6.04	27127.80	3.26	84.41
5(f)	Trisocles	6227	1.20	4392.72	0.53	72.50
5(g)	Other Clupeids	3745	0.72	3104.48	0.37	89.61
6(a)	Harpodon Nehereus	0	0.00	0.00	0.00	0.00
6(b)	Saurida & Saurus	9471	1.83	9739.40	1.17	88.13
7	Hemirhamphus & Belone	2212	0.43	322.57	0.04	116.41
8	Flying Fish	1305	0.25	27.66	0.00	361.30
9	Perches	39507	7.62	45843.58	5.51	114.91
10	Red Mulletts	607	0.12	777.18	0.09	119.89
11	Polynemids	1080	0.21	407.20	0.05	81.35
12	Sciaenids	9348	1.80	11925.15	1.43	121.94
13	Ribbon Fish	13041	2.51	14127.39	1.70	118.80
14(a)	Caranx	3798	0.73	4207.40	0.51	129.74
14(b)	Chorinemus	613	0.12	623.29	0.07	124.10
14(c)	Thachynotus	912	0.18	9.71	0.00	94.72
14(d)	Other Carangids	32912	6.34	54170.11	6.51	152.79
14(e)	Coryphaena	1162	0.22	3419.33	0.41	326.79
14(f)	Elacate	151	0.03	689.68	0.08	240.72
15(a)	Leiognathus	3090	0.60	3413.97	0.41	113.60
15(b)	Gazza	233	0.04	0.00	0.00	0.00
16	Lactrius	471	0.09	549.59	0.07	146.76
17	Pomfrets	5302	1.02	16557.05	1.99	320.08
18	Mackerel	70033	13.50	80524.60	9.68	114.65
19	Seer Fish	11196	2.16	42867.00	5.15	384.34
20	Tunnis	31955	6.16	65397.84	7.86	200.59
21	Sphyraena	1819	0.35	3182.75	0.38	143.05
22	Mugil	29	0.01	25.88	0.00	106.83
23	Bregmaceros	1428	0.28	0.00	0.00	0.00
24	Soles	9075	1.75	8187.09	0.98	88.03
25(a)	Penaid Prawn	52848	10.19	154753.26	18.61	294.37



25(b)	Non Penaid Prawn	5435	1.05	17827.53	2.14	276.04
25(c)	Lobsters	3052	0.59	24302.60	2.92	832.30
25(d)	Crabs	7533	1.45	8442.72	1.02	118.62
25(e)	Stomatopodes	245	0.05	1398.88	0.17	286.40
26	Cephalopodes	47327	9.12	111404.78	13.40	247.35
27	Miscellaneous	19211	3.70	27072.02	3.26	120.84
TOTAL		518783	100.00	831666.47	100.00	

- The cumulative average (2015-16 to 2019-20) of five major high quantity marine catches in Kerala coast is: Mackerel (13.50%), Oil Sardines (11.50%), Penaid Prawn (10.19%), Cephalopodes (9.12%), and Perches (7.62%),
- Five major high value (cumulative average) marine catches / fishes in Kerala coast are: Penaid Prawn (18.61%), Cephalopodes (13.40%), Mackerel (9.68%), Tunnis (7.86%), and Oil Sardines (6.54%).
- Species such as: Mackerel, Oil Sardines, Penaid Prawn, and Cephalopodes registered high quantity (catch) as well as high values.
- Lobsters (Rs.832.30), Seer fish (Rs.384.34), Flying fish (Rs.361.30), Pomfrets (Rs.320.08), and Non Penaid Prawn (Rs.294.37) have highest annual cumulative unit value (per Kg.).



Table 7.8
District Wise Cumulative Annual Average of 10 Major High Quantity Marine Catch in Kerala
(Year 2015-16 to 2019-20; Quantity in Metric tonnes)

Districts	Tunnis	Cephalopodes	Other Carangids	Mackerel	Anchovilla	Penaid Prawn	Perches	Oil Sardines	Lesser Sardines	Non Penaid Prawn	Trisocles	Soles
Thiruvananthapuram	11881.2	9226.31	8189.25	7707.11	6659.05	28592.99	15758.91	12109.78				
Kollam		19728.71		21385.69				6062.86	2724.62	1857.00	1376.23	
Alappuzha				11413.41								
Ernakulum	8158.05	11965.70		8139.20		8753.27	12550.26					
Trissur			1767.86	3730.35		3781.78		5265.72	1340.42			
Malappuram				3885.39	4244.83	2814.28		4842.64	1828.87			
Kozhikode		4718.59		8396.86	4609.25	4194.83		5892.10				
Kannur			1851.58	2848.07		1534.31		9236.19				825.55
Kasaragod			1734.93	2526.73		1789.74		7232.98			1068.35	



Figure 7.2 District Wise Cumulative Annual Average of 10 Major High Quantity Marine Catch in Kerala (Year 2015-16 to 2019-20; Quantity in Metric tonnes)

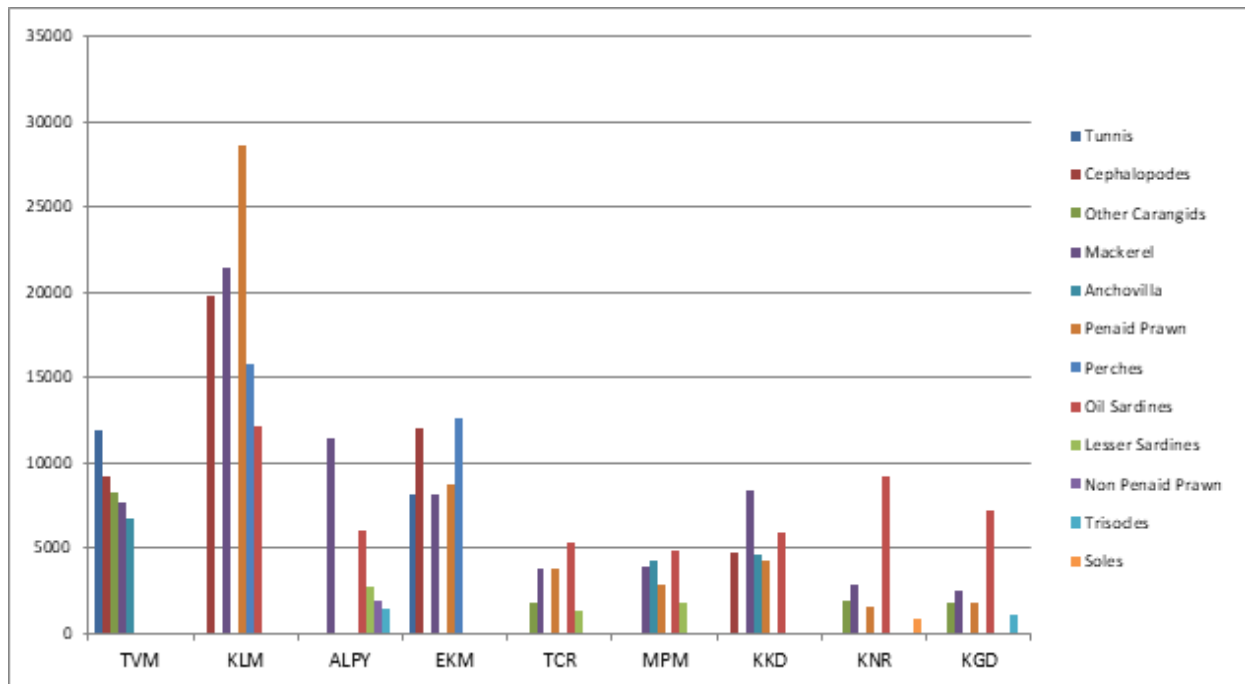


Table 7.9
District-wise Cumulative Annual Average of 10 Major High Value (total) Marine Catch in Kerala
(Year 2015-16 to 2019-20; Value in Lakhs)

Districts	Tunnis	Cephalop	Other	Mackerel	Anchovill	Penaid Prawn	Perches	Oil Sardines	Lesser Sardines	Non Penaid	Soles	Seer Fish	Lobsters	Pomfrets	Saurida &
Thiruvananthapuram	31108.63	20397.27	9574.21	8505.43								15022.16			
Kollam		47252.26	21883.48	18486.41		90516.35							24248.63		
Alappuzha				19873.02				8557.66	3254.23	3410.00				3640.67	
Ernakulum	16750.39	31138.14	12473.07			21772.41	18547.24								
Trissur		3146.49		4424.92		8663.04		5360.96				3322.38			
Malappuram				3136.53	3604.07	8968.89		2742.85			1810.66				
Kozhikode		9430.33		7951.71		10311.24			5467.21						7657.48
Kannur			1980.97	2783.05		4672.28		8181.98		1090.00					
Kasaragod			2742.21	4038.42		4912.39		8258.11		1591.00					



Figure 7.3 District-wise Cumulative Annual Average of 10 Major High Value (total) Marine Catch in Kerala (Year 2015-16 to 2019-20; Value in Lakhs)

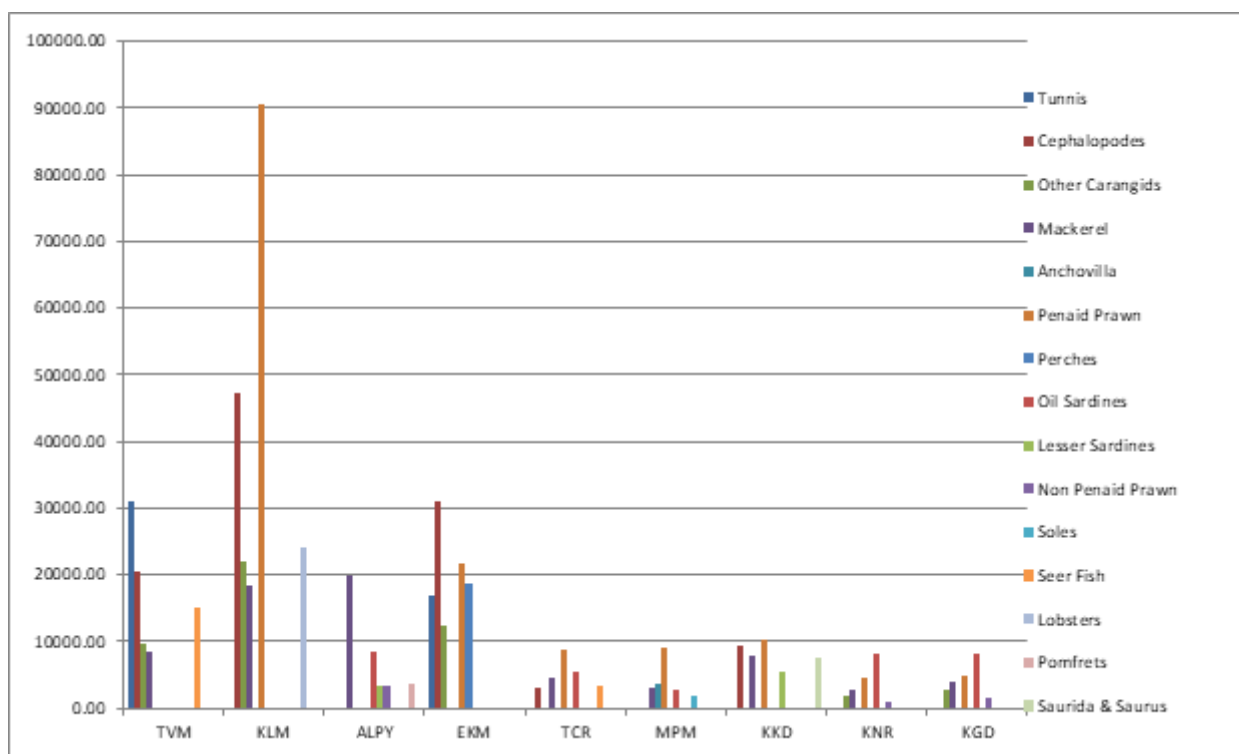


Table 7.10
District-wise Cumulative Annual Average Value (Unit value) of
High Value Marine Species in Kerala
(Year 2015-16 to 2019-20; Value in Rupees per Kilograms)

Districts	Cephalopodes	Penaid Prawn	Non Penaid Prawn	Seer Fish	Lobsters	Pomfrets	Flying Fish	Coryphæna	Elasmobranchs	Stomatopodes	Elacate
Thiruvananthapuram		422.28		503.68	947.00	400.66	380.00				
Kollam		336.74		438.328	842.486	370.581		325			
Alappuzha	254.15			471.66		353.06		350.00	329.93		
Ernakulum				400.65	916.00	273.40	400.00	325.00			
Trissur				498.00		406.00		310.00	302.00	300.00	
Malappuram			283.66	387.83	985.00	392.29		340.00			
Kozhikode			328.92	246.33		252.30		350.00			240.00
Kannur		287.90		349.39	750.00	337.14		320.00			
Kasaragod		275.133		396.758		238.16		330		280	



Figure 7.4
District-wise Cumulative Annual Average Value
(Unit value) of High Value Marine Species in Kerala
(Year 2015-16 to 2019-20; Value in Rupees per Kilograms)

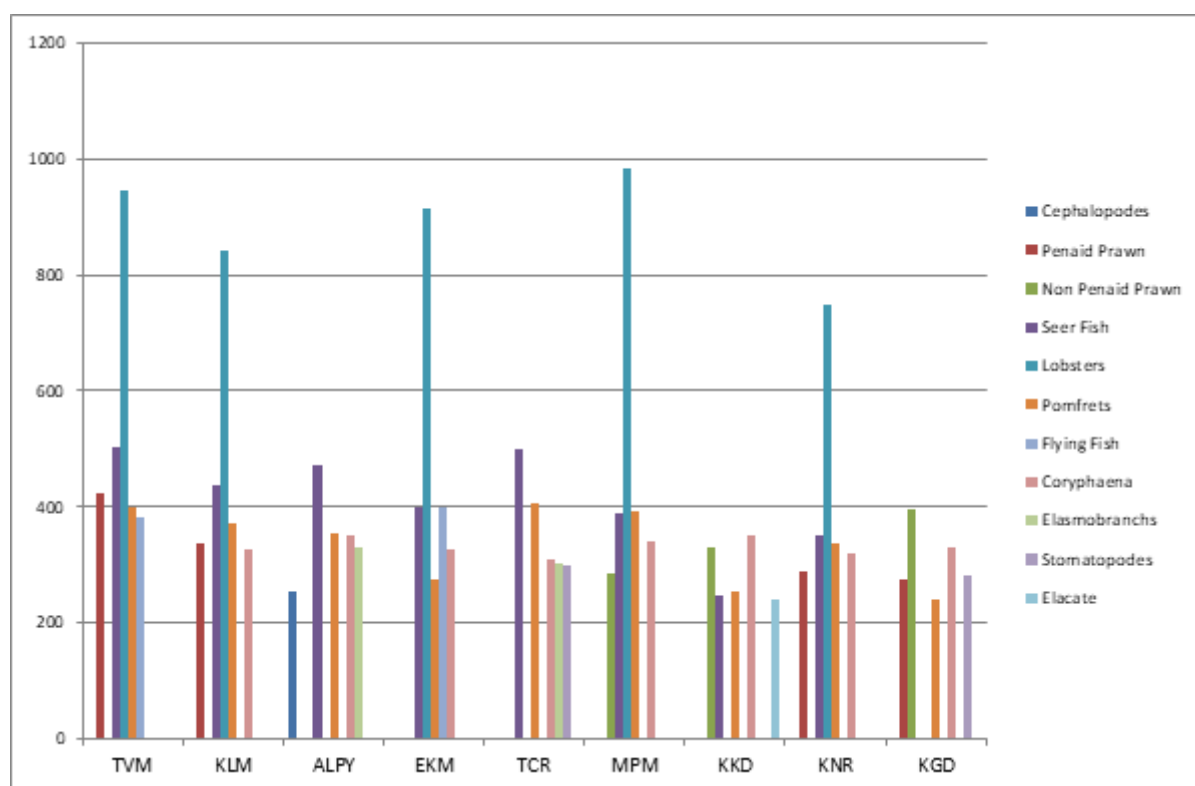
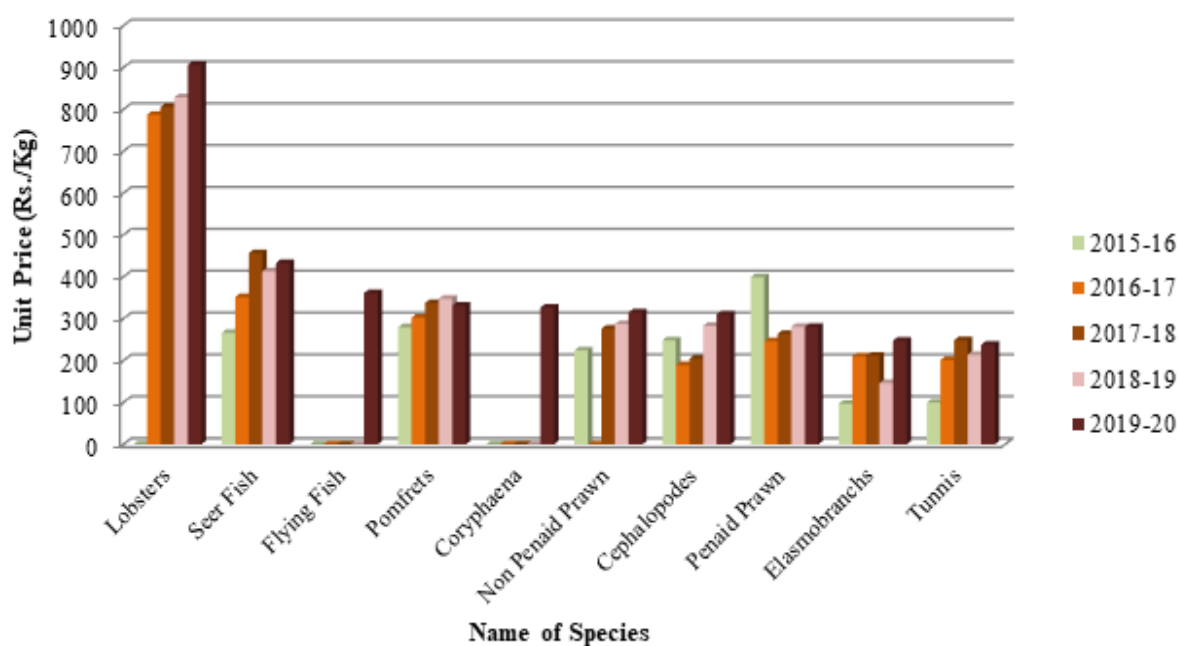


Table 7.11
Marine Catch: Year wise Unit Value of Major Species (Rs/Kg) in Kerala

Sl. No	Name of species	Year				
		2015-16	2016-17	2017-18	2018-19	2019-20
1.	Lobsters	NA	787.37	806.12	828.86	906.87
2.	Seer Fish	266.43	351.85	456.79	413.38	433.24
3.	Flying Fish	NA	NA	NA	NA	361.30
4.	Pomfrets	279.98	303.01	337.92	348.00	331.52
5.	Coryphaena	NA	NA	NA	NA	326.79
6.	Non Penaid Prawn	224.58	NA	276.56	287.58	315.43
7.	Cephalopodes	248.60	189.60	204.79	282.91	310.87
8.	Penaid Prawn	399.26	246.70	264.21	280.94	280.73
9.	Elasmobranchs	96.99	210.43	211.90	146.68	248.01
10.	Tunnis	100.24	201.67	248.93	213.93	238.19

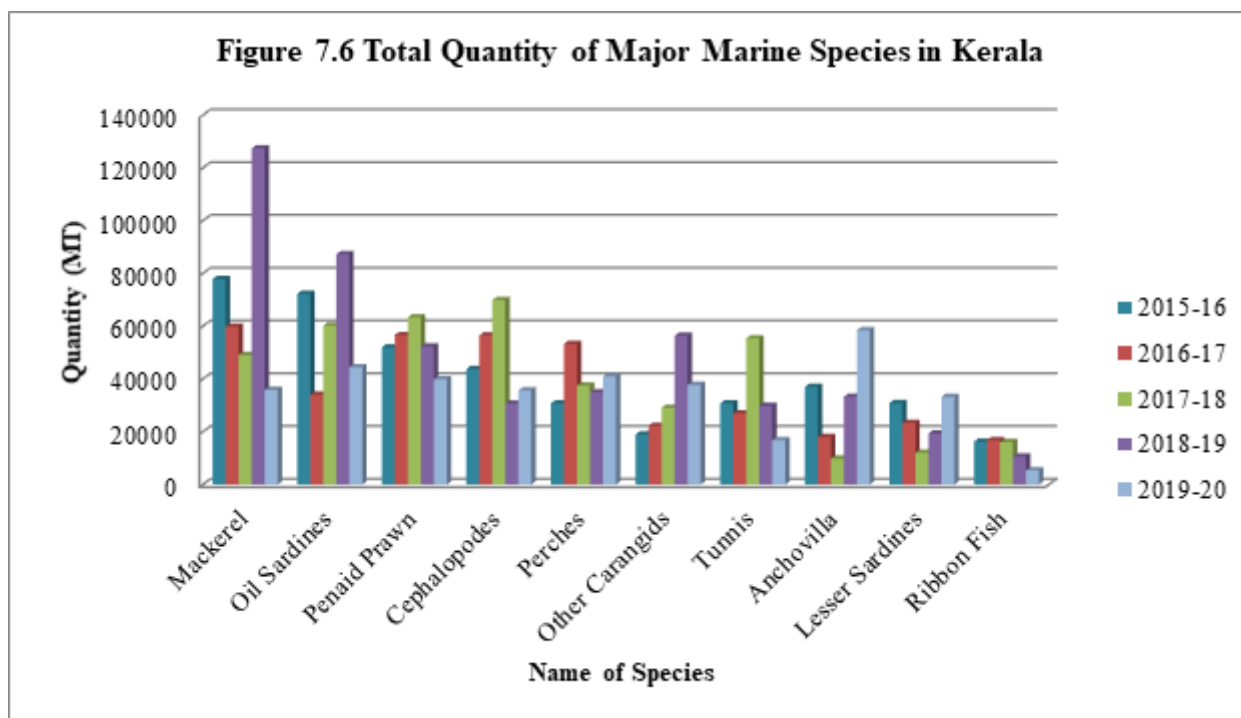
Figure 7.5 Marine Catch: Year wise Unit Value of Selected Species



- It is very clear that (from table 7.11 and figure 7.5) that most of the fish species unit price showed an increasing trend from 2015-16 to 2019-20.
- Lobsters showed the highest value in all the years.
- Elasmobranchs and Tunnis have relatively low unit value.

Table 7.12
Total Quantity of Major Marine Species in Kerala (Quantity in Metric Tonnes)

Sl. No	Name of the Species	Years				
		2015-16	2016-17	2017-18	2018-19	2019-20
1.	Mackerel	77891	59890	49070	127419	35895
2.	Oil Sardines	72257	34073	60251	87331	44500
3.	Penaid Prawn	51971	56667	63366	52331	39905
4.	Cephalopodes	43794	56530	69945	30679	35686
5.	Perches	30780	53286	37550	34962	40956
6.	Other Carangids	19021	22269	29107	56389	37776
7.	Tunnis	30767	26984	55420	29810	16793
8.	Anchovilla	37063	18027	9843	33242	58490
9.	Lesser Sardines	30873	23372	12094	19337	33199
10.	Ribbon Fish	16256	16776	16132	10617	5425



- Mackerel, Oil Sardines, Penaid Prawn and Cephalopodes were the major catch (quantity) during the last 5 years compared to other species.
- In the above case, species wise catch has not increased during the last 5 years, but showed a broadly decreasing trend.
- This decreasing trend might be studied further in the sustainability (yield) perspective.

Table 7.13
Total Value of Major Marine Catch (Species) in Lakh

Sl. No	Name of species	Year				
		2015-16	2016-17	2017-18	2018-19	2019-20
1.	Penaid Prawn	207500.00	139798.45	167422.39	147021.19	112024.26
2.	Cephalopodes	108872.63	107181.64	143237.07	86793.82	110938.74
3.	Mackerel	40412.04	65458.52	52033.46	187763.34	56955.64
4.	Tunnis	30841.36	54417.82	137957.87	63772.13	40000.04
5.	Oil Sardines	22613.98	37350.30	56767.91	96927.50	58418.84
6.	Other Carangids	16539.08	33205.62	43290.63	104769.02	73046.22
7.	Perches	22487.27	54445.06	43813.81	42522.99	65948.79
8.	Seer Fish	27695.00	59888.43	82245.92	25753.46	18752.18
9.	Anchovilla	15942.26	16790.50	8259.82	30927.54	63718.87
10.	Lesser Sardines	17827.63	21471.99	10161.21	11020.17	33905.74

Table 7.14 State level Marine Fishing in Kerala (2015-2020)

Sl.No.	Name of species	2015-16			2016-17			2017-18			2018-19			2019-20			Cumulative Average (2015-16 to 2019-20)					
		Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	%	Qty (MT)	Value (Lakh)	%	Unit price (Rs./Kg)	
1	Elasmobranchs	4464	4329.56	96.99	705	14837.4	210.43	522	11073.8	211.90	764	11213.9	146.68	276	68540.6	248.01	5430	9661.76	1.0	5	1.1	182.80
2	Eels	679	394.46	58.09	662	649.79	98.16	200	1165.24	58.09	593	540.37	91.12	878	1771.82	201.83	964	904.34	0.1	9	0.1	101.46
3	Cat Fish	1112	736.47	66.23	145	1683.40	115.62	477	539.15	113.03	30	29.12	97.05	259	330.97	127.82	667	663.82	0.1	3	0.0	103.95
4	Chirocentinus	733	421.82	57.55	0	0.00	0.00	127	0.00	0.00	23	0.40	1.72	108	60.02	55.51	248	160.75	0.0	5	0.0	57.39
5(a)	Oil Sardines	7225	22613.9	31.30	340	37350.3	109.62	602	56767.9	94.22	873	96927.5	110.99	445	58418.8	131.28	5968	54415.7	11.0	4	6.5	95.48
5(b)	Lesser Sardines	3087	17827.6	57.75	233	21471.9	91.87	120	10161.2	84.02	193	11020.1	56.99	331	33905.7	102.13	2377	18877.3	4.5	8	2.2	78.55
5(c)	Hilsa Hilsa	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.0	0	0.0	0.00
5(d)	Other Hilsa	0	0.00	0.00	0	51.52	0.00	0	0.00	0.00	0	0.00	0.00	312	269.52	86.49	312	160.52	0.0	6	0.0	86.49
5(e)	Anchovilla	3706	15942.2	43.01	180	16790.5	93.14	984	8259.82	83.92	332	30927.5	93.04	584	63718.8	108.94	3133	27127.8	6.0	4	3.2	84.41
5(f)	Trisocles	8037	3422.09	42.58	509	4090.53	80.24	217	1633.48	74.96	844	5283.39	62.57	737	7534.12	102.15	6227	4392.72	1.2	0	0.5	72.50
5(g)	Other Clupeids	2165	4185.30	193.32	302	2826.64	93.38	155	351.70	22.63	617	1793.35	29.03	580	6365.39	109.69	3745	3104.48	0.7	2	0.3	89.61
6(a)	Harpodon Nehereus	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.0	0	0.0	0.00
6(b)	Saurida & Saurus	3560	2032.85	57.10	812	6528.98	80.34	401	2736.33	68.24	142	15819.6	111.29	174	21579.2	123.70	9471	9739.40	1.8	3	1.1	88.13
7	Hemirhamphus & Belone	146	125.50	85.96	10	10.69	106.87	583	5.97	1.02	958	0.00	0.00	739	1148.14	155.39	2212	322.57	0.4	3	0.0	116.41



Sl. No.	Name of species	2015-16			2016-17			2017-18			2018-19			2019-20			Cumulative Average (2015-16 to 2019-20)			
		Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty (MT)	Value (Lakh)	Unit price (Rs./Kg)	Qty	Value (Lakh)	%	
8	Flying Fish	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1305	27.66	0.0	361.30	0.0
9	Perches	3078	22487.2	73.06	532	54445.0	102.18	43813.8	116.68	349	42522.9	121.63	409	65948.7	161.03	3950	7.6	45843.5	5.5	114.91
10	Red Mulllets	572	432.34	75.58	142	2334.94	163.40	199.06	153.12	463	43.38	9.37	443	876.20	197.98	607	0.1	777.18	0.0	119.89
11	Polynemids	1224	806.21	65.87	20	0.00	0.00	0.00	0.00	392	0.00	0.00	8	8.18	96.82	1080	0.2	407.20	0.0	81.35
12	Sciaenids	8015	3937.36	49.12	118	14045.1	118.53	8308.91	167.86	165	27518.1	166.58	540	5816.22	107.59	9348	1.8	11925.1	1.4	121.94
13	Ribbon Fish	1625	14250.1	87.66	167	16602.2	98.96	15126.2	93.77	106	15634.3	147.26	542	9023.96	166.33	1304	2.5	14127.3	1.7	118.80
14	Garanx	9691	12789.5	131.97	513	734.73	143.22	1149.02	109.12	541	393.66	7.27	232	5970.06	257.11	3798	0.7	4207.40	0.5	129.74
(a)																				
14	Chorinemus	55	37.80	68.73	427	796.40	186.51	1638.22	184.90	142	197.10	13.81	268	446.95	166.54	613	0.1	623.29	0.0	124.10
(b)																				
Sl. No.	Name of species	2015-16			2016-17			2017-18			2018-19			2019-20			Cumulative Average (2015-16 to 2019-20)			
(c)	Thaichyotus	0	0.00	0.00	0	0.00	0.00	0.00	0.00	181	0.00	0.00	10	9.71	94.72	912	0.1	9.71	0.0	94.72
14	Other Garangids	1902	16539.0	86.95	222	33205.6	149.11	43290.6	148.73	563	104769.	185.80	377	73046.2	193.37	3291	6.3	54170.1	6.5	152.79
(d)																				
14	Coryphaena	0	0.00	0.00	0	0.00	0.00	0.00	0.00	881	0.00	0.00	104	3419.33	326.79	1162	0.2	3419.33	0.4	326.79
(e)																				
14	Elacate	0	0.00	0.00	0	0.00	0.00	0.00	0.00	16	0.00	0.00	287	689.68	240.72	151	0.0	689.68	0.0	240.72
(f)																				
15	Leiognathus	2662	1771.75	66.56	627	6625.88	105.56	2286.25	126.52	176	2296.27	130.40	294	4089.71	138.99	3090	0.6	3413.97	0.4	113.60
(a)																				
15	Gazza	0	0.00	0.00	0	0.00	0.00	0.00	0.00	233	0.00	0.00	0	0.00	0.00	233	0.0	0.00	0.0	0.00
(b)																				
16	Lactrius	706	1325.25	187.71	496	9.30	1.88	0.73	1.08	246	0.00	0.00	839	863.07	102.84	471	0.0	549.59	0.0	146.76
17	Pomfrets	6948	19452.6	279.98	890	26973.6	303.01	13151.9	337.92	462	16091.3	348.00	214	7115.60	331.52	5302	1.0	16557.0	1.9	320.08
18	Mackerel	7789	40412.0	51.88	598	65458.5	109.30	52033.4	106.04	127	187763.	147.36	358	56955.6	158.67	7003	13.	80524.6	9.6	114.65
19	Seer Fish	1039	27695.0	266.43	170	59888.4	351.85	82245.9	456.79	623	25753.4	413.38	432	18752.1	433.24	1119	2.1	42867.0	5.1	384.34
20	Tunnis	3076	30841.3	100.24	269	54471.8	201.67	137957.	248.93	298	63772.1	213.93	167	40000.0	238.19	3195	6.1	65397.8	7.8	200.59
21	Sphyraena	791	526.29	66.53	634	1005.55	158.60	884.90	83.64	313	5813.13	185.66	348	7683.85	220.83	1819	0.3	3182.75	0.3	143.05
22	Mugil	6	2.94	49.06	2	1.78	89.00	0.62	1.07	25	0.00	0.00	54	98.19	181.38	29	0.0	25.88	0.0	106.83



7.2 PRIMARY SURVEY: FISHERMEN

Apart from the extensive secondary data collected from the Fisheries Department, a survey among the fisherman communities especially who involved in fishing from the representative landing sites in Kerala also carried out for boating certain economic information related to fisheries. The survey covered all the 9 coastal districts of Kerala and was conducted during January – February 2021.

There are 131 landing centres in the States. These landing centres were categorized into different size (mega, major, medium and minor) based on the number of vessels such as mechanized, motorized and non motorized vessels. Based on the number of fishing vessels and estimated number of fishermen, landing centres were selected (Annexure 7.1 and Table 7.15). Interview with the sample size of fisherman were conducted with a structured questionnaire Annexure 7.2 (total 30 - 50 fishermen in each landing centre). In major landing centres, 50 number of fishermen interviews and in minor landing centres, 30 number of fishermen interviews were conducted.

Parameters like: Age Group, Educational classification, Fish catch details /day in each landing centre (Catch details like -Fish Scientific Name, Common Name, Malayalam Name, Quantity of fish/day (kg) and Total Price (Rs.)). Total number of fishing vessel, fishing hours and its range, factors influencing price variation, mode of exchange and price determination, involvement of women in the auction sale and value added product development, facilities for storage of the resources, range of expenditure /day, range of money obtained from bio-resource exchange (Rs.) and destination of resources were considered.

Table 7.15: Total number of selected landing centers in each district

No	District	Landing centre
1	Trivandrum	22
2	Kollam	13
3	Alappuzha	15
4	Ernakulam	15
5	Thrissur	16
6	Malappuram	10
7	Kozhikode	14
8	Kannur	12
9	Kasargode	14
	Total	131

- The total number of landing centres surveyed were 131, comprising all the nine coastal districts of Kerala as given in the above Table no.
- The highest number of landing centres surveyed was in Thiruvananthapuram district with 22 landing centres, followed by Thrissur (16), Ernakulam (15) and Alappuzha (15).
- The lowest number of landing sites surveyed was in Malappuram district with only 10 landing centres.

Demographic Characteristics of Fisherfolk Community at Landing Centres

The demographic characteristics of the fisherfolk community were also gathered during this survey, whose results are given in the following Tables (7.16 & 7.17) and Figures (7.8a-r).



Table 7.16 Education Profile of the Sample population

SI.No.	Educational classification	Alappuzha		Ernakulam		Kannur		Kasargod		Kollam		Kozhikode		Malappuram		Thrissur		Thiruvananthapuram	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Up to 5 th	89	15%	169	36%	146	52%	106	40%	274	53%	46	13%	123	44%	10	5%	330	40%
2	Up to 10 th	466	77%	243	52%	107	38%	137	52%	224	44%	291	77%	143	51%	185	85%	387	47%
3	Plus Two	40	7%	46	10%	27	10%	22	8%	8	2%	30	8%	4	1%	23	11%	79	10%
4	Degree	14	2%	6	1%	2	1%	0	0%	4	1%	2	1%	0	0%	0	0%	23	3%
5	Other	0	0%	0	0%	1	0%		0%	0	0%	9	2%	8	3%	0	0%	1	0%
	Total	609	100%	464	100%	283	100%	265	100%	510	99%	378	101%	278	100%	218	100%	820	100%

- With respect to educational qualifications, most fisherfolk of all districts had attained qualification of up to 10th Std. except Kollam and Kannur where majority had attained qualification only up to 5th Std.
- There were even a few number of fishermen who have been educated up to 12th Std. (higher secondary) and degree level.
- Alappuzha district recorded highest number of fishermen who had qualified higher secondary level (14), while Kozhikode district recorded highest number of fishermen with degree qualification.
- It is interesting to note the high educational qualifications of the marine fishermen community in Kerala.



Table 7.17
Age wise Distribution of the Sample population

Sl.No	Age Group	Alappuzha		Ernakulam		Kannur		Kasargod		Kollam		Kozhikode		Malappuram		Thrissur		Thiruvananthapuram	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1	20-29	24	4%	7	2%	13	5%	29	11%	20	4%	7	2%	5	2%	0	0%	97	12%
2	30-39	153	25%	103	22%	66	23%	101	38%	78	15%	71	19%	29	10%	4	2%	212	26%
3	40-49	212	35%	153	33%	105	37%	94	35%	139	27%	175	46%	95	34%	72	33%	237	29%
4	50-59	145	24%	163	35%	64	23%	39	15%	189	37%	116	31%	99	36%	81	37%	184	22%
5	60-69	68	11%	38	8%	32	11%	2	1%	83	16%	9	2%	45	16%	61	28%	76	9%
6	70-79	7	1%	0	0%	2	1%	0	0%	1	0%	0	0%	5	2%	0	0%	14	2%
	Total	609	100%	464	100%	282	100%	265	100%	510	100%	378	100%	278	100%	218	100%	820	100%

- It was found from the survey that most fisherfolk in all districts comprised of the age group from 40-60 years, except Kasargod where the majority age group was 30-40 years old.
- Hence, it is clear that most of the fishermen are composed of middle aged men who have been engaged in this profession since many years.
- Their traditional knowledge of marine species, fishing techniques and weather patterns could be beneficial for capacity building as well as access and benefit sharing.
- This data on age group also may give an indication that younger generations are not as interested to continue in the fishing activity, probably due to better career prospects.



Fisherman Community - Educational Classification

Figure 7.8a. Fisherman Community - Educational Classification-Alappuzha

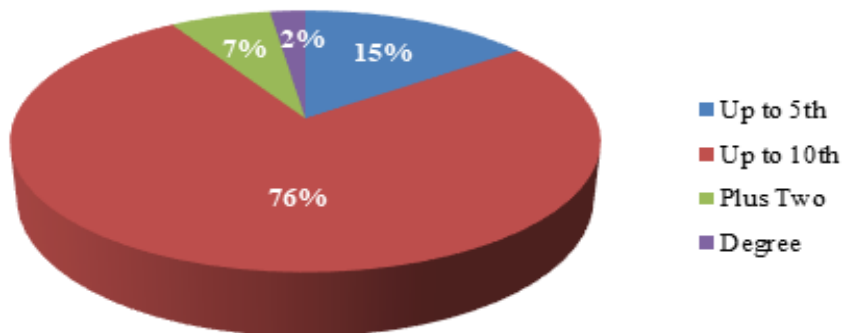


Figure 7.8b. Fisherman Community - Educational Classification-Kannur

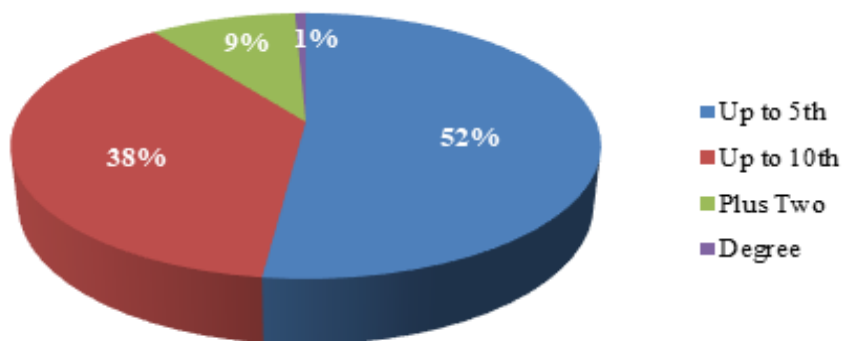
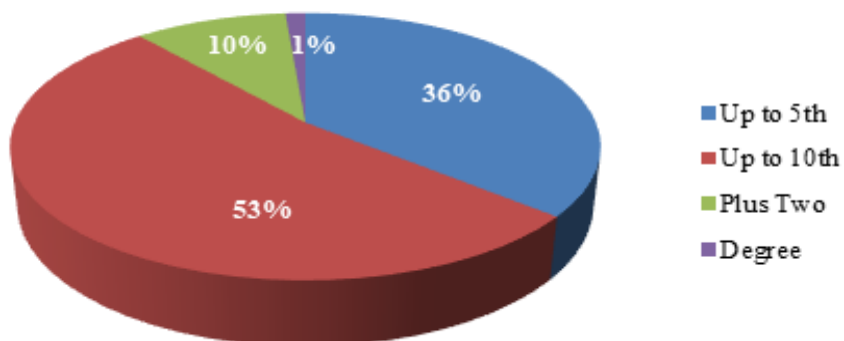


Figure 7.8c. Fisherman Community - Educational Classification-Ernakulam



Fisherman Community - Educational Classification

Figure 7.8d. Fisherman Community - Educational Classification-Kasargod

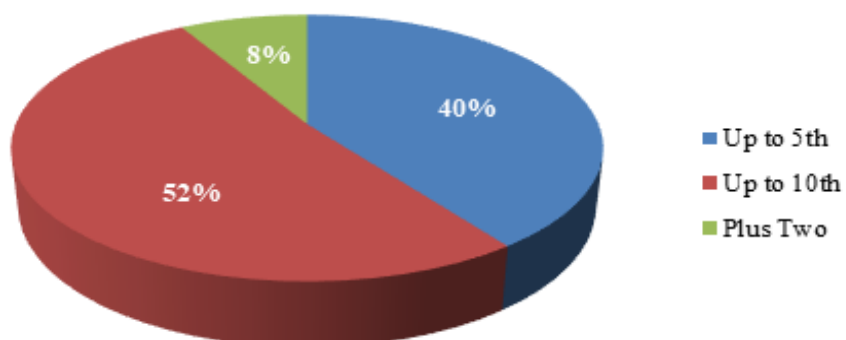


Figure 7.8e. Fisherman Community - Educational Classification-Kollam

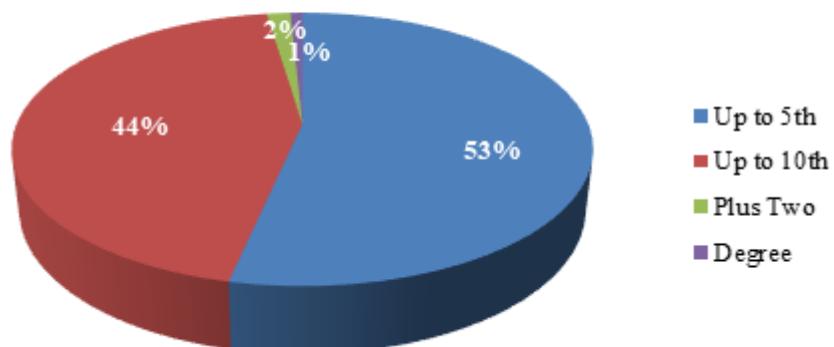
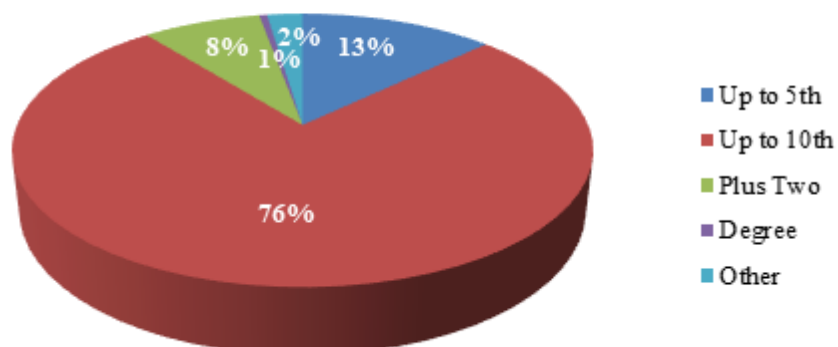


Figure 7.8f. Fisherman Community - Educational Classification-Kozhikode



Fisherman Community - Educational Classification

Figure 7.8g. Fisherman Community - Educational Classification-Malappuram

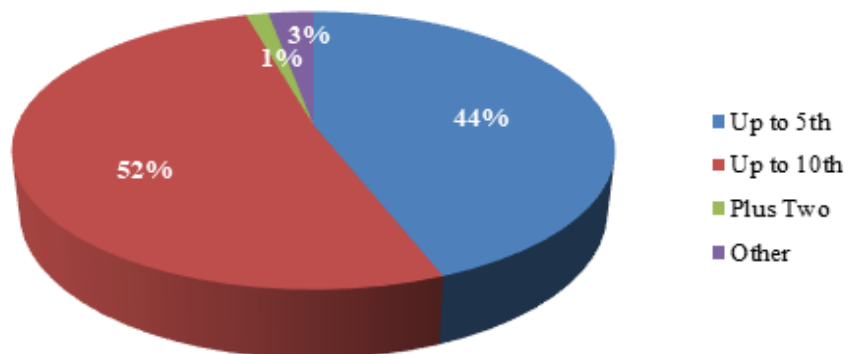


Figure 7.8h. Fisherman Community - Educational Classification-Thrissur

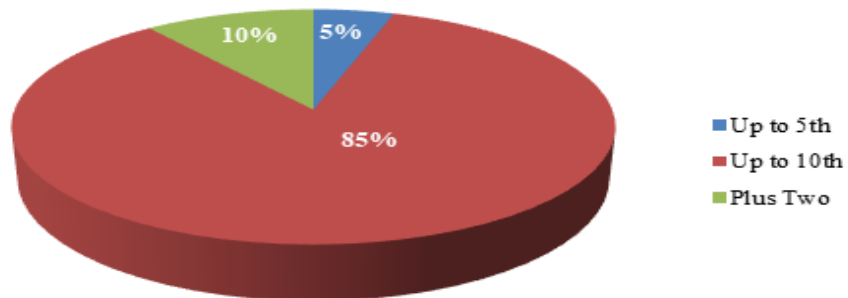
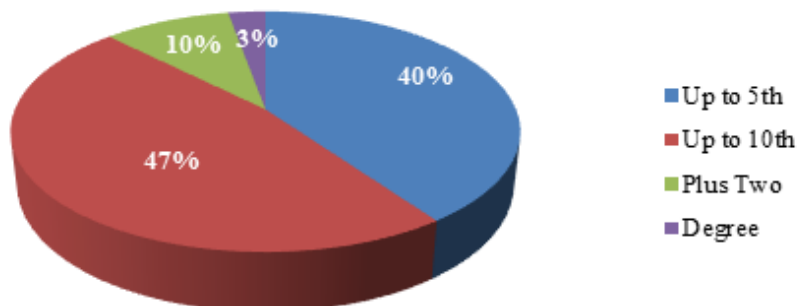


Figure 7.8i. Fisherman Community - Educational Classification-Thiruvananthapuram



Fisherman Community - Age Group Classification

Figure 7.8j. Fisherman Community - Age Group Classification-Alappuzha

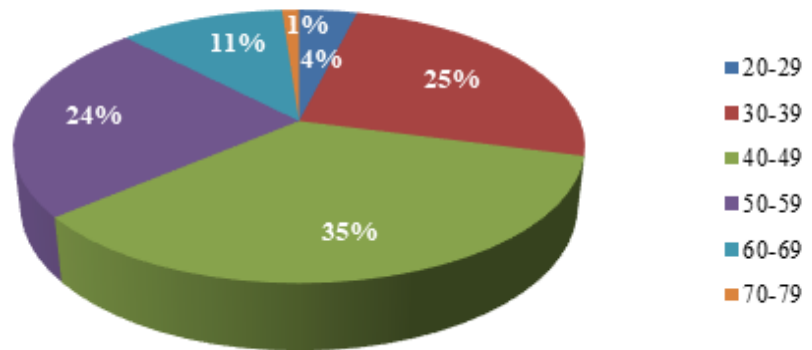


Figure 7.8k. Fisherman Community - Age Group Classification-Ernakulam

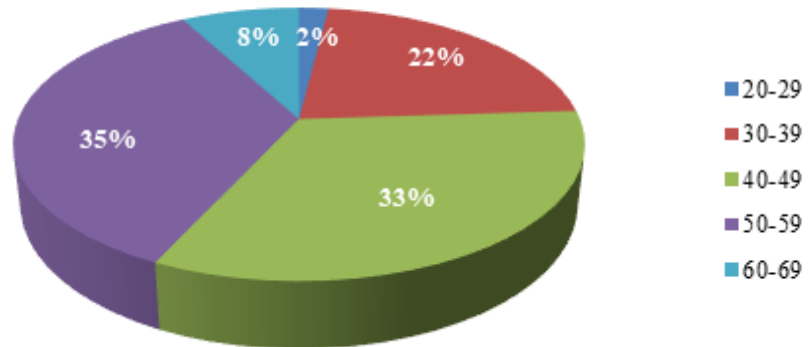
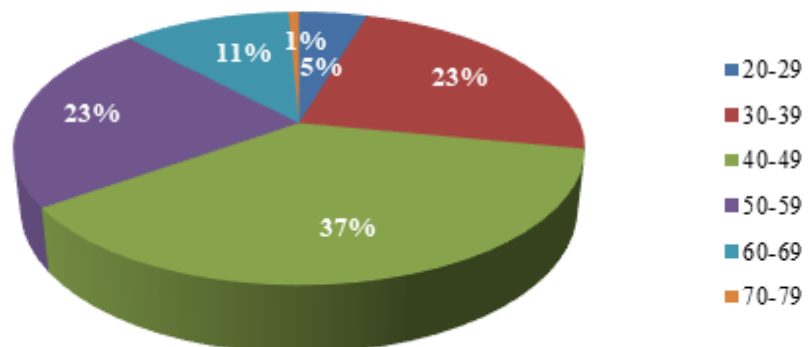


Figure 7.8l. Fisherman Community - Age Group Classification-Kannur



Fisherman Community - Age Group Classification

Figure 7.8m. Fisherman Community - Age Group Classification-Kasargod

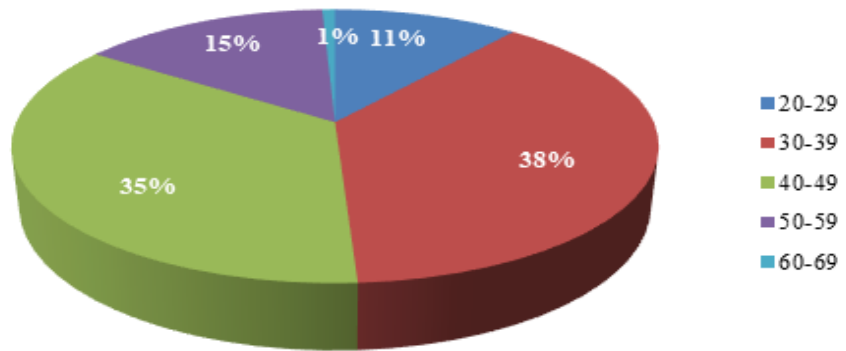


Figure 7.8n. Fisherman Community - Age Group Classification-Kollam

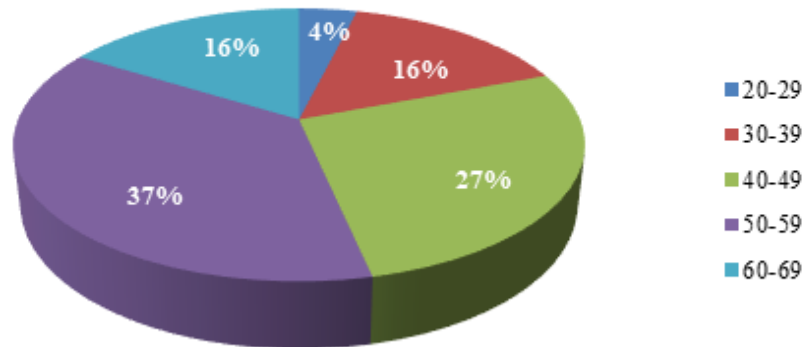
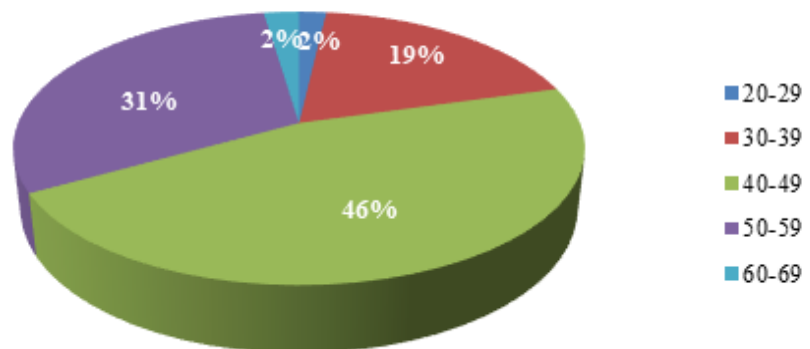


Figure 7.8o. Fisherman Community - Age Group Classification-Kozhikode



Fisherman Community - Age Group Classification

Figure 7.8p. Fisherman Community - Age Group Classification-Malappuram

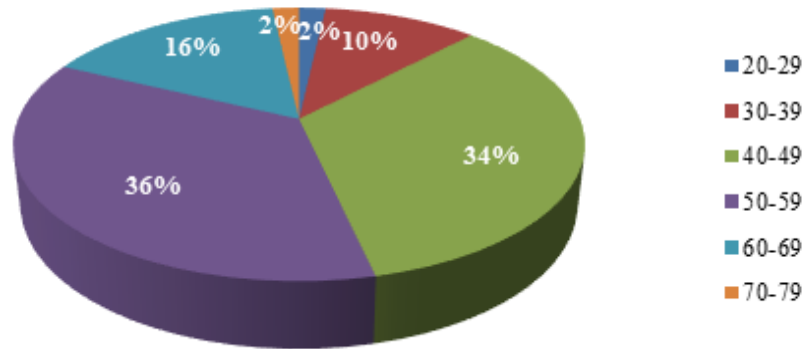


Figure 7.8q. Fisherman Community - Age Group Classification-Thrissur

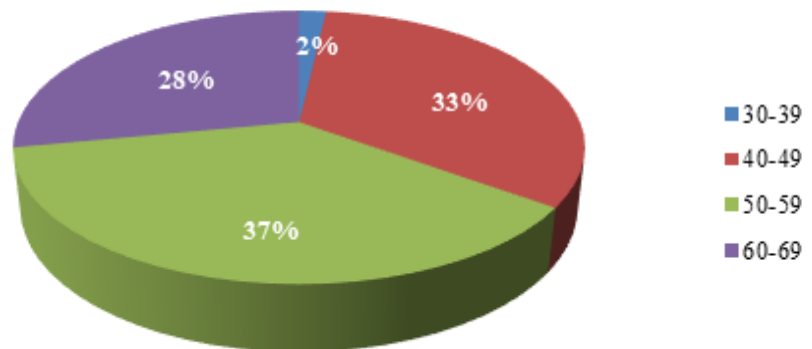
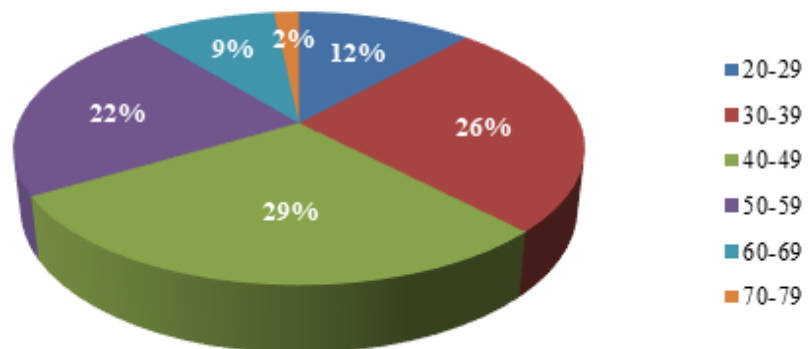


Figure 7.8r. Fisherman Community - Age Group Classification-Thiruvananthapuram



Key Factors and Variables in Marine Fishing Sector:

The survey conducted at the landing sites gave a comprehensive idea about the different socioeconomic factors and variables involved in the fishing sector, through which the quantity, value and unit price of marine bio-resources collected and sold by fisherfolk community is determined.

Fishing hours : One of the most important factors include the average hours of fishing in which a fisherman or a group of fishermen are engaged per day. It was found through the survey at all landing centres that the average duration spent per day on fishing activity was around 5-12 hours. The variation in this duration is influenced by various factors like type of boat, number of fishermen on the boat, distance travelled, weather patterns etc. This duration also in turn influences the quantity of fish catch by each fisherman or each boat, which may decide the final supply of marine bio-resources at the landing centre and at the market.

Factors influencing price : An important economic indicator which affects the livelihood of the fisherfolk is the price of fish they receive. The survey included questions about the factors influencing this variable. It was found in most landing centres unanimously that supply of fish is one of the most important factors determining the price of the bio-resource. The supply in turn depends upon the availability of fish which as a natural resource exhibits erratic nature of availability. This depends on various factors like marine ecosystem health, marine biodiversity, depth of fishing location, type of boat, duration of fishing, weather patterns etc. The type of fish species also determines the price since some high value species fetch higher unit price.

Marketing of fish and price determination : The marketing of fish is an important activity through which proper remuneration can be received by fishermen for their fish catch. This is done at most landing centres through the process of auction. At some instances, prices may also be predetermined by the fishermen at the time of fishing or during unloading. Bulk contract orders for the purpose of food processing also occurs at some landing centres, through which a fixed price is received. Mostly, the final price depends on the supply of fish, which varies both spatially and temporally.

Involvement of women : Considering the importance of increasing involvement of women in the labour force and improvement in their financial status, a gendered study of women's involvement was also conducted as part of the questionnaire survey. This becomes especially important due to the marginalized status of the fishing community, wherein women may face higher intensity of deprivation. It was found that the fishing sector is a collaborative activity, where men are involved mostly in the actual fishing activity while women are involved mostly in sales and value addition. This ensures an active participation of women in the entire supply chain of the marine fisheries sector, where they can earn some income through these activities and improve their condition.

Facilities for storage of the marine bio-resources : The availability of proper storage infrastructure is an important necessity for every sector that involves perishable goods. Marine bio-resources being perishable goods requires facilities that include chilling to prevent spoilage. In the survey, most landing centres had such chilling facilities using manufactured ice which ensures a longer shelf life of the commodity, thereby reducing losses through spoilage.

Destination for marine bio-resources : The final destination for the marine bio-resources collected by fishermen varies considerably. Although most of the fish are sold directly at the local or neighbouring markets, some are also dispatched towards other states as bulk sale or even exported to other countries. Exports form a very important part of the sale of marine bio-resources.



Table 7.18. Marine Fish Species Quantity and Unit Value

Sl. No.	Common Name	survey		
		Quantity(Kg)/day	Total Price/day	Unit value (Rs./Kg)
1	Barracuda	4550	1900000	418
2	Razorbelly scad	135	13500	100
3	Common glassfishes	47	2680	57
4	Chacunda Gizzard shad	60	8800	147
5	Frigate Tuna	1423	239150	168
6	Needlefishes	230	29800	130
7	Fish lice	92	22900	249
8	Trevally	675	115500	171
9	Hunchback trevally	40	12000	300
10	Bluespotted travally	1161	348570	300
11	Travally	975	321450	330
12	Blacktip Shark	524	78500	150
13	Dorab wolfherring	1671.5	122950	74
14	Common Dolphinfish	821	272170	332
15	Bengal Tounguesole	9854	1322920	134
16	Soles	3574	679170	190
17	White tail sting ray	915	128630	141
18	Rays	4040	564400	140
19	Indian Scad	6018	406670	68
20	Rainbow Sardine	1291	84890	66
21	Malabar Sprat	5433	510960	94
22	Rainbow runner	25	3750	150
23	Blacktip Grouper	421	70020	166
24	Malabar Grouper	670	97250	145



25	Groupers	2078	249360	120
26	Greasy grouper	240	37950	158
27	White sardine	11114	1162144	105
28	Mackerel Tuna	4603	702930	153
29	Tropical Two-Wing Flyingfish	460	81350	177
30	Spotted halfbeak	56	11200	200
31	Kelee shad	2197	230400	105
32	Red Sea halfbeak	79	15800	200
33	Black Marlin	600	86000	143
34	Croaker	41	4680	114
35	Croaker	306	27000	88
36	Skipjack tuna	2237	220300	98
37	False Trevally	293	31890	109
38	Common Ponyfish	3698.5	323395	87
39	Ponyfishes	11079	1268240	114
40	Indo-Pacific King Mackerel	2700	945000	350
41	Mangrove Red Snapper	8408	2126865	253
42	Giant black marlin	1508	410340	272
43	Torpedo scad	380	40200	106
44	Jinga Shrimp	3373	688000	204
45	Kadal Shrimp	8852	1446335	163
46	Speckled Shrimp	2608	339100	130
47	Mud crab	12	4000	333
48	Japanese Threadfin Bream	20149	2383670	118
49	Threadfin breams	639	81550	128
50	Soldier croaker	5343	591190	111
51	Long-finned Herring	18	1080	60
52	Silver pomfret	10619.5	8163610	769



53	Chinese Silver Pomfret	88	10560	120
54	Pomfret	10	7000	700
56	Kiddi Shrimp	4691	805435	172
57	Black pomfret	9396	3685860	392
58	Indian prawn	8186	2508840	306
59	Giant tiger prawn	5685	1473200	259
60	Asian green mussel	480	57600	120
61	Flower crab	144	20900	145
62	Three-spot swimming crab	2690	476900	177
63	Crabs	350	97080	277
64	King Fish	140	12800	91
65	Indian Mackerel	143107	14586355	102
66	Javanese Cownose Ray	279	43600	156
67	Fringescale Sardinella	15	1000	67
68	Striped Bonito	785	107400	137
69	White Sardinella	8297	758250	91
70	Sardinella	15342.5	1447195	94
71	Goldstripe sardinella	48860	7102500	145
72	Indian Oil Saradine	10604	1444515	136
73	Blacktip sardinella	140	15400	110
74	Brazilian lizardfish	850	59500	70
75	Yellowfin tuna	2055	287300	140
76	Narro-Barred Spanish Mackerel	7689	4182850	544
77	Indo-Pacific King Mackerel	10989	2235210	203
78	Streaked seerfish	5709	3515750	616
79	Mud Crab	33	10400	315
80	Bigeye scad	522	54750	105
81	Needle Cuttlefish	151	48260	320



82	Pharao Cuttlefish	4217	1430680	339
83	Sole Fish	14	3500	250
84	Great Barracuda	1300	169850	131
85	Commerson's Anchovy	15635	1634830	105
86	Indian Anchovy	8118	629870	78
87	Long Anchovy	8602	809975	94
88	Longjaw Anchovy	200	12000	60
89	Anchovy	9401	1150255	122
90	Yellow fin tuna	5162	1121200	217
91	Tuna	13669	2575630	188
92	Indian Ocean Squid	7550	2130490	282
93	Podimeen	40	2000	50
94	Bombla	30	4500	150
95	Chaavuri	214	34700	162
96	Kalava/Giant grouper	295	30000	102
97	Klathi	443	34740	78
98	Needlefish	35	5600	160
99	Kuttan	191	12400	65
100	Lizard fish	880	86650	98
101	Shell-fish	70	6050	86
102	Octopus dollfusi	610	74000	121
103	Miscellaneous	6394	587100	92

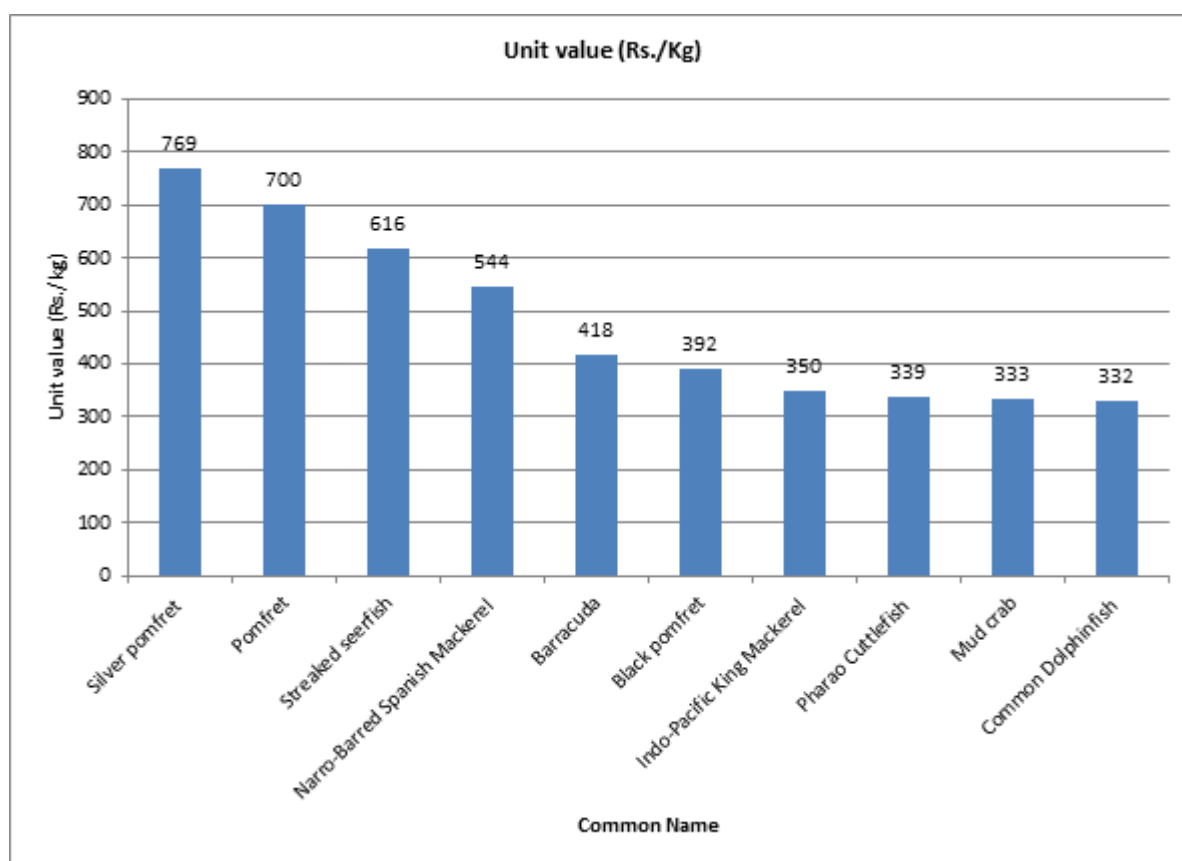
- The survey of fish catch to identify major species of fish in terms of quantity and value was also conducted as a part of this study (Table 7.18)
- The data represents average fish catch per day (quantity and value) across all landing centres in all districts to create an overall figure for each species
- As the availability and supply of fish is an important factor determining price, the quantity of fish catch needed to be enumerated.
- The value also varied between different species, which gives an idea about the various high value species which are in high demand.
- In this particular survey, Indian Mackerel species had the highest catch in terms of quantity (143107 kg/day), while Pomfret had the lowest catch (10 kg/day).
- In terms of value, Indian Mackerel again had the highest value which corresponded to its high quantity (14586355 Rs./day), while Fringescale Sardinella recorded the lowest value (1000 Rs./day).



Table 7.19 Top 10 High Unit Value Marine Fish Species

Common Name	Quantity (Kg)/day	Total Price/day	Unit value (Rs./Kg)
Silver pomfret	10619.5	8163610	769
Pomfret	10	7000	700
Streaked seerfish	5709	3515750	616
Narro-Barred Spanish Mackerel	7689	4182850	544
Barracuda	4550	1900000	418
Black pomfret	9396	3685860	392
Indo-Pacific King Mackerel	2700	945000	350
Pharao Cuttlefish	4217	1430680	339
Mud crab	12	4000	333
Common Dolphinfish	821	272170	332

Fig 7.9. Top 10 High Unit Value Marine Fish Species



- The list of top 10 high value species is given in Table 7.19 and Fig 7.9.
- The highest unit value species was found to be Silver pomfret (769 Rs./kg) followed by Pomfret (700 Rs./kg) and Streaked seerfish (616 Rs./kg).
- The lowest unit value species was found to be Podimeen (50 Rs./kg).

In brief, following are the major inferences from the landing site survey

- The primary questionnaire survey results from marine fisheries landing sites from all coastal districts showed the quantity (kg) of fish catch per day and the total price received per day for each species, given in Table 7.18.



- From this data, the unit value (price/kg) of each species was calculated which is also given in Table 7.18.
- The top ten high value species was calculated from given data which is given in Table 7.19 and Fig 7.9.
- The survey of demographic characteristics of the fishermen conducted found that the majority age group involved in fishing was 40-60 years old, and most fishermen had educational qualification up to 5th or 10th Std.
- Various socioeconomic factors and variables like fishing duration, price determination, storage infrastructure, marketing destination and involvement of women were also studied to give an insight into the status of the fishing community in the state.



CONCLUSION

Kerala has a total population of 334 lakh according to Census 2011 and the fisher folk population is estimated to be around 3.13% of Census population, which is around 10.44 lakh. They reside in 222 marine fishing villages and 113 inland fishing villages of the State. Out of the fisher folk population, 8.04 lakh belong to marine sector. Active fish workers are those fish workers who are engaged in fishing for their livelihood and are registered with the Kerala Fishermen's Welfare Fund Board. The number of active fish workers in the State in 2019-20 was 2,47,849. Thiruvananthapuram district has the largest number of active fish workers, followed by Alappuzha and Malappuram. This emphasises the importance of marine bio-resources in securing the livelihood of a sizeable population in the state, especially for those sections which are vulnerable and marginalised.

A significant change took place in the fisheries sector of Kerala through the initiative of Indo Norwegian Project (INP) in the 1950's. Primarily, this happened in the catching strategy of which the most important one is the mechanization process. As a result, the marine fisheries sector of Kerala was divided into two sectors, namely traditional and modern. The modern sector was introduced in 1953 at Neendakara – Shakthikulangara region under the initiative of the Indo-Norwegian project (INP). The novel facilities introduced in the fishing industry by the Indo-Norwegian Project were brand-new mechanically operated boats, new and improved fishing nets, as well as the Norwegian model ice factory with a cold storage plant. New methods of fish processing and forms of distribution were also introduced.

As a coastal state, the fisheries sector also plays an important role in the economy of Kerala. The share of fisheries sector in the total Gross State Value Added (GSVA) in 2019-20 constituted 0.82 % and accounted for 0.72 % of GSDP. Fisheries and Aquaculture contributed 9.7 % of the GSVA from the primary sector. The GSVA of the State has been growing over the years, but the share of primary sector has been declining. Though the share of other components of primary sector like crops, livestock and forestry in GSVA has declined, the share of fisheries sector has remained around 9.7 % of GSVA from primary sector (Kerala State Planning Board, 2020).

The total fish production of Kerala in 2019-20 was 6,80,798 metric tonnes with a contribution of 4,75,368 lakh metric tonne from marine sector. Total fish production in Kerala, which had been declining since 2015-16, witnessed a significant increase in 2018-19. Increase in marine fish production has been the prime reason for the jump in total fish production in Kerala in 2018-19. However, there was a decline in fish production in 2019-20, mainly due to decline in marine fish production. These figures show the key contributions of marine bioresources towards the fisheries sector of Kerala.

The analysis done in this chapter has emphasised on the species wise quantity of fish catch from different districts in Kerala, its market/trade value, unit value, export and foreign exchange earning etc. based on the data (last five years from 2015-16 to 2019-20) collected from the Fisheries Department.

The overall input of marine fish catch for a five year period was then consolidated through the calculation of cumulative averages of both quantity and value of all species groups to get a broad picture of the contribution of marine fish bioresources. The cumulative average of five major high quantity marine catches in Kerala coast was calculated: Mackerel (13.50%), Oil Sardines (11.50%), Penaid Prawn (10.19%), Cephalopodes (9.12%), and Perches (7.62%).

In terms of total value, the five major high value (cumulative average) marine catches / fishes in Kerala coast were: Penaid Prawn (18.61%), Cephalopodes (13.40%), Mackerel (9.68%), Tunnis (7.86%), and Oil Sardines (6.54%).

Species such as: Mackerel, Oil Sardines, Penaid Prawn, and Cephalopodes registered in high quantity (catch) as well as high values. Lobsters (Rs. 832.30), Seer fish (Rs. 384.34), Flying fish (Rs. 361.30), Pomfrets (Rs. 320.08), and Non Penaid Prawn (Rs. 294.37) have highest annual cumulative unit value (per Kg.), signifying the high benefits with respect to cost (higher return on investment) that can be gained by farmers by catching these marine high value species. Consequently, the ABS potential of these species especially can also be considerably high.

The district-wise cumulative annual averages of 10 high quantity, high value and high unit value marine species were also computed to understand the relative contributions of each district in the collection of marine bio-resources. Considering the district-wise data, the leading district in terms of quantity of fish catch was Kollam district followed Thiruvananthapuram, Ernakulam, Alappuzha and Kozhikode. In terms of major high total value marine catches, the same districts showed promising numbers with Kollam district again leading.

The trend of unit value across 5 years was analysed to achieve an understanding of price trend of some major high value marine species. Most of the species showed a consistent and predictable increasing trend in terms of unit value, with lobster being the highest unit value species in all five years. Elasmobranchs and Tunnis had relatively low unit value, with fluctuating price variations across different years.

The trend of quantity wise data of different high quantity species was also tabulated to understand the fluctuations in total quantity of catch of these high quantity species. After a year with high quantity catch (2015-16) most of the species showed a decreasing trend in the following 2 years. The quantity then rebounded to a higher amount in most species in the year 2018-19 which was even more than the quantity of catch in 2015-16. This was followed again by a substantial decrease in quantity in 2019-20. Since different factors such as market variations, meteorology, oceanic conditions etc impact the marine fish catch, the reason for these fluctuating numbers cannot be definitively pinpointed. However, these numbers can form a base for further studies on marine species sustainability and the need to allow time for marine resources to repopulate. In terms of high total value trend, this followed the pattern of quantity showing varying fluctuations across different years.



Thus, it can be observed from this study of marine bio-resources that this sector provides an important avenue of bio-resource utilisation contributing substantially to the economy of the state as well as for securing livelihoods of the fishermen community in the state. The sustainability of this sector can be improved through scientific management of marine bio-resources to ensure continuous and consistent yields which can ensure livelihood security for the fishermen and their families. Capacity building of farmers through BMC's can be undertaken to ensure they get maximum benefit of their catch from markets and also ensure forward linkages with fishing industries and exporting firms. Further, the ABS potential from value addition and commercialisation of marine bio-resources also needs to be explored which can act as a supplement for fishing community development.



Mega
Major
Medium
Minor

ANNEXURE 7.1 : NUMBER OF FISHING VESSELS, FISHERMEN AND SAMPLE SIZE- 1ST PHASE

	Fishing vessels				Estimated fishermen based on fishing vessel				Sample size	
	Mechanised	Motorized	Non motorised	Total	Mechanised	Motorized	Non motorised	Total		
Trivandrum										
1 Vizhinjam & Kottapuram	0	623	48	671	0	1869	96	1965	50	
2 Poonthura	0	173	68	241	0	519	136	655	50	
3 Puthiathura (Chinna marthandanthura)	0	197	86	283	0	591	172	763	50	
4 Poovar	0	147	200	347	0	441	400	841	50	
5 Valiaveli	0	58	75	133	0	174	150	324	30	
6 Kochuveli	0	28	50	78	0	84	100	184		
7 Adimalathura	0	28	100	128	0	84	200	284	30	
8 Puthiathura(Kochupally)	0	127	70	197	0	381	140	521	50	
9 Chempakaramanthura	0	47	65	112	0	141	130	271	30	
10 Erayammanthura	0	60	125	185	0	180	250	430	30	
11 Karimkulam	0	22	65	87	0	66	130	196	30	
12 Valiathura / Valiathura Pier	0	84	100	184	0	252	200	452	30	
13 Kollamgode	0	18	40	58	0	54	80	134		
14 Kochuthura	0	4	8	12	0	12	16	28		
15 Pallom	0	17	15	32	0	51	30	81		
16 Kovalam	0	0	15	15	0	0	30	30		



17	Panathura South	0	0	2	2	0	0	0	0	0	0	4	4	
18	Bheemapally	0	0	18	18	0	0	0	0	0	0	36	36	
19	Cheriathura	0	42	60	102	0	126	0	126	0	120	246	30	
20	Kochuthoppu	0	18	22	40	0	54	0	54	0	44	98		
21	Valiathoppu	0	15	18	33	0	45	0	45	0	36	81		
22	Kannanthura	0	8	16	24	0	24	0	24	0	32	56		
23	Vettucaud	0	0	2	2	0	0	0	0	0	4	4		
24	Anjengo North	0	187	115	302	0	561	0	561	0	230	791	50	
25	Anjengo South	0	158	70	228	0	474	0	474	0	140	614	50	
26	Marianad Colony	0	252	60	312	0	756	0	756	0	120	876	50	
27	Mampally	0	22	28	50	0	66	0	66	0	56	122		
28	Poothura	0	184	220	404	0	552	0	552	0	440	992	50	
29	Kochuthura	0	7	12	19	0	21	0	21	0	24	45		
30	Chilakkoor	0	18	32	50	0	54	0	54	0	64	118		
31	Vettoor	0	22	48	70	0	66	0	66	0	96	162	30	
32	Puthukurichi	0	84	50	134	0	252	0	252	0	100	352	30	
33	Santhipuram	0	8	15	23	0	24	0	24	0	30	54		
34	Thumba	0	28	35	63	0	84	0	84	0	70	154		
35	Vettuthura	0	22	30	52	0	66	0	66	0	60	126	30	
36	St.Andrews	0	8	27	35	0	24	0	24	0	54	78		
37	Pallithura	0	12	25	37	0	36	0	36	0	50	86		
38	Vettucaud	0	12	28	40	0	36	0	36	0	56	92		
39	Puthenthoppu	0	3	15	18	0	9	0	9	0	30	39		
40	Perumathura	0	0	22	22	0	0	0	0	0	44	44		
41	Thazhampally	0	0	8	8	0	0	0	0	0	16	16		
42	Singarathoppu	0	3	8	11	0	9	0	9	0	16	25		
43	Kayakara	0	0	5	5	0	0	0	0	0	10	10		
44	Onnampalem	0	0	3	3	0	0	0	0	0	6	6		
45	Arivalam & Rathikkal	0	0	6	6	0	0	0	0	0	12	12		



46	Perumon	0	0	0	3	3	0	0	0	0	6	6	
47	Parithiyoor	0	46	85	131	138	170	308	30				
48	Vizhinjam North	0	65	28	93	195	56	251	30				
49	Odayan	0	16	38	54	48	76	124	30				
50	Edava	0	7	16	23	21	32	53					
51	Kappil	0	0	4	4	0	8	8					
	DISTRICT : KOLLAM												
1	Thankassery F.H.	0	120	0	120	360	0	360	50				
2	Wadi	0	130	0	130	390	0	390	50				
3	Jonapuram	0	70	0	70	210	0	210	50				
4	Quilon Port	0	40	0	40	120	0	120	50				
5	Pallihottam	0	20	2	22	60	4	64	30				
6	Marathadi	0	20	0	20	60	0	60	30				
7	Chillickal	0	0	150	150	0	300	300	30				
8	Koluthumpad	0	0	10	10	0	20	20					
9	Chanakazhiyam	0	0	25	25	0	50	50	30				
10	Cheriazheekal	0	0	10	10	0	20	20					
11	Puthenthura	0	0	23	23	0	46	46	30				
12	Eravipuram	0	0	40	40	0	80	80	30				
13	Parakkada	0	0	10	10	0	20	20					
14	Thottukuzhi	0	0	25	25	0	50	50	30				
15	Pozhikkara	0	0	4	4	0	8	8					
16	Sakthikulangara	500	0	0	500	2500	0	2500	50				
17	Neendakara	493	123	0	616	2465	369	2834	50				
18	Moothakara	0	23	0	23	69	0	69					
	DISTRICT : ALAPPUZHA												



11	Chellanam	0	2	20	22		0	6	40	46		30
12	Saudi	0	0	0	0		0	0	0	0		
13	Manassery	0	3	6	9		0	9	12	21		
14	Maruvakad	0	0	5	5		0	0	10	10		30
15	Kunduparabu	0	4	8	12		0	12	16	28		30
16	Cochin F.H.	713	0	0	713		3565	0	0	3565		50
17	Kalamukku	260	250	0	510		1300	750	0	2050		50
18	Murikumpadam	65	5	0	70		325	15	0	340		50
19	Munambam F.H.	390	145	0	535		1950	435	0	2385		50
20	Munambam Mini F.H.	160	0	0	160		800	0	0	800		50
	DISTRICT : THRISSUR						0	0	0	0		
							0	0	0	0		
1	Munakkakadavu	88	0	0	88		440	0	0	440		50
2	Chettuva											
3	Banglankadavu	42	0	0	42		210	0	0	210		50
4	Puthenkadappuram	4	20	8	32		20	60	16	96		50
5	Blangad	0	261	15	276		0	783	30	813		
6	Nattika	12	42	8	62		60	126	16	202		50
7	Azheecode	16	40	25	81		80	120	50	250		50
8	Mannalamkunnu	1	5	5	11		5	15	10	30		30
9	Panchavadi	0	3	8	11		0	9	16	25		
10	Edakazhiyur	4	33	8	45		20	99	16	135		50
11	Thalikulam	0	32	0	32		0	96	0	96		
12	Kara	6	36	25	67		30	108	50	188		50
13	Eriyad (Chelarappa)	0	40	18	58		0	120	36	156		30
14	Vadanappally	3	6	4	13		15	18	8	41		30
15	Kazhimbram	2	20	20	42		10	60	40	110		30
16	Palapetty	2	6	5	13		10	18	10	38		30



Perinjanam	2	4	6	12	10	12	12	34	30
16 Arattukadavu	4	44	15	63	20	132	30	182	50
17 Attupuram	0	2	4	6	0	6	8	14	30
18 Kathiyalam	4	33	18	55	20	99	36	155	50

DISTRICT : MALAPPURAM (All should Cover)

1 Veliyamcode				0	0	0	0	0	
2 Ponnani	207	36	16	259	1035	108	32	1175	50
3 Thanur	42	700	20	762	210	2100	40	2350	50
4 Parapanangadi	40	500	22	562	200	1500	44	1744	50
5 Koottayi	4	97	12	113	20	291	24	335	50
6 Kadalundinagaram	12	45	20	77	60	135	40	235	50
7 Vadakke Kadappuram	32	75	8	115	160	225	16	401	50
8 Vakkad	0	30	30	60	0	90	60	150	30
9 Puthengadi/Paravanna	9	25	21	55	45	75	42	162	30
10 Theerukadappuram	6	50	25	81	30	150	50	230	50
11 Palappetty	1	13	12	26	5	39	24	68	30

DISTRICT : KOZHIKODE

1 Beypore F.H.	418	150	0	568	2090	450	0	2540	50
2 Puthiyappa F.H.	525	296	15	836	2625	888	30	3543	50
3 Chombala F.H.	116	536	35	687	580	1608	70	2258	50
4 Chaliyam	6	352	15	373	30	1056	30	1116	50
5 Quilandy/Koloth (Defunct)	0	0	15	15	0	0	30	30	30
6 Vellayil	0	20	5	25	0	60	10	70	30



7	Badagara Azhithala	0	165	10	175			0	495	20	515		50
8	Kolavi(Irinjal)	0	12	15	27			0	36	30	66		30
9	Thikkodi (Kodikkal)	0	105	20	125			0	315	40	355		50
10	Valavilkadappuram	0	5	15	20			0	15	30	45		
11	Muthayakadapuram	0	5	8	13			0	15	16	31		
12	Moodady	0	15	15	30			0	45	30	75		
13	Koloth	0	10	10	20			0	30	20	50		
14	Kovalad	0	23	8	31			0	69	16	85		30
15	Poilkavu	0	23	8	31			0	69	16	85		
16	Edakadavu	0	17	18	35			0	51	36	87		30
17	Kappad	0	7	8	15			0	21	16	37		30
18	Elathur	0	55	15	70			0	165	30	195		50
19	Kozhikode South	0	35	25	60			0	105	50	155		50

DISTRICT : KANNUR (All should Cover)

								0	0	0	0		
								0	0	0	0		
1	Azheekal Jetty	202	15	0	217			1010	45	0	1055		50
2	Ayikkara F.H.	71	147	15	233			355	441	30	826		50
3	Tellicherry	50	105	10	165			250	315	20	585		50
4	Puthiyangadi	2	100	5	107			10	300	10	320		50
5	Palakode	0	50	10	60			0	150	20	170		30
6	Muzhuppilangad	0	30	7	37			0	90	14	104		30
7	Ettikulam	0	15	15	30			0	45	30	75		30
8	Azheecode South	0	10	15	25			0	30	30	60		30
9	Edakkad	0	16	8	24			0	48	16	64		30
10	Thuruth	0	25	5	30			0	75	10	85		30
	Thalayy Kunhi												
11	Kadapuram	0	14	7	21			0	42	14	56		30



ANNEXURE 2
Tradable Bio-resource Database (Marine)
Questionnaire (Fishermen) who extract bio-resources from ocean)

S. No	Details	Remarks
1	Landing Area	
2	Name of the respondent (fisherman) - Age - Education - Address -	
3	Local / Vernacular name of the resource (fish etc.)	
4	Scientific name of the resource *	
5	Description and Nature of species (physical) (optional)	
6	Resource Availability months / season	
7	Availability of the resource (fish/-----) in the sea In shore / off shore - Top layer / medium layer / deep layer -	
8	Category of the resource (rare / endangered / threatened, -----)*	
9	Catch (quantity) in Kg. Daily - Monthly - Annually -	
10	To whom you are supplying the resources? (Supply Chain)	
11	Money obtained from BRs exchange (Rs.) Daily - Monthly - Annually -	
12	Price variations	



	<p>Range –</p> <p>Average -</p>	
13	<p>Factors influences on price variation</p> <p>More demand</p> <p>Less supply / availability</p> <p>Any government policy</p>	
14	<p>How the exchanging and price determination happening (auction or any other ways)</p>	
15	<p>Any idea about where the resources are going</p>	
16	<p>Any idea about what purpose the resources are going to use (domestic consumption / commercial use)</p>	
17	<p>Is it supply in local areas</p>	
18	<p>For collecting the resources what are the costs involved (other than your own labour)?</p> <p>Boat -</p> <p>Machinery -</p> <p>Fuel -</p> <p>Net -</p> <p>Any others -</p>	
19	<p>Are you availed any Government subsidy?</p> <p>If so for what item and %</p>	
20	<p>Traditional Knowledge associated with the resources if any (catch, storage, etc.)</p>	
21	<p>Changes on the availability of the resource and competition (past, present and future)</p> <p><i>(get from elderly person / fisherman)</i></p>	
22	<p>Any measures taken for sustainable harvesting of the resources.</p>	



	If yes, explain	
23	Any conservation measures for this resource from your side / any other agencies. If yes, explain	
24	Information related to Chaakara, (Peculiar marine phenomenon in which many fish and prawns throng together during a peculiar season as part of mud bank formed.)	
25	Any other information	
26	ABS scope / potential of the resources*	
27	Total number of vessels operating from the area	
28	Fishing Operation during fish ban period	
29	Income of fishermen during fish ban period	
30	Involvement of women in the auction, sale, value added product development	
31	What are the trades associated with the resources	
32	Man hours used for the production/ catch	
33	Facilities for storage of the resources	



7.3 . INLAND FISHERIES

Inland Fisheries in Kerala: Brief Profile

Kerala is one of the rich water resource states in India. The state has large number of water bodies, both fresh water and brackish water which includes rivers, interconnected backwaters (Kayals), estuaries, ponds & tanks, canals , reservoirs, lakes and other water bodies. These water bodies are providing a number of ecosystem goods and services and contribute significantly for the economic development of the State. All these water bodies are rich in unique fisheries resource (both culture and capture) and enhance the fish production of the State. Some of the brackish water resources of the state include backwaters, Pokkali and Kaippad fields distributed in Ernakulam, Thrissur , Alapuzha and Kannur districts are traditionally used for prawn filtration during summer season. (Directorate of Fisheries, 2017 & 2020)

Inland Fish Catch and Value in Kerala (2015-16 to 2019-20)

Species wise inland fish catch (quantity) as well as its value from 14 districts of Kerala during 2015-16 to 2019-20 was collected from the Fisheries Department, Government of Kerala. A detailed analysis was carried out considering the objectives of the project and its findings are summarised below. As the inland fish catch (quantity) and its value has been varying considerably over the period of time, the cumulative average was estimated and considered for analysis based on annual representation. The total Inland production during 2020-21 was 224495 MT.

**Table 7.20 Species wise Inland Fish Catch (Quantity) and Value in Kerala (2015-16)
(Quantity in MT and Value in Lakhs)**

S. No	Name of the Species	Quantity		Value	
		Quantity	%	Value	%
1	Prawn	28361	13.46	87919	30.44
2	Etroplus	8507	4.04	13186	4.56
3	Murrels	5518	2.62	5794	2.01
4	Mulletts	7069	3.35	18379	6.36
5	Cat fish	6365	3.02	7002	2.42
6	Jew fish	4157	1.97	4365	1.51
7	Tilapia	13129	6.23	17068	5.91
8	Labeo- fimbriatus	3429	1.63	4629	1.60
9	Barbus	806	0.38	846	0.29
10	Mrigal	12650	6.00	13283	4.60
11	Crabs	1853	0.88	6671	2.31
12	Common carps	12461	5.91	10592	3.67
13	Catla	30242	14.35	36897	12.77
14	Chanos	713	0.34	599	0.21
15	Eels	96	0.05	83	0.03
16	Labeo-Rohitha	29783	14.13	35740	12.37
17	Mussel	24060	11.42	13955	4.83
18	Edible Oyster	1867	0.89	1027	0.36
19	Miscellaneous	19696	9.35	10833	3.75
	Total	210763	100.00	288866	100.00



During the year 2015-16, the total quantity of inland fish catch in Kerala was 2,10,763 MT worth Rs. 2888.66 Crore. The major high quantity inland catches were Catla (14.35%), Labio Rohitha (14.13%), Prawn (13.46%), and Mussel (11.42%). In the value generation, prawn (30.44%) played a significant role followed by Catla (12.77%) and Labio Rohitha (12

Table 7.21 Species wise Inland Fish Catch (Quantity) and Value in Kerala (2016-17)
(Quantity in MT and Value in Lakhs)

S. No	Species	Quantity		Value	
		Quantity	%	Value	%
1	Prawn	27018	14.36	108072	27.31
2	Etroplus	8298	4.41	33192	8.39
3	Murrels	5102	2.71	21684	5.48
4	Mulletts	6685	3.55	38439	9.72
5	Cat fish	5780	3.07	6358	1.61
6	Jew fish	4070	2.16	21368	5.40
7	Tilapia	12776	6.79	22358	5.65
8	Labeo- fimbriatus	3187	1.69	3187	0.81
9	Barbus	788	0.42	2167	0.55
10	Mrigal	13910	7.39	13910	3.52
11	Crabs	1612	0.86	5803	1.47
12	Common carps	11712	6.23	11712	2.96
13	Catla	30830	16.39	44704	11.30
14	Chanos	690	0.37	1553	0.39
15	Eels	93	0.05	116	0.03
16	Labeo-Rohitha	26504	14.09	37106	9.38
17	Mussel	9537	5.07	8393	2.12
18	Edible Oyster	1774	0.94	3992	1.01
19	Miscellaneous	17764	9.44	11547	2.92
	Total	188130	100.00	395661	100.00

During the year 2016-17, the total quantity of inland fish catch in Kerala was 1,88,130 MT worth Rs. 3956.61 Crore. The major high quantity inland catches were Catla (16.39%), Prawn (14.36%) and Labio Rohitha (14.09%). In the value generation, Prawn (27.31%) played a significant role followed by Catla (16.39%) and Labio Rohitha (14.09%).



Table 7.22 Species wise Inland Fish Catch (Quantity) and Value in Kerala (2017-18)
(Quantity in MT and Value in Lakhs)

S.No	Species	Quantity		Value	
		Quantity	%	Value	%
1	Prawn	40802	41.08	188492	46.72
2	Etroplus	4879	4.55	20568	5.10
3	Murrels	3517	2.21	8812	2.18
4	Mulletts	3188	1.65	5983	1.48
5	Cat fish	4657	1.87	5667	1.40
6	Jew fish	1719	1.08	4156	1.03
7	Tilapia	5199	2.77	9719	2.41
8	Labeo- fimbriatus	1215	0.52	1557	0.39
9	Barbus	429	0.19	605	0.15
10	Mrigal	6302	2.63	7999	1.98
11	Crabs	2870	1.74	11541	2.86
12	Common carps	4703	1.97	5760	1.43
13	Catla	11282	5.34	17458	4.33
14	Chanos	487	0.30	1136	0.28
15	Eels	78	0.03	75	0.02
16	Labeo-Rohitha	10889	4.82	15311	3.79
17	Mussel	2541	0.69	2711	0.67
18	Edible Oyster	139	0.09	345	0.09
19	Miscellaneous	84185	26.95	95574	23.69
	Total	189081	100.00	403468	100.00

During the year 2017-18, the total quantity of inland fish catch in Kerala was 1,89,081 MT worth Rs. 4,034.68 Crore. The major high quantity inland catches were Prawn (41.08%) Catla (5.34%), Labio Rohitha (4.82%) and Etroplus (4.55%). In the value generation Prawn (46.72%) played a significant role followed by Etroplus (5.10%), Catla (4.33%) and Labio Rohitha (3.79%).



Table 7.23 Species wise Inland Fish Catch (Quantity) and Value in Kerala (2018-19)
(Quantity in MT and Value in Lakhs)

S. No	Species	Quantity		Value	
		Quantity	%	Value	%
1	Prawn	26312	13.70	128490	32.03
2	Etroplus	4194	2.18	18026	4.49
3	Murrels	2967	1.55	9047	2.25
4	Mulletts	2936	1.53	5697	1.42
5	Cat fish	3895	2.03	5188	1.29
6	Jew fish	312	0.16	918	0.23
7	Tilapia	1597	0.83	2579	0.64
8	Labeo- fimbriatus	3	0.00	4	0.00
9	Barbus	838	0.44	1353	0.34
10	Mrigal	4096	2.13	4503	1.12
11	Crabs	845	0.44	3406	0.85
12	Common carps	3137	1.63	4942	1.23
13	Catla	9096	4.74	14999	3.74
14	Chanos	609	0.32	1881	0.47
15	Eels	41	0.02	37	0.01
16	Labeo-Rohitha	5149	2.68	6964	1.74
17	Mussel	2097	1.09	3670	0.91
18	Edible Oyster	344	0.18	239	0.06
19	Miscellaneous	123560	64.35	189257	47.17
	Total	192027	100.00	401199	100.00

During the year 2018-19, the total quantity of inland fish catch in Kerala was 1,92,027 MT worth Rs. 4011.99 Crore. The major high quantity inland catches were Prawn (13.70%). In the value generation also Prawn (32.03%) played a significant role. It is very clear in the table that the miscellaneous fish items played a significant role in the year 2018-19 both in quantity (64.35%) and value (47.17%).



Table 7.24 Species wise Inland Fish Catch (Quantity) and Value in Kerala (2019-20)
(Quantity in MT and Value in Lakhs)

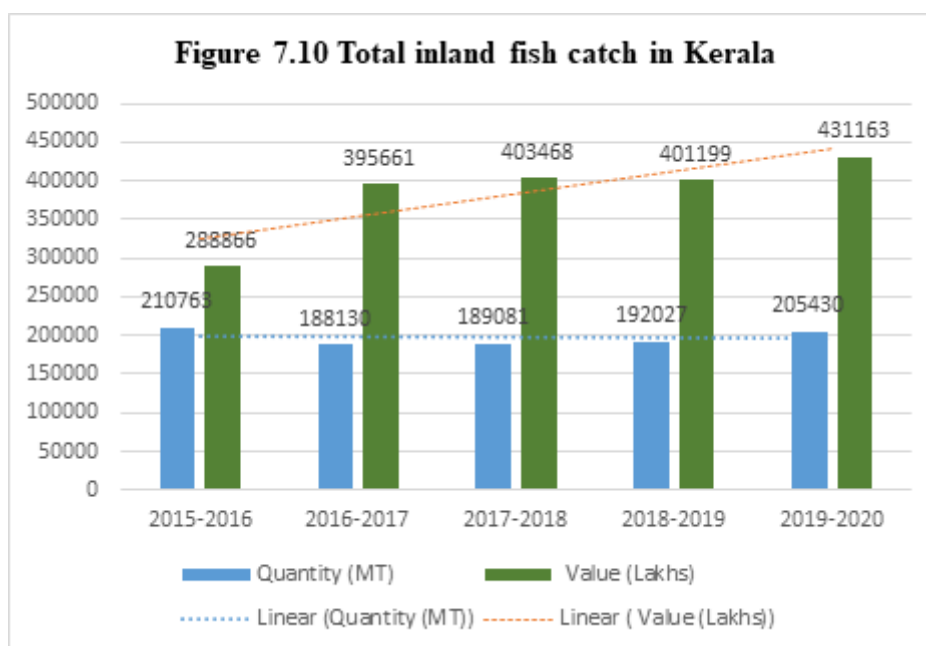
S. No	Species	Quantity		Value	
		Quantity	%	Value	%
1	Prawn	26454	12.88	129704	30.08
2	Etroplus	4319	2.10	18181	4.22
3	Murrels	2108	1.03	5324	1.23
4	Mulletts	3392	1.65	6665	1.55
5	Cat fish	4773	2.32	6612	1.53
6	Jew fish	130	0.06	366	0.08
7	Tilapia	4707	2.29	9228	2.14
8	Labeo- fimbriatus	175	0.09	25	0.01
9	Barbus	1382	0.67	2153	0.50
10	Mrigal	1338	0.65	1617	0.38
11	Crabs	2081	1.01	9003	2.09
12	Common carps	1228	0.60	1906	0.44
13	Catla	6713	3.27	11879	2.76
14	Chanos	1063	0.52	3087	0.72
15	Eels	15	0.01	11	0.00
16	Labeo-Rohitha	4897	2.38	7339	1.70
17	Mussel	3119	1.52	5169	1.20
18	Edible Oyster	548	0.27	453	0.11
19	Miscellaneous	136987	66.68	212441	49.27
	Total	205430	100.00	431163	100.00

During the year 2019-20, the total quantity of inland fish catch in Kerala was 2,05,430 MT worth Rs. 4311.63 Crore. The major high quantity inland catches were Prawn (12.82%). In the value generation also Prawn (30.08%) played a significant role. It is very clear in the table that the miscellaneous fish items played a significant role in the year 2019-20 both in quantity (66.68%) and value (49.27%).

Table 7.25 Total Inland fish catch in Kerala; 2015-2020

Year	Quantity (MT)	Value (Lakhs)
2015-2016	210763	288866
2016-2017	188130	395661
2017-2018	189081	403468
2018-2019	192027	401199
2019-2020	205430	431163





It is very clear from the above table (7.25) and figure (7.10) that the total quantity of inland fish catch in the State has not varied considerably from 2015-16 to 2019-20. However, during these periods, the value generated from inland fishing increased considerably over a period. This might be due to the increasing demand for the inland fishes..

Table 7.26
Cumulative annual average of 10 major high quantity inland catch in Kerala
(Year 2015-16 to 2019-20; Quantity in Metric tonnes)

Districts	Prawn	Etropus	Mulle ts	Cat fish	Tilapi a	Mriga l	Comm on carps	Catla	Labeo - Rohith a	Muss el
Thiruvananthapur am					310.84	335.09	355.04	1007.33	588.88	
Kollam	1294.38				1132.79		742.56	1503.83	1729.94	
Pathanamthitta				222.02	279.21	292.34		527.48	425.03	
Alappuzha	7203.86	1832.17			1728.86			1994.49	2782.18	
Kottayam	517.38	434.53			399.25			969.15	1762.21	
Idukki					108.19	83.97	534.00	525.26	197.08	
Ernakulum	15058.43				2315.38			1345.97		
Trissur	2650.90					1521.25	1503.34	4577.20	3076.42	
Palakkad					286.92	2398.68	1552.18	3260.12	3036.03	
Malappuram		208.22	372.59			935.69		995.95	458.00	
Kozhikode	493.36			283.00	234.94		330.31			342.98
Wayanad	116.08			7.39	82.52		224.88	301.78	309.45	
Kannur	847.34			252.01	289.72			226.31		266.93
Kasaragod	1288.01		199.31					181.76	180.91	6896.76

- ◀ The table 7.26 presents the cumulative annual average of ten major high quantities inland fish catch in the districts of Kerala over the years 2015-16 to 2019-20.
- ◀ Catla, Labeo-Rohitha, Tilapia and Prawn are the species captured or cultured in majority of the districts.
- ◀ Mulllets, Mussel, Etroplus, and Cat fish availability is in limited districts.
- ◀ However, Mrigal and Common carps exists in 6 to 7 districts only.

Table 7.27
Cumulative annual average of 10 major high value (total) inland catch in Kerala
(Year 2015-16 to 2019-20; Value in Lakhs)

Districts	Prawn	Etroplus	Murrels	Mulle ts	Cat fish	Tilapia	Mrigal	Catla	Labeo-Rohitha	Mussel
Thiruvananthapuram		763.62				377.59	422.64	1402.40	803.55	
Kollam	4573.29	2053.58		1840.43				2076.39	2186.08	
Pathanamthitta	368.52		469.85		595.32			893.74	735.27	
Alappuzha	32794.83	5455.16				2852.29		3084.59	3636.16	
Kottayam	1829.10	1439.60		1093.80				1428.93	2300.70	
Idukki			194.64			268.63	93.03	820.31	310.95	
Ernakulum	66459.20	4605.16		3616.23		3497.63		1813.00		
Trissur	11765.21	3674.85		2553.17				6623.94	4193.69	
Palakkad			261.10			579.44	2446.66	4444.94	3853.69	
Malappuram		726.47	942.61				921.03	1323.88	522.21	
Kozhikode	1488.58	468.28	446.84	710.78	358.72					
Wayanad	442.40		48.27			162.94		431.80	436.72	
Kannur	3371.99	501.98	550.74	736.07		489.49				
Kasaragod	4672.62	622.12		601.68					269.79	5510.71

- ◀ The table 7.27 presents the cumulative annual average of ten major high value inland fish catch in the districts of Kerala over the years 2015-16 to 2019-20.
- ◀ It is very clear that there is a strong correlation between the high quantity inland species and its value.





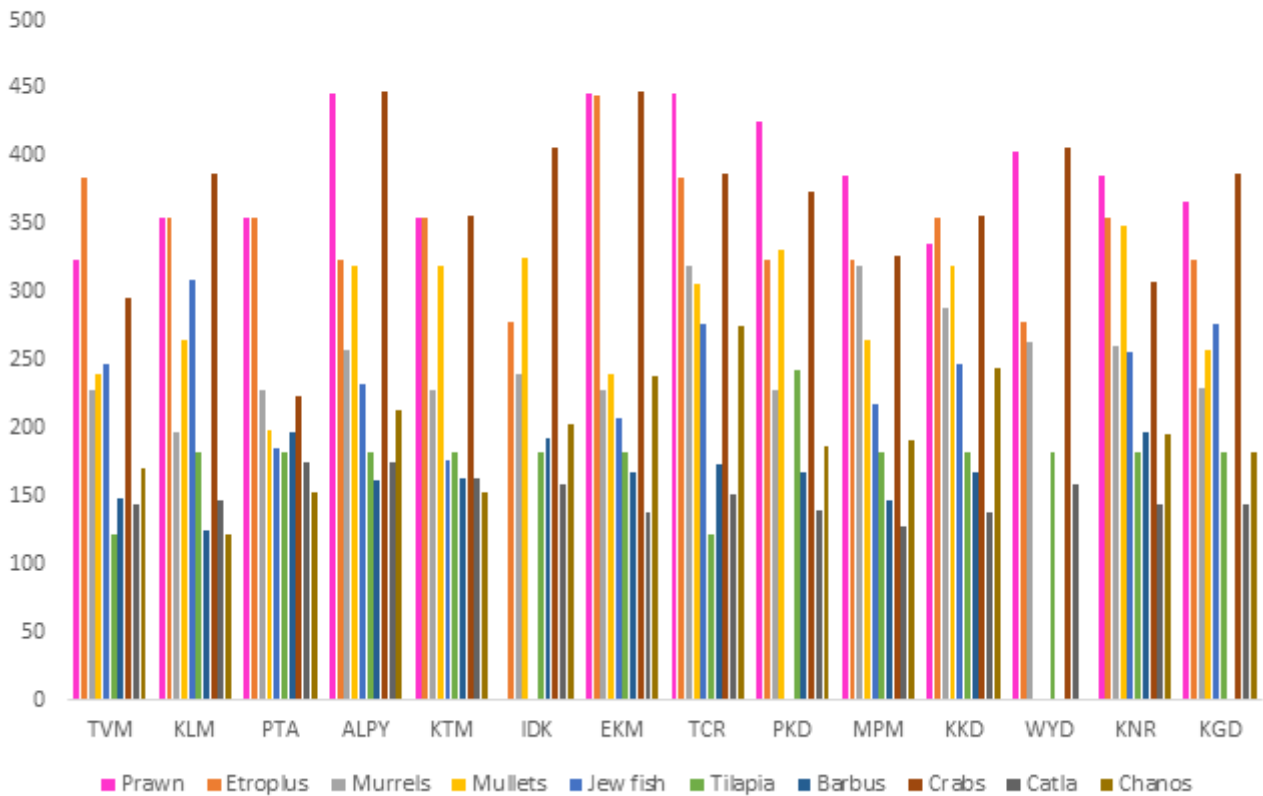
Table 7.28
Cumulative annual average value (Unit value) of selected 10 high unit value inland species in Kerala (Year 2015-16 to 2019-20; Value in Rupees per Kilograms)

Districts	Prawn	Etroplu s	Murrel s	Mullet s	Jew fish	Tilapi a	Barbu s	Crabs	Catla	Chano s
Thiruvananthapuram	324.40	384.60	227.60	239.80	247.60	121.80	148.96	296.00	144.60	171.24
Kollam	354.80	354.20	197.20	264.28	308.40	182.60	124.64	387.20	147.40	122.40
Pathanamthitta	354.80	354.20	227.60	199.00	186.00	182.60	197.60	224.00	175.00	153.00
Alappuzha	446.00	323.80	258.00	319.00	232.92	182.60	161.20	448.00	175.00	213.80
Kottayam	354.80	354.20	227.60	319.00	176.00	182.60	163.20	356.80	162.84	153.00
Idukki		277.50	239.92	325.00		182.60	193.33	406.67	158.68	203.00
Ernakulum	446.00	445.40	227.60	239.96	206.80	182.60	167.20	448.00	138.60	238.12
Trissur	446.00	384.60	318.80	306.84	276.67	121.80	173.28	387.20	150.68	274.60
Palakkad	426.00	323.80	227.60	331.67	0.00	243.40	167.20	373.33	139.40	186.33
Malappuram	385.20	323.80	318.80	264.28	217.20	182.60	146.80	326.40	127.40	191.64
Kozhikode	336.00	354.20	288.40	319.00	247.60	182.60	168.25	356.80	138.68	244.20
Wayanad	403.33	277.50	263.92	0.00		182.60		406.67	158.68	
Kannur	385.20	354.20	260.00	349.40	255.84	182.60	197.60	308.00	144.68	195.64
Kasaragod	366.00	323.80	229.87	258.20	276.67	182.60		387.20	144.60	182.40





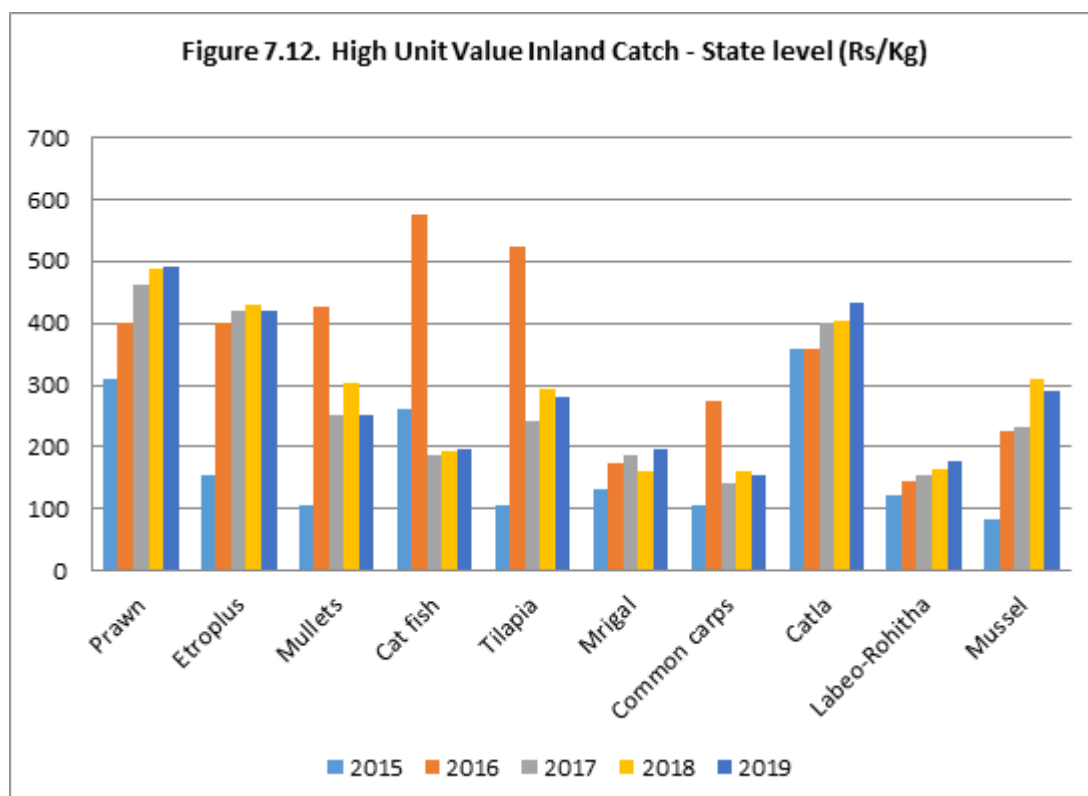
Figure 7.11. Cumulative annual average value (Unit value) of selected inland species in Kerala (Year 2015-16 to 2019-20; Value in Rupees per Kilograms)



- ◀ Table 7.28 and Figure 7.11 represents the cumulative annual average (unit value) of selected inland fish catch in 14 districts of Kerala over the years 2015-16 to 2019-20.
- ◀ The major high unit value inland species available in most of the districts are: prawn, etroplus, crabs, and mullets.
- ◀ The unit value of different species is not significantly varying between the districts. However, the minor variations were revealed and this might be due to the marketing and demand supply variations.

Table 7.29
Inland Catch: Year wise Unit Value of Selected / Major Species (Rs/Kg)

S. No	Name of species	Year				
		2015-16	2016-17	2017-18	2018-19	2019-20
1.	Prawn	310.00	400.00	461.97	488.33	490.29
2.	Etroplus	155.00	400.00	421.56	429.85	420.93
3.	Mulletts	105.00	425.00	250.55	304.88	252.57
4.	Cat fish	260.00	575.00	187.66	194.05	196.50
5.	Tilapia	105.00	525.00	241.78	294.62	281.17
6.	Mrigal	130.00	175.00	186.94	161.49	196.04
7.	Common carps	105.00	275.00	140.98	161.52	155.76
8.	Catla	360.00	360.00	402.11	403.14	432.65
9.	Labeo-Rohitha	122.01	145.00	154.75	164.89	176.96
10.	Mussel	84.00	225.00	233.24	308.88	290.46



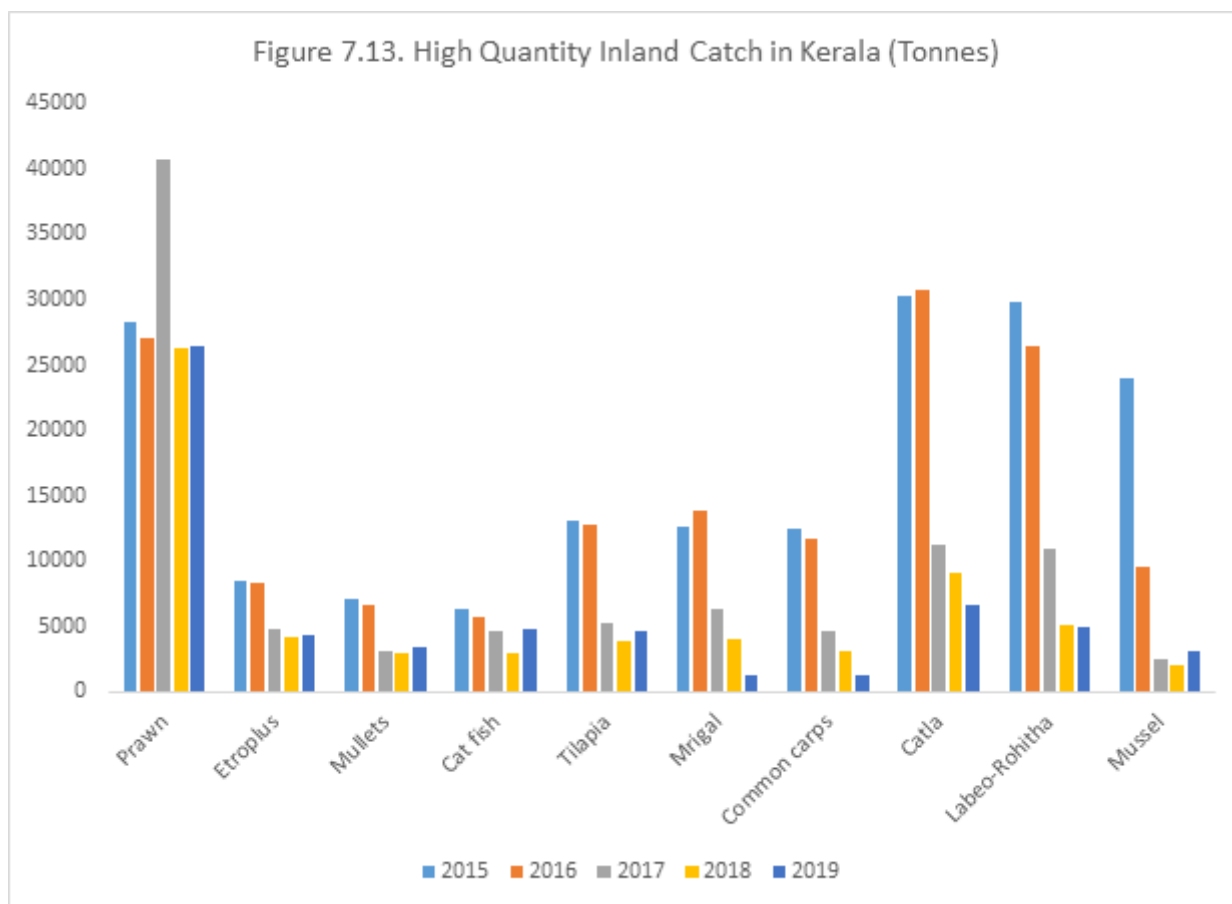
- ◀ Table 7.29 and Figure 7.12 represents the state level selected high value (unit value) inland fish catch over the years 2015-16 to 2019-20.
- ◀ The value (unit value) of majority of the species (especially Prawn, Etroplus, Catla, Labio Rohitha and Mussels) significantly increased over years.
- ◀ In the case of other species also, the increasing trend of price existed in general with a considerable fluctuation between the years.



Table 7.30
Total Quantity of Major Inland Species in Kerala
(Quantity in Metric Tonnes)

S. No	Name of the Species	Years				
		2015-26	2016-17	2017-18	2018-19	2019-20
1.	Prawn	28361.00	27018.00	40802.00	26312.05	26454.38
2.	Etroplus	8507.00	8298.00	4879.00	4193.61	4319.27
3.	Mulletts	7069.00	6685.00	3188.00	2967.42	3391.63
4.	Cat fish	6365.00	5780.00	4657.00	2935.72	4772.51
5.	Tilapia	13129.00	12776.00	5199.00	3894.58	4707.23
6.	Mrigal	12650.00	13910.00	6302.00	4096.37	1338.31
7.	Common carps	12461.00	11712.00	4703.00	3136.77	1228.02
8.	Catla	30242.00	30830.00	11282.00	9096.04	6712.75
9.	Labeo-Rohitha	29783.00	26504.00	10889.00	5149.07	4897.50
10.	Mussel	24060.00	9537.00	2541.00	2096.62	3118.67



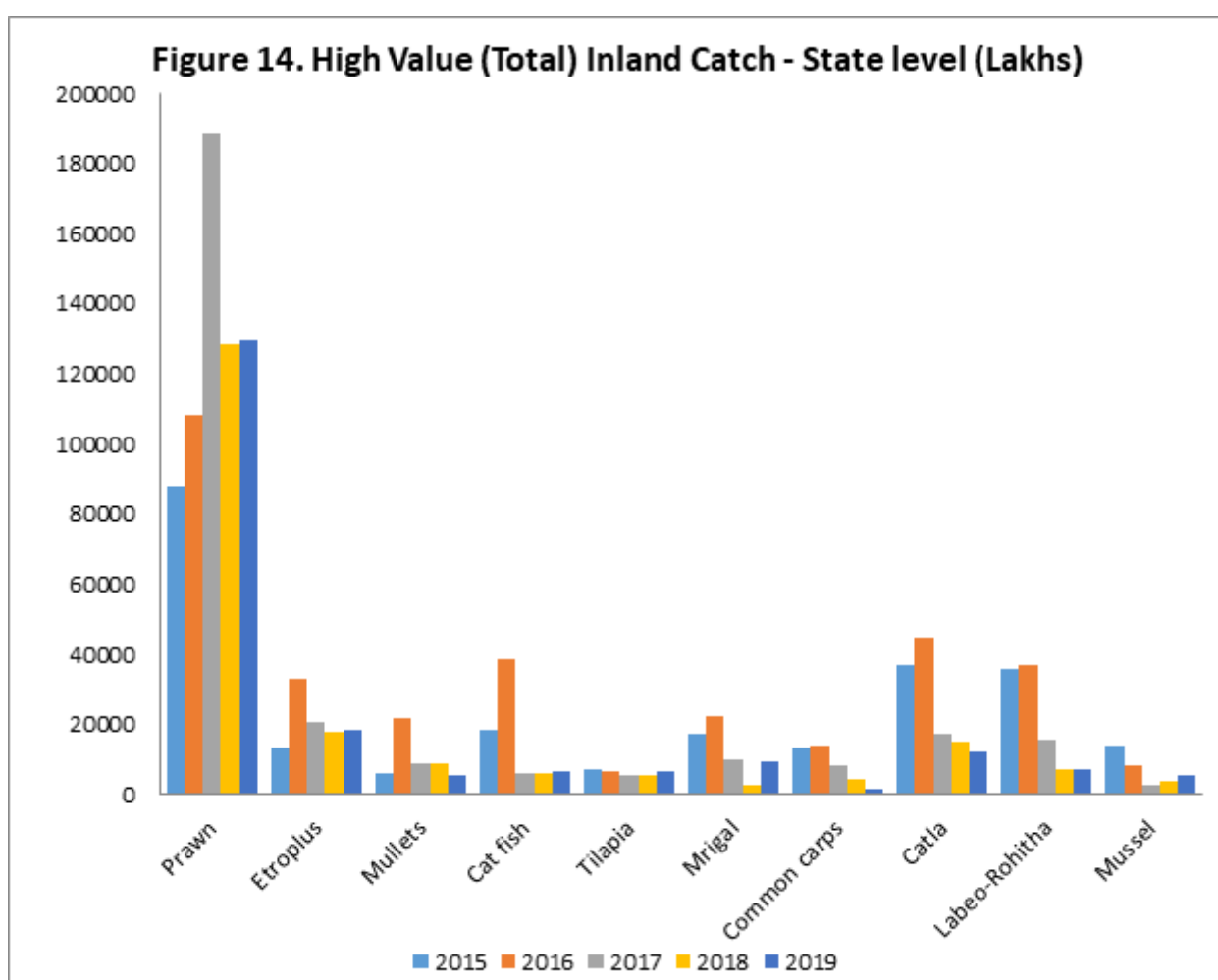


- ◀ Table 7.30 and figure 7.13 represents the state level ten selected high quantity inland fish catch over the years (2015-16 to 2019-20).
- ◀ Prawn was the high quantity inland species catch in all the years. Prawn catch was highest in 2017.
- ◀ Etroplus, Mullet, Catfish, Tilapia, Mrigal and Common Carps availability was relatively low in all the years.
- ◀ Catla, Labeo Rohita and Mussels catch was high during 2015-16 and 2016-17 but it reduced considerably in subsequent years.



Table 7.31
Total Value of Major Inland Catch (Species) in Lakhs

S. No	Name of species	Year				
		2015-16	2016-17	2017-18	2018-19	2019-20
1.	Prawn	87919	108072	188492	128490	129704
2.	Etroplus	13186	33192	20568	18026	18181
3.	Mulletts	5794	21684	8812	9047	5324
4.	Cat fish	18379	38439	5983	5697	6665
5.	Tilapia	7002	6358	5667	5188	6612
6.	Mrigal	17068	22358	9719	2579	9228
7.	Common carps	13283	13910	7999	4503	1617
8.	Catla	36897	44704	17458	14999	11879
9.	Labeo-Rohitha	35740	37106	15311	6964	7339
10.	Mussel	13955	8393	2711	3670	5169



- ◀ Table 7.31 and figure 7.14 represents the state level ten selected high value inland fish catch over the years (2015-16 to 2019-20).
- ◀ Fish catch value was high in the case of prawn in all the 5 years in proportion to the quantity of prawn catch.
- ◀ Compared to the value generated through prawn, the value generated through other species is insignificant.



Conclusion

The inland fisheries sector represents a sunrise sector with huge potential for growth, due to the large networks of freshwater and brackish water systems within the state. Although, its share does not match the fish bio-resources catch obtained from the marine sector, the inland fisheries yield is showing substantial growth in terms of value, which has been conclusively established from the present study. The secondary data was collected from the Fisheries Department of Government of Kerala, and subsequently analysed rigorously to provide a broad picture of the inland fisheries bio-resources in the state. For the purpose of this analysis, the cumulative averages of all the studied years according to districts and species were taken. The total quantity of inland fish catch in the State has not varied considerably from 2015-16 to 2019-20. However, during their period, the value generated from inland fishing increased considerably. This could be due to several influencing factors such as higher demand for inland fish species, increasing overhead costs, increase in quantity of catches of high value species etc. Nevertheless, the increasing trend in value of inland fisheries resources presents a promising picture for growth of this sector.

In order to get a more detailed idea of the inland fisheries bio-resources, the data was also classified into district-wise quantities and values, where 10 high quantity and high value species and their cumulative averages within each district were analysed. With respect to high quantity species of inland fish, these were Prawn, Etroplus, Mulletts, Cat fish, Tilapia, Mrigal, Common carps, Catla, Labeo-Rohitha and Mussel. Prawn (27.33%) showed the highest catch in quantity among the ten selected high quantity items, followed by Catla (16.18%) and Labeorohitha (14.17%) respectively. The cumulative annual average of ten major high quantity inland fish catch was found to be highest in Ernakulam (23.50%) followed by Alappuzha (18.02%), Thrissur (16.64%) and Palakkad (10.66%). Among the 14 districts, Ernakulam showed the highest cumulative annual averages (in quantity) of Prawn (50.55), Mulletts (21.93%), Catfish (23.50%) and Tilapia (29.16%). Kasargod was the only coastal district where the cumulative annual average of ten major high quantity marine catch was minimum (3.45%). However, the cumulative annual average of Mussel catch (83.39%) is highest in Kasargod relative to all other districts of Kerala.



This matches the cultural and traditional significance of mussels in the food habits of the northernmost district of Kerala.

With respect to high value species of inland fish, these were Prawn, Etroplus, Murrels, Mulletts, Cat fish, Tilapia, Mrigal, Catla, Labeo-Rohitha and Mussel. This shows that high value species are largely the same as high quantity species except common carps which feature in high quantity but not in high value list of species. This signifies the lower unit value of this particular category of species which can be further analysed in the next section on high unit value species. On the contrary, Murrels did not feature in high quantity but did feature in high value list indicating its probable high unit value. The cumulative annual average of ten major high value (total) inland fish catch is highest in Ernakulam (33.19%) followed by Alappuzha (20.99%) and Thrissur (13.64%) respectively. Among the 14 districts, Ernakulam showed the highest cumulative annual averages (in value (total) of Prawn (51.70%), Mulletts (24.06%), and tilapia (28.69%). Wayanad was the district where the cumulative annual average of ten major high value (total) inland fish catch is minimum (0.62%). Prawns (50.72%) recorded the high value (total) item among the ten selected high value (total) items, followed by Catla (9.94%), Etroplus (8.14%) and Labeorohita (8.09%) respectively.

With respect to high unit value species of inland fish, these were Prawn, Etroplus, Murrels, Mulletts, Jew fish, Tilapia, Barbus, Crabs, Catla and Chanos. The cumulative annual average of ten major high value (unit value) inland fish catch is highest in Thrissur (8.36%) followed by Alappuzha (8.12%), and Ernakulam (8.06%) respectively. The cumulative annual average of ten major high value (unit value) inland fish catch is highest in Thrissur (8.36%) followed by Alappuzha (8.12%), and Ernakulam (8.06%) respectively. Crabs (15.04%) recorded the highest value (unit value) item among the selected high value (unit value) items followed by Prawn (14.79%) and Etroplus (14.22%).

The total quantity and value of high quantity and high value species was also analysed across the 5 years studied to understand overall trend of inland fish catch. The high quantity marine catch was highest in the year 2015 (31.68%) followed by 2016 (28.09%), 2017 (17.33), 2018 (11.72%) and 2019 (11.18%) respectively. Etroplus, Mulletts, Catfish, Tilapia, and Labeorohita catch was highest during 2015. Mrigal, Common carps and Catla catch was highest during 2016. Prawn catch was highest in 2017.

The high value (total) inland fish catch was highest in the year 2016 (26.38%) followed by 2017 (22.31%), 2015 (19.67%), 2019 (15.92) and 2018 (15.72%). The values (Total value) of Prawn and Etroplus were increased in 2019 (20.18% and 17.62% respectively) when compared to 2015 (13.68% and 12.78% respectively). The total values of Murrels, Mulletts, Catfish, Tilapia, Mrigal, Catla, Labeorohita and Mussels decreased in 2019 (10.51%, 8.87%, 21.44%, 15.14%, 3.91%, 9.43%, 7.16% and 15.24% respectively) when compared to 2015 (11.44%, 24.45%, 22.71%, 28%, 32.15% 29.3%, 34.88% and 44.17% respectively). The unit value of Prawn, Etroplus, Murrels, Jew fish, Tilapia, Barbus, Crabs, Catla and Chanos significantly increased over the years. The value (unit value) of Mulletts reduced significantly over the years.

The inland fisheries bio-resources present a unique heritage of Kerala's combined systems of aquaculture within the agro-ecosystem, which has been practiced through integrated farming in the estuaries and backwater regions of Kerala. The Pokkali rice cultivation in central Kerala is an important example of this unique and ecologically sustainable integrated farming system. The Kuttanad rice cultivation below mean sea level has also been recognized as a Globally Important Agricultural Heritage System (GIAHS) by the Food and Agricultural Organisation (FAO). Such traditional practices may be considered while estimating the potential ABS amount from inland fisheries bio-resources. It may be noted that these combined systems of inland aquaculture and agriculture not only sustains the livelihoods of farmers and fishermen, but also conserves the rich biodiversity of these unique estuarine ecosystems. The freshwater rivers flowing from the Western Ghats and into the Arabian Sea also act as a storehouse for the inland fisheries bio-resources, warranting special attention for conservation.



Further, the increasing demand for inland fish species present an opportunity for creating forward linkages of aquaculture farmers with the local, national and international markets. Infrastructure development for storage, preservation and value addition also act as constraints for achieving the true potential of this sector in improving the livelihoods of the cultivators. Capacity building efforts through the agricultural department and BMC's to provide quality seed and feed for improved yield may also be explored.

Thus, the overall scenario of the economic value of inland fisheries bio-resources of Kerala has been comprehensively studied and analysed highlighting important districts and species with substantial contributions. This can provide a roadmap for further studies on ABS potential as well as interventions for improvement of this sector as mentioned above.



Annexure 7.3
State wise Inland Fish Catch and value (2015-16 to 2019-20)

Sl. No.	Name of Species	2015-16			2016-17			2017-18			2018-19			Total (2019-20)					
		QTY	%	VALU E	QTY	%	VALU E	QTY	%	VALU E	QTY	%	VALU E	QTY	%	VALU E			
1	Prawn	28361	13.46	87919	30.44	10807	27.31	4080	41.0	18849	46.72	2631	13.7	12849	32.03	2645	12.8	12970	30.08
2	Etropolis	8507	4.04	13186	4.56	33192	8.39	4879	4.55	20568	5.10	4194	2.18	18026	4.49	4319	2.10	18181	4.22
3	Murrels	5518	2.62	5794	2.01	21684	5.48	3517	2.21	8812	2.18	2967	1.55	9047	2.25	2108	1.03	5324	1.23
4	Mulletts	7069	3.35	18379	6.36	38439	9.72	3188	1.65	5983	1.48	2936	1.53	5697	1.42	3392	1.65	6665	1.55
5	Cat fish	6365	3.02	7002	2.42	6358	1.61	4657	1.87	5667	1.40	3895	2.03	5188	1.29	4773	2.32	6612	1.53
6	Jew fish	4157	1.97	4365	1.51	21368	5.40	1719	1.08	4156	1.03	312	0.16	918	0.23	130	0.06	366	0.08
7	Tilapia	13129	6.23	17068	5.91	22358	5.65	5199	2.77	9719	2.41	1597	0.83	2579	0.64	4707	2.29	9228	2.14
8	Labeo-fimbriatus	3429	1.63	4629	1.60	3187	0.81	1215	0.52	1557	0.39	3	0.00	4	0.00	175	0.09	25	0.01
9	Barbus	806	0.38	846	0.29	2167	0.55	429	0.19	605	0.15	838	0.44	1353	0.34	1382	0.67	2153	0.50
10	Mirgal	12650	6.00	13283	4.60	13910	3.52	6302	2.63	7999	1.98	4096	2.13	4503	1.12	1338	0.65	1617	0.38
11	Crabs	1853	0.88	6671	2.31	5803	1.47	2870	1.74	11541	2.86	845	0.44	3406	0.85	2081	1.01	9003	2.09
12	Common carps	12461	5.91	10592	3.67	11712	2.96	4703	1.97	5760	1.43	3137	1.63	4942	1.23	1228	0.60	1906	0.44
13	Catla	30242	14.35	36897	12.77	44704	11.30	1128	5.34	17458	4.33	9096	4.74	14999	3.74	6713	3.27	11879	2.76
14	Chanos	713	0.34	599	0.21	1553	0.39	487	0.30	1136	0.28	609	0.32	1881	0.47	1063	0.52	3087	0.72
15	Eels	96	0.05	83	0.03	116	0.03	78	0.03	75	0.02	41	0.02	37	0.01	15	0.01	11	0.00
16	Labeo-Rohitha	29783	14.13	35740	12.37	37106	9.38	1088	4.82	15311	3.79	5149	2.68	6964	1.74	4897	2.38	7339	1.70
17	Mussel	24060	11.42	13955	4.83	8393	2.12	2541	0.69	2711	0.67	2097	1.09	3670	0.91	3119	1.52	5169	1.20
18	Edible Oyster	1867	0.89	1027	0.36	3992	1.01	139	0.09	345	0.09	344	0.18	239	0.06	548	0.27	453	0.11
19	Miscellaneous	19696	9.35	10833	3.75	11547	2.92	8418	26.9	95574	23.69	1235	64.3	18925	47.17	1369	66.6	21244	49.27
	Total	2107	100.00	2888	100.00	3956	100.00	1890	100.00	4034	100.00	1920	100.00	4011	100.00	2054	100.00	4311	100.00



8.1 LAND USE PATTERN IN KERALA

The total geographical area of the State is 38,86,287 ha. Kerala's geographical area has been classified according to thirteen different uses of land which is presented in Table 8.1

Table 8.1. Land Use Pattern In Kerala

S. No	Category	Area	Percentage to total Geographical Area
1	Forest	1081509	27.83
2	Land put to Non Agricultural Use	455897	11.73
3	Barren and Uncultivable Land	10619	0.27
4	Permanent Pastures and other Grazing Land	0	0
5	Land Under Miscellaneous Tree Crops	2143	0.06
6	Cultivable Waste	99810	2.57
7	Fallow Other Than Current Fallow	46931	1.21
8	Current Fallow	57387	1.48
9	Marshy Land	11	0
10	Still Water	100160	2.58
11	Water Logged Area	3077	0.08
12	Social Forestry	2679	0.07
13	Net Area Sown	2026064	52.13
	Total	3886287	100

The net area under cultivation during the year 2019-20 was 20,26,064 Ha. The total cropped area during the year 2018-19 was 25,86,452 Ha.

Forest: Forest represents all naturally forested area as the lands classed or administered as forest under any legal enactment dealing with forest. The forest area of the State is 10,81,509 Ha which is 27.83% of the total geographical area of the State. Idukki district with an area of 1,98,413 Ha under forest (18.35%) is the district with largest extent of forest among all districts in the State.

Land put to Non-Agricultural use: The land put to use for purposes other than agriculture such as building, roads, canals, rivers, railways, reservoirs, etc. are brought under this category. Area under this classification during 2019-20 is 4,55,897 Ha accounting for 11.73 % of the state's geographical area. In Malappuram district, about 5,35,89 Ha (11.75 %) land put into non-agricultural uses is the highest followed by Ernakulam district with an extent of 47,785 Ha (10.48%).

Barren and uncultivable land: Land which cannot be brought for cultivation unless at a high cost, whether such a land is in isolated blocks or within cultivated holdings, such as mountains, deserts, hills etc are classified as barren and uncultivable land.

The total land which comes under this category is 10,619 Ha representing 0.27 % of the total geographical area of the State. Kasaragod district alone accounted for 3696 Ha which is 34.81 % of the state's barren and uncultivable land.

Permanent pastures and other grazing land:- All grazing lands, whether they are permanent pastures or meadows are considered as permanent pastures and other grazing lands. No area falls under this category in 2019-20.

*Land under miscellaneous tree crops :-*All cultivable lands, which is not included under net area sown, but is put to some agricultural use such as land under casuarina trees, thatching grass bamboo bushes and other groves for fuel etc. comes under this category. Out of the total geographical area, land under miscellaneous tree crops and groves are not included in the net area sown and it occupies only 2,143 Ha (0.06 %).

Cultivable wasteland:- These include land available for cultivation but not taken up for cultivation or abandoned after a few years for one reason or the other. Such lands may be either fallow or covered with shrubs and jungles, which are not put to any use. They may be assessed or unassessed and may lie in isolated blocks or within cultivate holdings. Lands once cultivated but remaining uncultivated for five years or more in succession shall also be included in this category. The total area under cultivable waste during 2019-20 is 99810 Ha ie, 2.57 % of the total geographical area of the State. The area under this category is highest in Palakkad district accounting 20911 Ha (20.95 %).

Fallow other than current fallow:- Land which were taken up for cultivation but have been temporarily put off cultivation for a period of not less than one year but not more than five years due to abject poverty of the cultivators, inadequate supply of water, silting of canals and rivers etc are treated as other fallow land. The total area under other fallow land during 2019-20 accounts 46931 Ha which is 1.21 % of the total geographical area. The land under this category is highest in Palakkad district with 13255 Ha.

Current fallow:- Land that are kept fallow off out of the net area sown during the previous year are classified as current fallow for the reporting year. The area under this category during 2018-19 is 57387 Ha., which is 1.48 % of total geographical area.

Marshy land:- Land which gets permanently or periodically inundated by water and characterized by vegetation which includes grasses and weeds. Out of the total geographical area, only 11 Ha come under marshy land during the year 2019-20.

Still water:- The land under still water is broadly the land occupied by water bodies like rivers, lakes, ponds, reservoirs, backwater, canals, tanks including nature made deeps in which water stands still for most part of the period. This is the land on which there is no vegetative growth of any kind. Out of the total geographical area, 1,00,160 Ha of land is under still water constituting 2.58 %. The land under still water is highest in Palakkad district and the area is 15,292 Ha.

Water logged area:- It is the land where water is at / near the surface and stands for most part of the year. It is generally found in low-lying areas and it excludes lakes, ponds and tanks. The total water logged area for the year 2019-20 is 3,077 Ha. It is 0.08 % of the total geographical area of the State.

Social Forestry :- The land under social forestry is the land in which the trees are planted by the side of railway lines, road side, river and canal banks with a view to meet the fuel and the fodder needs of the rural population and to serve the broader goals of soil conservation and provision of shed and shelter for crops. It also includes village forests/plantation which is being used by common man. An extent of 2,679 Ha of land comes under social forestry. The land under social forestry is highest in Idukki district with 1,250 Ha (46.66%) followed by Palakkad district with 402 Ha (15.0%).

Net Area Sown:- In calculating the net area sown, area sown more than once will be counted only once. Area cultivated during any part of the agricultural year should come under net area sown. Out



of 38,86,287 Ha of total geographical area, 20,26,064 Ha of land constituting 52.13 % is cultivated once with various crops during the year 2019-20.

From the above land use analysis, it is clear that the land under non agricultural use or predominantly, built-up areas comes to around 12% of the state land use pattern. That is majority of the remaining land is under cultivation (52.1%), Forests (27.8%), water bodies, wetlands etc., which support considerable volume of biodiversity. Hence the state's bio-wealth is substantial.

8.2 KERALA AGRICULTURE:

Kerala, bordered by Arabian Sea and the extensive network of backwaters, rivers and streams, boasts of an agrarian economy. The abundance of water due to the lakes and other small streamlets, innumerable backwaters and water bodies and rain-fed rivers flowing over the terrain of the state and also the adequate annual rainfall of 118 inches received by this state facilitates agriculture to a great extent and hence the economy of the state is dominated by agriculture.

The most essential or the staple crop is the rice or paddy. About 600 varieties of rice are grown in the sprawling paddy fields of Kerala. The Kuttanad region of the district of Kerala is known as the 'rice bowl of the state'. Next to rice is another very important crop is Tapioca and is cultivated mainly in the drier regions. Tapioca is a major food of the Keralites.

Besides production of the main crop, Kerala is also a major producer of spices that form the cash crops of the state. Kerala's spice trade is about 3000 years old and it is well known how the fresh aroma of the superb quality Kerala spices lured foreigners into this country in the medieval ages. Kerala produces 96% of the country's national output of pepper. The important spices are cardamom, cinnamon, clove, turmeric, nutmeg and vanilla. Cardamom is exported and brings great revenues to the country.

Other cash crops that constitute the agricultural sector include coconut, tea, coffee, cashew, coconut, areca nut, and ginger. In fact, coconut provides the principal source of income in Kerala- from coconut oil, coconut milk and other products, coir industry to coconut shell artefacts. Coconuts bring most of the economic gains to Kerala. Approximately, Kerala provides about 70% of Indian output of coconuts.

Cashew is also an essential cash crop. Raw cashew is seasoned with salt and spices and is also a hot favourite with everybody. Almost every tourist buys a packet of Kerala cashews and love gorging on them. Kerala also accounts for 91% of natural rubber production of the country. Kottayam district has extensive areas producing and processing rubber. Apart from rubber, other plantation crop like plantains or bananas are also grown in plenty. These bananas are of varied qualities ranging from red green and yellow coloured. The banana chips from Kerala are world famous. Last but not the least, the home gardens of Kerala also adds to the state's agrarian economy with a large number of vegetables, spices, coconuts, fruits grown locally.

However, the agriculture sector in Kerala has been facing challenges with regard to its growth. According to the data from the Directorate of Economics and Statistics (DES), the annual growth rate (GSVA at constant 2011-12 prices) of agriculture and allied activities (including crops, livestock, forestry and logging and fishing and aquaculture) was (-) 6.31 per cent in 2013-14, 0.02 per cent in 2014-15, (-) 5.10 per cent in 2015-16 and (-) 0.65 per cent in 2016-17. The sector witnessed a growth of 2.11 per cent in 2017-18. But the growth declined to (-) 2.38 per cent in 2018-19 and further to (-) 6.62 per cent in 2019-20. In 2018-19, fishing and forestry sector in the State had shown positive growth rate with, 6.55 per cent and 0.54 per cent respectively, while the rest of the sectors had displayed negative growth rate. But, on a positive note, as per SDG India Index 2019, even though the share of agriculture and allied sector in GSVA is negligible, Kerala ranks third in India with respect to GVA in agriculture per worker at ₹ 2.19 lakh (Economic Review, 2020).



In brief, the reduction in agriculture and allied activities in the states showed view in the light on the structural transformation (in the form of reduction in agriculture and an increase in industries and service sector) experiencing the Indian economy. However, agriculture and its allied activities are the source of our food and livelihoods of millions of poor. Even though the structural transformation is evident, agriculture and its allied activities inputs are the source of raw-materials for manufacturing and service sector in the State. Hence, bio-resources from agriculture, fisheries, livestock and forests, play a significant role in sustaining the Kerala economy.

Kerala has witnessed major changes in its land use pattern with the shift from cultivation of food crops to non- food crops and increase in area in land put to non-agricultural use. Agriculture plays an important role to achieve the Sustainable Development Goals (SDG) of no poverty, zero hunger, and good health and well-being. Crops, livestock, fishing, and forestry contributed 8.03 per cent to Kerala's Gross State Value Added (GSVA) in 2019-20 (constant prices).

8.3 AREA, PRODUCTION AND PRODUCTIVITY

Table 8.2
Area under Cultivation and Production of Principal Crops

S.No.	Crops	Area (Ha)			Production (Tonne)		
		2018-19	2019-20	2020-21	2018-19	2019-20	
1	Rice	198026	191051	201865	578256	587078	626888
2	Pulses including Tur	2490	2260.46	2005.95	2300	2103	1922.94
3	Pepper	82761	83765	82124.36	36776	34545	33590.933
4	Ginger	3275	2819	2700.4	15124	11917	12095.265
5	Turmeric	2484	2277	2216.84	6694	6653	7420.478
6	*Cardamom	38882	39697	39143	11535	10076	20570
7	Areca nut	95739	96921	96570.49	99925	92755	103158.59
8	Banana	52899	60678	57694.67	429060	548425	544188.71
9	Other Plantains	56211	56199	53568.83	383102	406902	412864.39
10	Cashew nut	38781	39898	37923.31	15635	19444	20908.99
11	Tapioca	61874	62070	64245.99	2325007	2592633	3027749.82
12	**Coconut	760947	760776	768809.04	5299	4814	4788
13	***Coffee	84976	85880	85880	64676	65459	68545
14	\$Tea	36474	35871.16	35871.16	60760	59260	66850
15	# Rubber	551200	551030(P)	550650	492500	533500(P)	519500
	Millets						
16	Ragi	225	213	230.26	271	261	329.55
17	Small millets	48	57	51	35	43	37.70



18	Sweet potato	210	194	309.04	3060	2782	4356.53
19	Other tubers		15462	14640.4			

Note** Production in million nuts, Productivity in nuts per ha, ^^ Paddy wetland area only

Source * Spices board, # Rubber Board, *** Coffee Board, and Tea Board, Directorate of Economics and Statistics

Table 8.3
Area, Production and Productivity of Rice in Kerala and India

Sl. No.	Year	Area (000' ha)		Production (000' MT)		Productivity (Kg/ha)	
		Kerala *	India	Kerala *	India	Kerala *	India
1.	2010-11	213.187	42560	522.738	95980	2452	2255
2.	2011-12	208.16	43970	568.993	102750	2733	2337
3.	2012-13	197.277	42410	508.299	104399	2577	2462
4.	2013-14	199.611	43900	564.325	106500	2827	2424
5.	2014-15	192.589	43860	562.092	105480	2919	2390
6.	2015-16	190.939	43500	549.275	104410	2877	2400
7.	2016-17	166.184	43990	436.483	108500	2627	2494
8.	2017-18	189.086	43770	521.31	112910	2757	2578
9.	2018-19	198.026	44160	578.256	116480	2920	2638
10.	2019-20	191.051	43780	587.078	118870	3073	2715
11.	2020-21	201.865	n.a	626.88	122270	3105	n.a

Economic Review 2020,

Directorate of Economics and Statistics, CMIE, RBI, *Agricultural Statistics at a glance 2020.

Note: n.a- Not available

Food crops comprising cereals, pulses etc occupied 9.88 per cent of the total cropped area in 2019-20 while cash crops (cashew, rubber, pepper, coconut, cardamom, tea and coffee) constituted 61.6 per cent. The area under crops like rubber, coffee, tea, and cardamom was 27.5 per cent of the total cropped area.

Rice comes third with 7.37 per cent of the total cropped area. In 2019- 20, 1.98 lakh hectares was cultivated with paddy and productivity has also increased. The area under paddy cultivation in Kerala in 2019-20 was 1.98 lakh ha of which 1.91 lakh ha was wetland paddy. Palakkad, Alappuzha, Thrissur, and Kottayam accounted for about 79.9 per cent of the total area of rice in the State, their individual shares being 40.1 per cent, 18.6 per cent, 11.8 per cent, and 9.2 per cent respectively. These Districts contributed 83 per cent of the total rice production in the State. But with respect to production, except for 2012-13, 2016-17, and 2017-18, the rice production has shown an increasing trend ranging from lowest of 5 per cent increase in 2015-16 to highest increase of 12 per cent in 2019-20.



Table 8.4 District-wise Area, Production and Productivity of Rice for High Yielding Varieties of Paddy 2019-20

Sl. No.	Name of District	Summer*			Winter*			Autumn*		
		Area	Production	Productivity	Area	Production	Productivity	Area	Production	Productivity
		(ha)	(Tonnes)	(kg/ha)	(ha)	(Tonnes)	(kg/ha)	(ha)	(Tonnes)	(kg/ha)
1	2	3	4	5	6	7	8	9	10	11
	Thiruvananthapuram	143	346	2420	775	1936	2498	884	2242	2536
	Kollam	336	651	1938	978	2090	2549	391	785	2008
	Pathanamthitta	293	10051	3429	513	1285	2505	54	44	815
	Alappuzha	225	82546	3668	341	10608	3112	932	18918	2029
	Kottayam	106	32118	3018	512	14469	2822	185	3457	1868
	Idukki	23	60	2609	423	1047	2409	52	98	1885
	Ernakulam	894	2432	2720	275	6852	2492	815	1517	1861
	Thrissur	115	46802	4036	913	26471	2887	183	3200	1746
	Palakkad	326	10829	3322	385	134527	3488	344	102088	2961
	Malappuram	270	10795	3995	484	15620	3425	242	443	1831
	Kozhikode	644	1102	1711	204	384	1648	19	24	1263
	Wayanad	424	1155	2724	655	17616	2686	0	0	
	Kannur	3	7	2333	165	4230	2568	285	6609	2314
	Kasaragod	168	397	2363	273	603	2209	285	2729	2276
	Kerala	562	19929	3542	752	23773	3183	539	14215	2633
		71	1		23	8		98	4	



Table 8.5 District wise Area, Productivity and Production of Rice for Local Varieties of Paddy 2019-20

Sl. No.	Name of District	Summer*			Winter*			Autumn*		
		Area (ha)	Production (Tonnes)	Productivity (kg/ha)	Area (ha)	Production (Tonnes)	Productivity (kg/ha)	Area (ha)	Production (Tonnes)	Productivity (kg/ha)
		3	4	5	6	7	8	9	10	11
1.	Thiruvananthapuram	0	0	0	4	11	2750	3	7	2333
2.	Kollam	0	0	0	392	657	1676	0	0	
3.	Pathanamthitta	5	2	400	0	1	0	1	1	1000
4.	Alappuzha	1	0	0	156	135	865	256	386	1508
5.	Kottayam	0	0	0	3	6	2000	0	0	
6.	Idukki	2	2	1000	101	257	2545	1	2	2000
7.	Ernakulam	0	0	0	7	10	1429	171	49	287
8.	Thrissur	0	1	0	70	81	1157	0	0	
9.	Palakkad	1	1	1000	423	702	1660	43	52	1209
10.	Malappuram	1	2	2000	841	1351	1606	2	1	500
11.	Kozhikode	13	14	1077	1241	1340	1080	7	4	571
12.	Wayanad	1	1	1000	343	741	2160	0	0	
13.	Kannur	3	4	1333	710	784	1104	129	170	1318
14.	Kasaragod	10	20	1946	535	980	1832	83	120	1446
	Kerala	37	47	1270	4826	7056	1462	696	792	1138

Coconut occupies the largest area with 29.3 per cent followed by rubber with 21.28 per cent.



Table 8.6 Area, Production and Productivity of Coconut in Kerala and India

Sl. No.	Year	Area (000' ha)		Production (million nuts)		Productivity (nuts/ha)	
		Kerala	India	Kerala	India	Kerala	India
1.	2010-11	770.473	1896	5287	10840	6862	5718
2.	2011-12	820.867	2070	5941	23351	7237	11277
3.	2012-13	798.162	2136	5799	22680	7265	10615
4.	2013-14	808.647	2140	5921	21665	7322	10122
5.	2014-15	793.856	1975.81	5947	20439	7491	10345
6.	2015-16	790.223	2088*	5873	22167*	7432	10614*
7.	2016-17	781.496	2082*	5384	23904*	6889	11481*
8.	2017-18	760.443	2096*	5230	23798*	6878	11350*
9.	2018-19	760.947	2150*	5299	21288*	6964	9897*
10.	2019-20	760.776	2173*	4814	21308*	6328	9898*
11.	2020-21	768.809	2189	4788	21206	6228	9687*



Table 8.7 Area, Production and Productivity of Cashew in Kerala and India

Sl.No.	Year	Area (000' ha)		Production (000' MT)		Productivity (kg/ha)	
		Kerala	India	Kerala	India	Kerala	India
1.	2010-11	43.85	945	34.75	653	793	691
2.	2011-12	54.05	991	36.74	692	680	749
3.	2012-13	52.09	982	37.92	728	728	741
4.	2013-14	49.1	1006	33.38	736	680	732
5.	2014-15	45.44	1027	29.72	725	654	705
6.	2015-16	43.09	1034	24.73	670.3	574	648
7.	2016-17	41.66	1035	27.94	779	671	752
8.	2017-18	39.72	1062	25.63	817	645	753
9.	2018-19	38.78	1105.47	15.63	742.7	403	707
10.	2019-20	39.89	1125.06	19.44	702.87	487	n.a
11.	2020-21	37.92	1158.5	20.91	738.01	551	n.a

In the last one decade in Kerala, there has been a continuous and considerable decline in both area and production of cashew. The production which stood at 34.75 thousand metric tonnes in 2010-11 declined to 19.44 thousand metric tonnes in 2019-20, with a decline in the area from 43.85 thousand ha to 39.89 thousand ha during the same period. Kerala has a substantial share in the four plantation crops of rubber, tea, coffee and cardamom. These four crops together occupy 7.12 lakh ha, accounting for 27.5 per cent of the total cropped area in the State. Kerala's share in the national production of rubber is 74.9 per cent, cardamom 89.7 per cent, coffee 21.87 per cent, and tea 4.35 per cent in the year 2019-20.

Annual average price for domestic RSS 4 grade rubber for the year 2019-20 was ₹13,522 per 100 kg compared to ₹ 12,595 per 100 kg in 2018-19 (Source: Rubber Statistical News 2019-20).



Table 8.8 Average Market Price of Natural Rubber in Domestic (Kottayam) and International (Bangkok) Markets (/100 kg)

Year	Kottayam (RSS-4)	Bangkok (RSS-3)
1	2	3
2010-11	19003	19555
2011-12	20805	20915
2012-13	17682	17576
2013-14	16602	15525
2014-15	13257	11271
2015-16	11306	9636
2016-17	13549	13178
2017-18	12980	11678
2018-19	12595	10883
2019-20	13522	11601

Source: Rubber Board, Kottayam

Rubber occupies the second largest area in the State next to Coconut with 21.3 per cent of the gross cropped area. In Kerala, the area under rubber decreased by 170 ha in 2019-20 while the production increased by 8.32 per cent to 5.33 lakh tonnes compared to 2018-19.

Table 8.9 Plantation Crops- Area, Production and Productivity in Kerala (2017-18 to 2019-20)

	2017-18	2018-19	2019-20	2020-21
1	2	3	4	5
AREA (Ha)				
Tea	30205	36474	35871	35871.16
Coffee	84976	84976	85880	85880
Rubber	551115	551200	551030(P)	550650
Cardamom	39080	38882	39697	39143
PRODUCTION (MT)				
Tea	62230	60760	59260	66850
Coffee	66465	64676	65459	68545
Rubber	540775	492500	533500(P)	519500
Cardamom	18350	11535	10076	20570
PRODUCTIVITY (kg/ha)				
Tea	2060	1666	1652	1864
Coffee	782	761	762	798
Rubber	1553	1549	1559(P)	1534
Cardamom	470	297	254	526



Table 8.10 Production, Export and Auction Price of Tea

Year	Production			Consumption (In M kg)	Exports		Cochin Auction Price (₹/kg)
	India (in M kg)	Kerala (in M kg)	% of Kerala		India (In M kg)	Percentage of Production	
1	2	3	4	5	6	7	8
2010-11	966.4	66.8	6.91	n. a.	222	22.97	67.69
2011-12	1115.7	61.5	5.51	n. a.	215.4	19.31	70.03
2012-13	1126.3	63	5.59	n. a.	201.1	17.85	87.55
2013-14	1200	62.8	5.23	n. a.	219.1	18.26	99.17
2014-15	1207.3	65.17	5.4	932	201.2	16.66	93.35
2015-16	1191.1	57.89	4.87	951	217.7	18.27	81.67
2016-17	1250.49	61.51	4.97	973	227.63	18.2	n. a.
2017-18	1325.05	62.23	4.69	1066	256.57	19.36	n. a.
2018-19	1350.04	60.76	4.5	1090	254.5	18.85	n. a.
2019-20	1360.81	59.26	4.35	1116	240.02	17.63	n. a.
2020-21	1283.03	66.85	5.2	1145	202.00	15.74	n.a

Note: n. a. = not available, M kg = million kilogram, Source: Association of Planters of Kerala, Tea Board

(Economic Review 2019)

Domestic coffee production for the year 2019-20 was estimated at 299.3 thousand tonnes (post monsoon estimates) with Arabica production of 90,400 tonnes (30.2 per cent) and Robusta at 208.9 thousand tonnes (69.8 per cent). This represents an overall decrease of the total production as well as within the break-up of Arabica and Robusta production by 20.2 thousand tonnes, 4.6 thousand tonnes and 15.6 thousand tonnes respectively compared to 2018-19.

Kerala accounted for 4.35 per cent of the total domestic production of tea in the country in 2019-20. The area under tea declined by 1.65 per cent in 2019-20 to 35871 ha compared to 2018-19. The production of tea in the State declined by 2.46 per cent at 59.26 million kg compared to 2018-19. Compared to 2018-19, area under tapioca showed an increase of 0.31 per cent and area under pulses declined by 229.54 ha with a decline in production by 197 tonnes recording 2260.46 ha and 2103 tonnes respectively. Among other crops, arecanut, coffee, cashew, banana, cardamom, and pepper recorded an increase in area over 2018-19. Ginger, turmeric, tea, and coconut recorded a decline in area. Banana recorded the highest increase in area with 14.7 per cent over 2018-19. There was an increase in production for banana, cashewnut, coffee and other plantains. The vegetable production in 2019-20 was 14.9 lakh tonnes from an area of 96,313 ha which is an increase of 17 per cent and 23 per cent in area and production respectively compared to 2018-19. (Source: Department of Agriculture Development and Farmers welfare)



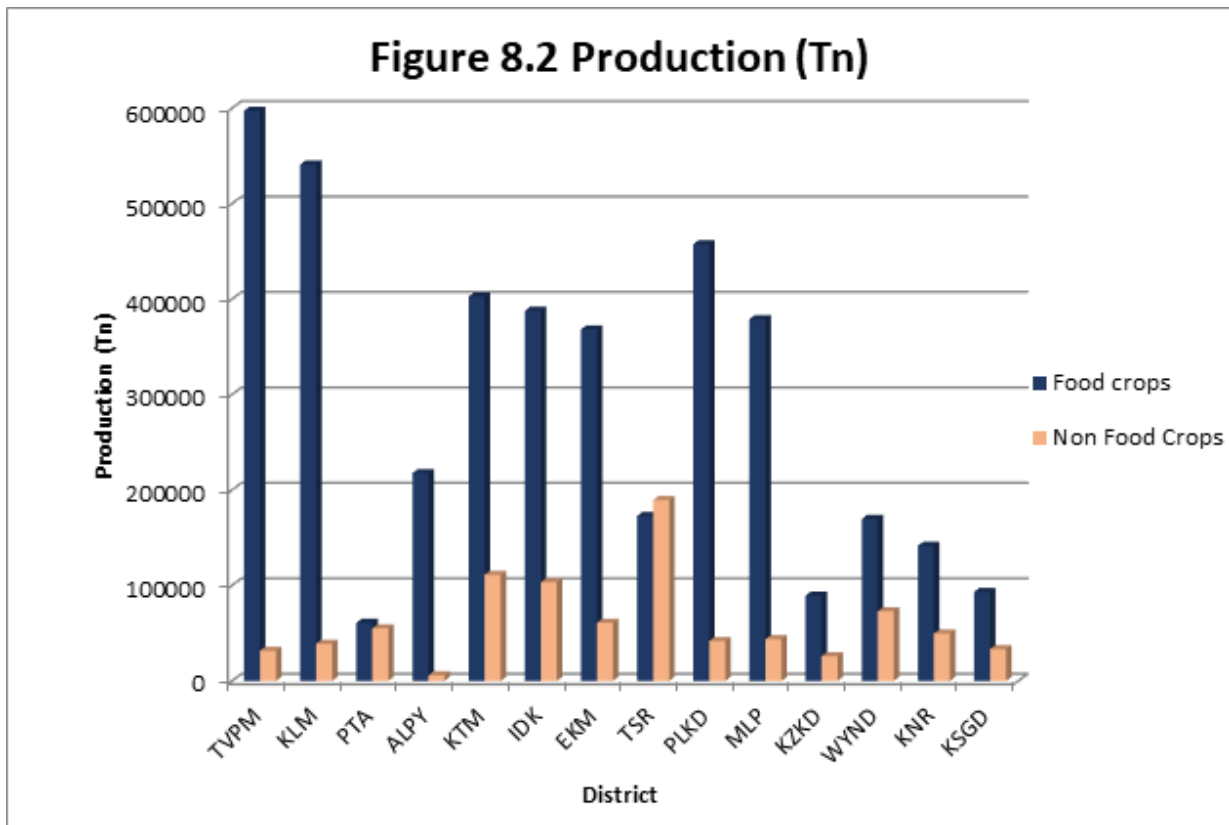
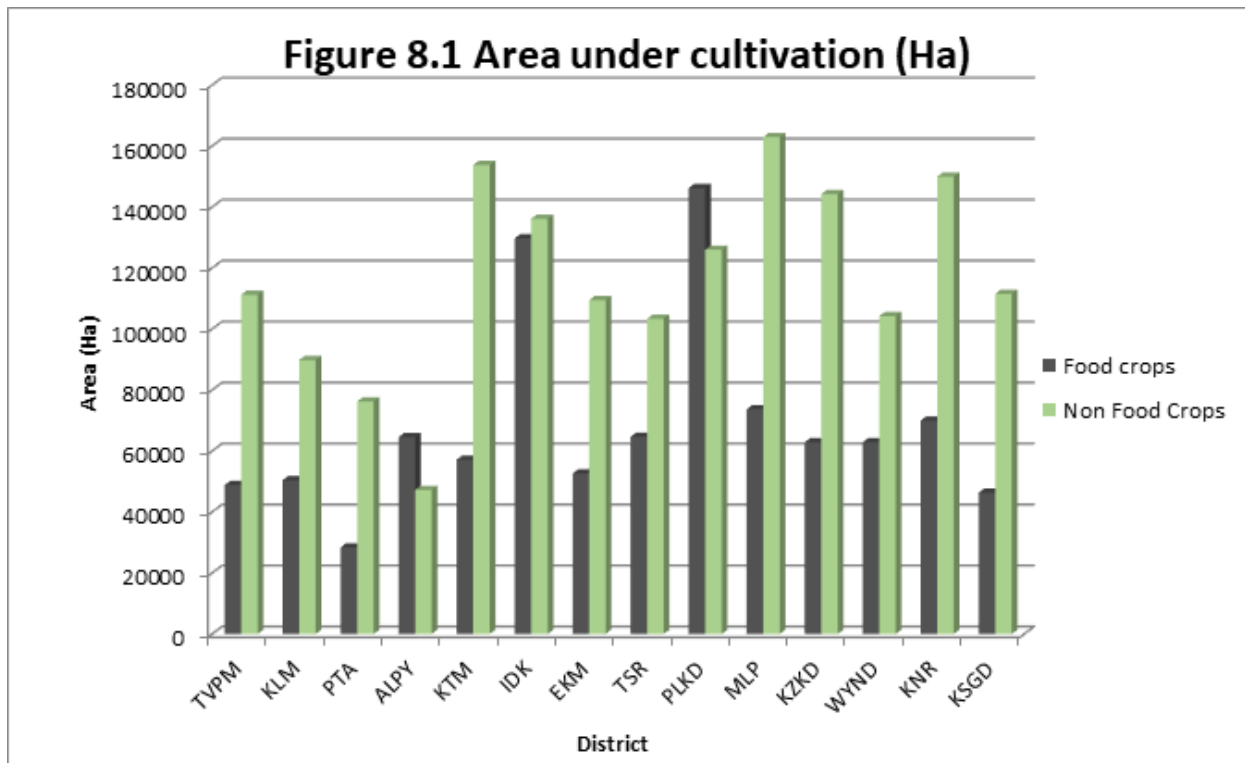
The area under pepper in the State was 83,765 ha in 2019-20 which is an increase of 1,004 ha compared to 2018-19. But there was decline in production and productivity by 6 per cent and 7.2 per cent respectively recording 34545 tonnes and 412 kg per ha respectively contributing to 56.6 per cent of the domestic production. The price of pepper has been on a declining trend since 2017 as the prices declined from ₹ 529.59 per kg to ₹ 354.05 per kg in the year 2019. The decline in pepper prices was largely on account of imports of pepper (Source: UPASI Annual Report 2020). Kerala holds the major share in cardamom production contributing to 89.7 per cent of the total production. The cardamom production in the State has declined by 12.6 per cent in 2019-20 compared to 2018-19 recording 10076 metric tonnes.

The vegetable production in 2019-20 was 14.9 lakh tonnes from an area of 96,313 ha an increase of 17 per cent and 23 per cent in area and production respectively compared to 2018-19. (Source: Department of Agriculture Development and Farmers Welfare). There is a decrease of 2.36% in the total area of food grains during the year 2019-20 as against 2018-19. Total area of food crops during 2019-20 is 955114 Ha. The total area of non food crops has increased by 0.04 % than 2018-19.

Table 8.11
Agriculture (Area under Cultivation and Production) Details in Kerala: 2018-19

Districts	Food Crops		Non-Food Crops		Total Crop	
	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)
Thiruvananthapuram	48818.65	597314.20	111235.93	31585.58	160054.59	628899.78
Kollam	50439.99	540948.80	89820.98	38959.36	140260.96	579908.16
Pathanamthitta	28385.43	60927.18	76236.20	54971.68	104621.63	115898.86
Alappuzha	64550.85	217725.50	47192.19	5974.80	111743.04	223700.30
Kottayam	57122.07	402798.84	153791.53	111148.60	210913.60	513947.44
Idukki	129720.58	387918.00	136155.67	103402.30	265876.25	491320.30
Ernakulam	52615.22	368343.00	109478.20	60961.07	162093.42	429304.07
Thrissur	64659.58	172841.70	103360.67	189434.70	168020.25	362276.40
Palakkad	146223.79	457480.80	125971.12	41874.04	272194.91	499354.84
Malappuram	73668.07	379097.60	162929.42	43795.61	236597.48	422893.21
Kozhikode	62857.66	89502.92	144227.41	26001.27	193894.67	115504.19
Wayanad	62857.66	169701.30	104212.50	72903.42	167070.16	242604.72
Kannur	69949.56	141555.80	149951.62	49604.16	219901.18	191159.96
Kasaragod	46338.81	93286.80	111519.80	33377.24	157858.61	126664.04
Total	958207.92	4079442.44	1626083.24	863993.83	2571100.75	4943436.27







8.4 Economic Analysis of Selected Crops:
Table 8.12 Farm Wholesale Price of Agricultural Commodities for the year 2018-19

Districts	Food Crops		Non-Food Crops		Total Crop	
	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)
Thiruvananthapuram	48818.65	597314.20	111235.93	31585.58	160054.59	628899.78
Kollam	50439.99	540948.80	89820.98	38959.36	140260.96	579908.16
Pathanamthitta	28385.43	60927.18	76236.20	54971.68	104621.63	115898.86
Alappuzha	64550.85	217725.50	47192.19	5974.80	111743.04	223700.30
Kottayam	57122.07	402798.84	153791.53	111148.60	210913.60	513947.44
Idukki	129720.58	387918.00	136155.67	103402.30	265876.25	491320.30
Ernakulam	52615.22	368343.00	109478.20	60961.07	162093.42	429304.07
Thrissur	64659.58	172841.70	103360.67	189434.70	168020.25	362276.40
Palakkad	146223.79	457480.80	125971.12	41874.04	272194.91	499354.84
Malappuram	73668.07	379097.60	162929.42	43795.61	236597.48	422893.21
Kozhikode	62857.66	89502.92	144227.41	26001.27	193894.67	115504.19
Wayanad	62857.66	169701.30	104212.50	72903.42	167070.16	242604.72
Kannur	69949.56	141555.80	149951.62	49604.16	219901.18	191159.96
Kasaragod	46338.81	93286.80	111519.80	33377.24	157858.61	126664.04
Total	958207.92	4079442.44	1626083.24	863993.83	2571100.75	4943436.27



Districts	Food Crops		Non-Food Crops		Total Crop	
	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)	Area Under Cultivation (Ha)	Production (Tn)
Thiruvananthapuram	48818.65	597314.20	111235.93	31585.58	160054.59	628899.78
Kollam	50439.99	540948.80	89820.98	38959.36	140260.96	579908.16
Pathanamthitta	28385.43	60927.18	76236.20	54971.68	104621.63	115898.86
Alappuzha	64550.85	217725.50	47192.19	5974.80	111743.04	223700.30
Kottayam	57122.07	402798.84	153791.53	111148.60	210913.60	513947.44
Idukki	129720.58	387918.00	136155.67	103402.30	265876.25	491320.30
Ernakulam	52615.22	368343.00	109478.20	60961.07	162093.42	429304.07
Thrissur	64659.58	172841.70	103360.67	189434.70	168020.25	362276.40
Palakkad	146223.79	457480.80	125971.12	41874.04	272194.91	499354.84
Malappuram	73668.07	379097.60	162929.42	43795.61	236597.48	422893.21
Kozhikode	62857.66	89502.92	144227.41	26001.27	193894.67	115504.19
Wayanad	62857.66	169701.30	104212.50	72903.42	167070.16	242604.72
Kannur	69949.56	141555.80	149951.62	49604.16	219901.18	191159.96
Kasaragod	46338.81	93286.80	111519.80	33377.24	157858.61	126664.04
Total	958207.92	4079442.44	1626083.24	863993.83	2571100.75	4943436.27



Table 8.13 Farm Wholesale Price of Agricultural Commodities for the year 2018-19

Sl.No.	Cost Items	Major crops																	
		Paddy Autumn	Paddy Winter	Paddy summer	Coconut	Arecanut	Tapioca	Banana	Pepper	Ginger	Turmeric	Pineapple	Bitter guard	Bitter guard	Bitter guard	Cowpea (Winter)	Cowpea (Summer)	Cardamo m	
1.	Hired human labour	25474	25234	22006	4091	36698	5028	7359	46279	8707	4680	52878	43905	48485	47922	4723	50393	53731	55554
2.	Animal labour	539	183	0	22	0	0	13	0	0	102	0	0	0	0	0	0	0	0
3.	Machine labour	8241	11743	10762	351	454	1841	2237	149	5312	2235	8059	1219	1330	2808	612	847	2519	1055
4.	Seed / seedlings	2717	2877	3040	669	433	5723	2364	3245	6744	2728	61343	5141	6907	6598	3302	4571	5255	8189
5.	Farmyard manure and chemical fertilizers	6405	7073	7061	1521	23072	1809	3660	15967	3492	2044	31024	10943	23194	27731	2009	21544	21105	45142
6.	Plant protection	526	1190	1218	78	529	240	1171	377	1786	635	2299	5471	2662	2811	2112	2650	2441	2319
7.	Land tax and irrigation cess	240	404	385	260	526	221	489	262	203	209	244	5820	545	476	333	211	271	190
8.	Repair and maintenance charges of implements, machinery and building	472	538	308	594	892	992	964	1209	1589	2254	236	1527	3193	8641	1341	3100	4522	2516
9.	Interest on working capital	2481	2793	2544	6019	6420	8608	1649	6868	2122	1075	19230	7034	11547	13246	9735	10575	11499	11984



10. Other expenses	5723	7565	6785	2939	3017	9890	2770	2663	1573	1003	36697	3661	32893	44592	2399	25746	29943	7577
11. Total cost 'A' (1-10)	52818	59600	54109	6706	72041	9589	1829	77019	2352	1207	21201	84721	13075	15482	1087	11963	13128	13452
12. Interest on fixed capital	531	763	575	3679	7781	3500	5223	8313	6654	1189	787	7332	11499	10762	6222	8536	8433	5994
13. Cost 'B1' (11+12)	53349	60363	54684	7074	79822	9939	1881	85332	2419	1326	21279	92053	14225	16558	1149	12817	13791	14052
14. Interest on land value	51808	54298	44061	3154	23335	2137	2261	21482	1721	2150	19987	13574	15081	16568	1368	14329	14097	98784
15. Cost 'B' (13+14)	10515	11466	98745	3861	31317	3131	4142	30015	4141	3476	41266	22779	29306	33127	2518	27146	28069	23930
16. Imputed value of household labour	7705	6693	5794	9838	15243	3263	4115	24410	4306	4733	7783	53100	64441	71255	6718	62635	68960	22351
17. Cost 'C' (15+16)	11286	12135	10453	3960	32842	3458	4554	32456	4571	3949	42045	28009	35750	40252	3189	33410	34965	26165
	2	4	9	09	1	22	08	7	84	99	2	7	6	5	85	4	7	5



Table 8.14 Monthly Average Farm Price of Important Agricultural Commodities for the year 2019-20

Commodities	Unit	2019												2020			
		July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June				
Paddy Local	₹/Qtl.	1991.25	1833.33	1937.5	2102	2086.67	2081.25	2074.64	2122.05	2111.59	2038.33	2152.22	2157.14				
Coconut with husk	₹/100 Nos.	1481.46	1458.46	1561.62	1592.97	1607.03	1639.56	1660.79	1757.03	1769.84	1800	1749.4	1706.54				
Areca nut (Ripe)	₹/100 Nos.	157.16	156.74	154.38	145.38	140.54	146.25	147.46	152.06	157.39	168.44	173.15	206.33				
Cashew nut	₹/Qtl.							10600	10435.19	8894.55	7885.19	7203.03	6941.67				
Pepper (Dry)	₹/Qtl.	31750	31625	30872.83	29708.7	30876.14	31487.21	30207.84	29622.5	28679.84	29375	29554.68	30022.92				
Cardamom	₹/kg	3160	2965	2855	2390	2590	2995	3515	3095	2390	1600	1741.67	1360				
Tea	₹/Qtl	1412.5	1283.33	1256.25	1200	1195.83	1241.67	1362.5	1400	1475	1291.67	1289.58	1212.5				
Coffee	₹/Qtl	6881.82	7000	7114.58	6827.08	6718.18	6631.82	6402.27	6400	6363.46	6471.43	6479.17	6692.31				
Rubber	₹/Qtl	12880.42	12506.15	11780	11187.92	11535.17	11581.36	11600	11586.07	11212.29	10247.37	10005.43	10366.67				



Tapioca	₹/Qtl.	1890.79	1881.33	1903.67	1917	1930.74	1924.66	1876.23	1862.16	1855.14	1839.06	1875	1818.57
Ginger-dry	₹/Qtl.	18062.5	18375	17500	18500	18666.67	20500	19500	19616.67	20016.67	18500	20458.33	20000
Banana	₹/Qtl	4207.53	4198	4543.09	4270.72	3724.32	3507.43	3289	2674.34	2764	2997.54	3435.27	3602.08

Table 8.15 Average Farm Price of Important Agricultural Commodities (₹)

Year	Paddy (Qtl)	Coconut (With Husk) in 100 Nos.	Areca nut (Ripe) in 100 Nos	Pepper (Qtl)	Tea (Qtl)	Coffee (Qtl)	Rubber (Qtl)	Tapioca (Qtl)	Banana (Qtl)	Cashew Nut (Qtl)	Cardamom (kg)
2015-16	1707	1131	140	63114	1086	5994	17521	1113	3250	9082	627
2016-17	1849	1162	148	60069	1481	7125	11589	1938	4400	11030	956
2017-18	2017	1842	167	39510	1247	6790	11316	1459	3970	11780	919
2018-19	2022	1714	173	33222	1463	6652	11347	1827	4017	9447	1361
2019-20	2057	1649	159	30315	1302	6665	11374	1881	3601	8660	2555
% Change in 2019-20 over 2018-19	1.75	-3.77	-8.1	-8.75	-10.98	0.19	0.24	2.94	-10.36	-8.33	87.71



Table 8.16 Economic Analysis: Paddy (2017-18)

Sl. No.	Name of Crop	Area Under Cultivation (Ha)		Total Production (Rice)		Production in One Ha (Total production (kg)/Area under)	Farm Price (Paddy) (Rs.)				Value of Product (Rs.)		Cost of Cultivation (Rs.)				Net Income (Rs.) **
		Tn	Kg	Tn	Kg		Local	High Yield		per Ha	(Value of Product per Kg/Production in ha/Production in One Ha)	per Ha	per Kg (Cost of cultivation per ha/Production in	per Qntl *	per Kg		
1	Paddy (Autumn)	5827	1489130	2555.	2048.	20.4	2031.	20.3	2048.	20.4	7797	30.52	57369	22.45	1866	18.66	1.66
		8	00	22	22	8	91	2	22	8	6						
	Straw						305.16/	bundle		7614							0
2	Paddy (Winter)	8111	2189340	2699.	2048.	20.4	2031.	20.3	2048.	20.4	9197	34.08	61663	22.85	1382	13.82	6.66
		5	00	06	22	8	91	2	22	8	5						
	Straw						305.16/	bundle		1435							0
3	Paddy (Summer)	4969	1534630	3088.	2048.	20.4	2031.	20.3	2048.	20.4	8759	28.36	57200	18.52	1216	12.16	8.32
		3	00	22	22	8	91	2	22	8	6						
	Straw						305.16/	bundle		8079							0
	Total	1890	521310	2757.	2048.	20.	2031.	20.	2048.	20.	2875	30.98	58744	21.31	1488	14.88	5.44
		86	000	00	22	48	91	32	22	96	(Average)	(Average)	(Average)	(Average)	(Average)	(Average)	
		Source: Agriculture Statistics 2017-18															
		Source: Price statistics 2017															
		Source: Report on cost of cultivation of important crops in Kerala 2017-18															

* Cost of production of paddy per quintal is estimated by dividing the cost of cultivation per hectare (after deducting the value of by-product per hectare from the cost of cultivation per hectare) by the quantity of paddy produced per hectare.

** Net income calculated by deducting the cost of cultivation (Column-P) from Farm price for Local paddy (Column-H)

The area under paddy cultivation in Kerala during the agricultural year 2017-18 is 1,94,235 Ha (189086 + 5149 (dry land))



Table 8.17 Economic Analysis: Coconut (2017-18)

Sl. No.	Name of Crop	Area Under Cultivation (Ha)		Total Production		Production in One Ha (Nos)/Area under cultivation (Total production in One Ha)	Farm Price (Rs.)				Value of Product (Rs.)*		Cost of Cultivation (Rs.)		Net Income (Rs.)**
		Million Nos	Nos	Coconut Ripe (Medium) Without Husk			Coconut Ripe (Medium) With Husk		per Ha	for 1 product (Value of Product per ha/Production in One Ha)	per Ha	for 1 coconut (Cost of cultivation per ha/Production in One Ha)			
				100 Nos	1 No.		100 Nos	1 No.							
1	Coconut	5230	5230000000	6878.00	1551.30	15.51	1528.42	15.28	150283	21.85	68434	9.95	5.56		
	Coconut Leaves						216.95								
		Source: Agriculture Statistics 2017-18													
		Source: Price statistics 2017													
		Source: Report on cost of cultivation of important crops in Kerala 2017-18													

* This is the market/ retail price of the coconut

**Net income calculated by deducting the cost of cultivation (Column-N) from Farm price for Coconut Ripe (Medium) without husk (Column-H)

Table 8.18 Economic Analysis: Arecanut (2017-18)

Sl.No	Name of Crop	Area Under Cultivation (Ha)	Total Production		Production in One Ha (Total production (kg)/Area under cultivation) (Kg)	Farm Price (Rs.)		Value of Product (Rs.)		Cost of Cultivation (Rs.)		Net Income (Rs.)*	
			Tn	Kg		Arecanut		per Ha	per Kg (Value of Product per ha/Production in One Ha)	per Ha	per Kg (Cost of cultivation per ha /Production in One ha)		
						Qntl	Kg						After deducting transportation cost #
1	Arecanut	94580	108516	108516000	1147.35	35864	359	329	248838	216.88	84897	74	255
		Source: Agriculture Statistics 2017-18											
		Source: Agriplus.in (https://agriplus.in/prices/arecanut-betelnut-supari/kerala)											
		Source: Report on cost of cultivation of important crops in Kerala 2017-18											

#Farm price calculated by deducting transportation cost from available market price (28.07.2021)

*Net income calculated by deducting the cost of cultivation (Column-M) from Farm price for Raw material (Column-I)



Table 8.19 Economic Analysis: Fruits/Spices/Tuber (2017-18)

Sl.No.	Name of Crops	Area Under Cultivation (Ha)		Total Production		Production in One Ha (Total production (kg)/Area under cultivation) (kg)	Farm Price (Rs.)				Value of Product (Rs.)		Cost of Cultivation (Rs.)		Net Income (Rs.)*
		Tn	Kg	Tn	Kg		Raw	Dry	per Ha	per Kg (Value of Product per ha/Production in One Ha)	per Ha	per Kg (Cost of cultivation per ha/Production in One Ha)			
1	Banana	565829	565829000	4234.63	42.35	0	0.00	481535	52.86	186081	20.43	21.92			
2	Pineapple	82934	82934000	2392.9	23.93	0	0.00	435187	46.30	192302	20.46	3.47			
3	Pepper	37955	37955000	16615.79	166.16	49229.10	492.29	256679	575.78	76510	171.63	320.66 **			
4	Ginger	18979	18979000	3761.02	37.61	9839.58	98.40	363578	83.72	238820	54.99	13.01 ***			
5	Turmeric	8822	8822000	2461.94	24.62	11096.35	110.96	287347	90.48	137084	43.17	36.93 ***			
6	Cardamom	18350	18350000	98497.00	984.97	0	0.00	459312	978.20	137342	292.50	692.47			
7	Tapioca	2697319	2697319000	1738.47	17.38	0	0.00	287490		103061	2.68	14.70			
							Source: Price statistics 2017				Source: Report on cost of cultivation of important crops in Kerala 2017-18				

*Net income calculated by deducting the cost of cultivation (Column-N) from Farm price for Raw material (Column-H).

** Net income for pepper calculated by deducting the cost of cultivation (Column-N) from Farm price for Dry material (Column-J)

**Net income for Ginger and Turmeric calculated by deducting the cost of cultivation (Column-N) from Average of Farm price for Raw and Dry material (Column-H+J/2)



Table 8.20
Production of Major (26 nos) Crops in Kerala 2018-19

Sl. No.	Crops	Production (Tn)	Production (Kg)	Farm Price (Rs./Kg.) (Retail prices are deducted to 70 %)	Value (Rs.)
1	2	3	4 (3 x 1000)	5	6 (4 x 5)
1	Paddy (total)	578256	578256000	20.48	11,84,26,82,880.00
2	Tur/Redgram	438	438000	60.75	2,66,09,814.00
3	Gram	546	546000	48.10	2,62,60,962.00
4	Sugarcane	10630	10630000	2.90	3,08,27,000.00
5	Pepper	36776	36776000	492.29 (dry)	18,10,44,57,040.00
6	Ginger	15124	15124000	37.61	56,88,13,640.00
7	Turmeric	6694	6694000	110.96 (dry)	74,27,66,240.00
8	Cardamom	11535	11535000	984.97	11,36,16,28,950.00
9	Areca nut	99925	99925000	329.00	32,87,53,25,000.00
10	Cloves	63	63000	648.71	4,08,68,730.00
11	Nutmeg	14598	14598000	210.35	3,07,06,89,300.00
12	Garlic	345	345000	41.72	1,43,93,400.00
13	Mango	485683	485683000	37.57	18,24,66,24,627.00
14	Banana	429059	429059000	42.35	18,17,06,48,650.00
15	Plantain	383102	383102000	21.90	8,39,10,83,106.00
16	Pineapple	93008	93008000	23.93	2,22,56,81,440.00
17	Cashew	15635	15635000	86.60	1,35,39,91,000.00
18	Tapioca	2325007	2325007000	17.38	40,40,86,21,660.00
19	Drumstick	15951	15951000	75.13	1,19,84,14,581.00
20	Bitter Gourd	15703	15703000	39.73	62,38,01,675.00
21	Green Chillies	1451	1451000	36.26	5,26,13,260.00
22	Potato	7381	7381000	21.00	15,50,01,000.00
23	Coconut (Million nuts)	5299	5299	15.28 (with husk)	80,968.72
24	Tea	60760	60760000	13.01	79,04,87,600.00
25	Coffee	64676	64676000	66.65	4,31,06,55,400.00
26	Rubber	540775	540775000	113.74	61,50,77,48,500.00
	Total				2,36,14,07,76,423.72

Note: Source of the farm price

Serial no.2,3,12,15,21,22

Serial no.10,11

Serial no. 4

Serial no. 17,24,25,26

Serial no. 13,19,20

Serial no. 1,5,6,7,8,9,14,16,18,23

- : DES-Retail prices of essential commodities-dated 01.01.2019
- : Farm wholesale price of agriculture commodities for the year 2018-19
- : FRP price of Govt. of India
- : Monthly Average Farm prize of important Agriculture Commodities for 2019-20
- : Price list of horticult - 9th December 2021
- : Report on cost of cultivation of important crops in Kerala 2017-18



Table 8.21 Net value of Major Agriculture Produce in Kerala

Sl. No.	Particulars	Amount (Rs. in Crore)
1	Gross Value	23614
2	Cost of cultivation (Based on the available crops data)	8265
3	Net income for Agriculture	15349



Conclusion

The evaluation of tradable bio-resources from the agro-ecosystem was carried out due to the importance of agriculture in India's and Kerala's economy. With a net sown area of more than 50% of total geographical area, Kerala has a rich agrarian diversity. Although in recent times, agricultural productivity has declined continuously due to the shift of manpower towards other sectors, agriculture still holds an important place for the livelihood of farmers, especially small and marginal as well as for the food security of the state and nation. Agriculture in Kerala is today dominated by plantation crops like cashew, rubber, coffee, coconut, areca-nut as well as spices like cardamom, turmeric, pepper etc. with the only major field crop being paddy. The conservation of agro-biodiversity in Kerala has been of primary concern especially due to the diversity of landraces of crops like paddy and banana which have even earned Geographical Indicator (GI) tags. Although, many of the cultivated crops may not be eligible under ABS due to being listed under Normally Traded Commodities (NTC), the evaluation of selected agricultural tradable bio-resources can widen our scope for their proper sustainable utilization. The study of selected agricultural commodities was undertaken through analysis of various secondary sources such as Directorate of Economics and Statistics (2021) to give an overall value of these resources at market price. The final estimated annual value of agricultural commodities in the state (2018-19) was found to be around Rs. 23,614 crore.



The major field crop under cultivation was paddy (rice), with a total net sown area of 191051 Ha and production of 587078 Tonnes. About 79.9 per cent of the total area of rice in the State could be attributed to the districts of Palakkad, Alappuzha, Thrissur, and Kottayam with their individual shares being 40.1 per cent, 18.6 per cent, 11.8 per cent, and 9.2 per cent respectively. Other major crops included spices like cardamom, ginger and pepper as well as plantation crops like Rubber, Areca, Banana, Coconut etc. Tapioca (Cassava) was another major crop which comes under the category of tubers and forms an important source of livelihood for people especially from districts of Central Kerala. Area and production of pulses, millets, sweet potato etc were very minimal compared to other crops. Cash crops (cashew, rubber, pepper, coconut, cardamom, tea and coffee) constituted 61.6 per cent of the total cropped area in 2019-20 showing the shift towards cultivation of cash crops and declining importance of food crops in Kerala agriculture. Food crops comprising cereals, pulses etc occupied only 9.88 per cent of the total cropped area in 2019-20. The area under crops like rubber, coffee, tea, and cardamom was 27.5 per cent of the total cropped area.

Among plantation crops, Coconut occupies the largest area with 29.3 per cent followed by rubber with 21.28 per cent. Kerala has a substantial share in the four plantation crops of rubber, tea, coffee and cardamom. Kerala's share in the national production of rubber is 74.9 per cent, cardamom 89.7 per cent, coffee 21.87 per cent, and tea 4.35 per cent in the year 2019-20. These four crops together occupy 7.12 lakh ha, accounting for 27.5 per cent of the total cropped area in the State.

Domestic coffee production for the year 2019-20 was estimated at 299.3 thousand tonnes (post monsoon estimates) with Arabica production of 90,400 tonnes (30.2 per cent) and Robusta at 208.9 thousand tonnes (69.8 per cent). Kerala accounted for 4.35 per cent of the total domestic production of tea in the country in 2019-20. The area under tea declined by 1.65 per cent in 2019-20 to 35871 ha compared to 2018-19.

Compared to 2018-19, area under tapioca showed an increase of 0.31 per cent and area under pulses declined by 229.54 ha with a decline in production by 197 tonnes recording 2260.46 ha and 2103 tonnes respectively. Among other crops, arecanut, coffee, cashew, banana, cardamom, and pepper recorded an increase in area over 2018-19. Ginger, turmeric, tea, and coconut recorded a decline in area. Banana recorded the highest increase in area with 14.7 per cent over 2018-19. There was an increase in production for banana, cashewnut, coffee and other plantains.

The area under pepper in the State was 83,765 ha in 2019-20 which is an increase of 1,004 ha compared to 2018-19. But there was decline in production and productivity by 6 per cent and 7.2 per cent respectively recording 34545 tonnes and 412 kg per ha respectively contributing to 56.6 per cent of the domestic production. The price of pepper has been on a declining trend since 2017 as the prices declined from ₹ 529.59 per kg to ₹ 354.05 per kg in the year 2019. The decline in pepper prices was largely on account of imports of pepper.

Kerala holds the major share in cardamom production contributing to 89.7 per cent of the total production. The cardamom production in the State has declined by 12.6 per cent in 2019-20 compared to 2018-19 recording 10076 metric tonnes.

The vegetable production in 2019-20 was 14.9 lakh tonnes from an area of 96,313 ha an increase of 17 per cent and 23 per cent in area and production respectively compared to 2018-19. There was a decrease of 2.36% in the total area of food grains during the year 2019-20 as against 2018-19.

The economic analysis for various major crops was also done through calculation of value using market wholesale prices of each commodity to yield the overall value of bio-resources that can be attributed to the agro-ecosystem. The final value of Rs. 23,614 crore (2017-18) was calculated based on the economic valuation of 26 crops, of which Tapioca showed the highest value of around Rs. 4,040 crore followed by



Areca nut (Rs. 3,287 crore) and Mango (Rs. 1,824 crore). The lowest value was obtained from coconut (Rs. 80,968). The gross value of agricultural bio-resources was deducted with the available data on cost of cultivation (Rs.8265 crore) to yield an estimated net income of Rs. 15349 crore. This data can be useful for sustaining and improving the net per capita income of the farmers as well as frame policies for supplementing their income from other sources as well.

**DISTRICT WISE DETAILS OF (AREA UNDER CROPS,
PRODUCTION AND PRODUCTIVITY) OF CROPS IN KERALA**
Annexure 8.1 Classification of Area on the Basis of Land Utilization 2018-19

Sl.No.	District	Total Geographical	Forest	Land put to non agricultural use	Barren & uncultivable	Permanent pasture & other	Land under misc. tree crops	Cultivable waste	Fallow other than current	Current fallow	Marshy land	Still water	Water Logged area	Social forestry	Net area sown	Area sown more than once	Total Cropped area
1	Thiruvananthapuram	218781	49861	32515.68	227.7	0	39.37	596.06	907.48	2759.65	1	2696	16	22	129139.09	30915.5	160054.585
2	Kollam	248788	81438	28895.76	82.5	0	50.77	3134.15	1533.07	2464.55	4.93	6938.66	939	94.97	123211.91	17049.05	140260.962
3	Pathanamthitta	265277	155214	18947.66	138.7	0	94.02	2445.91	2447.08	3076.18	0	2279.28	145	73.19	80415.92	24205.71	104621.633
4	Alappuzha	141011	0	25271.13	3.84	0	95.43	14457.5	2197.29	2550.11	0	12458	336	40	83601.70	28141.34	111743.039
5	Kottayam	220442	8141	30048.32	1017	0	123.65	5723.39	1801.87	4173.51	0	6360	159	112	162781.80	48131.8	210913.600
6	Idukki	436328	198413	14494.47	1364	0	154.72	1921.34	1150.99	1788.18	0	10560	0	1190	205291.27	60584.98	265876.253
7	Ernakulam	305826	70617	46530.62	294.7	0	118.74	15730.86	6827.92	7373.02	0	11171	290	106	146766.16	15327.26	162093.416
8	Thrissur	302919	103619	40471.68	49.55	0	192.45	9811.81	4869.01	7731.72	0	5035	318	147	130673.78	37346.47	168020.249
9	Palakkad	447584	136257	48460.39	1498	0	531.91	19199.89	10918.3	8838.38	0	15337	0	403.79	206139.42	66055.49	272194.91
10	Malappuram	355446	103417	53164.76	699	0	150.63	5412.84	4897.62	6289.95	0	6229	63	191	174931.21	61666.27	236597.484
11	Kozhikode	234641	41386	34915.46	551.7	0	123.86	2320.18	1627.03	2499.67	5	5405.85	551	37	145218.26	48676.41	193894.673
12	Wayanad	212966	78787	11948.13	41.04	0	43.6	904.52	1064.85	3066.56	0	4047.13	19.1	68.2	112975.92	54094.24	167070.163
13	Kannur	297112	48734	40722.81	1155	0	201.57	5977.48	3528.74	3107.25	2	6472.42	372	72.65	186766.20	33134.98	219901.18
14	Kasaragode	199166	5625	27660.18	3158	0	197.16	8860.8	1769.71	1744.86	0	4336.31	20	76	145718.03	12140.58	157858.61
	State	3886287	1081509	454047.05	10280.73	0	2117.88	96496.73	45540.96	57463.59	12.93	99325.65	3228.1	2633.8	2033630.67	537470.08	2571100.757



Annexure 8.2 Area and Production of Paddy in Kerala (2018-19)

Sl. No.	District	Area under crops (Ha) (Including dry paddy)	Production of crops (Tn)	Productivity (Kg/Ha)
1.	Thiruvananthapuram	2038.79	5167	2624
2.	Kollam	2134.68	4514	2286
3.	Pathanamthitta	3199.99	11676	3685
4.	Alappuzha	42273.39	128560	3329
5.	Kottayam	22222.89	61917	2793
6.	Idukki	688.30	1562	2310
7.	Ernakulam	5044.14	11191	2237
8.	Thrissur	22131.45	69454	3160
9.	Palakkad	77121.31	215285	2798
10.	Malappuram	8339.63	26984	3288
11.	Kozhikode	2329.09	3439	1581
12.	Wayanad	7761.51	22340	2878
13.	Kannur	5330.91	11143	2168
14.	Kasaragode	2291.05	5024	2248
	Total	202907.13	578256	*SA-2920

SA-State Average



Annexure 8.3 Area and Production of Paddy (High yield and Local paddy) in Kerala (2018-19)

Sl. No.	Items	High Yield Paddy		Local Paddy	
	District	Area under crops (Ha)	Production of crops (Tn)	Area under crops (Ha)	Production of crops (Tn)
1.	Thiruvananthapuram	1901.77	5011.723	67.14	154.344
2.	Kollam	1543.73	3768.071	430.86	746.136
3.	Pathanamthitta	3156.89	11645.84	11.88	29.984
4.	Alappuzha	38172.04	127853.8	451.09	706.126
5.	Kottayam	22166.98	61900.21	5.07	17.306
6.	Idukki	563.26	1305.035	112.87	256.93
7.	Ernakulam	4640.21	10846.1	361.36	345.562
8.	Thrissur	21915.43	69374.83	66.16	78.488
9.	Palakkad	76322.47	214222.7	620.28	1062.132
10.	Malappuram	7051.91	24834.14	1153.83	2149.322
11.	Kozhikode	853.52	2068.72	1321.3	1370.273
12.	Wayanad	6932.95	20454.83	828.56	1885.43
13.	Kannur	4356.36	10155.85	784.06	987.86
14.	Kasaragode	1604.85	3928.541	629.58	1095.683
	Total	191182.4	567370.4	6844.04	10885.58



Annexure 8.4
Area and Production of Grains in Kerala (2018-19)

Sl. No	Items	Cholam/Jowar			Ragi/Finger Millet (Koov araku)			Maize			Small Millet (Thina/Cham)			Wheat		
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)
	District															
	Thiruvananthapuram															
	Kollam															
	Pathanamthitta						0.081	0.14								
	Alappuzha															
	Kottayam															
	Idukki				73.2	130.65	641	18.303	46.94				1.4	2.03		
	Ernakulam															
	Thrissur															
	Palakkad	205	167.50	817	151.5	140.80	558	80.4	84.60			47.5	34.50	726		
	Malappuram							0.04	0.60							
	Kozhikode															
	Wayanad							5.502	12.10							
	Kannur															



Annexure 8.6 Area and Production of Sugar crops in Kerala (2018-19)

Sl. No.	Items	Sugarcane				Palmyrah			
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	
1.	Thiruvananthapuram	0	0		25.38				
2.	Kollam	0	0		16.00				
3.	Pathanamthitta	10.198	68.021	6670	53.17				
4.	Alappuzha	29.000	153.700	5300	11.35				
5.	Kottayam	15.430	109.388	7089	162.64				
6.	Idukki	888.000	9776.880	11010	146.84				
7.	Ernakulam	0.008	0.068	8500	120.82				
8.	Thrissur	0	0		102.29				
9.	Palakkad	66.603	494.539	7425	825.15				
10.	Malappuram	0.121	1.029	8504	220.36				
11.	Kozhikode	0	0		100.59				
12.	Wayanad	0	0		62.48				
13.	Kannur	2.520	26.260	10421	12.98				
14.	Kasaragode	0	0		25.55				
	Total	1011.88	10629.885	*SA-10505	1885.60				

*SA-State Average



Annexure 8.7 Area and Production of Spices & Condiments in Kerala (2018-19)

Sl. No.	Items	Pepper			Ginger			Turmeric			Cardamum			Arecanut		
		Area under crops (Ha)	Production of crops (Black pepper) (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Cured Ginger) (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Cured Turmeric)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Processed)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)
	Thiruvananthapuram	2003.4	670.013	334	72.12	214	297	64.8	128	197			901.14	462	512	
	Kollam	2870.15	860.837	300	327.42	855	261	283.13	520	183			1619.84	1045	645	
	Pathanamthitta	1593.19	505.582	317	280.72	1155	411	103.22	295	286			987.66	623	630	
	Alappuzha	609.1	116.730	192	55.25	132	238	39.27	64	162			1370.32	385	281	
	Kottayam	3014.99	1214.543	403	115.71	380	328	108.52	290	267			1391.97	1081	777	
	Idukki	43103.7	23980.97	556	489.21	2370	484	188.02	672	357			1784.24	1395	782	
	Ernakulam	1843.53	440.890	239	77.55	204	263	217.9	583	267			4107.73	3033	738	



Thrissur	1741.71	502.973	289	43.01	119	276	77.76	177	227					5643.66	4759	843
Palakkad	2653.7	1095.317	413	193.12	742	384	474.86	142	300	2754	67	24	7960.69	6346	797	
Malappuram	2368.33	478.060	202	31.9	73	227	292.63	649	221	70	1	14	17955.9	1452	809	
Kozhikode	3590.41	953.456	266	59.21	193	326	292.78	812	277	220	1	5	10037.8	8473	844	
Wayanad	9939.49	3123.148	314	1456.1	8400	576	147.22	369	250	4120	215	52	11852.2	3679	310	
Kannur	4341.42	1428.848	329	51.34	202	394	161.38	609	377				9362.01	9532	101	
Kasaragode	3088.21	1404.592	455	22.36	85	379	32.22	98	303				20764.0	4459	214	
Total	82761.41	36775.9	*SA-444	3275.09	15124	*SA-4618	2483.71	6694	*SA-2695	38882	11535	*SA-297	95739.29	99925	*SA-1044	

*SA-State Average



Annexure 8.8 Spices & Condiments

Sl. No.	Items				Garlic				Cloves				Nutmeg			
	District	Area under crops (Ha)	Production of crops (Tn)	Productivity (kg/Ha)	Area under crops (Ha)	Production of crops (Dry) (Tn)	Productivity (kg/Ha)		Area under crops (Ha)	Production of crops (Tn)	Productivity (kg/Ha)		Area under crops (Ha)	Production of crops (Tn)	Productivity (kg/Ha)	
1.	Thiruvananthapuram				11.84	0.916	77		85.25	38	448					
2.	Kollam				9.62	1.203	125		79.53	30	380					
3.	Pathanamthitta				8.25	0.916	111		554.81	246	443					
4.	Alappuzha				1.13	1.13	1000		304.05	102	335					
5.	Kottayam				79.87	6.789	85		2649.88	1591	600					
6.	Idukki	69.61	345	4956	674.66	42.504	63		3652.14	2187	599					
7.	Ernakulam				4.42	1.768	400		6671.32	5362	804					
8.	Thrissur				3.93	0.656	167		6896.96	4068	590					
9.	Palakkad				7.30	1.46	200		365.88	167	457					
10.	Malappuram				4.33	0.866	200		469.34	222	473					
11.	Kozhikode				29.80	1.877	63		582.34	315	542					
12.	Wayanad				19.68	0.846	43		112.53	25	222					
13.	Kannur				17.42	1.585	91		209.95	112	535					
14.	Kasaragode				9.67	0.88	91		136.69	133	972					
	Total	69.61	345	*SA-4956	881.92	63.396	*SA-72	22770.67	14598	*SA-641						



Annexure 8.9 Area under crops in Kerala (2018-19)

Sl. No.	District	Area under crops (Ha)			
		Tamarind	Vanila	Cinnamom	Others
1.	Thiruvananthapuram	668.52	0.81	0.04	8.34
2.	Kollam	399.04	0	0	47
3.	Pathanamthitta	204.88	0.83	1.35	98.14
4.	Alappuzha	520.59	0	5.84	464.01
5.	Kottayam	415.81	13.04	5.91	158.73
6.	Idukki	335.93	16.03	23.88	94.69
7.	Ernakulam	557.49	0.5	5.82	120.82
8.	Thrissur	1197.03	0.19	25.81	185.83
9.	Palakkad	3014.59	1.22	1.59	21.72
10.	Malappuram	1327.72	0.37	7.71	44.82
11.	Kozhikode	619.43	1.71	18.71	29.31
12.	Wayanad	68.7	2.13	3.18	36.97
13.	Kannur	445.8	11.18	7.75	49.12
14.	Kasaragode	208.89	1.58	0.17	8.99
	Total	9984.42	49.59	107.76	1368.49



Annexure 8.10 Area and Production of Fruits in Kerala (2018-19)

Sl. No.	Items	Jack			Pappaya			Banana			Plantain			Pineapple		
		Area under crops (Ha)	Production of crops (Million nuts) (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)
1.	Thiruvananthapuram	6520.74	21	3220	1778.21	15457.980	8693	3113.97	27818.147	8933	7748.81	65560.783	8461	94.20	717.510	7617
2.	Kollam	6016.95	20	3324	1415.83	6912.082	4882	3455.49	25970.833	7516	5845.56	44018.474	7530	95.25	652.299	6848
3.	Pathanamthitta	3058.53	10	3270	803.05	7049.976	8779	2215.24	17322.444	7820	2182.39	19088.922	8747	192.59	990.801	5145
4.	Alappuzha	2825.02	2	708	1084.17	8949.823	8255	318.45	1937.911	6085	2120.02	13212.688	6232	57.74	427.178	7398
5.	Kottayam	4065.22	14	3444	1282.79	6285.671	4900	3252.49	29188.160	8974	2848.39	22279.665	7822	1586.84	15155.713	9551
6.	Idukki	16732.68	61	3646	917.09	5895.055	6428	3319.80	29604.958	8918	3768.10	28524.192	7570	1302.33	13808.750	10603
7.	Ernakulam	3797.46	14	3687	1236.93	8289.905	6702	4980.62	35128.826	7053	4651.69	37871.769	8142	5375.62	58571.596	10896
8.	Thrissur	5166.54	17	3290	1348.57	4776.635	3542	1702.14	8203.624	4820	5049.56	34401.612	6813	65.98	473.175	7171
9.	Palakkad	6668.98	19	2849	1460.03	7684.138	5263	11997.72	102811.983	8569	7658.46	50333.424	6572	50.62	285.962	5649
10.	Malappuram	8183.35	18	2200	2303.09	10882.100	4725	5683.18	40493.548	7125	4428.80	24832.602	5607	39.73	215.712	5429
11.	Kozhikode	9331.78	17	1822	1926.39	7651.621	3972	1454.63	12981.503	8924	3519.03	15290.520	4345	113.92	718.885	6310
12.	Wayanad	6916.10	13	1880	366.99	3153.178	8592	8860.98	74562.156	8415	1142.65	6537.955	5722	23.81	111.664	4690
13.	Kannur	8619.18	22	2552	1785.34	11593.998	6494	1885.78	17313.030	9181	2950.30	11512.412	3902	100.31	506.891	5053
14.	Kasaragode	3005.37	12	3993	874.85	5965.602	6819	658.12	5722.549	8695	2297.53	9637.031	4195	53.61	371.665	6933
	Total	90907.9	260	*SA-2860	18583.33	110547.764	*SA-5949	52898.61	429059.672	*SA-8111	56211.29	383102.049	*SA-6815	9152.55	93007.801	*SA-10162



Annexure 8.11 Area of Fruits cultivation in Kerala (2018-19)

Sl. No.	District	Area under crops (Ha)					
		Mango	Orange	Lemon (Big)	Lemon (Small)	Other Fresh Fruits	
1.	Thiruvananthapuram	4827.62	0.05	20.82	23.13	505.51	
2.	Kollam	5090.31	0	22.00	27.00	457.00	
3.	Pathanamthitta	2025.20	0	19.36	19.22	875.59	
4.	Alappuzha	4510.31	0.50	18.99	24.89	653.62	
5.	Kottayam	3022.56	1	31.61	45.21	793.99	
6.	Idukki	5450.80	215.21	94.46	142.30	1193.12	
7.	Ernakulam	4268.29	0.03	22.22	27.77	1044.63	
8.	Thrissur	7037.06	0	21.15	24.44	1188.91	
9.	Palakkad	10067.50	0.04	75.53	73.79	1214.57	
10.	Malappuram	7696.68	0.05	47.97	62.64	1394.48	
11.	Kozhikode	8541.72	0.03	15.22	28.26	793.99	
12.	Wayanad	4637.27	34.08	33.52	36.08	260.05	
13.	Kannur	8164.44	0.03	91.70	56.01	904.79	
14.	Kasaragode	2815.12	0.04	21.28	26.66	689.14	
	Total	78154.88	251.06	535.83	617.4	11969.39	



Annexure 8.12 Area and Production of Cashew cultivation in Kerala (2018-19)

Sl. No.	District	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)
1.	Thiruvananthapuram	839.01	207.031	247
2.	Kollam	1671	455.317	272
3.	Pathanamthitta	411.7	87.376	212
4.	Alappuzha	1617.02	332.189	205
5.	Kottayam	345.34	90.199	261
6.	Idukki	944.56	191.445	203
7.	Ernakulam	394.87	99.464	252
8.	Thrissur	1296.37	398.254	307
9.	Palakkad	1130.28	210.040	186
10.	Malappuram	1635.30	257.091	157
11.	Kozhikode	1542.24	298.892	194
12.	Wayanad	469.29	152.594	325
13.	Kannur	19242.93	8568.560	445
14.	Kasaragode	7240.75	4286.607	592
	Total	38780.66	15635.059	*SA-403



Annexure 8.13 Area and Production of Tubers in Kerala (2018-19)

Sl. No.	Items	Tapioca				Sweet Potato			
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	
1.	Thiruvananthapuram	13037.83	475449.148	36467		11.94	131.340	11000	
2.	Kollam	12909.63	450759.454	34917		2.09	22.990	11000	
3.	Pathanamthitta	4682.43	209528.367	44748		1.53	18.360	12000	
4.	Alappuzha	1855.71	58912.438	31747		4.38	47.085	10750	
5.	Kottayam	5960.35	259500.917	43538		0.23	2.530	11000	
6.	Idukki	5962.25	242395.074	40655		4.5	99.000	22000	
7.	Ernakulam	5022.10	201364.585	40096		3.17	38.040	12000	
8.	Thrissur	976.26	41411.944	42419		2.26	15.820	7000	
9.	Palakkad	1725.15	55374.026	32098		51.22	768.300	15000	
10.	Malappuram	4938.34	176373.567	35715		44.62	535.440	12000	
11.	Kozhikode	1360.04	36255.342	26658		10.59	161.741	15273	
12.	Wayanad	1223.28	40549.188	33148		2.8	44.100	15750	



13.	Kannur	1800.68	64443.089	35788	19.92	220.016	11045	
14.	Kasaragode	420.11	12690.175	30207	51.16	955.004	18667	
	Total	61874.16	2325007.314	*SA- 37576	210.41	3059.766	*SA-14542	

**SA-State Average*



Annexure 8.15 Area and Production of Vegetables in Kerala (2018-19)

Sl. No.	Item	Drumstick				Bitter Gourd				Green Chillies				Potato				Cowpea			
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost
1.	Thiruvananthapuram	2057.73	2506.315	1218		81.47	568.318	6976		172.19	153.249	890						254.62	1903	7475	
2.	Kollam	1498.08	1538.528	1027		1498.08	1538.528	6561		188.40	170.314	904						254.11	1783	7016	
3.	Pathanamthitta	509.97	348.819	684		102.60	494.737	4822		53.79	51.961	966						204.64	986	4817	
4.	Alappuzha	571.98	386.087	675		197.80	575.461	2909		99.64	90.573	909						382.68	3328	8697	
5.	Kottayam	654.87	457.099	698		177.03	853.504	4821		103.37	90.655	877						474.74	2302	4848	
6.	Idukki	591.89	572.95	968		466.03	2222.419	4769		117.89	105.983	899		536.90	7381.3	13748		564.57	3075	5446	
7.	Ernakulam	588.49	644.397	1095		61.88	429.339	6938		48.39	43.019	889						891.72	5036	5647	
8.	Thrissur	1154.43	1305.66	1131		108.67	734.550	6759		125.98	114.768	911						406.88	1925	4730	
9.	Palakkad	2142.40	3877.744	1810		390.60	3593.166	9199		224.89	227.589	1012						910.11	5469	6009	



10.	Malappuram	2499.87	1474.923	590	74.93	425.239	5675	49.07	45.046	918							708.85	4187	5907
11.	Kozhikode	1544.17	592.961	384	75.24	456.690	6070	117.43	117.430	1000							162.25	786	4843
12.	Wayanad	411.58	159.281	387	252.24	3314.497	13140	60.19	60.190	1000							261.23	2298	8798
13.	Kannur	1752.17	1373.701	784	95.07	721.947	7594	112.65	111.524	990							231.48	1758	7597
14.	Kasaragode	668.67	712.134	1065	48.83	486.073	9954	72.40	68.563	947							95.17	1010	10615
	Total	16646.3	15950.599	*SA-958	2258.43	15702.852	*SA-6953	1546.28	1450.864	*SA-938	536.90	7381.3	536.90	*SA-13748	5803.05	35846	*SA-6177		

*SA- State Average



Annexure 8.16 Area of Vegetables cultivation in Kerala (2018-19)

Sl. No.	District	Area under crops (Ha)												
		Amaranthus	Snake Guard	Ladies Finger	Brinjal	Bottle Gourd	Little Gourd (Koval)	Ash Gourd (Kumbalam)	Pumpkin	Cucumber	Carrot	Beetroot	Cabbage	Tomato
1	Thiruvananthapuram	237.63	101.81	82.60	80.48	0.58	61.92	2.92	14.54	135.92	0	0	0.08	5.76
2	Kollam	188.33	52.45	85.09	120.49	12.44	153.65	45.64	55.80	20.58	0	0	0.68	7.15
3	Pathanamthitta	84.94	71.09	66.10	88.01	0.34	139.17	55.36	50.86	31.48	0	0	0.18	2.41
4	Alappuzha	297.22	191.51	125.73	113.19	1.15	164.77	64.63	76.17	103.05	0	0	0.31	34.01
5	Kottayam	120.08	193.07	104.48	143.00	0.58	324.52	49.86	53.54	36.11	0	0	2.78	9.88
6	Idukki	80.96	26.36	52.76	95.11	0.12	111.59	39.83	70.26	14.39	990.59	1.59	141.56	44.23
7	Ernakulam	131.01	106.84	69.36	59.67	20.55	134.24	70.67	65.20	76.35	0	0.10	0.38	3.77
8	Thrissur	89.12	50.32	80.62	66.34	2.65	61.03	57.61	58.76	35.90	0	0.02	0.99	6.59
9	Palakkad	138.40	229.92	352.12	158.73	21.79	89.56	176.89	259.45	105.47	0	0.48	0.44	239.30
1	Malappuram	107.50	50.12	95.89	34.29	135.05	64.42	154.48	317.75	186.47	0	0	0.05	3.38
1	Kozhikode	111.58	21.87	47.10	23.71	6.19	42.81	46.49	52.20	95.14	0	0.07	0.48	6.19
1	Wayanad	57.18	7.30	10.54	33.37	2.22	20.69	46.96	109.91	13.99	0.08	0.13	17.13	21.86
1	Kannur	212.27	23.41	87.02	73.21	1.52	117.05	94.20	80.42	203.82	0	0	1.88	14.15
1	Kasaragode	58.25	15.86	65.52	39.57	8.54	102.16	25.08	32.17	79.36	6.62	0	0.36	4.00
	Total	1914.47	1141.93	1324.93	1129.17	213.72	1587.58	930.62	1297.03	1138.03	997.29	2.39	167.3	402.68



Sl. No.	District	Area under crops (Ha)			
		Cauliflower	Beans	Onion	Other Vegetables
1.	Thiruvananthapuram	0.04	0.07	0.09	15.83
2.	Kollam	0.99	0	0	5.84
3.	Pathanamthitta	0.24	0	0	94.32
4.	Alappuzha	0.65	0.09	0	103.88
5.	Kottayam	1.94	0.17	0	121.87
6.	Idukki	1.20	1018.97	0.69	99.52
7.	Ernakulam	0.26	0.13	0	193.25
8.	Thrissur	0.87	0.03	0	41.76
9.	Palakkad	1.16	39.86	4.28	165.93
10.	Malappuram	0.21	0.07	0	492.98
11.	Kozhikode	0.60	0	0	30.23
12.	Wayanad	8.56	6.27	0.15	37.74
13.	Kannur	2.02	0	0	161.05
14.	Kasaragode	0.67	0	0	116.53
	Total	19.41	1065.66	5.21	1680.73



Annexure 8.17 Area and Production of Oil seeds in Kerala (2018-19)

Sl. No.	Items	Groundnut				Sesamum				Coconut				Others			
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Million)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost
1.	Thiruvananthapuram					0.081	0.033	407		71157.95	491	6900		42.64			
2.	Kollam					67.677	56.879	840		45473.19	319	7015		66.81			
3.	Pathanamthitta					0.243	0.098	387		15815.74	94	5943		39.34			
4.	Alappuzha					216.199	67.483	312		33755.11	192	5688		118.43			
5.	Kottayam					0	0	0		25513.92	124	4860		64.28			
6.	Idukki					0.340	0.130	0		14513.61	59	4065		34.71			
7.	Ernakulam					4.288	0.736	172		39275.29	174	4430		92.46			
8.	Thrissur					8.699	13.789	1585		79765.86	496	6218		235.53			



9.	Palakkad	187.30	39.4	1278	15.397	3.770	289	55501.5 2	441	7946	963.06	
10.	Malappuram				63.849	14.473	227	104684. 71	912	8712	118.43	
11.	Kozhikode				0.413	0.159	385	115706. 18	790	6828	61.72	
12.	Wayanad				0.121	0.046	380	10121.3 3	56	5533	13.55	
13.	Kannur				0.350	0.156	0	83663.4 6	501	5988	90.65	
14.	Kasaragode				0	0	0	65998.9 4	650	9849	53.72	
	Total	187.30	39.4	1278	377.65 7	157.752	*SA- 418	760946. 81	529 9	*SA- 6964	1995.3 3	

*SA-State Average



Annexure 8.18 Area and Production of Fibre Drugs and Narcotics in Kerala (2018-19)

Sl. No.	Items	Cotton				Betel Leaves				Tobacco				Lemon Grass			
		Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost	Area under crops (Ha)	Production of crops (Tn)	Productivity (Kg/Ha)	Cost
1.	Thiruvananthapuram					12.32	426.055	34582					0.07				
2.	Kollam					25.14	946.927	37666					0				
3.	Pathanamthitta					35.88	797.28	22221					0				
4.	Alappuzha					25.86	1336.202	51671					0.20				
5.	Kottayam					6.63	166.733	25148					0				
6.	Idukki					0.07	3.103	44329					101.24				
7.	Ernakulam					2.58	128.098	49650					0.02				
8.	Thrissur					3.29	55.927	16999					0				
9.	Palakkad	59.40	89.51	1507		1.06	32.226	30402					0.10				
10.	Malappuram					102.08	3707.503	36320					0.04				



Annexure 8.20 Area under Non Food Crops (2018-19)

Sl. No.	District	Non Food Crops						Total Non Food Crops	Total Cropped Area
		Fodder Grass	Green Manure Crops	Other Crops & Trees	Teak	Medicinal Plants	Total		
1.	Thiruvananthapuram	118.32	479.80	5566.43	744.67	17.62	6926.84	111235.931	160054.59
2.	Kollam	177.00	900.00	3723.00	1547.00	14.00	6361.00	89820.977	140260.96
3.	Pathanamthitta	162.25	913.81	5650.27	2364.88	35.20	9126.41	76236.203	104621.63
4.	Alappuzha	166.16	709.94	6425.68	1205.30	15.55	8522.63	47192.190	111743.04
5.	Kottayam	345.08	537.99	8742.99	3233.86	31.61	12891.53	153791.530	210913.60
6.	Idukki	1439.37	1554.04	28764.70	1275.02	225.53	33258.66	136155.670	265876.25
7.	Ernakulam	406.01	559.13	6103.25	1775.86	15.77	8860.03	109478.200	162093.42
8.	Thrissur	125.99	1615.84	4096.70	1245.89	30.04	7114.46	103360.670	168020.25
9.	Palakkad	1677.92	3224.92	15706.68	4972.56	27.66	25609.74	125971.120	272194.91
10.	Malappuram	107.94	3949.85	7723.80	3271.41	54.27	15107.27	162929.420	236597.48
11.	Kozhikode	64.18	1451.14	3541.87	634.43	24.17	5715.79	144227.410	193894.67
12.	Wayanad	750.22	610.37	5491.83	287.19	92.16	7231.77	104212.500	167070.16



13.	Kannur	156.32	1087.45	13971.98	2491.87	27.09	17734.71	149951.620	219901.18
14.	Kasaragode	106.93	1906.53	8588.02	631.78	12.11	11245.37	111519.80	157858.61
	Total	5803.69	19500.81	124097.21	25681.72	622.78	175706.21	1626083.241	2571100.76



Annexure 8.21
District wise Agriculture (Area under Cultivation and Production) Details: 2018-19
Thiruvananthapuram

Sl. No.	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	2038.79	5167.00
2	Pulses		
	a. Gram	110.47	130.32
	b. Other Pulses	28.325	31.16
3	Sugar Crops		
	a. Palmyrah	25.38	-
4	Spices and Condiments		
	a. Pepper	2003.4	670.01
	b. Ginger	72.12	214.00
	c. Turmeric	64.8	128.00
	d. Arecanut	901.14	462.00
	e. Cloves	11.84	0.92
	f. Nutmeg	85.25	38.00
	g. Tamarind	668.52	-
	h. Vanila	0.81	-
	i. Cinnamom	0.04	-
	j. Others	8.34	-
5	Fresh Fruits		
	a. Jack	6520.74	21.00*
	b. Pappaya	1778.21	15457.98
	c. Banana	3113.97	27818.15
	d. Plantain	7748.81	65560.78
	e. Pineapple	94.20	717.510
	f. Mango	4827.62	
	g. Orange	0.05	
	h. Lemon (Big)	20.82	
	i. Lemon (Small)	23.13	
	j. Other Fresh Fruits	505.51	
6	Dry Fruits		
	a. Cashew	839.01	207.03
7	Tapioca	13037.83	475449.15
8	Tubers		
	a. Sweet Potato	11.94	131.34
	b. Elephant Foot Yam	313.10	
	c. Colocasia	486.75	
	d. Yam (Kachil)	46.67	
	e. Koorka	0.96	
	f. Nanakizhang	24.35	
	g. Other Tubers	99.48	
9	Vegetables		
	a. Drumstick	2057.73	2506.32
	b. Bitter Gourd	81.47	568.32
	c. Green Chillies	172.19	153.25



	d. Cowpea	254.62	1903.00
	e. Amaranthus	237.63	
	f. Snake Gourd	101.81	
	g. Ladies Finger	82.60	
	h. Brinjal	80.48	
	i. Bottle Gourd	0.58	
	j. Little Gourd (Koval)	61.92	
	k. Ash Gourd (Kumbalam)	2.92	
	l. Pumpkin	14.54	
	m. Cucumber	135.92	
	n. Cabbage	0.08	
	o. Tomato	5.76	
	p. Cauliflower	0.04	
	q. Beans	0.07	
	r. Onion	0.09	
	s. Other Vegetables	15.83	
	Total Food Crops	48818.65	597314.20
10	Oil Seeds		
	a. Sesamum	0.081	0.03
	b. Coconut	71157.95	491.00*
	c. Others	42.64	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	12.32	426.06
	b. Lemon Grass	0.07	-
12	Plantation Crops		
	a. Tea	835.59	50.00
	b. Rubber	32200	31070.00
	c. Cocoa	60.44	39.49
13	Other Non-food crops		
	a. Fodder Grass	118.32	
	b. Green Manure Crops	479.80	
	c. Other Crops & Trees	5566.43	
	d. Teak	744.67	
	e. Medicinal Plants	17.62	
	Total Non-Food Crops	111235.93	31585.58
	GRAND TOTAL	160054.59	628899.78

* Jack and Coconut production in Million nuts



Annexure 8.22
District wise Agriculture (Area under Cultivation and Production) Details: 2018-19
Kollam

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	2134.68	4514.00
2	Pulses		
	a. Gram	1.60	0.62
	b. Other Pulses	21.17	11.99
3	Sugar Crops		
	a. Palmyrah	16.00	-
4	Spices and Condiments		
	a. Pepper	2870.15	860.84
	b. Ginger	327.42	855.00
	c. Turmeric	283.13	520.00
	d. Arecanut	1619.84	1045.00
	e. Cloves	9.62	1.20
	f. Nutmeg	79.53	30.00
	g. Tamarind	399.04	-
	h. Others	47.00	-
5	Fresh Fruits		
	a. Jack	6016.95	20.00*
	b. Pappaya	1415.83	6912.08
	c. Banana	3455.49	25970.83
	d. Plantain	5845.56	44018.47
	e. Pineapple	95.25	652.30
	f. Mango	5090.31	
	g. Lemon (Big)	22.00	
	h. Lemon (Small)	27.00	
	i. Other Fresh Fruits	457.00	
6	Dry Fruits		
	a. Cashew	1671.00	455.32
7	Tapioca	12909.63	450759.45
8	Tubers		
	a. Sweet Potato	2.09	22.99
	b. Elephant Foot Yam	1005.86	
	c. Colocasia	1268.41	
	d. Yam (Kachil)	414.89	
	e. Koorka	1.76	
	f. Nanakizhang	56.59	
	g. Other Tubers	59.42	
9	Vegetables		
	a. Drumstick	1498.08	1538.53
	b. Bitter Gourd	126.04	826.91
	c. Green Chillies	188.40	170.31
	d. Potato	-	-



	e. Cowpea	254.11	1783.00
	f. Amaranthus	188.33	
	g. Snake Gourd	52.45	
	h. Ladies Finger	85.09	
	i. Brinjal	120.49	
	j. Bottle Gourd	12.44	
	k. Little Gourd (Koval)	153.65	
	l. Ash Gourd (Kumbalam)	45.64	
	m. Pumpkin	55.80	
	n. Cucumber	20.58	
	o. Carrot	-	
	p. Beetroot	-	
	q. Cabbage	0.68	
	r. Tomato	7.15	
	s. Cauliflower	0.99	
	t. Beans	-	
	u. Onion	-	
	v. Other Vegetables	5.84	
	Total Food Crops	50439.99	540948.80
10	Oil Seeds		
	a. Sesamum	67.68	56.88
	b. Coconut	45473.19	319.00*
	c. Others	66.81	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	25.14	946.93
12	Plantation Crops		
	a. Tea	548.71	170.00
	b. Rubber	37270	37780.00
	c. Cocoa	8.45	5.55
13	Other Non-food Crops		
	a. Fodder Grass	177.00	
	b. Green Manure Crops	900.00	
	c. Other Crops & Trees	3723.00	
	d. Teak	1547.00	
	e. Medicinal Plants	14.00	
	Total Non-Food Crops	89820.98	38959.36
	GRAND TOTAL	140260.96	579908.16

* Jack and Coconut production in Million nuts



Annexure 8.23
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Pathanamthitta

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	3199.99	11676.00
2	Grains		
	a. Maize	0.08	0.14
3	Pulses		
	a. Gram	1.062	0.50
4	Sugar Crops		
	a. Sugarcane	10.198	68.02
	b. Palmyrah	53.17	-
5	Spices and Condiments		
	a. Pepper	1593.19	505.58
	b. Ginger	280.72	1155.00
	c. Turmeric	103.22	295.00
	d. Cardamum	664.00	5.00
	e. Arecanut	987.66	623.00
	f. Cloves	8.25	0.92
	g. Nutmeg	554.81	246.00
	h. Tamarind	204.88	-
	i. Vanila	0.83	-
	j. Cinnamom	1.35	-
	k. Others	98.14	-
6	Fresh Fruits		
	a. Jack	3058.53	10.00*
	a. Pappaya	803.05	7049.98



	b. Banana	2215.24	17322.44
	c. Plantain	2182.39	19088.92
	d. Pineapple	192.59	990.80
	e. Mango	2025.20	
	f. Lemon (Big)	19.36	
	g. Lemon (Small)	19.22	
	h. Other Fresh Fruits	875.59	
7	Dry Fruits		
	a. Cashew	411.70	87.38
8	Tapioca	4682.43	209528.37
9	Tubers		
	a. Sweet Potato	1.53	18.36
	b. Elephant Foot Yam	993.07	
	c. Colocasia	1128.60	
	d. Yam (Kachil)	397.32	
	e. Koorka	1.78	
	f. Nanakizhang	59.01	
	g. Other Tubers	1.77	
10	Vegetables		
	a. Drumstick	509.97	348.82
	b. Bitter Gourd	102.60	494.74
	c. Green Chillies	53.79	51.96
	d. Cowpea	204.64	986.00
	e. Amaranthus	84.94	
	f. Snake Gourd	71.09	
	g. Ladies Finger	66.10	
	h. Brinjal	88.01	
	i. Bottle Gourd	0.34	



	j. Little Gourd (Koval)	139.17	
	k. Ash Gourd (Kumbalam)	55.36	
	l. Pumpkin	50.86	
	m. Cucumber	31.48	
	n. Cabbage	0.18	
	o. Tomato	2.41	
	p. Cauliflower	0.24	
	q. Other Vegetables	94.32	
	Total Food Crops	28385.43	60927.18
11	Oil Seeds		
	a. Sesamum	0.24	0.10
	b. Coconut	15815.74	94.00*
	c. Others	39.34	
12	Fibre, Drugs, Narcotics		
	a. Betel Leaves	35.88	797.28
13	Plantation Crops		
	a. Rubber	50900.00	53800.00
	b. Cocoa	318.59	374.30
14	Other Non-food Crops		
	a. Fodder Grass	162.25	
	b. Green Manure Crops	913.81	
	c. Other Crops & Trees	5650.27	
	d. Teak	2364.88	
	e. Medicinal Plants	35.20	
	Total Non-Food Crops	76236.20	54971.68
	GRAND TOTAL	104621.63	115898.86

* Jack and Coconut production in Million nuts



Annexure 8.24
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Alappuzha

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	42273.39	128560.00
2	Pulses		
	a. Gram	23.4	11.50
3	Sugar Crops		
	a. Sugarcane	29.000	153.70
	b. Palmyrah	11.35	-
4	Spices and Condiments		
	a. Pepper	609.1	116.73
	b. Ginger	55.25	132.00
	c. Turmeric	39.27	64.00
	d. Arecanut	1370.32	385.00
	e. Cloves	1.13	1.13
	f. Nutmeg	304.05	102.00
	g. Tamarind	520.59	-
	h. Cinnamom	5.84	-
	i. Others	464.01	-
5	Fresh Fruits		
	a. Jack	2825.02	2.00*
	b. Pappaya	1084.17	8949.82
	c. Banana	318.45	1937.91
	d. Plantain	2120.02	13212.69
	e. Pineapple	57.74	427.18
	f. Mango	4510.31	
	g. Orange	0.50	



	h. Lemon (Big)	18.99	
	i. Lemon (Small)	24.89	
	j. Other Fresh Fruits	653.62	
6	Dry Fruits		
	a. Cashew	1617.02	332.19
7	Tapioca		58912.44
8	Tubers		
	a. Sweet Potato	4.38	47.09
	b. Elephant Foot Yam	473.79	
	c. Colocasia	580.19	
	d. Yam (Kachil)	135.02	
	e. Koorka	2.25	
	f. Nanakizhang	33.91	
	g. Other Tubers	0.16	
9	Vegetables		
	a. Drumstick	571.98	386.09
	b. Bitter Gourd	197.80	575.46
	c. Green Chillies	99.64	90.57
	d. Cowpea	382.68	3328.00
	e. Amaranthus	297.22	
	f. Snake Gourd	191.51	
	g. Ladies Finger	125.73	
	h. Brinjal	113.19	
	i. Bottle Gourd	1.15	
	j. Little Gourd (Koval)	164.77	
	k. Ash Gourd (Kumbalam)	64.63	
	l. Pumpkin	76.17	
	m. Cucumber	103.05	



	n. Cabbage	0.31	
	o. Tomato	34.01	
	p. Cauliflower	0.65	
	q. Beans	0.09	
	r. Other Vegetables	103.88	
	Total Food Crops	64550.85	217725.50
10	Oil Seeds		
	a. Sesamum	216.20	67.48
	b. Coconut	33755.11	192.00*
	c. Others	118.43	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	25.86	1336.20
	b. Lemon Grass	0.20	-
12	Plantation Crops		
	a. Rubber	4500.00	4500.00
	b. Cocoa	53.76	71.12
13	Other Non-food Crops		
	a. Fodder Grass	166.16	
	b. Green Manure Crops	709.94	
	c. Other Crops & Trees	6425.68	
	d. Teak	1205.30	
	e. Medicinal Plants	15.55	
	Total Non-Food Crops	47192.19	5974.80
	GRAND TOTAL	111743.04	223700.30

* Jack and Coconut production in Million nuts



Annexure 8.25
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Kottayam

Sl.No.	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	22222.89	61917.00
2	Sugar Crops		
	a. Sugarcane	15.43	109.39
	b. Palmyrah	162.64	-
3	Spices and condiments		
	a. Pepper	3014.99	1214.54
	b. Ginger	115.71	380.00
	c. Turmeric	108.52	290.00
	d. Cardamum	86.00	3.00
	e. Arecanut	1391.97	1081.00
	f. Cloves	79.87	6.79
	g. Nutmeg	2649.88	1591.00
	h. Tamarind	415.81	-
	i. Vanila	13.04	-
	j. Cinnamom	5.91	-
	k. Others	158.73	-
4	Fresh Fruits		
	a. Jack	4065.22	14.00*
	b. Pappaya	1282.79	6285.67
	c. Banana	3252.49	29188.16
	d. Plantain	2848.39	22279.67
	e. Pineapple	1586.84	15155.71



	f. Mango	3022.56	
	g. Orange	1.00	
	h. Lemon (Big)	31.61	
	i. Lemon (Small)	45.21	
	j. Other Fresh Fruits	793.99	
5	Dry Fruits		
	a. Cashew	345.34	90.20
6	Tapioca	5960.35	259500.92
7	Tubers		
	a. Sweet Potato	0.23	2.53
	b. Elephant Foot Yam	400.29	
	c. Colocasia	395.14	
	d. Yam (Kachil)	72.63	
	e. Koorka	0.53	
	f. Nanakizhang	4.18	
8	Vegetables		
	a. Drumstick	654.87	457.10
	b. Bitter Gourd	177.03	853.50
	c. Green Chillies	103.37	90.66
	d. Cowpea	474.74	2302.00
	e. Amaranthus	120.08	
	f. Snake Gourd	193.07	
	g. Ladies Finger	104.48	
	h. Brinjal	143.00	
	i. Bottle Gourd	0.58	
	j. Little Gourd (Koval)	324.52	
	k. Ash Gourd (Kumbalam)	49.86	



	l. Pumpkin	53.54	
	m. Cucumber	36.11	
	n. Cabbage	2.78	
	o. Tomato	9.88	
	p. Cauliflower	1.94	
	q. Beans	0.17	
	r. Other Vegetables	121.87	
	Total Food Crops	57122.07	402798.84
9	Oil Seeds		
	a. Coconut	25513.92	124.00*
	b. Others	64.28	
10	Fibre, Drugs, Narcotics		
	a. Betel Leaves	6.63	166.73
11	Plantation Crops		
	a. Rubber	114440	110100.00
	b. Cocoa	875.17	881.84
12	Other Non-food Crops		
	a. Fodder Grass	345.08	
	b. Green Manure Crops	537.99	
	c. Other Crops & Trees	8742.99	
	d. Teak	3233.86	
	e. Medicinal Plants	31.61	
	Total Non-Food Crops	153791.53	111148.60
	GRAND TOTAL	210913.60	513947.44

* Jack and Coconut production in Million nuts



Annexure 8.26
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Idukki

Sl.No.	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	688.30	1562.00
2	Grains		
	a. Ragi/Finger Millet	73.20	130.65
	b. Maize	18.30	46.94
	c. Wheat	1.40	2.03
3	Pulses		
	a. Other Pulses	72.72	287.86
4	Sugar Crops		
	a. Sugarcane	888.00	9776.88
	b. Palmyrah	146.84	-
5	Spices and Condiments		
	a. Pepper	43103.78	23980.98
	b. Ginger	489.21	2370.00
	c. Turmeric	188.02	672.00
	d. Cardamum	30968.00	11243.00
	e. Arecanut	1784.24	1395.00
	f. Garlic	69.61	345.00
	g. Cloves	674.66	42.50
	h. Nutmeg	3652.14	2187.00
	i. Tamarind	335.93	-
	j. Vanila	16.03	-
	k. Cinnamom	23.88	-



	l. Others	94.69	-
6	Fresh Fruits		
	a. Jack	16732.68	61.00*
	b. Pappaya	917.09	5895.06
	c. Banana	3319.80	29604.96
	d. Plantain	3768.10	28524.19
	e. Pineapple	1302.33	13808.75
	f. Mango	5450.80	
	g. Orange	215.21	
	h. Lemon (Big)	94.46	
	i. Lemon (Small)	142.30	
	j. Other Fresh Fruits	1193.12	
7	Dry Fruits		
	a. Cashew	944.56	191.45
8	Tapioca	5962.25	242395.07
9	Tubers		
	a. Sweet Potato	4.50	99.00
	b. Elephant Foot Yam	552.57	
	c. Colocasia	567.02	
	d. Yam (Kachil)	162.03	
	e. Koorka	22.84	
	f. Nanakizhang	2.89	
	g. Other Tubers	10.07	
10	Vegetables		
	a. Drumstick	591.89	572.95
	b. Bitter Gourd	466.03	2222.42
	c. Green Chillies	117.89	105.98



	d. Potato	536.90	7381.30
	e. Cowpea	564.57	3075.00
	f. Amaranthus	80.96	
	g. Snake Gourd	26.36	
	h. Ladies Finger	52.76	
	i. Brinjal	95.11	
	j. Bottle Gourd	0.12	
	k. Little Gourd (Koval)	111.59	
	l. Ash Gourd (Kumbalam)	39.83	
	m. Pumpkin	70.26	
	n. Cucumber	14.39	
	o. Carrot	990.59	
	p. Beetroot	1.59	
	q. Cabbage	141.56	
	r. Tomato	44.23	
	s. Cauliflower	1.20	
	t. Beans	1018.97	
	u. Onion	0.69	
	v. Other Vegetables	99.52	
	Total Food Crops	129720.58	387918.00
10	Oil Seeds		
	a. Sesamum	0.34	0.13
	b. Coconut	14513.61	59.00*
	c. Others	34.71	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	0.07	3.10



	b. Lemon Grass	101.24	-
12	Plantation Crops		
	a. Tea	25588.03	46130.00
	b. Coffee	12717.00	8365.00
	c. Rubber	40600.00	39395.00
	d. Cocoa	9342.01	9509.05
13	Other Non-food Crops		
	a. Fodder Grass	1439.37	
	b. Green Manure Crops	1554.04	
	c. Other Crops & Trees	28764.70	
	d. Teak	1275.02	
	e. Medicinal Plants	225.53	
	Total Non-Food Crops	136155.67	103402.30
	GRAND TOTAL	265876.25	491320.30

* Jack and Coconut production in Million nuts



Annexure 8.27
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Ernakulam

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	5044.14	11191.00
2	Pulses		
	a. Other Pulses	35.46	10.28
3	Sugar Crops		
	a. Sugarcane	0.008	0.07
	b. Palmyrah	120.82	-
4	Spices and Condiments		
	a. Pepper	1843.53	440.89
	b. Ginger	77.55	204.00
	c. Turmeric	217.90	583.00
	d. Arecanut	4107.73	3033.00
	e. Cloves	4.42	1.77
	f. Nutmeg	6671.32	5362.00
	g. Tamarind	557.49	-
	h. Vanilla	0.50	-
	i. Cinnamom	5.82	-
	j. Others	120.82	-
5	Fresh Fruits		
	a. Jack	3797.46	14.00*
	b. Pappaya	1236.93	8289.91
	c. Banana	4980.62	35128.83



	d. Plantain	4651.69	37871.77
	e. Pineapple	5375.62	58571.60
	f. Mango	4268.29	
	g. Orange	0.03	
	h. Lemon (Big)	22.22	
	i. Lemon (Small)	27.77	
	j. Other Fresh Fruits	1044.63	
6	Dry Fruits		
	a. Cashew	394.87	99.46
7	Tapioca		
		5022.10	201364.59
8	Tubers		
	a. Sweet Potato	3.17	38.04
	b. Elephant Foot Yam	214.37	
	c. Colocasia	184.43	
	d. Yam (Kachil)	19.82	
	e. Koorka	38.61	
	f. Nanakizhang	2.07	
	g. Other Tubers	0.75	
9	Vegetables		
	a. Drumstick	588.49	644.40
	b. Bitter Gourd	61.88	429.34
	c. Green Chillies	48.39	43.02
	d. Cowpea	891.72	5036.00
	e. Amaranthus	131.01	
	f. Snake Gourd	106.84	
	g. Ladies Finger	69.36	
	h. Brinjal	59.67	



	i. Bottle Gourd	20.55	
	j. Little Gourd (Koval)	134.24	
	k. Ash Gourd (Kumbalam)	70.67	
	l. Pumpkin	65.20	
	m. Cucumber	76.35	
	n. Carrot	-	
	o. Beetroot	0.10	
	p. Cabbage	0.38	
	q. Tomato	3.77	
	r. Cauliflower	0.26	
	s. Beans	0.13	
	t. Onion	-	
	u. Other Vegetables	193.25	
	Total Food Crops	52615.22	368343.00
10	Oil Seeds		
	a. Sesamum	4.29	0.74
	b. Coconut	39275.29	174.00*
	c. Others	92.46	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	2.58	128.10
	b. Lemon Grass	0.02	-
12	Plantation Crops		
	a. Rubber	60170.00	60050.00
	b. Cocoa	1073.53	782.23
13	Non-food crops		
	a. Fodder Grass	406.01	



	b. Green Manure Crops	559.13	
	c. Other Crops & Trees	6103.25	
	d. Teak	1775.86	
	e. Medicinal Plants	15.77	
	Total Non-Food Crops	109478.20	60961.07
	GRAND TOTAL	162093.42	429304.07

* Jack and Coconut production in Million nuts



Annexure 8.28
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Thrissur

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	22131.45	69454.00
2	Sugar crops		
	a. Palmyrah	102.29	-
3	Spices and Condiments		
	a. Pepper	1741.71	502.97
	b. Ginger	43.01	119.00
	c. Turmeric	77.76	177.00
	d. Arecanut	5643.66	4759.00
	e. Cloves	3.93	0.66
	f. Nutmeg	6896.96	4068.00
	g. Tamarind	1197.03	-
	h. Vanilla	0.19	-
	i. Cinnamom	25.81	-
	j. Others	185.83	-
4	Fresh Fruits		
	a. Jack	5166.54	17.00*
	b. Pappaya	1348.57	4776.64
	c. Banana	1702.14	8203.62
	d. Plantain	5049.56	34401.61
	e. Pineapple	65.98	473.18
	f. Mango	7037.06	
	g. Lemon (Big)	21.15	
	h. Lemon (Small)	24.44	



	i. Other Fresh Fruits	1188.91	
5	Dry Fruits		
	a. Cashew	1296.37	398.25
6	Tapioca	976.26	41411.94
7	Tubers		
	a. Sweet Potato	2.26	15.82
	b. Elephant Foot Yam	46.30	
	c. Colocasia	140.12	
	d. Yam (Kachil)	6.39	
	e. Koorka	167.06	
	f. Nanakizhang	0.06	
	g. Other Tubers	22.21	
10	Vegetables		
	a. Drumstick	1154.43	1305.66
	b. Bitter Gourd	108.67	734.55
	c. Green Chillies	125.98	114.77
	d. Cowpea	406.88	1925.00
	e. Amaranthus	89.12	
	f. Snake Gourd	50.32	
	g. Ladies Finger	80.62	
	h. Brinjal	66.34	
	i. Bottle Gourd	2.65	
	j. Little Gourd (Koval)	61.03	
	k. Ash Gourd (Kumbalam)	57.61	
	l. Pumpkin	58.76	
	m. Cucumber	35.90	
	n. Beetroot	0.02	
	o. Cabbage	0.99	



	p. Tomato	6.59	
	q. Cauliflower	0.87	
	r. Beans	0.03	
	s. Other Vegetables	41.76	
	Total Food Crops	64659.58	172841.70
11	Oil Seeds		
	a. Sesamum	8.70	13.79
	b. Coconut	79765.86	496.00*
	c. Others	235.53	
13	Fibre, Drugs, Narcotics		
	a. Betel Leaves	3.29	55.93
14	Plantation Crops		
	a. Tea	529.76	880.00
	b. Rubber	15660.00	15600.00
	c. Cocoa	43.07	26.30
15	Other Non-food Crops		
	a. Fodder Grass	125.99	
	b. Green Manure Crops	1615.84	
	c. Other Crops & Trees	4096.70	
	d. Teak	1245.89	
	e. Medicinal Plants	30.04	
	Total Non-Food Crops	103360.67	189434.70
	GRAND TOTAL	168020.25	362276.40

* Jack and Coconut production in Million nuts



Annexure 8.29
District wise Agriculture (Area under Cultivation and Production) Details - 2018-19
Palakkad

Sl.No.	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	77121.31	215285.00
2	Grains		
	a. Cholan/Jower	205.00	167.50
	b. Ragi/Finger Millet	151.50	140.80
	c. Maize	80.40	84.60
	d. Small Millet (Thina/Cham)	47.50	34.50
3	Pulses		
	a. Tur/Redgram	266.00	437.90
	b. Gram	100.80	78.90
	c. Other Pulses	297.00	274.90
4	Sugar Crops		
	a. Sugarcane	66.60	494.54
	b. Palmyrah	825.15	-
5	Spices and Condiments		
	a. Pepper	2653.70	1095.32
	b. Ginger	193.12	742.00
	c. Turmeric	474.86	1428.00
	d. Cardamum	2754.00	67.00
	e. Arecanut	7960.69	6346.00
	f. Cloves	7.30	1.46
	g. Nutmeg	365.88	167.00
	h. Tamarind	3014.59	-
	i. Vanila	1.22	-
	j. Cinnamom	1.59	-



	k. Others	21.72	-
6	Fresh Fruits		
	a. Jack	6668.98	19.00*
	b. Pappaya	1460.03	7684.14
	c. Banana	11997.72	102811.98
	d. Plantain	7658.46	50333.42
	e. Pineapple	50.62	285.96
	f. Mango	10067.50	
	g. Orange	0.04	
	h. Lemon (Big)	75.53	
	i. Lemon (Small)	73.79	
	j. Other Fresh Fruits	1214.57	
7	Dry Fruits		
	a. Cashew	1130.28	210.04
8	Tapioca	1725.15	55374.03
9	Tubers		
	a. Sweet Potato	51.22	768.30
	b. Elephant Foot Yam	588.51	
	c. Colocasia	378.47	
	d. Yam (Kachil)	21.63	
	e. Koorka	648.37	
	f. Nanakizhang	16.42	
	g. Other Tubers	134.99	
10	Vegetables		
	a. Drumstick	2142.40	3877.74
	b. Bitter Gourd	390.60	3593.17
	c. Green Chillies	224.89	227.59
	d. Cowpea	910.11	5469.00



	e. Amaranthus	138.40	
	f. Snake Gourd	229.92	
	g. Ladies Finger	352.12	
	h. Brinjal	158.73	
	i. Bottle Gourd	21.79	
	j. Little Gourd (Koval)	89.56	
	k. Ash Gourd (Kumbalam)	176.89	
	l. Pumpkin	259.45	
	m. Cucumber	105.47	
	n. Beetroot	0.48	
	o. Cabbage	0.44	
	p. Tomato	239.30	
	q. Cauliflower	1.16	
	r. Beans	39.86	
	s. Onion	4.28	
	t. Other Vegetables	165.93	
	Total Food Crops	146223.79	457480.80
11	Oil Seeds		
	a. Groudnut	187.30	239.40
	b. Sesamum	15.40	3.77
	c. Coconut	55501.52	441.00*
	d. Others	963.06	
12	Fibre, Drugs, Narcotics		
	a. Cotton	59.40	89.51**
	b. Betel Leaves	1.06	32.23
	c. Lemon Grass	0.10	-
13	Plantation Crops		
	a. Tea	777.89	2050.00



	b. Coffee	4833.00	2975.00
	c. Rubber	37870.00	36400.00
	d. Cocoa	152.65	173.64
14	Other Non-food Crops		
	a. Fodder Grass	1677.92	
	b. Green Manure Crops	3224.92	
	c. Other Crops & Trees	15706.68	
	d. Teak	4972.56	
	e. Medicinal Plants	27.66	
	Total Non-Food Crops	125971.12	41874.04
	GRAND TOTAL	272194.91	499354.84

* Jack and Coconut production in Million nuts
production in no. of bales of 170 kg each

**Cotton



Annexure 8.30
District wise Agriculture (Area under Cultivation
and Production) Details - 2018-19
Malappuram

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	8339.63	26984.00
2	Grains		
	a. Maize	0.04	0.60
3	Pulses		
	a. Gram	0.34	0.10
	b. Other Pulses	12.95	2.72
4	Sugar Crops		
	a. Sugarcane	0.12	1.03
	b. Palmyrah	220.36	-
5	Spices and condiments		
	a. Pepper	2368.33	478.06
	b. Ginger	31.90	73.00
	c. Turmeric	292.63	649.00
	d. Cardamum	70.00	1.00
	e. Arecanut	17955.92	14521.00
	f. Cloves	4.33	0.87
	g. Nutmeg	469.34	222.00
	h. Tamarind	1327.72	-
	i. Vanilla	0.37	-
	j. Cinnamom	7.71	-
	k. Others	44.82	-



6	Fresh Fruits		
	a. Jack	8183.35	18.00*
	b. Pappaya	2303.09	10882.10
	c. Banana	5683.18	40493.55
	d. Plantain	4428.80	24832.60
	e. Pineapple	39.73	215.71
	f. Mango	7696.68	
	g. Orange	0.05	
	h. Lemon (Big)	47.97	
	i. Lemon (Small)	62.64	
	j. Other Fresh Fruits	1394.48	
7	Dry Fruits		
	a. Cashew	1635.30	257.09
8	Tapioca	4938.34	176373.57
9	Tubers		
	a. Sweet Potato	44.62	535.44
	b. Elephant Foot Yam	497.78	
	c. Colocasia	428.98	
	d. Yam (Kachil)	47.67	
	e. Koorka	33.99	
	f. Nanakizhang	11.16	
	g. Other Tubers	68.36	
10	Vegetables		
	a. Drumstick	2499.87	1474.92
	b. Bitter Gourd	74.93	425.24
	c. Green Chillies	49.07	45.05



	d. Cowpea	708.85	4187.00
	e. Amaranthus	107.50	
	f. Snake Gourd	50.12	
	g. Ladies Finger	95.89	
	h. Brinjal	34.29	
	i. Bottle Gourd	135.05	
	j. Little Gourd (Koval)	64.42	
	k. Ash Gourd (Kumbalam)	154.48	
	l. Pumpkin	317.75	
	m. Cucumber	186.47	
	n. Cabbage	0.05	
	o. Tomato	3.38	
	p. Cauliflower	0.21	
	q. Beans	0.07	
	r. Other Vegetables	492.98	
	Total Food Crops	73668.07	379097.60
11	Oil Seeds		
	a. Sesamum	63.85	14.47
	b. Coconut	104684.71	912.00*
	c. Others	118.43	
12	Fibre, Drugs, Narcotics		
	a. Betel Leaves	102.08	3707.50
	b. Lemon Grass	0.04	-
13	Plantation Crops		
	a. Rubber	42775.00	40040.00
	b. Cocoa	78.04	33.64
14	Other Non-food Crops		



	a. Fodder Grass	107.94	
	b. Green Manure Crops	3949.85	
	c. Other Crops & Trees	7723.80	
	d. Teak	3271.41	
	e. Medicinal Plants	54.27	
	Total Non-Food Crops	162929.42	43795.61
	GRAND TOTAL	236597.48	422893.21

* Jack and Coconut production in Million nuts



Annexure 8.31
District wise Agriculture (Area under Cultivation and
Production) Details - 2018-19
Kozhikode

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	2329.09	3439.00
2	Pulses		
	a. Other Pulses	3.00	3.00
3	Sugar crops		
	a. Palmyrah	100.59	-
4	Spices and Condiments		
	a. Pepper	3590.41	953.46
	a. Ginger	59.21	193.00
	b. Turmeric	292.78	812.00
	c. Cardamum	220.00	1.00
	d. Arecanut	10037.84	8473.00
	e. Cloves	29.80	1.88
	f. Nutmeg	582.34	315.00
	g. Tamarind	619.43	-
	h. Vanila	1.71	-
	i. Cinnamom	18.71	-
	j. Others	29.31	-
5	Fresh Fruits		
	a. Jack	9331.78	17.00*
	b. Pappaya	1926.39	7651.62



	c. Banana	1454.63	12981.50
	d. Plantain	3519.03	15290.52
	e. Pineapple	113.92	718.89
	f. Mango	8541.72	
	g. Orange	0.03	
	h. Lemon (Big)	15.22	
	i. Lemon (Small)	28.26	
	j. Other Fresh Fruits	793.99	
6	Dry Fruits		
	a. Cashew	1542.24	298.89
7	Tapioca	1360.04	36255.34
8	Tubers		
	a. Sweet Potato	10.59	161.74
	b. Elephant Foot Yam	185.47	
	c. Colocasia	454.95	
	d. Yam (Kachil)	26.25	
	e. Koorka	4.80	
	f. Nanakizhang	3.38	
	g. Other Tubers	56.60	
9	Vegetables		
	a. Drumstick	1544.17	592.96
	b. Bitter Gourd	75.24	456.69
	c. Green Chillies	117.43	117.43
	d. Cowpea	162.25	786.00
	e. Amaranthus	111.58	
	f. Snake Gourd	21.87	



	g. Ladies Finger	47.10	
	h. Brinjal	23.71	
	i. Bottle Gourd	6.19	
	j. Little Gourd (Koval)	42.81	
	k. Ash Gourd (Kumbalam)	46.49	
	l. Pumpkin	52.20	
	m. Cucumber	95.14	
	n. Beetroot	0.07	
	o. Cabbage	0.48	
	p. Tomato	6.19	
	q. Cauliflower	0.60	
	r. Other Vegetables	30.23	
	Total Food Crops	62857.66	89502.92
10	Oil Seeds		
	a. Sesamum	0.41	0.16
	b. Coconut	115706.18	790.00*
	c. Others	61.72	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	6.77	2393.26
12	Plantation Crops		
	a. Rubber	21930.00	22950.00
	b. Cocoa	806.54	657.85
13	Other Non-food Crops		
	a. Fodder Grass	64.18	
	b. Green Manure Crops	1451.14	
	c. Other Crops & Trees	3541.87	



	d. Teak	634.43	
	e. Medicinal Plants	24.17	
	Total Non-Food Crops	144227.41	26001.27
	GRAND TOTAL	193894.67	115504.19

* Jack and Coconut production in Million nuts



Annexure 8.32
District wise Agriculture (Area under Cultivation
and Production) Details - 2018-19
Wayanad

Sl.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	7761.51	22340.00
2	Grains		
	a. Maize	5.50	12.10
3	Pulses		
	a. Other Pulses	936.00	594.40
4	Sugar Crops		
	a. Palmyrah	62.48	-
5	Spices and Condiments		
	a. Pepper	9939.49	3123.15
	b. Ginger	1456.17	8400.00
	c. Turmeric	147.22	369.00
	d. Cardamum	4120.00	215.00
	e. Arecanut	11852.21	3679.00
	f. Cloves	19.68	0.85
	g. Nutmeg	112.53	25.00
	h. Tamarind	68.70	-
	i. Vanila	2.13	-
	j. Cinnamom	3.18	-
	k. Others	36.97	-
6	Fresh Fruits		
	a. Jack	6916.10	13.00*
	b. Pappaya	366.99	3153.18



	c. Banana	8860.98	74562.16
	d. Plantain	1142.65	6537.96
	e. Pineapple	23.81	111.66
	f. Mango	4637.27	
	g. Orange	34.08	
	h. Lemon (Big)	33.52	
	i. Lemon (Small)	36.08	
	j. Other Fresh Fruits	260.05	
7	Dry Fruits		
	a. Cashew	469.29	152.59
8	Tapioca	1223.28	40549.19
9	Tubers		
	a. Sweet Potato	2.80	44.10
	b. Elephant Foot Yam	737.55	
	c. Colocasia	160.00	
	d. Yam (Kachil)	48.25	
	e. Koorka	1.53	
	f. Nanakizhang	0.04	
	g. Other Tubers	0.30	
10	Vegetables		
	a. Drumstick	411.58	159.28
	b. Bitter Gourd	252.24	3314.50
	c. Green Chillies	60.19	60.19
	d. Cowpea	261.23	2298.00
	e. Amaranthus	57.18	
	f. Snake Gourd	7.30	
	g. Ladies Finger	10.54	



	h. Brinjal	33.37	
	i. Bottle Gourd	2.22	
	j. Little Gourd (Koval)	20.69	
	k. Ash Gourd (Kumbalam)	46.96	
	l. Pumpkin	109.91	
	m. Cucumber	13.99	
	n. Carrot	0.08	
	o. Beetroot	0.13	
	p. Cabbage	17.13	
	q. Tomato	21.86	
	r. Cauliflower	8.56	
	s. Beans	6.27	
	t. Onion	0.15	
	u. Other Vegetables	37.74	
	Total Food Crops	62857.66	169701.30
11	Oil Seeds		
	a. Sesamum	0.12	0.05
	b. Coconut	10121.33	56.00*
	c. Others	13.55	
12	Fibre, Drugs, Narcotics		
	a. Betel Leaves	0.86	28.04
	b. Lemon Grass	4.12	-
13	Plantation Crops		
	a. Tea	8193.95	11480.00
	b. Coffee	67426.00	53336.00
	c. Rubber	10800.00	7700.00
	d. Cocoa	420.80	359.33



14	Other Non-food Crops		
	a. Fodder Grass	750.22	
	b. Green Manure Crops	610.37	
	c. Other Crops & Trees	5491.83	
	d. Teak	287.19	
	e. Medicinal Plants	92.16	
	Total Non-Food Crops	104212.50	72903.42
	GRAND TOTAL	167070.16	242604.72

* Jack and Coconut production in Million nuts



Annexure 8.33
District wise Agriculture (Area under Cultivation
and Production) Details - 2018-19
Kannur

S.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	5330.91	11143.00
2	Pulses		
	a. Gram	441.02	307.54
	b. Other Pulses	105.37	71.31
3	Sugar Crops		
	a. Sugarcane	2.52	26.26
	b. Palmyrah	12.98	-
4	Spices and Condiments		
	a. Pepper	4341.42	1428.85
	b. Ginger	51.34	202.00
	c. Turmeric	161.38	609.00
	d. Arecanut	9362.01	9532.00
	e. Cloves	17.42	1.59
	f. Nutmeg	209.95	112.00
	g. Tamarind	445.80	-
	h. Vanilla	11.18	-
	i. Cinnamom	7.75	-
	j. Others	49.12	-
5	Fresh Fruits		
	a. Jack	8619.18	22.00*



	b. Pappaya	1785.34	11593.10
	c. Banana	1885.78	17313.03
	d. Plantain	2950.30	11512.41
	e. Pineapple	100.31	506.89
	f. Mango	8164.44	
	g. Orange	0.03	
	h. Lemon (Big)	91.70	
	i. Lemon (Small)	56.01	
	j. Other Fresh Fruits	904.79	
6	Dry Fruits		
	a. Cashew	19242.93	8568.56
7	Tapioca	1800.68	64443.09
8	Tubers		
	a. Sweet Potato	19.92	220.02
	b. Elephant Foot Yam	116.17	
	c. Colocasia	322.78	
	d. Yam (Kachil)	16.43	
	e. Koorka	4.52	
	f. Nanakizhang	1.32	
	g. Other Tubers	53.37	
9	Vegetables		
	a. Drumstick	1752.17	1373.70
	b. Bitter Gourd	95.07	721.95
	c. Green Chillies	112.65	111.52
	d. Cowpea	231.48	1758.00
	e. Amaranthus	212.27	



	f. Snake Gourd	23.41	
	g. Ladies Finger	87.02	
	h. Brinjal	73.21	
	i. Bottle Gourd	1.52	
	j. Little Gourd (Koval)	117.05	
	k. Ash Gourd (Kumbalam)	94.20	
	l. Pumpkin	80.42	
	m. Cucumber	203.82	
	n. Cabbage	1.88	
	o. Tomato	14.15	
	p. Cauliflower	2.02	
	q. Other Vegetables	161.05	
	Total Food Crops	69949.56	141555.80
10	Oil Seeds		
	a. Sesamum	0.35	0.16
	b. Coconut	83663.46	501.00*
	c. Others	90.65	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	5.41	268.78
	b. Lemon Grass	0.43	-
12	Plantation Crops		
	a. Rubber	48080.00	49090.00
	b. Cocoa	376.61	245.22
13	Other Non-food crops		
	a. Fodder Grass	156.32	
	b. Green Manure Crops	1087.45	



	c. Other Crops & Trees	13971.98	
	d. Teak	2491.87	
	e. Medicinal Plants	27.09	
	Total Non-Food Crops	149951.62	49604.16
	GRAND TOTAL	219901.18	191159.96

* Jack and Coconut production in Million nuts



Annexure 8.34
District wise Agriculture (Area under Cultivation
and Production) Details - 2018-19
Kasaragode

S.No	Crops	Area Under Cultivation (Ha)	Total Production (Tn)
1	Paddy (total)	2291.05	5024.00
2	Pulses		
	a. Gram	12.16	16.13
	b. Other Pulses	20.83	28.79
3	Sugar Crops		
	a. Palmyrah	25.55	-
4	Spices and Condiments		
	a. Pepper	3088.21	1404.59
	b. Ginger	22.36	85.00
	c. Turmeric	32.22	98.00
	d. Arecanut	20764.06	44591.00
	e. Cloves	9.67	0.88
	f. Nutmeg	136.69	133.00
	g. Tamarind	208.89	-
	h. Vanilla	1.58	-
	i. Cinnamom	0.17	-
	j. Others	8.99	-
5	Fresh Fruits		
	a. Jack	3005.37	12.00*
	b. Pappaya	874.85	5965.60
	c. Banana	658.12	5722.55
	d. Plantain	2297.53	9637.03
	e. Pineapple	53.61	371.65



	f. Mango	2815.12	
	g. Orange	0.04	
	h. Lemon (Big)	21.28	
	i. Lemon (Small)	26.66	
	j. Other Fresh Fruits	689.14	
6	Dry Fruits		
	a. Cashew	7240.75	4286.61
7	Tapioca	420.11	12690.17
8	Tubers		
	a. Sweet Potato	51.16	955.004
	b. Elephant Foot Yam	32.71	
	c. Colocasia	81.32	
	d. Yam (Kachil)	6.53	
	e. Koorka	1.51	
	f. Other Tubers	0.81	
9	Vegetables		
	a. Drumstick	668.67	712.134
	b. Bitter Gourd	48.83	486.07
	c. Green Chillies	72.40	68.56
	d. Cowpea	95.17	1010.00
	e. Amaranthus	58.25	
	f. Snake Gourd	15.86	
	g. Ladies Finger	65.52	
	h. Brinjal	39.57	
	i. Bottle Gourd	8.54	
	j. Little Gourd (Koval)	102.16	
	k. Ash Gourd (Kumbalam)	25.08	
	l. Pumpkin	32.17	



	m. Cucumber	79.36	
	n. Carrot	6.62	
	o. Cabbage	0.36	
	p. Tomato	4.00	
	q. Cauliflower	0.67	
	r. Other Vegetables	116.53	
	Total Food Crops	46338.81	93286.80
10	Oil Seeds		
	a. Coconut	65998.94	650.00*
	b. Others	53.72	
11	Fibre, Drugs, Narcotics		
	a. Betel Leaves	13.04	823.62
	b. Tobacco	7.28	11.65
12	Plantation Crops		
	a. Rubber	33920.00	32300.00
	b. Cocoa	281.45	241.97
13	Other Non-food Crops		
	a. Fodder Grass	106.93	
	b. Green Manure Crops	1906.53	
	c. Other Crops & Trees	8588.02	
	d. Teak	631.78	
	e. Medicinal Plants	12.11	
	Total Non-Food Crops	111519.80	33377.24
	GRAND TOTAL	157858.61	126664.04

* Jack and Coconut production in Million nuts



Livestock is one of the major allied agriculture activities in India and its significance is more in recent years as people's lifestyle and food habits are changing considerably. In recent period milk and milk products, meats, and eggs are the major food items and people prefer this more than the traditional agriculture produce like rice and wheat. Livestock rearing is an indispensable part of rural community, especially for the small and marginal farmers. It is a source of income for the communities depending on agriculture as well as many landless households. Further, milk, meats, and eggs are the major source of protein.

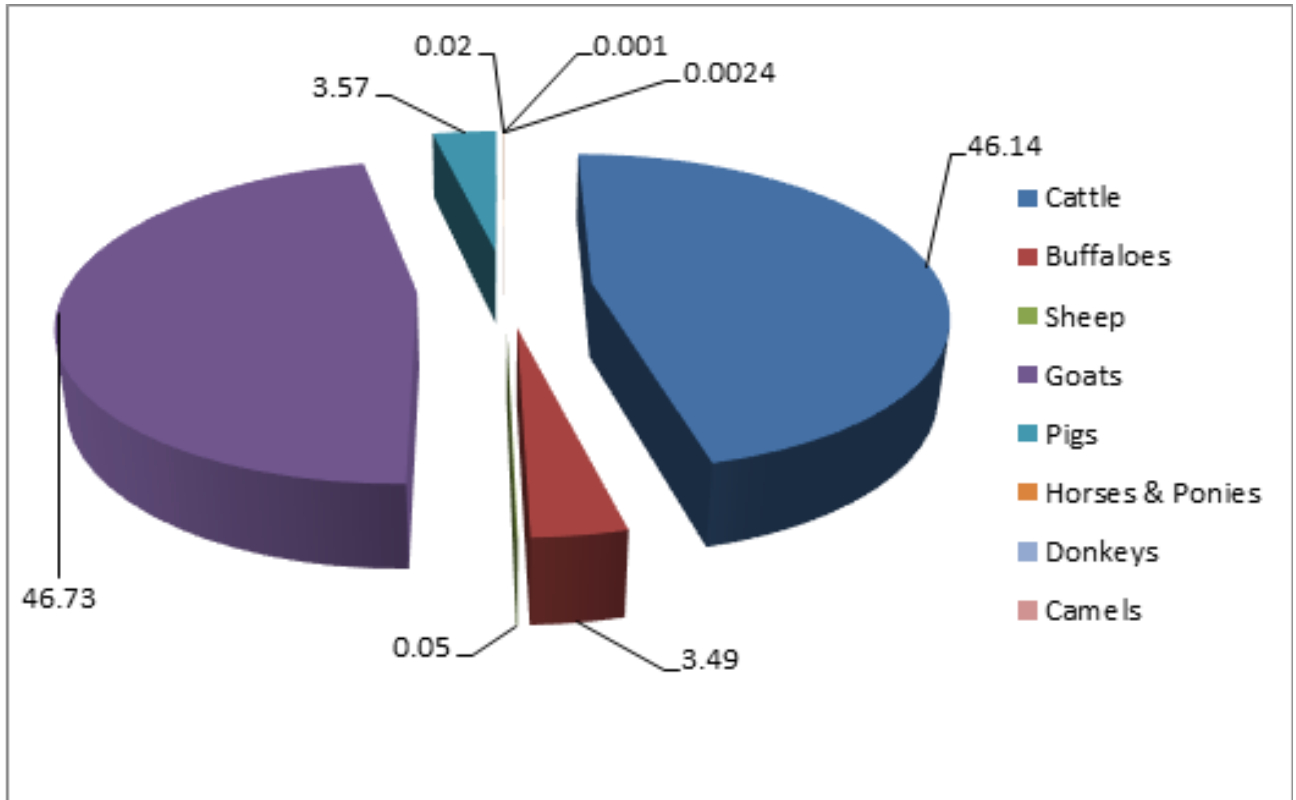
As per 20th Livestock Census (2019), the livestock population in the State was 29 lakhs. The poultry population was 29.7 lakh which accounts for 3.5 per cent of the total poultry population in the country. Kerala ranks 9th among the States in poultry population of the country.

Table 9.1 Livestock Population in Kerala (2019)

S. No	Specie	Population (In Thousands)	% of total Population
1	Cattle	1341.99	46.1400
2	Buffaloes	101.50	3.4866
3	Sheep	1.48	0.0500
4	Goats	1359.16	46.7300
5	Pigs	103.86	3.5700
6	Horses & Ponies	0.56	0.0200
7	Donkeys	0.07	0.0024
8	Camels	0.03	0.0010
	Total Population	2908.65	100.0000
9	Poultry	29771.91	

Source: Report on 20th Quinquennial Livestock Census-2019, Animal Husbandry Department

Figure 9.1 Percentage Share of Livestock Population – 2019



It is very clear from the above table and figure, the cattle and goats are major livestock in Kerala. Although buffaloes and pigs are presented in reasonable number, but others are insignificant.



Table 9.2 District Wise Major Livestock Population – 2019

Sl.No.	Districts / Species	Cattle		Buffalo		Sheep		Goat		Pig	
		No	(%)	No	(%)	No	(%)	No	(%)	No	(%)
1.	Alappuzha	79370	5.91	5.72	5.63	18	1.21	55.10	4.05	0.81	0.78
2.	Ernakulam	108061	8.05	10.02	9.87	7	0.47	126.60	9.32	9.20	8.86
3.	Idukki	97395	7.26	5.06	4.99	9	0.61	102.43	7.54	14.30	13.77
4.	Kannur	91687	6.83	2.44	2.40	8	0.54	65.16	4.79	12.34	11.88
5.	Kasargod	73968	5.51	1.50	1.48	50	3.37	37.42	2.75	4.65	4.48
6.	Kollam	110542	8.24	8.65	8.52	12	0.81	124.32	9.15	2.04	1.96
7.	Kottayam	81074	6.04	6.20	6.11	19	1.28	94.96	6.99	8.70	8.38
8.	Kozhikkode	94248	7.02	3.90	3.84	25	1.69	55.21	4.06	11.23	10.81
9.	Malappuram	87035	6.50	15.10	14.88	28	1.90	169.90	12.50	2.83	2.72
10.	Palakkad	166952	12.44	9.74	9.60	914	61.67	144.10	10.60	9.25	8.91
11.	Pathanamthitta	61157	4.56	3.26	3.21	27	1.82	52.10	3.83	0.89	0.86
12.	Thiruvananthapuram	98822	7.36	5.04	4.97	106	7.15	156.90	11.54	5.44	5.24
13.	Thrissur	111932	8.34	20.52	20.21	21	1.42	129.60	9.54	13.04	12.55
14.	Wayanad	79753	5.94	4.35	4.29	238	16.06	45.36	3.34	9.14	8.80
	Total	1341996	100.00	101.50	100.00	1482	100.00	1359.16	100.00	103.86	100.00

Source: Report on 20th Quinquennial Livestock Census-2019, Animal Husbandry Department



Table 9.3 District Wise Poultry Population - 2019

S. No	Districts	Population (In Thousands)	% of total Population
1	Alappuzha	1779.06	5.98
2	Eranakulam	4033.87	13.55
3	Idukki	746.36	2.51
4	Kannur	1325.48	4.45
5	Kasargod	615.47	2.07
6	Kollam	1522.11	5.11
7	Kottayam	2212.17	7.43
8	Kozhikkode	1760.4	5.91
9	Malappuram	6137.46	20.61
10	Palakkad	2028.59	6.81
11	Pathanamthitta	798.87	2.68
12	Thiruvananthapuram	2523.44	8.48
13	Thrissur	3399.38	11.42
14	Wayanad	889.25	2.99
Total Population		29771.91	100.00

Source: Report on 20th Quinquennial Livestock Census-2019, Animal Husbandry Department



The total poultry population in the state comes to around 2,97,71,910 and its major share is in Malappuram (20.61%), Ernakulam (13.55%) and Thrissur (11.42%).

Major Livestock Products

Milk, egg and meat are the major livestock products in the State.

9.1 MILK PRODUCTION

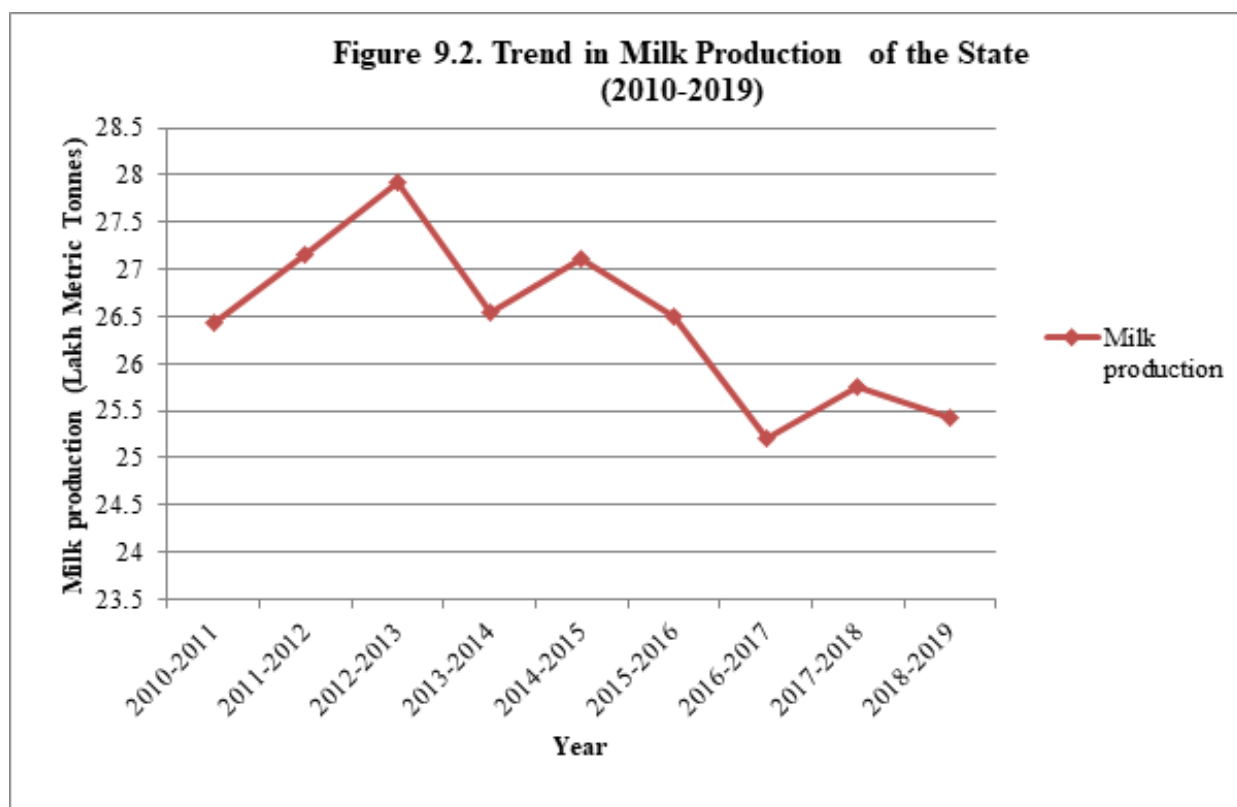
India is one of the largest milk producing countries in the world and the per capita availability of milk has been increasing in India. The highest per capita availability is in Punjab (1181 gram per day) followed by Haryana (1087 gram per day). The highest producer of milk is Uttar Pradesh with 16.3 per cent of total milk production in the country, followed by Rajasthan (12.6 per cent). The species-wise milk production shows that nearly 35 per cent of total milk production is contributed by indigenous buffaloes followed by 26 per cent by cross-bred cattle. The indigenous cattle contribute 11 per cent of the total milk production. Goat milk shares a contribution of 3 per cent in the total milk production across the country.

The total requirement of milk in Kerala in 2019-20 was 33.22 lakh MT, but the supply was only 25.42 lakh MT resulting in a deficiency of 4.65 lakh MT milk. This necessitated an import of 3.1 lakh MT. Out of 25.42 lakh MT of milk produced in the State, major share was produced by cross bred cows (93.25 per cent). Indigenous cows produced only 1,949 lakh MT of milk (0.08 per cent). The production of milk from goat was 1.28 lakh MT (5.02 per cent).

Table 9.4 Milk Production of Kerala

Year	Milk Production (Lakh Metric Tonnes)
2010-2011	26.43
2011-2012	27.16
2012-2013	27.92
2013-2014	26.55
2014-2015	27.11
2015-2016	26.49
2016-2017	25.2
2017-2018	25.76
2018-2019	25.42





It is clear that the milk production in the state has not increased during the last 10 years, but revealed a slight reduction.

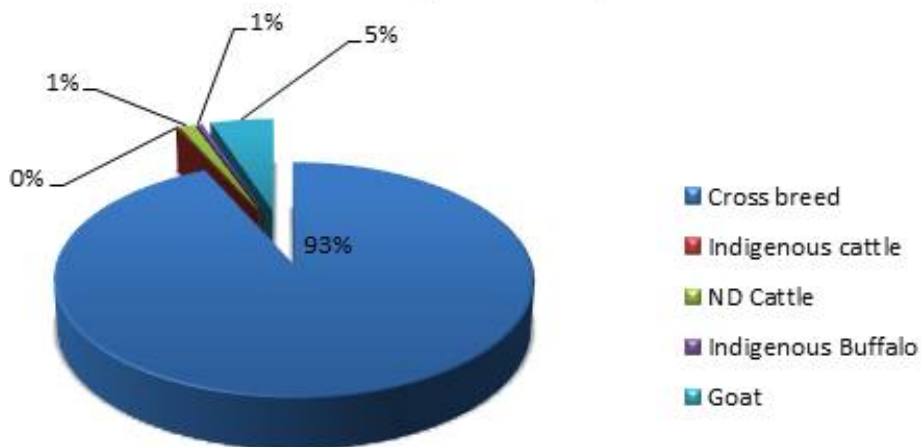
Table 9.5 Species wise Milk Production in Kerala (2019-20)

Sl. No.	Species	Milk Production				
		(Lakh MT)	(Lakh Ltrs)	(%)	Unit Price (Rs./Ltr)	Total Value (Rs. in Lakhs) (C4*C6)
1	2	3	4	5	6	7
1.	Cross breed Cattle	23.70	22898.55	93.25	48.08	1100962.28
2.	Indigenous cattle	0.02	19.32	0.08	48.08	928.91
3.	ND Cattle	0.31	299.52	1.20	48.08	14400.92
4.	Indigenous Buffalo	0.11	106.28	0.45	74.73	7942.30
5.	Goat	1.28	1236.71	5.02	100.00*	123671.00
	Total	25.42	24560.38	100.00		1247905.42

*Goat milk price is estimated from correct market price

Source: Economic Review, 2020, Kerala State Planning Board

Figure 9.3 Species wise milk production in Kerala (2019-20)



The species wise milk production analysis clearly reveals that the cross-breed cattle milk production is significant and it accounts for 93% of the milk production of the state.

Table 9.6 DAIRY CO-OPERATIVE SOCIETIES

DISTRICTS	DCS Registered			Dormant DCS			Functioning DCS		
	APCOS	Non APCOS	Total	APCOS	Non APCOS	Total	APCOS	Non APCOS	Total
Thiruvananthapuram	345	78	423	35	43	78	310	35	345
Kollam	281	59	340	34	9	43	247	50	297
Pathanamthitta	188	16	204	28	0	28	160	16	176
Alappuzha	250	18	268	16	3	19	234	15	249
Kottayam	253	26	279	27	5	32	226	21	247
Idukki	199	11	210	14	1	15	185	10	195
Ernakulam	324	9	333	18	0	18	306	9	315
Thrissur	225	57	282	13	3	16	212	54	266
Palakkad	326	21	347	22	1	23	304	20	324
Malappuram	265	17	282	27	7	34	238	10	248
Kozhikode	239	14	253	0	0	0	239	14	253
Wayanad	55	1	56	0	0	0	55	1	56
Kannur	169	54	223	5	0	5	164	54	218
Kasargod	140	7	147	4	2	6	136	5	141
Total	3259	388	3647	243	74	317	3016	314	3330

Kerala is one of the states which gives the highest price for milk to the farmers in the country. The sale of milk by Kerala Co-operative Milk Marketing Federation (MILMA) showed a decrease in the current year. In 2019-20, a total of 6,789 lakh litres of milk was procured by the dairy co-operative societies in the State, of which 4,516 lakh litres were sent to the dairies and 2,246 lakh litres were marketed locally by the societies. The average milk poured per day by Anand Pattern Co-operative Societies (APCOS) in 2019-20 was 1415 MT against the previous year average of 1528 MT. The procurement/day/society in 2019-20 decreased to 440 litres from 501 litres in 2018-19. The procurement and sale of milk by Kerala Co-operative Milk Marketing Federation (KCMMF) was 3940.76 lakh litres and 4466.27 lakh litres respectively in 2019-20. Except in Ernakulam, Palakkad and Wayanad, sales of milk exceeded procurement. The shortfall between milk procurement and sales was met by arranging milk mostly from State Milk Federations of Karnataka, Tamil Nadu and purchase of skimmed milk powder.

Table 9.7 Average Quantity of Milk Procured per day by APCOS (2003 – 2020)

Year	No. of Societies (Functional)	Total procurement/ day (ltr)	Procurement per Society/ day (ltr)
2003	1500	457993.27	305.33
2004	1548	493294.31	318.67
2005	1597	594933.03	372.53
2006	1639	747562.4	456.11
2007	2563	819946	319.92
2008-09	2628	845433.82	321.7
2009-10	2695	875215.75	324.76
2010-11	2721	814532.27	299.35
2011-12	2737	922771.79	337.15
2012-13	2779	1026790	369.48
2013-14	2808	1092896	389.21
2014-15	2859	1167320	408.3
2015-16	2891	1270588.6	439.5
2016-17	2914	1034858	355.13
2017-18	2956	1432067.2	484.46
2018-19	2997	1501764.5	501.09
2019-20	3034	1334394.6	439.81

Source: KCMMF



Table 9.8 Price Revision Details of Milk (2010 onwards)

Date of Revision /Region	FAT (Rs./Kg)	SNF(Rs./Kg)	Purchase Price (Rs./Litre (Average rate)	Sales Price (Rs./Litre (Toned Milk)
TRCMPU				
28.06.2010	171.7	140.46	19.14	23
05.09.2011	217.52	177.97	23.55	28
14.10.2012	202.93	248.03	28.7	33
21.07.2014	211.11	270.25	31.23	38
11.02.2017	289.3	289.3	35.45	42
19.09.2019	328.14	328.14	38.23	46
ERCMPU				
28.06.2010	137.93	112.83	19.01	23
05.09.2011	211.18	172.79	23.41	28
14.10.2012	197.02	240.81	28.46	33
21.07.2014	214.67	262.38	31	36
11.02.2017	280.94	280.94	35.3	40
19.09.2019	308.85	308.85	38.81	42.24
MRCMPU				
28.06.2010	137.93	112.83	19.45	23
05.09.2011	137.93	112.83	23.27	28
14.10.2012	197.02	240.81	26.95	33
21.07.2014	214.67	262.38	29.86	36
11.02.2017	289.3 per litre based on total solids		35.59	40
19.09.2019	311	311	39.09	44
KCMMF				
28.06.2010	171.7	140.46	19.14	23



05.09.2011	217.52	177.97	23.55	28
14.10.2012	202.93	248.03	28.61	33
21.07.2014	214.67	262.38	29.86	38
11.02.2017	289.3	289.3	35.59	40
19.09.2019	328.69	328.69	38.23	46



Table 9.9 Price Spread of Milk (Average price per lit. in Rs)

Year	Producer/Society	Consumer	Difference in price between producer and consumers
TRCMPU (2012-13)	28.7	33	4.3
MRCMPU (2012-13)	28.82	33	4.18
ERCMPU (2012-13)	27.17	33	5.83
TRCMPU (2013-14)	31.23	35	3.77
MRCMPU (2013-14)	28.88	33	4.12
ERCMPU (2013-14)	27.17	33	5.83
TRCMPU (2014-15)	31.23	35	3.77
MRCMPU (2014-15)	31.33	36	4.67
ERCMPU (2014-15)	29.6	36	6.4
TRCMPU (2015-16)	31.28	35	3.72
MRCMPU (2015-16)	31.37	36	4.63
ERCMPU (2015-16)	29.6	36	6.4
TRCMPU (2016-17)	35.45	39	3.55
MRCMPU (2016-17)	31.85	36	4.15
ERCMPU (2016-17)	33.27	40	6.73
TRCMPU (2017-18)	35.58	42	6.42
MRCMPU (2017-18)	35.65	40	4.35
ERCMPU (2017-18)	35.24	41.14	5.9
TRCMPU (2018-19)	35.39	42	6.61
MRCMPU (2018-19)	35.61	40	4.39
ERCMPU (2018-19)	35.26	41.16	5.9
TRCMPU (2019-20)	36.78	44	7.22
MRCMPU (2019-20)	37.36	44	6.64
ERCMPU (2019-20)	36.78	46	9.22

Source: KCMMF



9.2 EGG PRODUCTION

Total egg production in India was 10,332 crore in 2018-19, registering a growth of 8.5 per cent. The per capita availability of eggs has increased to 79 eggs per annum in 2018-19 but the per capita consumption was around 70 eggs per annum. The largest producer of eggs is Andhra Pradesh, which produces 19.1 per cent of total egg production in the country, closely followed by Tamil Nadu (18.2 per cent) and Telangana (13.2 per cent). Other States that contributed more than 5 per cent of the country's egg production were West Bengal (8.3) and Haryana (5.9). The highest per capita availability of egg is in Andhra Pradesh (372 eggs per annum) followed by Tamil Nadu (265), Haryana (224), Punjab (191), Karnataka (95), and West Bengal (88) which are significantly higher than the national average. The improved fowl breeds contribute 87.33 per cent of the production of egg. 11.52 per cent is from indigenous fowls. The indigenous duck and improved duck breeds contribute 0.89 per cent and 0.26 per cent respectively with respect to total egg production.

Kerala ranks 10th among the states of India in egg production. The total egg production in the State was at 224 crore eggs in the year 2012-13, which has declined to 218 crore in 2019-20. The per capita egg availability is 62 eggs per annum and the per capita consumption was 128 eggs per annum in 2019-20.

About 73.9 per cent of the total eggs produced in the State are from improved fowl and around 21.1 per cent are from desi fowl. The contribution of desi duck and improved duck to the total egg production of the State is 2.7 per cent and 2.2 per cent respectively. 99.7 per cent of eggs produced in the State come from backyard poultry. Commercial poultry contributes a very small share (0.27 per cent), warranting emphasis on backyard poultry in future. For backyard poultry, the average yield per year for desi fowls and desi ducks are 138 eggs and 171 eggs per year. With regard to improved fowls, and improved ducks the average yield is 217 eggs and 167 eggs per year.

The animal husbandry sector in Kerala has to attain a greater degree of self-sufficiency in egg and meat. It is essential to reduce the dependency on outside states for eggs and to produce an additional 75 lakh eggs per day in the State.

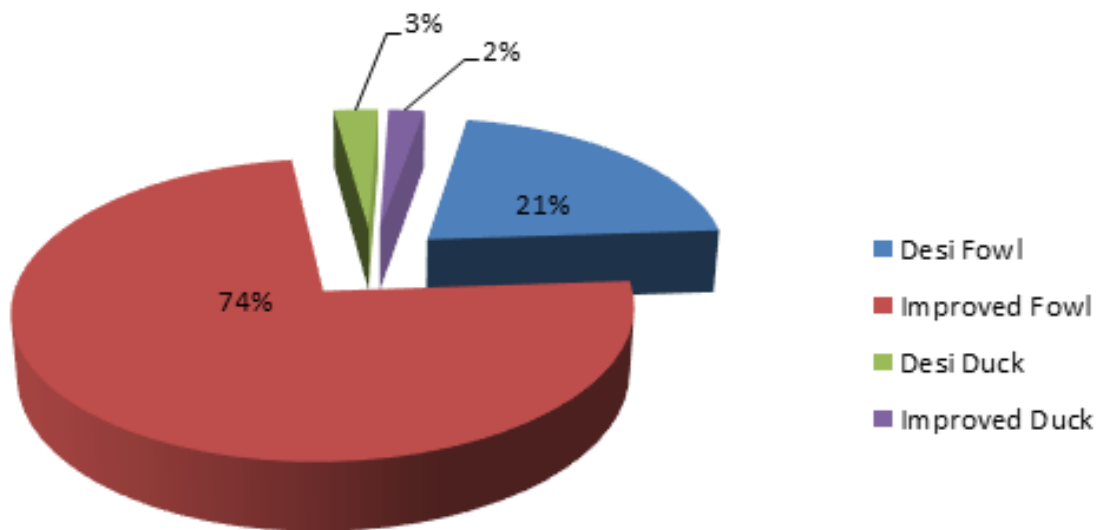
Table 9.10 Species wise Poultry Production in Kerala, 2020

Sl. No.	Species	Egg Production			
		(Crores)	(%)	Unit Prize (Rs.)	Total Value (Rs. in Crores) (C3*C5)
1	2	3	4	5	6
1.	Desi Fowl	46.09	21.14	7.75	357.20
2.	Improved Fowl	161.15	73.92	5.20	837.93
3.	Desi Duck	5.95	2.73	10.62	63.20
4.	Improved Duck	4.82	2.21	10.62	51.17
	Total	218.00	100.00		1309.50

Source: Economic Review, 2020, Kerala State Planning Board



Figure 9.4 Species wise poultry production in Kerala, 2020



9.3 MEAT PRODUCTION

The largest producer of meat in the country is Uttar Pradesh producing 15 per cent of the total meat followed by Maharashtra (12.6 per cent), West Bengal (10.2 per cent), Andhra Pradesh (9.6 per cent), Telangana (9.3 per cent), and Kerala (5.6 per cent), which together contribute 57 per cent of total meat production in the country. Species-wise meat contribution shows that nearly 50 per cent of meat production in the country is contributed by poultry. Maharashtra, Tamil Nadu, and West Bengal are the largest producers of poultry meat in the country. Buffaloes and goats contribute 19 per cent and 14 per cent respectively to the total meat production in India.

In Kerala, meat production shows a stagnant level of 4.69 lakh MT in the previous two years and declined to 4.57 lakh MT in 2018-19 and 4.55 lakh MT in 2019-20 showing a negative growth. Kerala is the 8th largest meat producing State in the country contributing 5.6 per cent of meat produced in India. The total requirement of meat in Kerala was 4.92 lakh MT; the supply was only 4.55 lakh MT and 0.28 lakh MT of processed meat was imported, resulting in a deficiency of 0.09 lakh MT meat.



Table 9.11 Species wise Meat Production in Kerala, 2017-18

Sl. No.	Species	(Lakh MT)	(%)	Unit Prize (Rs.)	Total Value (Rs. in Lakh)
		3	5	6	7
1.	Cattle	1.60	33.95	330.00*	528000.00
2.	Buffalo	0.98	20.99	350.50	343490.00
3.	Goat	0.22	4.78	595.93	131104.60
4.	Pig	0.07	1.47	279.55	19568.50
5.	Poultry	1.82	38.81	269.59**	490653.80
	Total	4.69	100.00		1512816.90

Source: Economic Review, 2018, Kerala State Planning Board

* Unit price for Cattle estimated from correct market prize

** Chicken (Broiler)=176.83, Chicken (Desi)=362.34, Unit price for poultry estimated from average price of Chicken (Broiler & Desi), $(176.83 + 362.34)/2 = 269.585$

Figure 9.5 Species wise Meat production in Kerala (2017-18)

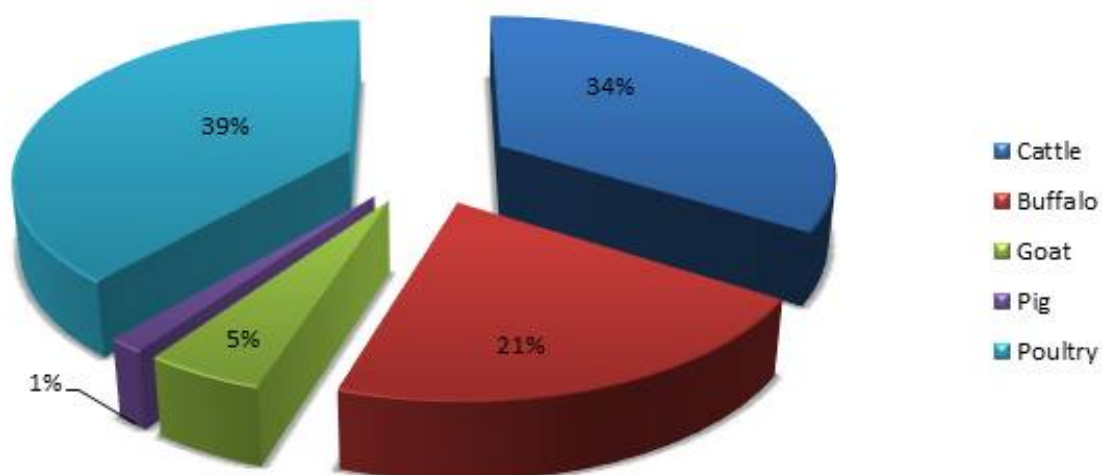


Table 9.11 Total Livestock Annual Production in Kerala

S. No	Livestock Product	Production	Value (Rs. Crore)
1.	Milk	24560.38 (Lakh Ltrs)	12,479
2.	Egg	218.00 Crore Numbers	1,309.50
3.	Meat	4.69 (Lakh MT)	15,128
	Total		28,916.5



Conclusion

The study of the livestock sector showed that the total economic value of the livestock sector in Kerala amounted up to 28,916.5 Rs.crore, where the value of milk was 12,479 Rs.crore, that of egg was 1,309.5 Rs.crore and that of meat was 15,128 Rs.crore (Table 9.11). This data was collated from various sources like the Livestock census 2019 (Animal Husbandry Dept.), the Economic Review of Kerala 2020 and Kerala Co-operative Milk Marketing Federation (KCMMF).

Due to the consistent decrease in milk production in Kerala across the years, this has necessitated the procurement of milk from other nearby states. Hence, the livestock sector requires attention to arrest the decline in milk productivity. However, dairy farmers are the most benefited in Kerala due to the high amount of value they receive for each unit quantity of milk compared to other states.

The poultry sector also showed decline in productivity across the years, leading to dependence for eggs on other states. The per-capita availability was found to be quite less compared to per-capita requirement of eggs.

Meat production shows a stagnant level of production in the previous two years and declined in 2018-19 and 2019-20 showing a negative growth. Poultry, cattle and buffaloes contributed to the bulk of meat production in Kerala.

The conservation and application of technology in breeding can be used to improve the livestock productivity. Protection and improvement of indigenous breeds forms a part of National Biodiversity Targets, which needs to be focused upon for improving the status of dairy, poultry and meat since most of the farmers engage in this sector as much needed source of supplementary income.



Biodiversity, at the species and ecosystems level provides an important foundation for tourism. The intrinsic and scenic beauty of biodiversity attracts large number of tourists; hence, these spots are having a huge scope for eco-tourism and can also be developed for biodiversity education and research. According to the CBD (2004), tourism is one of the world's fastest growing industries. In recent decades, tourism has emerged as significant economic activities, which occupy attractive landscapes and rich biodiversity spots. However, it is also a source of increasing stress on fragile ecosystems and their biodiversity.

Broadly, tourism's social, economic and environmental impacts are immense and complex, not least because tourism concentrates on vulnerable natural and cultural sites. Short-term gains may take precedence over long-term environmental considerations, such as the conservation and sustainable use of biological diversity. However, natural ecosystems and biological resources that may be threatened by tourism development provide the very goods and services that underpin the tourism industry.

In this context, what is needed is that tourism should be developed in harmony with environmental considerations. Sustainable tourism can generate employment and income (particularly to the local communities) on one side, thus providing a strong incentive for the conservation of eco-systems / biodiversity on the other. It can also raise mass public awareness of the many goods and services provided by biological diversity, and help to understand the traditional knowledge and practices associated with biodiversity and of the need to respect them.

Ecotourism is a new approach to tourism, which restricts travel to natural areas to appreciate the cultural and natural history of the environment, taking care not to disturb the integrity of the ecosystem, while creating economic opportunities that make conservation and protection of natural resources advantageous to the local people. It is a tourism programme that is "nature based, ecologically sustainable, where education and interpretation is a major constituent and where local people are benefited".

In brief, sustainable tourism has the potential to reconcile economic and environmental concerns and give a practical meaning to sustainable development (CBD, 2004). According to Hoppstadius and Dahlstrom (2015) "ecotourism is a form of tourism that aims to deliver sustainable development through preservation of the environment concurrent with safeguarding socio-economic development. The simultaneous occurrence of production and consumption in tourism brings important insights into the relational co-production and interactions of the host, the visitors and community regarding sustainable development processes."

CBD emphasised that tourism is related to many of the 20 Aichi Biodiversity Targets. For Targets 5, 8, 9, 10 and 12 this is primarily about ensuring greater control and management to reduce damage to biodiversity from tourism. But for others 1, 11, 15, 18, and 20, it is about pursuing the positive contribution of tourism to biodiversity awareness, protected areas, habitat restoration, community engagement, and resource mobilization. A further dimension is the better integration of biodiversity and sustainability into developmental policies and business models that include tourism, thereby supporting targets 2 and 4 (CBD, 2017).

In this context tourism is playing a significant role in each nation's, including India's, National Biodiversity Targets as well as the NBAP. Integration of biodiversity concerns in economic and social development



(mainstreaming) is a highlight of NBAP. Generally, development oriented, narrow and short sighted tourism places a huge cost on biodiversity. However, a well-managed tourist sector can contribute significantly to reducing the threats to biodiversity. Further it promotes biodiversity conservation and maintains or increases key wildlife populations and biodiversity values through tourism revenue.

Therefore, it is necessary to raise awareness and generate action towards the important contribution of sustainable tourism both to economic growth and to the conservation and sustainable use of biodiversity. This has been progressing in nations with an emphasis on different ecosystems (coastal, forests and aquatic) or biodiversity spots with the direct control of the government or the tourism department. These tourist spots are the attraction for the overseas as well as domestic tourists.

Use Values is one of the major components of the Total Economic Value of an ecosystem or biodiversity (see figure 2.1 in Chapter 2). In the Use Values, the Direct Values are the ecosystem's marketed/traded goods such as: fish, timber, medicines, fodder, grains, cereals, milk, etc. and the marketed services such as recreation. Hence in our report, valuation of bio-resources emphasised recreation (tourism) services of biodiversity also along with various biodiversity goods (bio-resources) such as fish, timber, NTFPs, agricultural products, and livestock. In the analysis tourism including the ecotourism's revenue (direct and indirect) generated is considered as the recreation value of the biodiversity / ecosystem in the State.



10.1 TOURISM IN KERALA AND ITS ECONOMIC POTENTIAL

With the Arabian Sea in the West, the very tall Western Ghats in the East and networked by 44 interconnected rivers, Kerala is blessed with a unique set of geographical features which has made it one of the most significant tourist destinations in Asia. A long shoreline with serene beaches, calm stretches of bright green backwaters, green hill stations and exotic wildlife are unique natural resources of Kerala, which attracts tourists from all over the world. Further, each of these charming tourist destinations is only a two hour drive from the other - a singular advantage no other place on the planet can offer.

Kerala is divided into three geographical regions: Highlands, which slope down from the Western Ghats onto the Midlands of undulating hills and valleys into an unbroken 580 km long coastline with many picturesque backwaters, interconnected with canals and rivers. The wild lands are covered with dense forests, while other regions lie under tea and coffee plantations or other forms of cultivation. Most of the state is engulfed in rich greenery which ensures a very calming experience at all times.

Bestowed with a pleasant and equable climate throughout the year, Kerala is a tropical land where one can relax and be at ease. The Monsoons (June-September and October-November) and summer (February-May) are the seasons noticeably experienced in Kerala. Winter is only a slight drop in temperature from the normal range of 28-32°C. In brief, generally the pleasant climate prevalent in the State is also a big favour for the tourism development.



Further, Kerala's history is closely linked with its commerce, which until recent times revolved around its spice trade. Celebrated as the Spice Coast of India, ancient Kerala played host to travellers and traders from across the world including the Greeks, Romans, Arabs, Chinese, Portuguese, Dutch, French and the British. Almost all of them have left their imprints on this State in some form or the other and that has helped Kerala mould and design its own special way of interacting with the world, or in other words this helps in drain more foreign tourists in Kerala. .

Along with the geographical speciality, the natural beauty of the state, climate, historical background, the people and their life in the State also significantly influenced tourism development. Kerala is one of India's most progressive states in terms of social welfare and quality of life. The State boasts of one of India's highest literacy rates, highest life expectancy and lowest child mortality rates. The literacy rate for women in Kerala is one of the highest in all of Asia. Enjoying a unique cosmopolitan viewpoint, the people here, at all levels of society, have greater access to services and opportunities - as well as a greater say in their governance (Kerala at a glance - Know Kerala and Kerala fact file | Kerala Tourism).

Ecologically responsible tourism gives importance to Nature and those activities which are ecologically sustainable. Ecotourism in Kerala ensures responsible travel to nature to create awareness among the travellers on the need for conservation of the environment with the help of local people, who are mostly tribals. Each of the destinations earmarked for the purpose caters to the tastes of both ardent nature lovers and those adventurers who want to live their lives on the edges. Programmes that give importance to livelihood of local people is one of the highlights of Ecotourism in the State. Kerala is considered as one of the most beautiful places in the world for ecotourism and the ecotourism destinations unfasten doors to more exciting getaways for the traveller to see and enjoy nature from close quarters. (Ecotourism Adventure Tourism in Kerala | Trekking Packages & Ecotourism in Kerala | Official Micro Website of Kerala Eco Tourism (keralatourism.org)

The following Table provides a comprehensive picture about the no. of tourists as well as foreign exchange earnings / total revenue generated during 2018 and 2019 in Kerala. The statistics is very impressive and it reveals the overall significance of tourism in the Kerala economy.

Table 10.1

Tourism Statistics of Kerala

Details	Foreign			Domestic		
	2018	2019	% Increase	2018	2019	% Increase
No. of Tourists (In Crores)	10,96,407	11,89,771	8.52	1,56,04,661	1,83,84,233	17.81
Foreign Exchange Earnings / Total revenue generated (Domestic) In Crores	8,764.46	10,271.06	17.19	19,474.62	24,785.62	24.14 27.24

Source: Kerala Tourist Statistics (2019)



The following table 10.2 provides the details of District wise important tourist destinations and attractions in Kerala. These tourist destinations and attractions includes: ecosystem or biodiversity significant scenic natural beauty spots, historical monuments and religious centres.

Table 10.2
Important Tourist Destinations & Attractions

Districts	Destinations	Attractions
Thiruvananthapuram	Thiruvananthapuram	The Capital City, Secretariat, Sri Padmanabha Swami Temple (Richest temple of the world), Napier Museum Zoo, Kuthiramalika etc
	Kovalam	Internationally famous Beach
	Ponmudi	Waterfalls, Hill Station
	Poovar	Beach, Boating, Fishing Harbour
	Varkala	Internationally famous Beach, Sivagiri Mutt, Janardana Swami Temple
	Chowara	Amazing beach and a fishing hamlet located near Kovalam
	Vellayani	Largest fresh water lake in Thiruvananthapuram district
	Shasthampara-Kattakada	Romantic hillock
	Kadalukanipara-Kallara	Mesmerizing view of Arabian Sea
	Vell Tourist Village	Boating, Children's Park, etc
	Aakkulam Tourist Village	Boating, Children's Park, etc
	Kappil	Beach-back water
	Neyyar Dam	DAM/Park
	Shangumukham	Beach/Giant sculpture of Mermaid
	Aruvikkara	DAM
Madavoorpara	Cave temple	
Kollam	Kollam	Cashew nut factories, Ancient Port, Ashta mudi Lake, Historical Temples Neendakara Harbour, Beach etc
	Thenmala-Palanuvi	India's First Eco-Tourism Project & Palaruvi Waterfalls
	Mundakkal	Beach
	Alumkadavu	First house boat in India built here
	Munroe Thuruth	Island, Coir Manufacturing centre
	Paravoor	Lake, Coir Manufacturing centre
	Thangassheri	Lighthouse
	Jadayu Para	world's largest bird sculpture, Adventure tourism activities
	Thanni Beach	Beach and Fish landing centre
	Ashtamudi	Gateway to Kerala backwaters
Chavara	Traditional village surrounded by Ashtamudi lake, fishing	
Pathanamthitta	Aranmula	Land of Snake Boats, Famous for Aranmulakkannadi (Metal Mirror).
	Erumeli	Erumeli Petta Thuilal (A Religious Dance) Resting Place of Sabarimala Pilgrims
	Perumthenaravi	Waterfalls on Pamba river
	Gavi	Eco tourism project, trekking wildlife watching, night safaris
Alappuzha	Alappuzha	Venice of the East, Coir Industries, Beach and Back waters, famous for traditional house boats
	Kuttanadu	Known as The Paddy Bowl of Kerala, Water ways,



	Kakkathuruthu	Island in Vembanad lake
	Pathiramanal	Small island in Muhamma panchayath, scenic beauty on both sides of lake, Bird watching
Kottayam	Kumarakom	Bird Sanctuary, Vembanad Lake, House Boats
	Vaikkom	Natural beauty, Lake and famous temple
	Illikkal kallu	Monolith, Majestic peak
	Aruvikuzhi	Waterfalls
	Ilaveezha Poonchira	Pond surrounded by three enchanting hillocks, place for trekking
Idukki	Munnar	Most famous Hill station of Kerala, Tea plantations, Waterfalls, DAMS, Beautiful Hills, Neelakkurinji and Varayadu (Nilgin Thar) are major attractions.
	Thekkady	Periyar Wildlife Sanctuary, Famous Boating Center
	Wagamon	Beautiful Hills, Tea Plantations, Paragliding activities
	Koombanpara	A forest destination
	Parumthumpara	Hill station, Eagle shaped rock
	Thommankuthu	Waterfalls
	Panchalimed	Hill station
	Mattupetti	DAM
	Ramakkalmed	One of the windiest place in Asia, Hill station
	Eravikulam	First national park in Kerala famous for Nilgiri Thar
	Chinnakkanal	Waterfall
	Lakshmi	Tea plantations, Trekking
Ernakulam	Aluva	Sivarathri Manappuram (River Bed), Aluva Palace, Amusement Parks.
	Bhoothathankettu	Dam site with boating situated in vast virgin Forest.
	Cherai Beach	Famous Beach, Rarely see the Dolphins, Coconut Groves
	Fort Kochi	Colonial Architectures like Jew Town, Synagogue, Bolgatty palace, Beach etc
	Kalady	Birth place of Saint Aadi. Sankaracharya, Sanskrit University.
	Kochi City	Queen of Arabian Sea, Metropolitan city, Chinese Fishing Net, Various famous temples/churches etc
	Maradu	Backwaters, Convention Centres
	N.Paravur	Muziris Heritage Zone
	Aluva-Manappuram	Famous for Aluva Shiva Temple
	Aareekkal	Waterfalls
	Iringole kavu	Forest Temple, Sacred grove devoted to Goddess Durga
	Kumbalangi	Island village, mangrove forest
	Kanjoor	Pilgrimage centre (Church)
	Ezhutthumangalam - Prakruthi Gramam	Park
	Malayattoor-Manappat tuchira	Church on top of hill, Lake, Boating



	Kadambrayar	Ecotourism village, Boating
	Kuzhupilly -Munambam Beach	Beaches
	Kadamakudi	Back water, fishing, etc
Thrissur	Athirappalli	Biggest Waterfall in Kerala
	Chalakkudi	Amusement Parks
	Chavakkad	Beautiful Beach
	Guruvayur	Famous Sni Krishna Temple Mammiyoor Temple, Elephant training centre
	Malakkapara	Hill Station
	Kalashamala	Ecotourism point
	Vilangan Kunnu	Ecotourism point
	Azheekod-Munakkal	Beach
	Snehatheeram	Beach
	Nattika	Famous Beach
	Thumboormuzhi	DAM
	Poomala	DAM, Cheppara caves
	Vadanappalli	Beach
	Mandalam Kunnu	Beach
	Periyambalam	Beach
	Peechi	DAM cum Garden
Vazhani	DAM cum Garden	
Palakkad	Malampuzha	DAM, Park and Garden, Famous statue of Yakshi, Rock Garden, Rope way.
	Nelliyampathy	Beautiful Hill station, water falls, Forest, Orange Plantations.
	Parambikkulam	Wild life sanctuary, Boating Facilities Famous for Erumadam (Tree House)
	Silent Valley	National park and World Heritage Site, recognised by UNESCO
	Palakkad	Kalpathy, Fort etc
	Kanjirappuzha	Lake cum Dam
	Pothundi	Lake cum Dam
Malappuram	Kodikuthimala	Hill Station
	Nilambur	Teak Plantations
	Ottumpuram	Beach
	Aadhyanpara	Waterfalls
	Padinjarekkara	Beach
	Kanuvarakkund	Waterfalls



	Ponnani	Ancient Juma masjid, Beach, Harbour
	Thirunavaya	Navamukunda Temple, Land of Mamankam
Kozhikode	Iringal	Sargaalaya Craft village, Kunhalimarakkar memorial.
	Kakkayam	DAM, Adventure Tourism Facilities
	Kadalundi Nagaram	Bird Sanchuary
	Kozhikode City	Ancient City, Beaches, Mananchira park, etc
	Kappad	Historical beach. Vasco-da- Gama the first European came to India landed here.
	Peruvannamoozhi	DAM, Boating, wild life sanctuary
	Thusharagiri	Waterfalls
	Thusharagiri	Famous for Ayurveda treatment
	Beypore	Ancient port, Beach
Wayanad	Kuruvadweep - Mananthavadi	Island due to river delta, thick forest, Bamboo rafting
	Ambalavayal	Ancient Edakkal caves, Heritage Museum, Cheengeri Hills, Phantom rock
	Pookode Lake	Lake, Boating
	Kanthan Para	Water falls
	Mananthavadi	Pazhashi Raja Tomb and Museum
	Thirunelli	Mahavishnu Temple , wild life sanctuary
	Sulthan Bathery	Muthanga wild life sanctuary
	Karlad Lake Lake	Adventure Tourism
Kannur	Meenkunnu - Payyambalam	Beaches
	Muzhuppilangad	The only Drive In Beach in Kerala.
	Parassinikkadavu	Pilgrim Centre (Muthappan Temple)
	Palakkayam Thattu	Hill station
	Paithal Mala	Hill station
	Chootad	Beach
	Thalassery	Ancient Fort
	Dharmadam Island	Beach
	Chembalikkundu	Floating Park
	Vellikkeel	Ecotourism Park
	Kottiyoor	Wild life sanctuary, Pilgrim Centre (Temple)
	Mattannur	Pazhassi dam
	Kannur City	Museum, Park, Beach, Fort etc
Kasaragod	Bekal	Famous Ancient Fort , Beach
	Valiyaparamba	Back water, House boats
	Ranipuram	Hill Station
	Azhithala	Beach

Source: Kerala Tourist Statistics (2019)

From the table 10.2, it is very clear that majority of the tourist destinations and attractions (120 out of 138 - 87%) in Kerala are nature based. These includes: forests / hill stations, waterfalls, National Parks and Wildlife Sanctuaries, Dams etc. in Western Ghats and the beautiful beaches, backwaters and estuaries, mangroves. Besides, plantations, rivers and other fresh water sources spread over the States also the tourist attract spots in the State. Apart from the natural scenic beauty the spiritual and religious centres like temples, churches and mosques are the tourists attracted spots. Some of these are located in the rich biodiversity area. For example, the world famous Shabarimala temple is located in the middle of the thick forests in the Western Ghats.



10.2 ECO-TOURISM DESTINATIONS

The eco-tourism in forest areas is implemented through Forest Development Agencies. At present there are 60 eco-tourism destinations functioning in the State.

**Table 10.3 District Wise Number of Eco-Tourism
Wildlife Sanctuaries and National Park Destinations**

Sl. No	Districts	No. of destination
1	Thiruvananthapuram	6
2	Kollam	3
3	Pathanamthitta	5
4	Alappuzha	0
5	Idukki	9
6	Kottayam	2
7	Ernakulam	3
8	Thrissur	2
9	Palakkad	6
10	Malappuram	3
11	Kozhikode	5
12	Wayanad	12
13	Kannur	3
14	Kasaragod	1
	Total	60

Source: Kerala Tourist Statistics (2019)

During 2018-19, the income from Ecotourism activities to the Forest dept. is as follows:

1. A total amount of Rs 1067.23 lakh has been generated in ecotourism activities in 22 territorial divisions in the state.
2. An amount of Rs 2595.27 lakh has been generated from National Parks and wildlife sanctuaries in wildlife division

District wise details and income generation from eco-tourism (both in territorial divisions and National Parks and wildlife sanctuaries) is given in the following table.



Table 10.4

Details of Eco-Tourism Activities in Territorial Divisions of Kerala Forest Department during 2018-19

S No	Division	Name of range	Location of eco-tourism centre	No. of Visitors				Income generated (in rupees)
				Native	Foreigners	Students	Total	
1.	Thiruvananthapuram	Palode	Ponmudi	298068	2432	19221	319721	15871215
			Mankayam	20455	19	1523	21997	784665
		Paruthippally	Kallar	104720	1326	13858	119904	4375965
2.	Thenmala	Aryankavu	Palaruvi	150544	118	7785	158447	9502155
3.	Achencovil	Achencovil	Manalar-Kumbhavuruty	29307	0	3113	32420	997870
4.	Punalur	Anchal	Kudukkathupara	15662	0	899	16561	437650
5.	Ranni	Goodrical.	Pachakkanam	19246	314	0	19560	918030
6.	Konni	Konni	Eco Tourism	162045	159	22111	184315	4826900
			Tree Top Huts	889	0	163	1052	1186000
		Adavi	Adavi	58872	281	5976	65129	7754900
		Naduvathumoozhy	Gavi Bus Tour	1059	0	96	1155	2024650
7.	Kothamangalam	Kaliyar	Thommankuthu	60583	160	4565	65308	2215060
8.	Kottayam	Kumily	Chellarcovil	4538	295	1561	6394	174840
		Ayyappancoil	Kalvari mount	135343	0	2340	137683	3675259
9.	Mankulam	Mankulam	Kainagiri (Viripara)	20074	2017	4469	26560	985040
			Nakshathrakuthu	3012	51	143	3206	195970
10.	Marayur Sandal	Marayur	Rajiv Gandhi National Park	3156	52	8198	11406	32080
		Kanthalloor	Anakottapara Park	33073	1522	25915	60510	345950
11.	Vazhachal	Charpa	Athirappally	900904	9933	190776	1101613	5000765
			Vazhachal	79733	333	11511	91577	426187
12.	Malayattoor	Kodanad	Paniyeliporu VSS	108560	159	14637	123356	2867785
		Kalady	Mulamkuzhy VSS.	45323	0	5231	50554	1223150
		Thundathil	Bhoothathankettu	37997	63	6901	44961	810390
13.	Mannarkkad	Agali	Singapara /Sruvani	704	33	77	814	173370
			Thodukappu	8602	2	4033	12637	202193
14.	Nilambur South	Karuli	Nedungayam	19596	5	3633	23234	677345
15.	Nilambur North	Edavanna	Conolly Plot, Aruvacode	165813	829	18126	184768	4597170
			Kozhipara	43480	46	2052	45578	901615
		Nilambur	Chandakkunnu	10715	7	2634	13356	337520
16.	Palakkad	Ottappalam Olavakkode	Ananganmala	38523	0	0	38523	737850
			Meenvallam Waterfalls	51121	0	0	51121	984780
			Dhoni Waterfalls	8400	0	0	8400	840000
17.	Nemmara	Kollengode	Minnampara	19494	13	67	19574	1437000
18.	Kozhikode	Thamarassery	Thusharagiri	133556	883	7407	141846	4161935
			Kakkad	8490	0	547	9037	280310
			Kakkavayal	12066	0	2677	14743	403135
		Peruvannamuzhi	Peruvannamuzhi	21520	0	4189	25709	708435
		Kuttiady	Janakikkad	19582	5	1587	21174	611515
19.	Wayanad North	Begur	Brahmagiri Trekking	966	52	122	1140	130920
			Chirapullu	655	9	54	718	150050



		Mananthavady	Muneeswarakunnu	1263	0	39	1302	75890
20.	Wayanad south	Kalpetta	Banasura - Meenmutty	92535	549	12888	105972	3082832
Meppady		Soochippara		152859	686	21440	174985	8704879
		Chembra		11344	214	98	11656	1603015
Chedalathu		Pakkom-Kuruva		84108	253	16395	100756	6570704
21.	Kannur	Thaliparamba	Paithalmala	23825	25	653	24503	807020
			Sasippara view point	13450	2	677	14129	285890
			Azhakapuri Waterfalls	14999	10	1298	16307	313940
22.	Kasargod	Kanhangad	Ranipuram	44494	22	1703	44516	1311475
TOTAL				3295323	22879	453388	3769887	106723264

Source: Kerala Tourist Statistics (2019)

Table 10.5
Details of Eco-Tourism Activities in Wildlife Divisions of
Kerala Forest Department during 2018-19

SL NO	Name of Wildlife Sanctuary/National Park	District	Division	No. of Visitors				Income generated (in rupees)
				Native	Foreigners	Students	Total	
1.	ABP range, Kottoor	Thiruvananthapuram	TVPM WL Division	76496	16154	3894	96544	3963000
2.	Neyyar WLS			45424	11658	1445	58527	7794000
3.	Peppara WLS			13692	0	20	13712	2530000
4.	Shenduruneey WLS	Kollam	Shenduruneey WLS	8719	40	930	9689	3713108
5.	Thattekad bird sanctuary	Eranakulam	Idukki WLS	55582	636	3541	59759	2998733
6.	Idukki WLS	Idukki		12106	7	0	12113	2014474
7.	Malabar Sanctuary	Kozhikode	Kozhikode	51255	34	1010	52299	1554500
8.	Wayanad WLS	Wayanad	Tholpetty EDC	32949	678	6109	39736	1335355
9.			Muthanga EDC	47964	1561	7974	57499	2034515
10.	Parambikulam Tiger Reserve	Palakkad	Parambikulam	83528	493	2471	86492	49230360
11.	Periyar East Tiger Reserve	Idukki	Thekkady in PTR	383045	30613	7742	421400	101683761
12.			Vallakkada vu PTR	13904	1223	431	15558	2158317
13.			Gavi (Safari)	12089	926	955	13970	1306685
14.	Silent Valley NP	Palakkad	Mukkali	7795	26	45	7866	1528211
15.	Eravikulam NP	Idukki	Munnar wildlife	374574	61168	8600	444342	63367761
16.	Chinnar WLS			13106	1189	0	14295	9899035
17.	Pampadum shola NP			2570	318	0	2888	1920775
18.	Chimmini WLS	Thrissur	Peechi	449	0	0	449	361800
19.	Aralam WLS	Kannur	Aralam	2678	11	2675	5364	132520
TOTAL				1237925	126735	47842	1412502	259526910

Source: Kerala Tourist Statistics (2019)

10.3 VALUE OF TOURISM IN KERALA

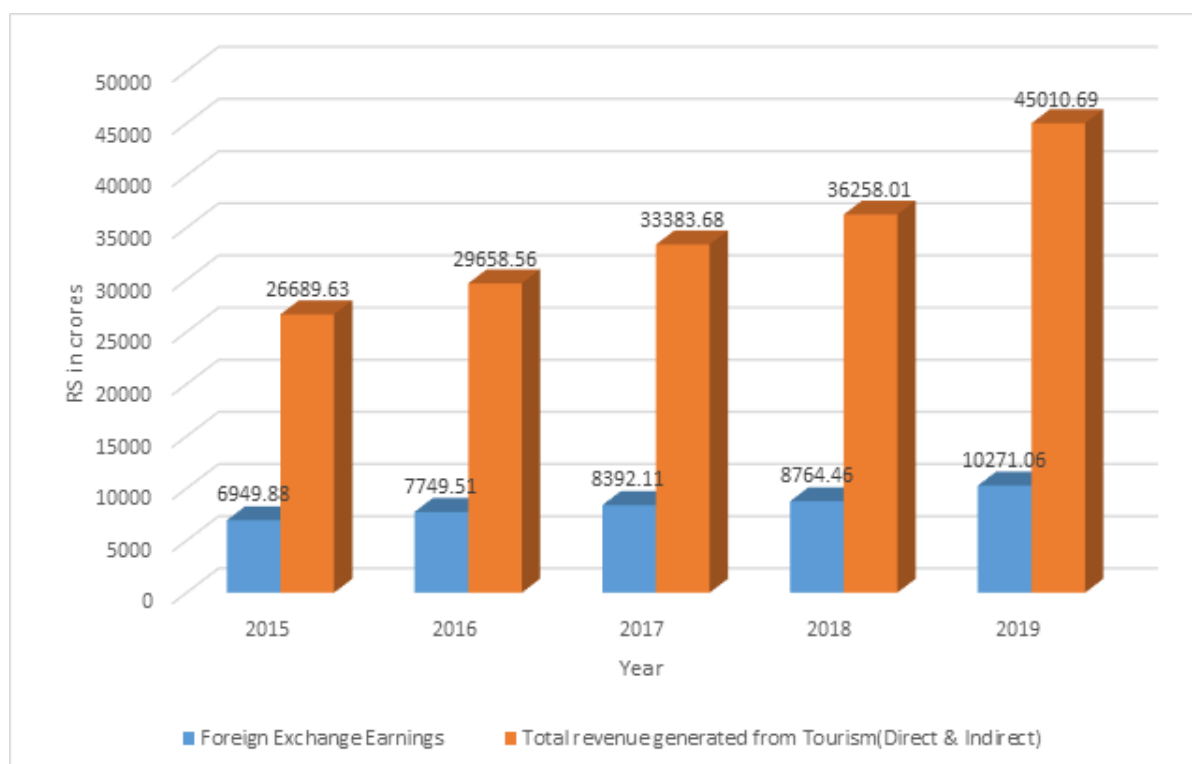
The following Table 10.6 and Figure 10.1 shows the earnings from tourism (foreign tourists and domestic tourists) over the last five years. Revenue or earnings from tourism have shown a steady growth over the last five years. In 2019, Kerala has earned Rs.10271.06 crores as foreign exchange from tourism against Rs.8764.46crores in the year 2018 showing a growth of 17.19 %.

Table 10.6
Earnings from Tourism: 2015-2019 (Rs. In Crores)

S. No	Year	Foreign Exchange Earnings	% of Increase	Earnings from Domestic Tourist	% of Increase	Total revenue generated from Tourism (Direct & Indirect)	% of Increase
1	2015	6949.88	8.61	13836.78	-	26689.63	7.25
2	2016	7749.51	11.51	15348.64	10.93	29658.56	11.12
3	2017	8392.11	8.29	17608.22	14.72	33383.68	12.56
4	2018	8764.46	4.44	19474.62	10.60	36258.01	8.61
5	2019	10271.06	17.19	24785.62	27.27	45010.69	24.14

Source: Kerala Tourist Statistics (2019)

Figure 10.1 Earnings from Tourism 2015-2019



As the value or the revenue generated from tourism substantially varied over a period between 2015 – 2019, in order to obtain an representative annual value, the cumulative average of values were considered Table 10.7).

Table 10.7

Earnings (Cumulative Average) from Tourism: 2015-2019 (Rs. In Crores)

Years	Foreign Exchange Earnings	Earnings from Domestic Tourist	Total revenue generated from Tourism (Direct & Indirect)
2015-2019	8,425	18,211	34,200

The following table 10.8 provide the details of district wise foreign exchange earnings from tourism during 2018 and 2019.

Table 10.8

District Wise Foreign Exchange Earnings from Tourism

2018 & 2019 (Rs in Crores)

S. No	Districts	Foreign Exchange Earnings (2018)	Foreign Exchange Earnings (2019)
1	Ernakulam	3902.37	4508.32
2	Thiruvananthapuram	2739.97	2680.06
3	Alappuzha	763.58	1003.37
4	Idukki	358.39	649.24
5	Kottayam	346.03	502.24
6	Malappuram	140.77	221.84
7	Kozhikode	146.99	194.37
8	Thrissur	90.59	135.46
9	Kollam	72.63	111.89
10	Wayanad	92.79	106.21
11	Kasaragod	32.95	62.75
12	Kannur	46.07	59.15
13	Palakkad	15.72	18.53
14	Pathanamthitta	15.61	17.63
	TOTAL	8764.46	10271.06

Source: Kerala Tourist Statistics (2019)



It is very clear that Ernakulam and Thiruvananthapuram are the major foreign tourists arrived districts followed by Alappuzha, Idukki and Kottayam. The foreign exchange earning of the state has increased from Rs. 8764.46 crores (2018) to Rs. 10271.06 crores (2019).

Table 10.9

Revenue from Ecotourism (Forest Department): 2018-19

S. No	Source	Revenue (Rs. In Crores)
1	22 territorial divisions	10.67
2	National Parks and wildlife sanctuaries in wildlife division	25.95

The total revenue generated by the Forest Department through eco-tourism during 2018-19 was Rs. 36.62 crore. Out of it, Rs. 10.67 crore was obtained from 22 territorial divisions and Rs. 25.95 crore through national parks and wildlife sanctuaries in the Wildlife Divisions.

Table 10.10

Total Value of Tourism and the Share of Biodiversity / Ecosystem Attributes (2019 in Crores)

S. No	Source	Amount	Biodiversity Attributed Share
1	Revenue from General Tourism (Direct and Indirect)	45,011	39,160 (87% of 45011)
2	Revenue from Ecotourism	37	37
	Total	45,048	39,197

The Share of Biodiversity / Ecosystem Attributes value of tourism out of the total revenue of tourism is estimated based on the 2019 data and it comes to Rs. 39,197 Crores.

Conclusion

It is very clear that the biodiversity / ecosystem induced tourism play a significant role in Kerala, one of the rich biodiversity States in India. Even if Kerala's most of the tourist spots are natural scenic beauty based such as: forest areas, hill stations, waterfalls, National Parks and Wildlife Sanctuaries, Dams, beaches, backwaters and estuaries, mangroves, rivers, lakes and ponds etc, very limited tourist centres only designated as eco-tourism spots. Generally, the eco-tourism projects in the biodiversity spots have been organized well with the support of the government. However, there are a number of biodiversity potential tourist spots at regional levels (which might have attracted the people) without the consent of the tourism departments or the local government. These spots may include: coastal zones (beaches, estuaries, backwaters, mangrove areas, etc.), forests and forest fringe areas (agro-forestry spots, medicinal plant gardens etc.), biodiversity heritage sites, botanical gardens, inland water bodies (lakes, tanks, etc.), waterfall areas, etc. It is important to value the tourism potential of these biodiversity spots and even the private parties and corporates can come forward. Further, even the the CSR fund can



target the development and management of the above mentioned spots for eco-tourism with the support of the local communities.

There are many biodiversity spots at regional levels, having eco-tourism potential, are not properly managed or are experiencing mis-management and degradation. Generally, tourists are going to these areas (might be a beach or hilltop) and misusing these fragile ecosystems, as the management measures are not in place. In these spots, the scope of eco-tourism development with community participation is promising and can reach a win-win situation. This will facilitate the conservation of biodiversity or rejuvenation of degraded biodiversity areas. When the local community involves itself in the conservation activities and manages eco-tourism, it emerges as an employment opportunity or livelihood option. Here the tourism development should be more inclusive with an emphasis on biodiversity conservation and sustainable use of its goods and services, particularly its scenic beauty.

In this regard, the 'Guidelines on Biodiversity and Tourism Development' developed by the CBD is promising, and the State Government should follow the principle in it. The guidelines aim at making tourism and biodiversity more mutually supportive, engaging the private sector and local and indigenous communities, and promoting infrastructure and land-use planning, based on the principles of conservation and sustainable use of biodiversity. The guidelines provide a framework addressing what the proponent of a new tourism investment or activity should do to seek approval, how the authorities should manage the approval process, and how to sustain the transition to sustainable tourism through education and capacity building (CBD, 2004).

Further, the Guidelines are conceived as a practical tool providing technical guidance to policy makers, decision makers and managers with responsibilities covering tourism and/or biodiversity, whether in the national or local government, the private sector, indigenous and local communities, non-governmental organizations and other organizations, on ways of working together with key stakeholders involved in tourism and biodiversity. To ensure their effective implementation, the Guidelines should be supported by long-term public education and awareness-raising campaigns to inform both professionals and the general public about the impacts of tourism on biological diversity and about good practices in this area, and capacity building activities.

No doubt that the guideline is extremely significance for the Tourism Department as well as the key policy makers of the Government of Kerala. It really facilitates in enhancing the tourism glory of the 'God's own country/state' in more biodiversity friendly manner.



11. 1 Industries in Kerala: A Brief Profile

Industrial sector in Kerala comprises medium and large industries, micro, small and medium enterprises (MSME) and traditional industries. The departments/agencies that deal with medium and large industries are: Kerala State Industrial Development Corporation Ltd (KSIDC), Kerala Industrial Infrastructure Development Corporation (KINFRA), Public Sector Restructuring and Internal Audit Board (RIAB), Bureau of Public Enterprises (BPE) and Centre for Management Development (CMD). The agencies dealing with MSME and traditional industries are Department of Industries and Commerce, Directorate of Handloom and Textiles, Directorate of Coir Development, Khadi and Village Industries Board and Capex. Department of Mining and Geology also comes under this sector.

Industries in Kerala: Kerala, with all its limitation, is putting efforts for speedy Industrial Development in the state. traditional industries are handloom, cashew, coir and handicrafts where the persons employed are from weaker sections of the community. Other important industries are rubber, tea, ceramics, electric and electronic appliances, telephone cables, transformers, bricks and tiles, drugs and chemicals, general engineering, plywood splints and veneers, beedi and cigar, soaps & oils, fertilizers and khadi and village industry products.

There are a number of manufacturing units for production of precision instruments, machine tools, petroleum products, paints, pulp paper, newsprint, glass and non-ferrous metals. Principal export products are cashew nut, tea, coffee, spices, lemon grass oil, seafood, rose wood and coir. The land of Kerala is endowed with a number of deposits of good quality china clay and beach sands containing a variety of valuable minerals. Heavy mineral sands and china clay contribute more than 90 percent of the total value of mineral production in the state. Kerala possesses one of the world – class deposits of mineral sands in the coastal tracts between Neendakara and Kayamkulam. Gold occurs in Kerala both as primary and placer deposits and the known occurrences are mainly in Wayanad and Nilambur regions.

1. Handicraft industry : Handicraft industry is one of the traditional industries of Kerala. Kerala has the tradition of making beautiful handicrafts with ivory, bamboo, palm leaves, seashells, wood, coconut shells, clay, cloth, coir, metals, stone, lacquer ware, and so on. Many old handicraft classics can be seen in palaces, old heritage homes and museums in the State. A vast majority of the traditional artisans belong to socially and economically backward classes. Importance of Handicraft Industries in the State are: Kerala State Handicrafts Apex Co-operative Society (SURABHI), Handicrafts Development Corporation, and Artisans Development Corporation are the major agencies for the promotion of the handicraft industry in Kerala.

2. Bamboo Industry: Bamboo is a highly productive renewable and eco-friendly resource and has several applications. It is widely used in environment protection, as a nutrient food, high-value construction material and in about 1,500 other applications. It is estimated that about 2.5 billion people use bamboo in one form or the other at the global level. Advanced research activities are conducted to utilize bamboo for efficient fuel generating system.

In Kerala, 28 species of bamboo are found. Bamboo from the Kerala forest are being supplied mainly to the pulp and rayon units under concessional rates. It is estimated that there are about one lakh people in the State dependent on bamboo for their livelihood. A unique feature of Kerala is that 67.3 percent of the extracted bamboo comes from home gardens rather than from the forests (Source:<http://www.keralabamboomission.org>).

3. Handloom Industry: Among traditional industries of Kerala, handloom sector stands second only to the coir sector in providing employment. Kerala's textile industry comprises traditional handloom sector, power loom and the spinning sector. The handloom industry in the State is mainly concentrated in Thiruvananthapuram and Kannur District and in some parts of Kozhikode, Palakkad, Thrissur, Ernakulam, Kollam and Kasaragod Districts. The industry is dominated by the co-operative sector, covering 96 per cent of total looms. The remaining 4 percent of handloom units are owned by industrial entrepreneurs.

4. Cashew: Cashew is an important commercial horticulture crop of India. The overall production of raw cashew nuts in India during 2010-11 was estimated at 653000 MT as against the estimated production of 613000 MT in 2009-10, showed an increase of 6.53 percent. Kerala has a long tradition both in cashew cultivation and cashew nut processing. Though the production of raw cashew nuts in Kerala shows an upward trend, during 2010-11 it has increased from 66000 MT in 2009-10 to 71000 MT. An estimate of domestic production of raw cashew nuts in various states during 2010-11. The total export of Cashew Kernels from India during 2010-11 was 91559 MT, valued at Rs.2598.15 crore which registered a heavy decline of 15.32 percent in quantity and 10.59 percent in value as compared to the previous year. Similarly, the total export of cashew kernels from Kerala during 2010-11 was 49692 MT valued at Rs.1417.28 crore. It showed a decreasing trend of 3.2 percent in quantity and 4.7 percent in value. Nearly 54 percent of total exports of India is from Kerala.

5. Beedi Industry: Beedi Industry in Kerala is concentrated in Kozhikkode, Kannur and Kasaragod. The Kerala Dinesh Beedi Workers Central Co-operative Society Ltd. was the only agency in the State to promote beedi industry in the organized sector. During the period under review, the society concentrated on the upliftment of units for the diversified products for the rehabilitation of about 7000 beedi workers under the society. The society distributed Rs.466.03 lakh as Relief Pension to beedi workers and Rs.600.00 lakh as gratuity to the workers who retired from service from the year 2006-07 to 30.09.2009.

As part of product diversification programme, the Society started a Dinesh Garment unit, Dinesh Umbrella unit and Dinesh Foods. Dinesh Garment unit, Thana, Kannur provided employment to 150 workers. During 2010-11, the profit of the unit was Rs.57.58 lakh and the sales turnover was Rs.6.52 lakh. Two more units of Dinesh Garment at Chala, Kannur and Cheruvathur, Kasargod which will provide employment to 250 workers were initiated functioning with training to workers and the development activities of Dinesh Cocunut milk unit is also started.

11.2 MICRO, SMALL, AND MEDIUM ENTERPRISES (MSMEs) IN KERALA

11.2.1 MSMEs in Kerala: A Brief Profile

The Micro, Small and Medium Enterprises (MSME) sector is fast emerging into a major income generating and employment providing sector in Kerala with relatively lower investment. Kerala is one of the main centres of MSMEs in the country. As per the MSME survey & Quick Results of 4th Census 5.62 % of all India share of MSME enterprise is in Kerala. MSME sector can lead the State economy by increasing exports through quality production techniques and products. Government provides various schemes in MSME sector, targeting various social groups like SC, ST, Women, Youth, and Physically Handicapped etc. In Kerala, Government and banks are providing lot of facilities for MSME Sector.

The Micro, Small and Medium Enterprises (MSME) sector is fast emerging into a major income generating and employment providing sector in Kerala with relatively lower investment. Most of the MSME's in Kerala are concentrated in the coastal zone, mainly in Ernakulam and Trivandrum.

Within the MSME Sector there is a significant increase of Micro Enterprises, both in terms of working enterprises and employment. There are over 6000 various MSME products ranging from traditional to high-tech items which are manufactured in this sector. MSMEs play a critical role in innovation, and have ability to experiment with new technologies on small scales.



However, they often suffer from funds, lack of entrepreneurial spirit, inability to take technology developments risks and face the difficulty of attracting skilled manpower. The industries coming under this sector are handicrafts, Handloom, Khadi, Food processing industries, Garment making and Textile industries, industries related to coir/wood/bamboo/Plastic/rubber/ leather/clay products etc. District wise MSME units with Udyog Aadhaar Number as on 31-03-2018 is given below (Table 11.1):

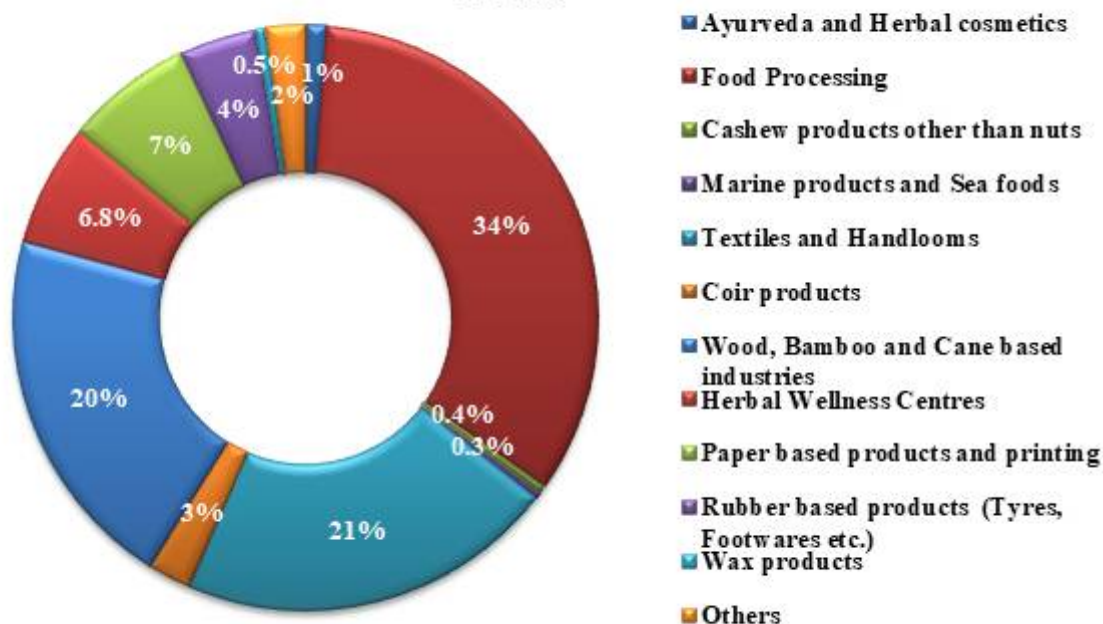
Table 11.1 MSME units with Udyog Aadhaar Number as on 31-03-2018										
District Name		Manufacturing				Services			Total	Grand Total
		Micro	Small	Medium	Total	Micro	Small	Medium		
1	Thiruvananthapuram	5030	366	15	5411	4525	798	15	5338	10749
2	Kollam	2778	315	11	3104	823	188	6	1017	4121
3	Pathanamthita	1047	95	10	1152	426	68	0	494	1646
4	Alappuzha	2975	304	31	3310	838	156	10	1004	4314
5	Kottayam	1860	245	13	2118	868	198	7	1073	3191
6	Idukki	757	65	4	826	269	56	1	326	1152
7	Ernakulam	5242	1402	57	6701	3364	990	35	4389	11090
8	Thrissur	3515	432	21	3968	1455	328	9	1792	5760
9	Palakkad	1699	327	23	2049	762	126	14	902	2951
10	Malappuram	1867	269	5	2141	452	122	3	577	2718
11	Kozhikode	2055	295	13	2363	601	193	6	800	3163
12	Wayanad	442	63	1	506	111	30	0	141	647
13	Kannur	1589	245	11	1845	513	108	4	625	2470
14	Kasargod	662	94	0	756	285	76	1	362	1118
Total		31518	4517	215	36250	15292	3437	111	18840	55090

Source: Directorate of Industries & Commerce

Table 11.2 BIORESOURCE BASED ENTERPRISES PROFILE – KERALA

Sl.No.	Categories	Number of Enterprises
1	Ayurveda and Herbal cosmetics	586
2	Food Processing	15927
3	Cashew products other than nuts	207
4	Marine products and Sea foods	174
5	Textiles and Handlooms	9964
6	Coir products	1159
7	Wood, Bamboo and Cane based industries	9629
8	Herbal Wellness Centres	3245
9	Paper based products and printing	3317
10	Rubber based products (Tyres, Footwares etc.)	2023
11	Wax products	254
12	Others	1056
TOTAL		47541

Figure 11.1 Percentage of Bioresources Based Enterprises, Kerala

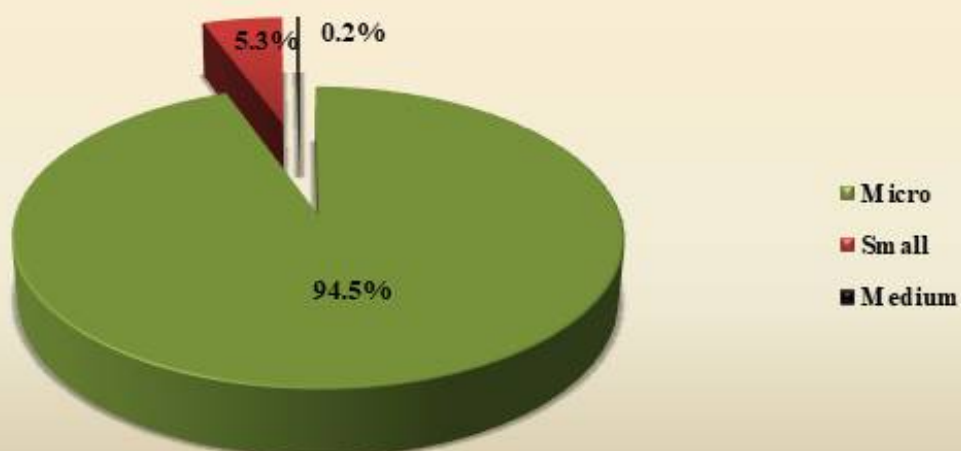


- Maximum bio-resource-based enterprises belong to the food processing category (15927).
- Textiles-Handlooms and wood based industries are the 2nd and 3rd largest enterprises in Kerala.
- The least number of MSME enterprises are in the 'Marine and Sea Foods category' (174).

Table 11.3 Proportion of Micro, Small, and Medium Enterprises

Sl. No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	533	47	6	586
2	Food Processing	15068	804	55	15927
3	Cashew products other than nuts	202	5	0	207
4	Marine products and Sea foods	98	66	10	174
5	Textiles and Handlooms	9785	166	13	9964
6	Coir products	1096	53	10	1159
7	Wood, Bamboo and Cane based industries	8921	698	10	9629
8	Herbal Wellness Centres	3218	26	1	3245
9	Paper based products and printing	3010	296	11	3317
10	Rubber based products (Tyres, Foot wares etc.)	1713	303	7	2023
11	Wax products	254	5	0	259
12	Others	1008	40	3	1051
	TOTAL	44906 (94.45%)	2509 (5.27%)	126 (0.26%)	47541 (100%)

Figure 11.2 Proportion of Micro Small and Medium Enterprises

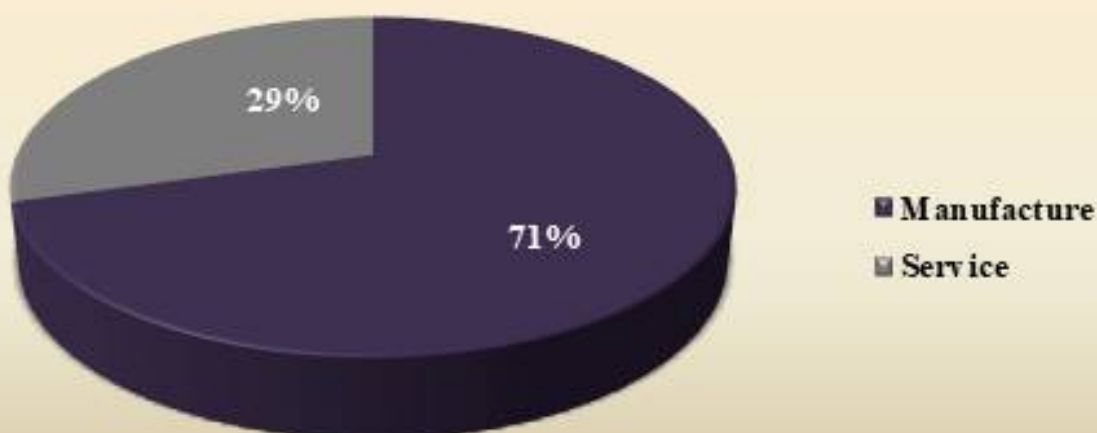


- Maximum enterprises (94.5%) are in the category micro enterprises. 5.3% enterprises are in the small category and only 0.2% enterprises are in the medium category.

Table 11.4 Proportion of Manufacture and Service based Enterprises

Sl. No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	489	45	534
2	Food Processing	12400	3007	15407
3	Cashew products other than nuts	207	0	207
4	Marine products and Sea foods	135	38	173
5	Textiles and Handlooms	5139	4430	9569
6	Coir products	1104	48	1152
7	Wood, Bamboo and Cane based industries	8298	974	9272
8	Herbal Wellness Centres	201	3052	3253
9	Paper based products and printing	1978	1101	3079
10	Rubber based products (Tyres, Footwares etc.)	1366	646	2012
11	Wax products	252	2	254
12	Others	881	157	1038
	TOTAL	32450 (70.62%)	13500 (29.38%)	45950 (100%)

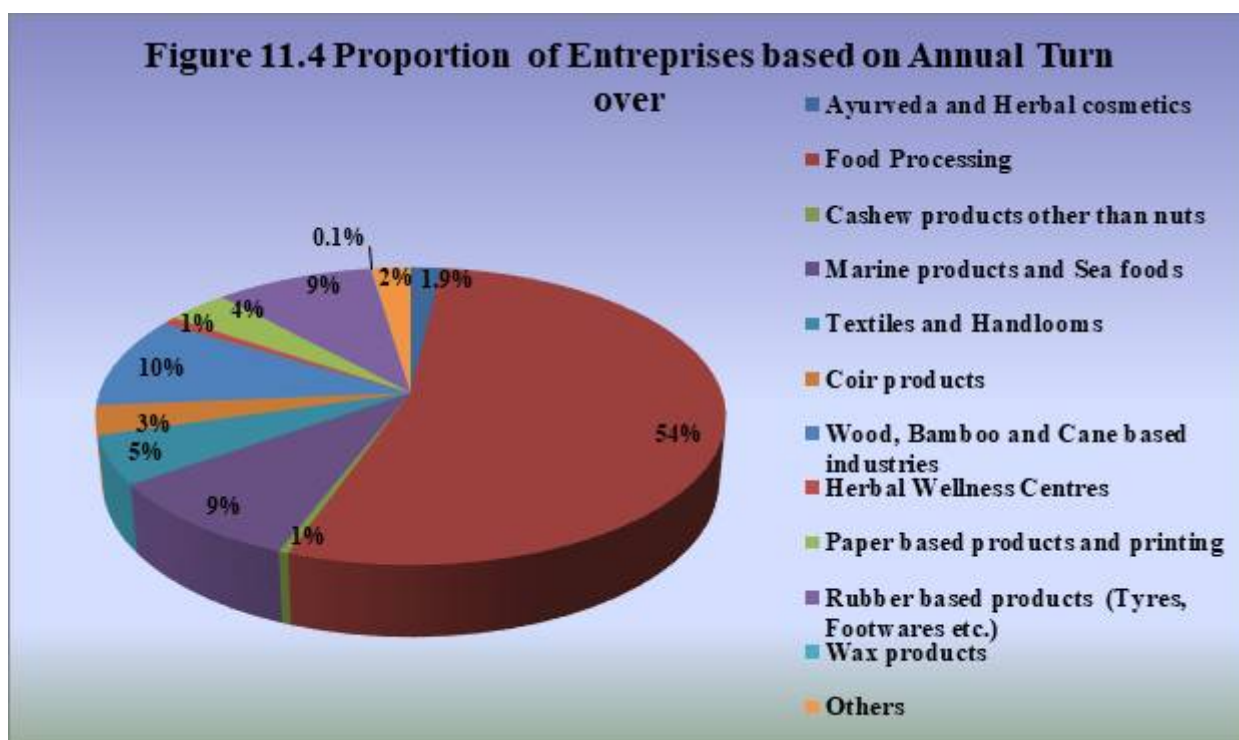
Figure 11.3 Proportion of Manufacture and Service based industries



- Manufacturing/ Servicing details are not available for Palakkad (1082) and Kasargod (483) districts. By considering remaining 12 districts majority of enterprises are in manufacturing sector (71 %).
- In food processing, textiles, and wood-based enterprises there is a higher proportion of manufacturing activity.
- In the Herbal wellness centres, the maximum enterprises are service-based ones.

Table 11.5 Annual Turnover from different categories of Bioresource-based Enterprises

Sl. No.	Category	Annual Turnover	
		Rs. in Lakh	%
1	Ayurveda and Herbal cosmetics	43648.74	1.90
2	Food Processing	1287608.39	53.62
3	Cashew products other than nuts	10554.00	0.44
4	Marine products and Sea foods	224992.61	9.24
5	Textiles and Handlooms	125492.73	5.23
6	Coir products	76682.40	3.19
7	Wood, Bamboo and Cane based industries	238901.98	9.95
8	Herbal Wellness Centres	20844.79	0.87
9	Paper based products and printing	88400.70	3.68
10	Rubber based products (Tyres, Foot wares etc.)	226636.84	9.44
11	Wax products	1220.08	0.10
12	Others	56211.11	2.34
	TOTAL	2401194.36	100

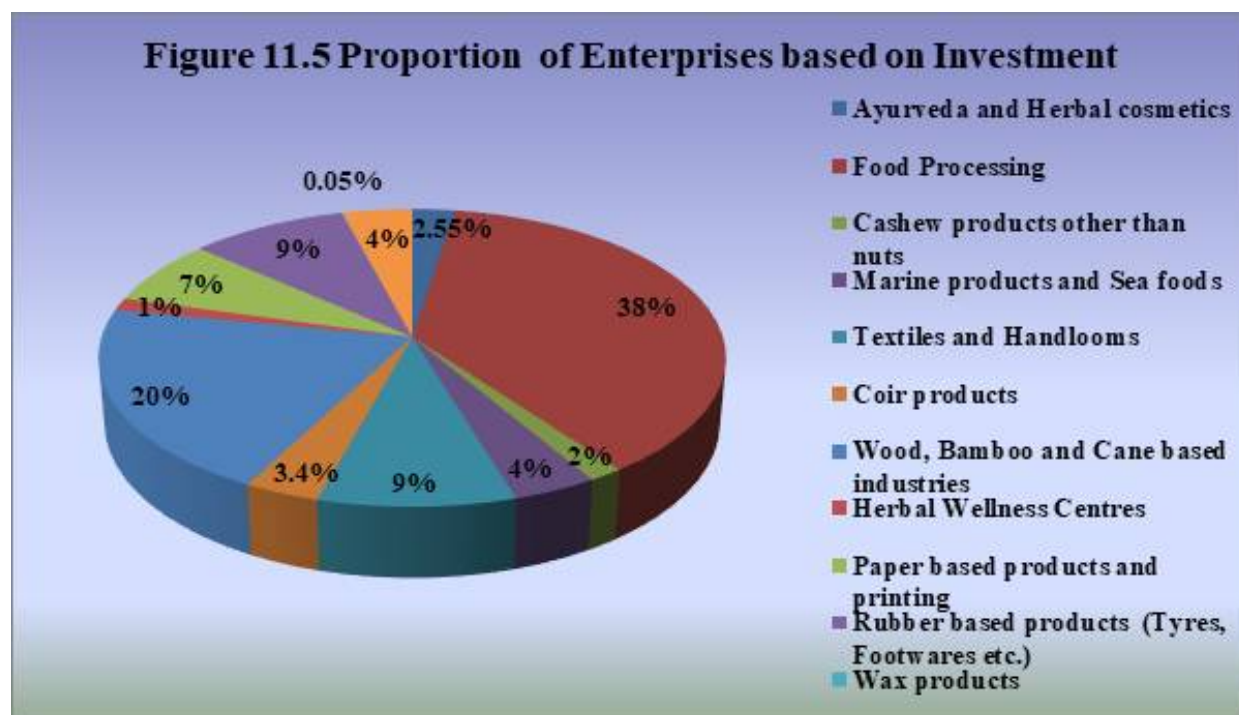


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 54% of total annual turnover of Kerala.
- The percentage share of 'Marine products and seafood categories' and 'Rubber based products' to the total annual turnover is much higher despite the lower number of enterprises in these categories.
- The lowest percentage share to total annual turnover is for the 'Wax products', 'Cashew other than nuts' and 'Herbal wellness centres', and this could be attributed to a lower number of enterprises in this category.

Table 11.6 Total Investment in different categories of Bioresource-based Enterprises

Sl. No	Category	Total Investment	
		Rs. in Lakh	%
1	Ayurveda and Herbal cosmetics	22418.72	2.55
2	Food Processing	332645.79	37.41
3	Cashew products other than nuts	13868.00	1.53
4	Marine products and Sea foods	34043.52	3.83
5	Textiles and Handlooms	79538.72	8.95
6	Coir products	30316.82	3.41
7	Wood, Bamboo and Cane based industries	181068.07	20.37
8	Herbal Wellness Centres	12130.09	1.36
9	Paper based products and printing	63240.06	7.11
10	Rubber based products (Tyres, Foot wares etc.)	82737.25	9.31
11	Wax products	436.13	0.05
12	Others	36665.59	4.12
	TOTAL	889108.75	100

Figure 11.5 Proportion of Enterprises based on Investment

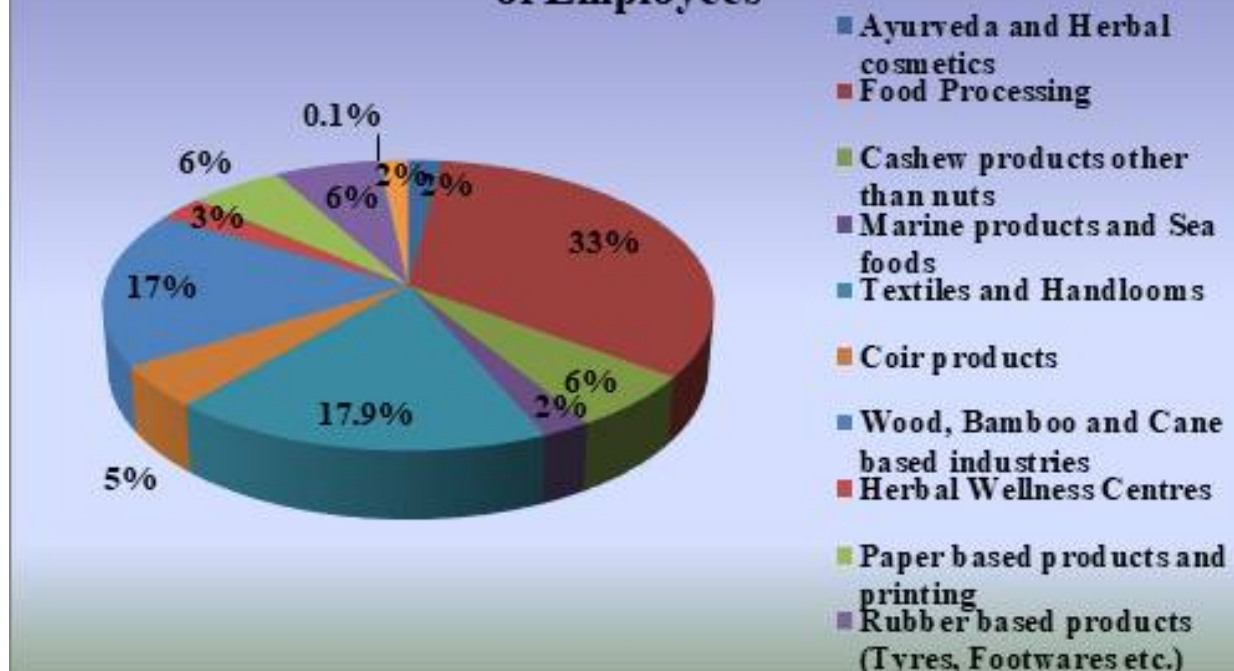


- The total investment is also highest in the Food processing category (38%)
- 'Wood, Bamboo and Cane based industries' contribute 20% in total investment.
- The 'Wax products', 'Cashew other than nuts' and 'Herbal Wellness centres' having the lowest annual turnover is also having a low total investment comparatively.

**Table 11.7
Total number of employees in different
categories of Bioresource-based Enterprises**

Sl. No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	4986	2.03
2	Food Processing	81403	33.07
3	Cashew products other than nuts	15147	6.15
4	Marine products and Sea foods	5618	2.28
5	Textiles and Handlooms	44033	17.89
6	Coir products	11640	4.73
7	Wood, Bamboo and Cane based industries	42877	17.42
8	Herbal Wellness Centres	6727	2.73
9	Paper based products and printing	13770	5.59
10	Rubber based products (Tyres, Footwares etc.)	15462	6.28
11	Wax products	367	0.15
12	Others	4113	1.67
	TOTAL	246143	100

Figure 11.6 Proportion of MSME's based on no. of Employees



- The number of employees is also higher in 'Food processing' sector.
- "Textiles and handlooms" sector and 'Wood-based industries' sector comes next to 'Food processing' sector.
- 'Wax products' 'Marine products and seafoods' sector, 'Coir' sector and 'Ayurveda and Herbal cosmetic' sectors have a lower share in number of employees mainly because of less number of enterprises in these sectors.

Table 11.8
Classification based on year of establishment
of various Enterprises

Sl. No.	Category	before 2000	2000 - 2010	2011 - 2020	Date not available	Total
1	Ayurveda and Herbal cosmetics	22	77	80	407	586
2	Food Processing	658	1357	2264	11648	15927
3	Cashew products other than nuts	0	0	0	207	207
4	Marine products and Sea foods	22	26	44	82	174
5	Textiles and Handlooms	377	679	1597	7311	9964
6	Coir products	265	218	323	353	1159
7	Wood, Bamboo and Cane based industries	592	538	639	7860	9629
8	Herbal Wellness Centres	16	115	590	2524	3245
9	Paper based products and printing	109	180	384	2644	3317
10	Rubber based products (Tyres, Footwares etc.)	36	61	130	1796	2023
11	Wax products	21	0	158	0	179
12	Others	28	69	124	835	1056
	Total	2146	3395	6333	35667	47541

- These details are available only for Thiruvananthapuram, Alappuzha, Kozhikode and Kannur districts. Remaining 10 districts are considered in data not available column.

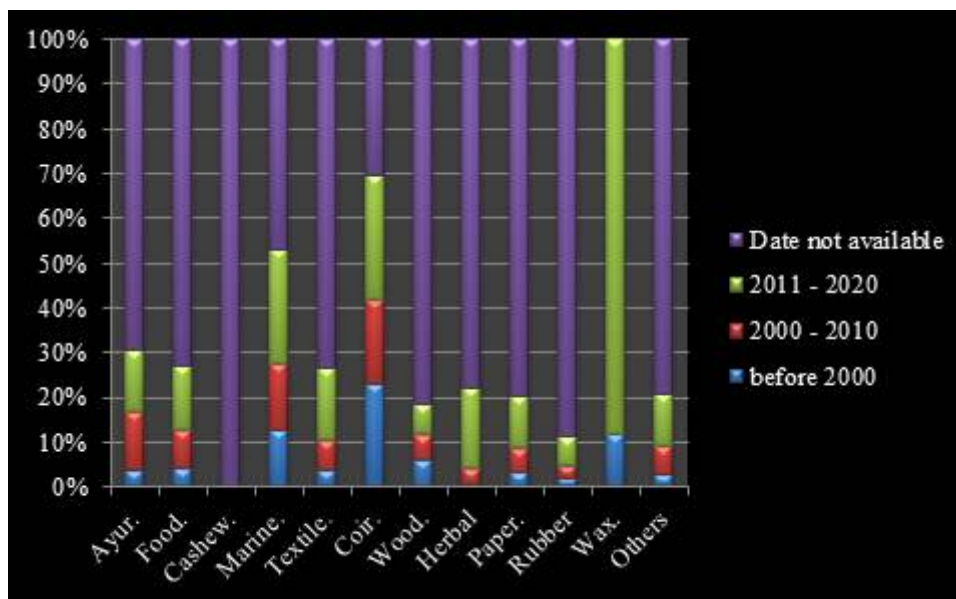
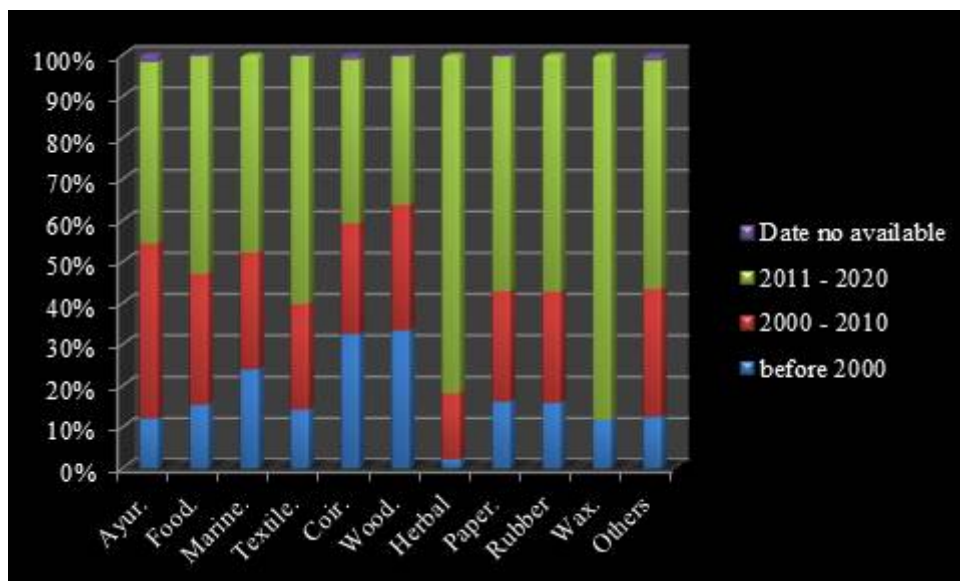


Figure 11.7
Proportion of MSME's based on year of establishment of various Enterprises
(Thiruvananthapuram, Alappuzha Kozhikode and Kannur)



11.2.2 BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

THIRUVANANTHAPURAM

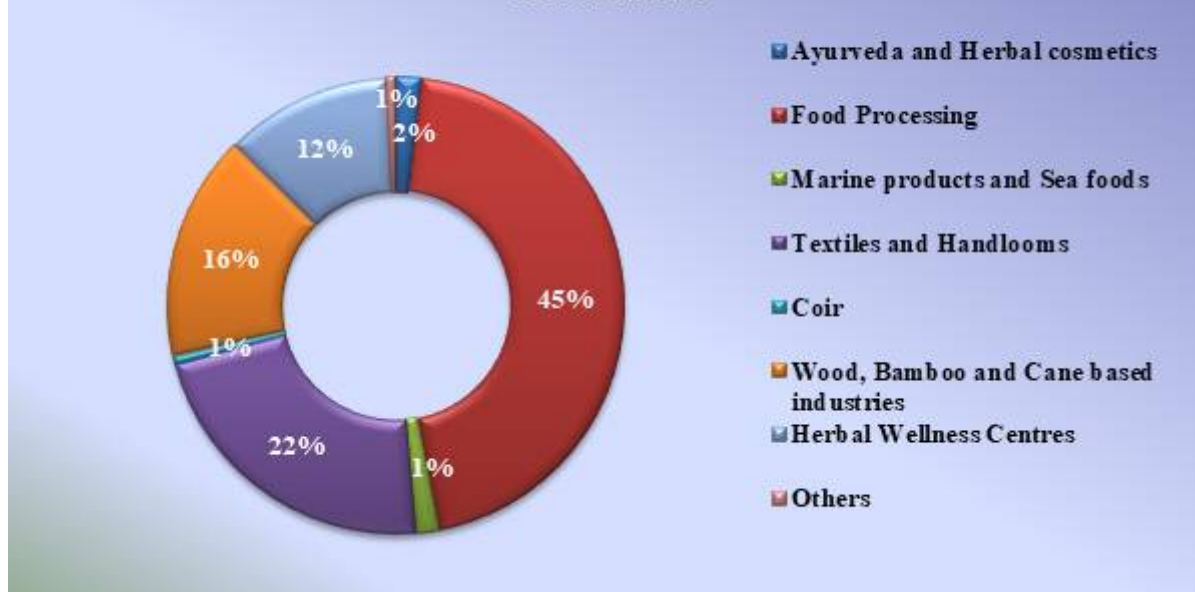
Total number of Bioresource based Enterprises: 1506

Table 11.9 Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	27
	a. Ayurvedic medicines	14
	b. Herbal cosmetics	2
	c. Ayurvedic oils/Thailams	3
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	8
2	Food Processing	680
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	143
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	397
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	13
	d. Value added products (Pickle, Pappad etc)	28
	e. Meat Processing (Chicken, Meat)	27
	f. Copra and Coconut oil	18
	g. Restaurants Hotels and Catering	40
	h. Milk/Dairy products	7
	i. Others (Food Industry etc.)	7
3	Marine products and Sea foods	25
	a. Dry Fish	4
	b. Fish Meat/Oil	21
4	Textiles and Handlooms	332
	a. Cotton	39
	b. Others	296
5	Coir	10
	a. Coir Fibre	4
	b. Coir Products	6
6	Wood, Bamboo and Cane based industries	240
	a. Wood items/furniture/saw mill	189
	b. Bamboo and cane furniture	51
7	Herbal Wellness Centers	178
8	Others	11
	a. Pet animals	5
	b. Flower Arrangements and business	4
	c. Rubber based products	2



Figure 11.8 Percentage of Bioresources Based Enterprises, Trivandrum



- Maximum bio-resource-based Enterprises belong to the Food processing category (680).
- Textiles-Handlooms and Wood based industries are the 2nd and 3rd largest enterprises in Trivandrum
- The least number of Enterprises are in the 'Coir' sector (10).

**Table 11.10
Proportion of Micro, Small, and Medium Enterprises**

Sl.No.	Category	Micro	Small	Medium	Total
1.	Ayurveda and Herbal cosmetics	24	2	1	27
2.	Food Processing	655	20	5	680
3.	Marine products and Sea foods	24	1	0	25
4.	Textiles and Handlooms	321	11	3	335
5.	Coir	10	0	0	10
6.	Wood, Bamboo and Cane based industries	230	5	5	240
7.	Herbal Wellness Centres	174	4	0	178
8.	Others	9	2		11
	Total	1447 (96.1%)	45 (3%)	14 (0.9)	1506 (100%)

- Maximum enterprises (96%) are in the category micro enterprises. 3% enterprises are in the small category and only 1% enterprises are in the medium category.

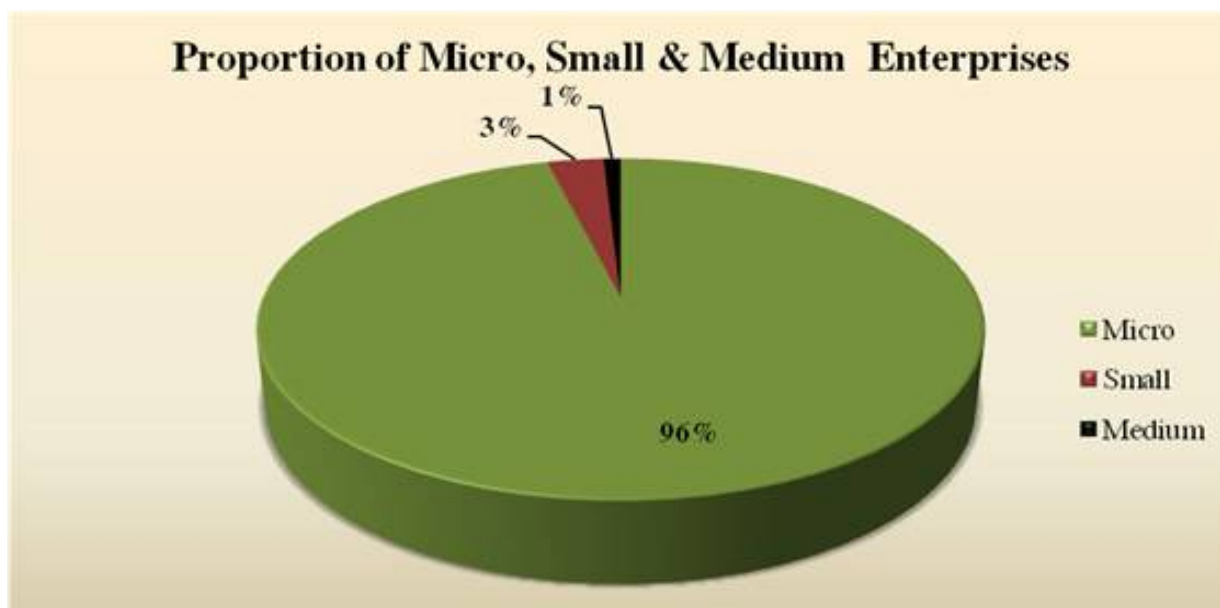
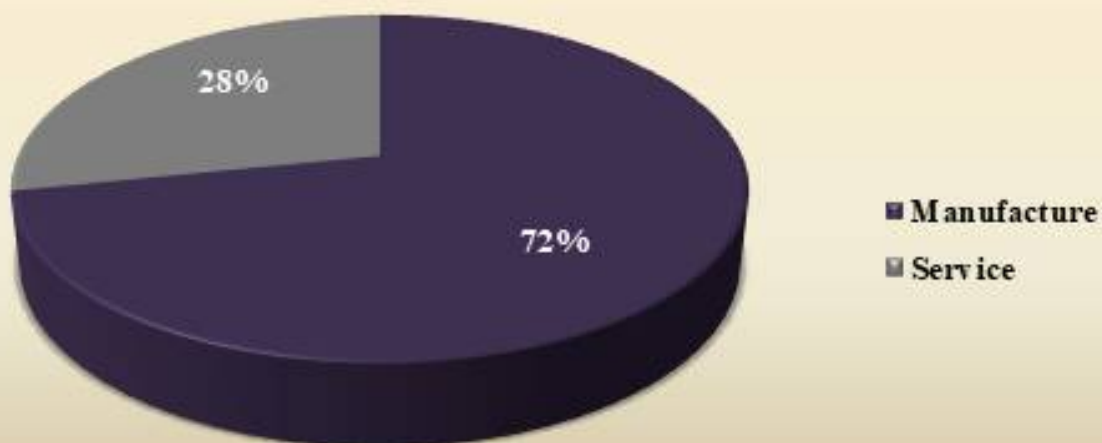


Table 11.11 Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1.	Ayurveda and Herbal cosmetics	20	7	27
2.	Food Processing	532	148	680
3.	Marine products and Sea foods	11	14	25
4.	Textiles and Handlooms	268	67	335
5.	Coir	9	1	10
6.	Wood, Bamboo and Cane based industries	225	15	240
7.	Herbal Wellness Centers	14	164	178
8.	Others	2	9	11
	Total	1081 (71.78 %)	425 (28.22 %)	1506 (100%)



Figure 11.10 Proportion of Manufacture and Service based industries



- Majority of enterprises are in manufacturing sector.
- In Food Processing, Textiles, and wood-based enterprises there is a higher proportion of manufacturing activity.
- In the Herbal wellness centres, the maximum enterprises are service-based ones.

**Table 11.12
Annual Turnover from different categories of
Bioresource-based Enterprises**

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	1,228	3.723
2	Food Processing	16989.86	51.485
3	Marine products and Sea foods	306.57	0.929
4	Textiles and Handlooms	2259.74	6.848
5	Coir	236.2	0.716
6	Wood-based industries	3390.67	10.275
7	Herbal Wellness Centers	1349.09	4.088
8	Others	7239.02	21.937
	Total	32999.62	100.000

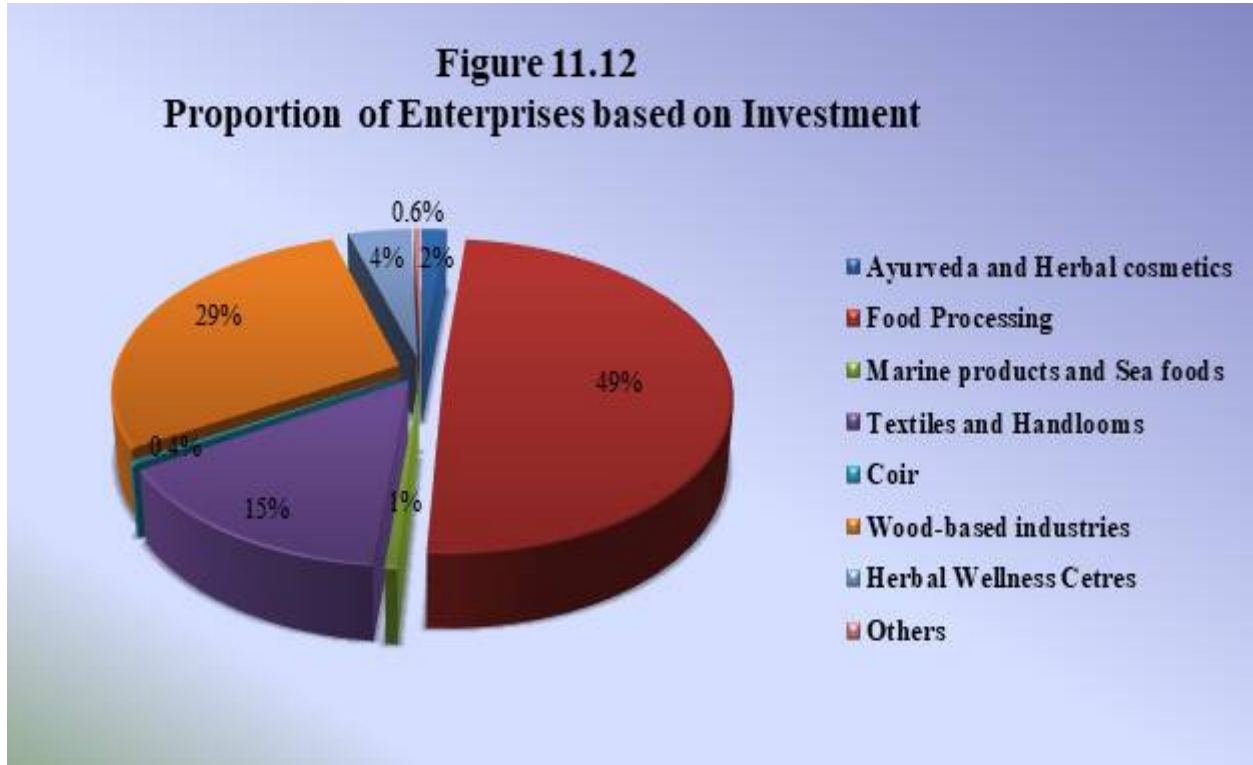
Figure 11.11
Proportion of Entreprises based on Annual Turn over



- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 51% of total annual turnover.
- The percentage share of 'Ayurveda and Herbal cosmetic enterprises' and 'Marine products and seafood categories' to the total annual turnover is much higher despite the lower number of enterprises in these categories.
- The lowest percentage share to total annual turnover is for the Coir enterprises and this could be attributed to a lower number of enterprises in this category.

Table 11.13
Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	355.00	1.64
2	Food Processing	10704.95	49.35
3	Marine products and Sea foods	127.00	0.59
4	Textiles and Handlooms	3167.00	14.60
5	Coir	82.00	0.38
6	Wood-based industries	6262.30	28.87
7	Herbal Wellness Centers	905.00	4.17
8	Others	88.03	0.41
	Total	21691.28	100.00

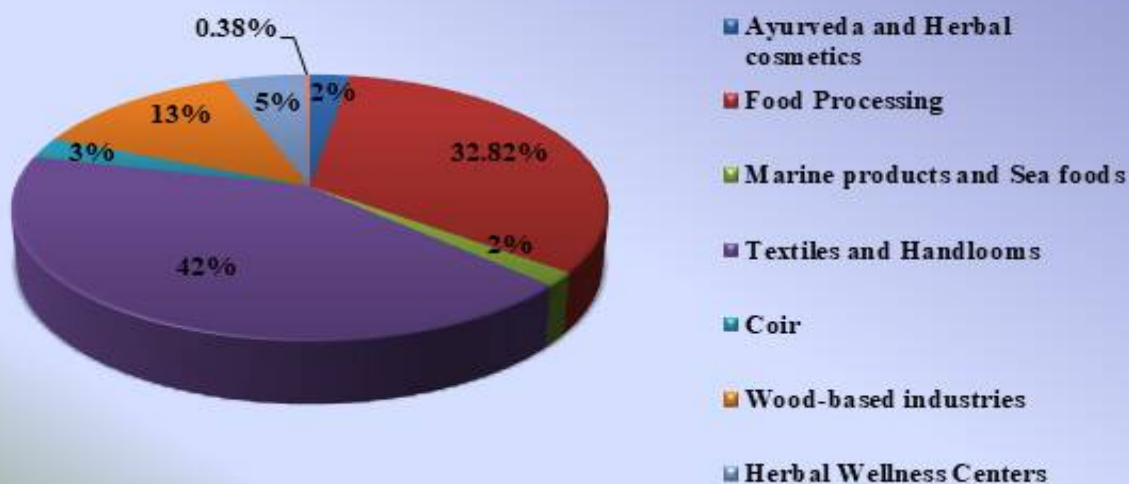


- The total investment is also highest in the Food processing category which is immediately followed by Textiles-handloom industries.
- 'Herbal Wellness Centres' also contribute more in a total investment of all the bio-resource based enterprises
- The 'Ayurveda and herbal cosmetics' category and 'Marine products and sea foods' category which had higher annual turnover are having a low total investment comparatively.

Table 11.14
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	191	2.51
2	Food Processing	2498	32.82
3	Marine products and Sea foods	125	1.64
4	Textiles and Handlooms	3185	41.84
5	Coir	194	2.55
6	Wood-based industries	1002	13.16
7	Herbal Wellness Centers	388	5.10
8	Others	29	0.38
	Total	7612	100

Figure 11.13
Proportion of MSME's based on no. of Employees

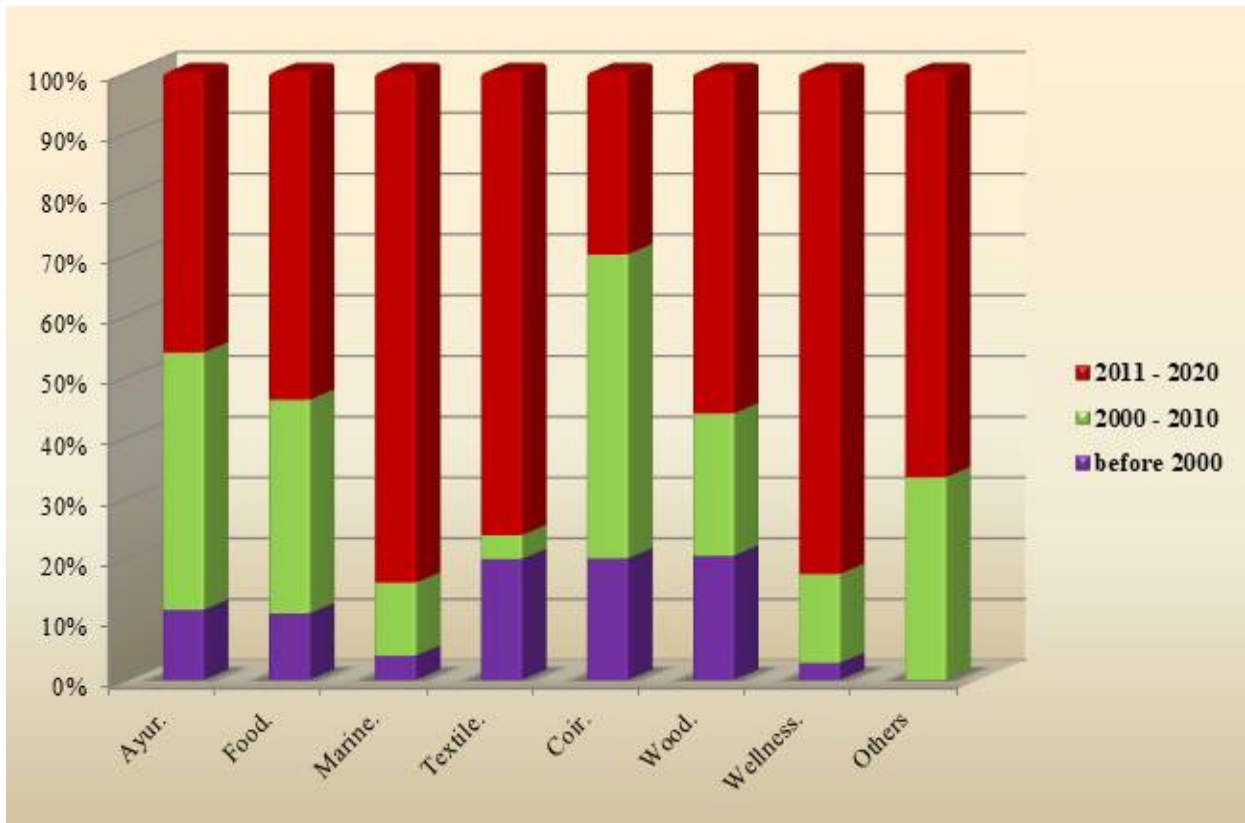


- Interestingly, the number of employees is higher in 'Textiles and handlooms' sector despite the lower number of enterprises than the food processing sector.
- 'Food processing' sector and 'Wood-based industries' sector comes next to 'Textiles and Handlooms sector'
- 'Marine products and seafoods' sector, 'Coir' sector and 'Ayurveda and Herbal cosmetic' sectors have a lower share in number of employees mainly because of less number of enterprises in these sectors

Table 11.15
Classification based on year of establishment of various Enterprises

Sl.No.	Category	before 2000	2000 - 2010	2011 - 2020	Date not available	Total
1	Ayurveda and Herbal Cosmetics	3	11	12	1	27
2	Food Processing	74	237	364	5	680
3	Marine Products and Sea foods	1	3	21		25
4	Textiles and Handlooms	66	13	253	3	335
5	Coir	2	5	3		10
6	Wood, Bamboo and Cane based Industries	48	55	132	5	240
7	Herbal Wellness Centers	5	26	147		178
8	Others		3	6	2	11
	Total	199	353	938	16	1506

Figure 11.14
Classification based on year of establishment of various Enterprises



- Maximum number of enterprises established between 2011 and 2020.
- Herbal Wellness Centers are established after 2000



**BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)
KOLLAM**

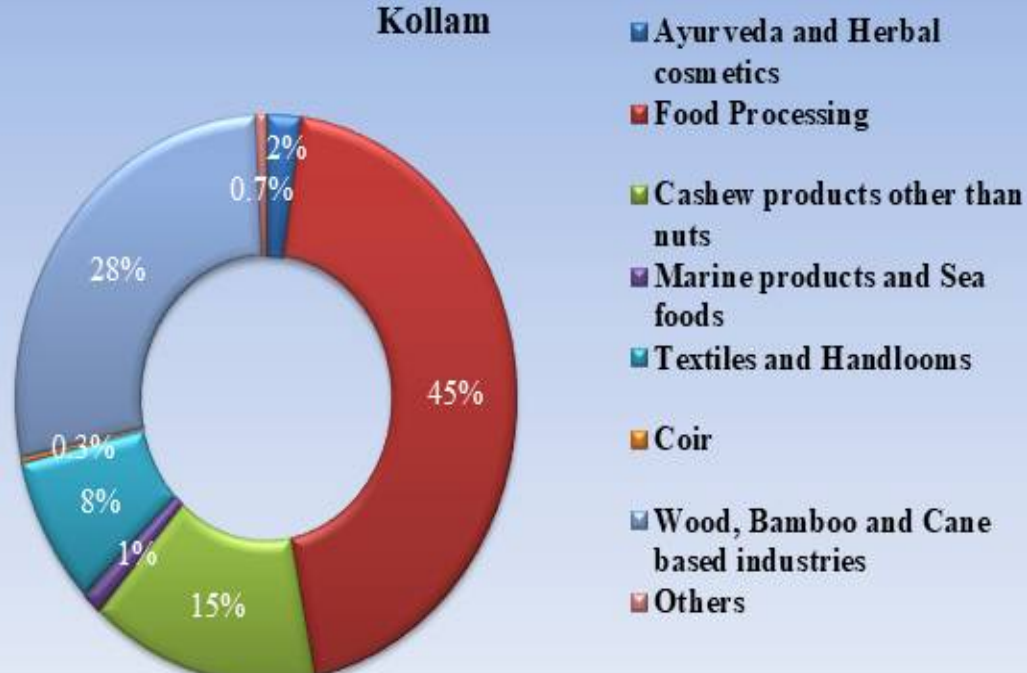
Total number of Bioresource based Enterprises: 1412

Table 11.16 Category-wise number of Enterprises:

SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	32
	a. Ayurvedic medicines	27
	b. Herbal cosmetics	1
	c. Ayurvedic oils/Thailams	2
	d. Other Herbal Products	2
2	Food Processing	630
	a. Bakery Products (Sweets, ice cream, nuts, snacks, soft drinks, other bakery items, etc)	337
	j. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	62
	k. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	16
	l. Value added products (Pickle, Pappad etc)	39
	m. Copra, Coconut oil and other coconut products like powder	34
	n. Milk/Dairy products	4
	o. Spices	5
	p. Other Vegetable oils	9
	q. Honey	2
	r. Others (Food Industry etc.)	122
	3	Cashew products other than nuts
4	Marine products and Sea foods	18
	a. Fish products and processing	18
5	Textiles and Handlooms	120
	a. Cotton	50
	b. Others (Textile products, garments and tailoring, etc.)	70
6	Coir	4
	a. Coir Fibre	2
	b. Coir Products	2
7	Wood, Bamboo and Cane based industries	391
	a. Wood items/furniture/saw mill	386
	b. Bamboo and cane products, furnitures	5
8	Others	10
	a. Flower Arrangements and business	4
	b. Handicrafts made out of bioresources	6
	Total	1412



Figure 11.15 Percentage of Bioresources Based Enterprises, Kollam

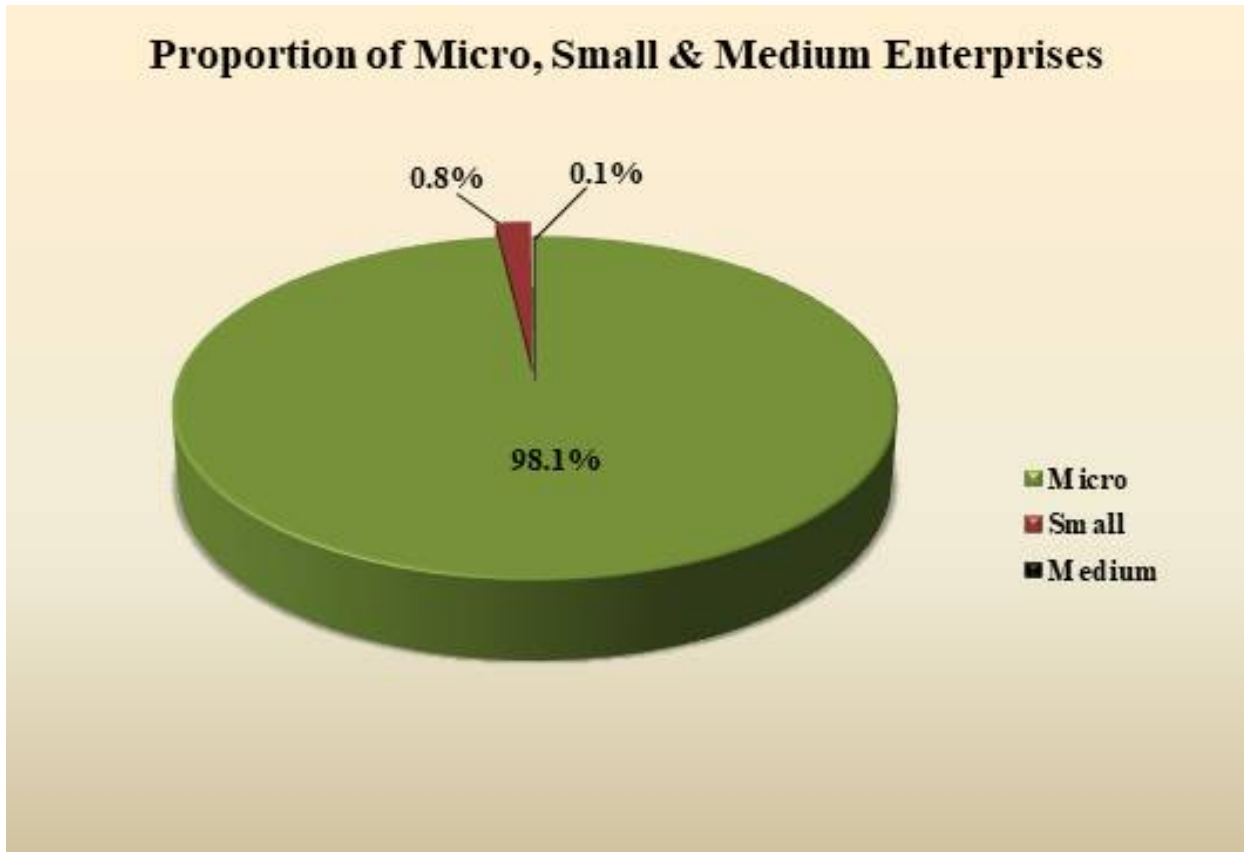


- Maximum bio-resource-based Enterprises belong to the Food processing category (630).
- Wood, Bamboo, Cane based (391) and Cashew products other than nuts (207) enterprises are the 2nd and 3rd largest enterprises in Kollam.
- The least number of Enterprises are in the 'Coir' sector (4).

**Table 11.17
Proportion of Micro, Small, and Medium Enterprises**

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	29	3		32
2	Food Processing	614	15	1	630
3	Cashew products other than nuts	202	5		207
4	Marine products and Sea foods	15	3		18
5	Textiles and Handlooms	120	0		120
6	Coir	4	0		4
7	Wood, Bamboo and Cane based industries	391	0		391
8	Others	10	0		10
	Total	1385 (98.1%)	26 (1.8%)	1 (0.1%)	1412 (100%)

Figure 11.16

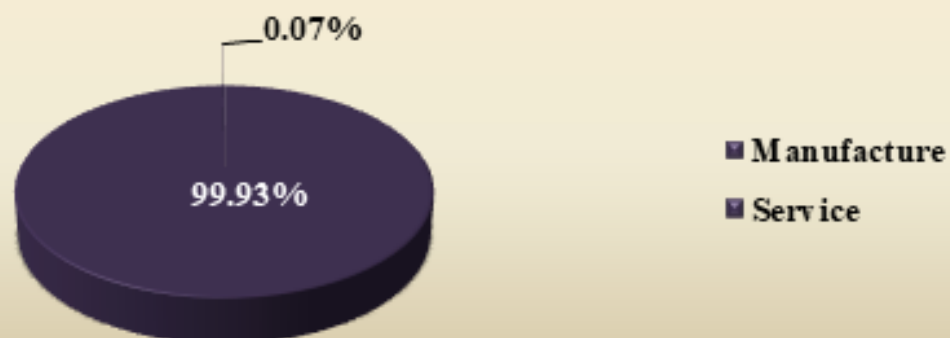


- Maximum enterprises (98.1%) are in the category micro enterprises. 0.8% enterprises are in the small category and only 0.1% enterprises are in the medium category.

Table 11.18 Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	32		32
2	Food Processing	629	1	630
3	Cashew products other than nuts	207		207
4	Marine products and Sea foods	18		18
5	Textiles and Handlooms	120		120
6	Coir	4		4
7	Wood, Bamboo and Cane based industries	391		391
8	Others	10		10
	Total	1411 (99.93%)	1 (0.07%)	1412 (100%)

Figure 11.17
Proportion of Manufacture and Service based Enterprises

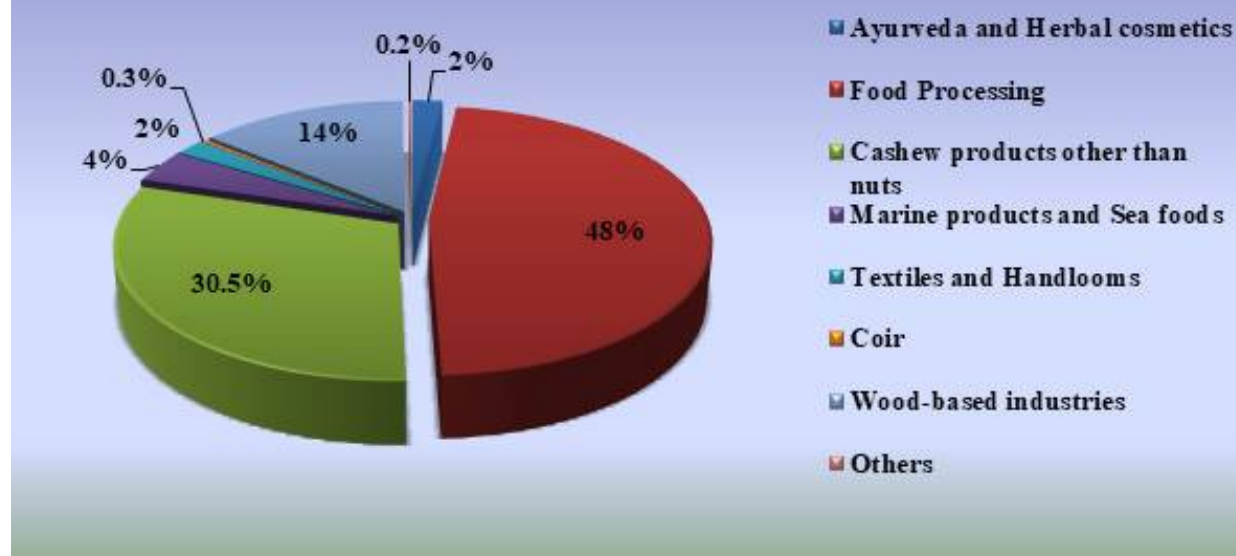


- In Kollam, 99.9% of MSME enterprises are under manufacturing category.
- In Food processing, Textiles-Handloom, Wood-based and Cashew products other than nuts enterprises there is a higher proportion of manufacturing activity.

Table 11.19
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	625.00	1.80
2	Food Processing category	16578.44	47.82
3	Cashew products other than nuts	10554.00	30.45
4	Marine products and Sea foods	1191.98	3.44
5	Textiles and Handlooms	698.05	2.01
6	Coir	99.29	0.29
7	Wood, Bamboo and Cane based industries	4856.35	14.01
8	Others	62.00	0.18
	Total	34665.11	100

Figure 11.18
Proportion of Entreprises based on Annual Turnover

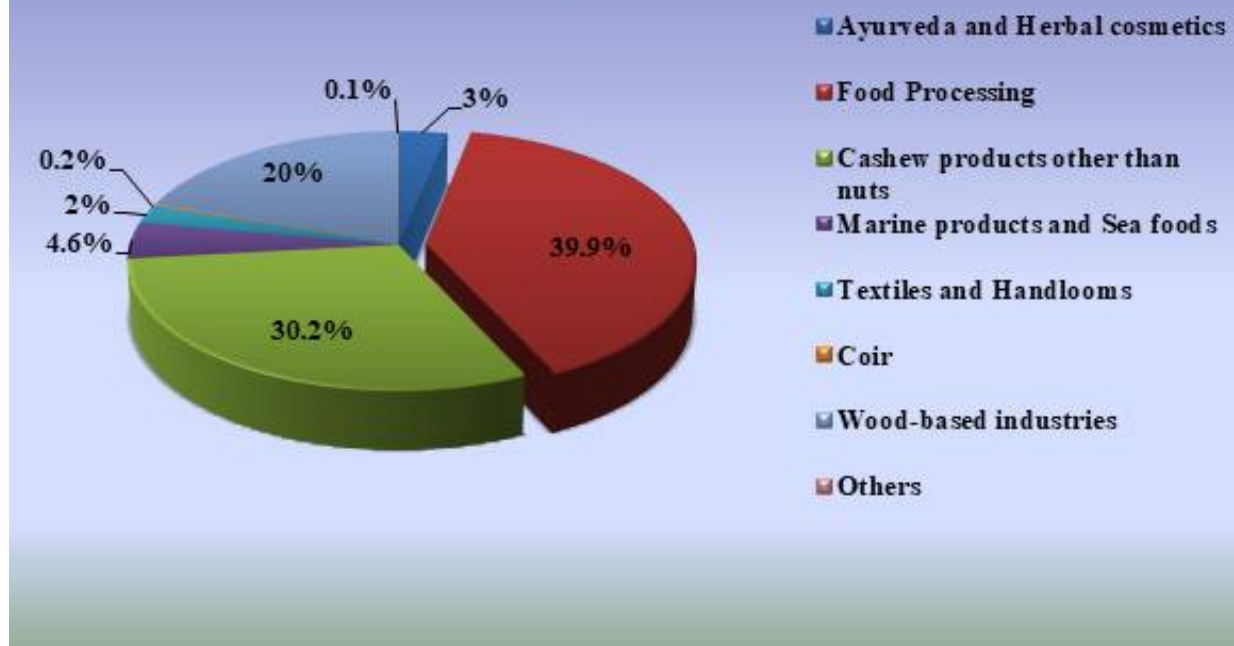


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 47.82% of total annual turnover.
- Cashew products other than nuts (30.45%) industries having the 2nd position in annual turn over.
- The lowest percentage share to total annual turnover is for the Coir sector (0.29%) and this could be attributed to a lower number of enterprises in this category..

Table 11.20
Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	1492.00	3.25
2	Food Processing category	18326.50	39.87
3	Cashew products other than nuts	13868.00	30.17
4	Marine products and Sea foods	2131.75	4.64
5	Textiles and Handlooms	1028.50	2.24
6	Coir	111.00	0.24
7	Wood, Bamboo and Cane based industries	8973.00	19.52
8	Others	37.00	0.08
	Total	45967.75	100.00

Figure 11.19
Proportion of Enterprises based on Investment

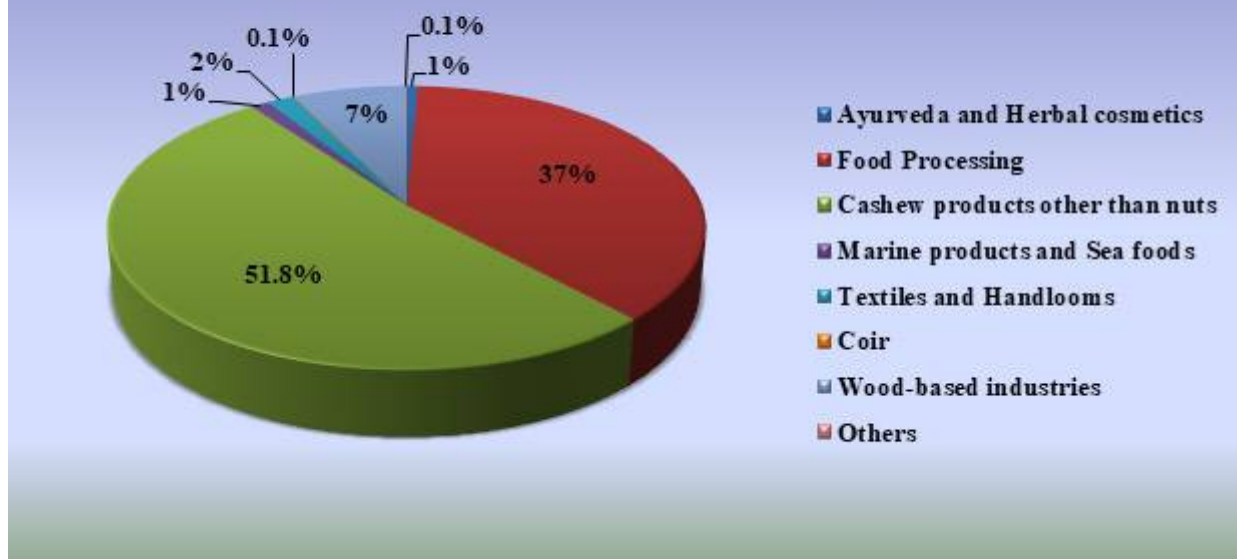


- The total investment is highest in the Food processing category (39.87%) which is immediately followed by Cashew products other than nuts (30.17%).
- The Coir sector (0.24%) had lower annual turnover also having a low total investment comparatively.

Table 11.21
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal cosmetics	212	0.73
2	Food Processing category	10901	37.31
3	Cashew products other than nuts	15147	51.84
4	Marine products and Sea foods	332	1.14
5	Textiles and Handlooms	506	1.73
6	Coir	40	0.14
7	Wood, Bamboo and Cane based industries	2054	7.03
8	Others	29	0.10
	Total	29221	100

Figure 11.20
Proportion based on no. of Employees



- Cashew products other than nuts (51.8 %) category have higher share in number of employees because Kollam is the India's cashew processing hub.
- Coir sector have lower share in number of employees mainly because of less number of enterprises in these sectors in Kollam.

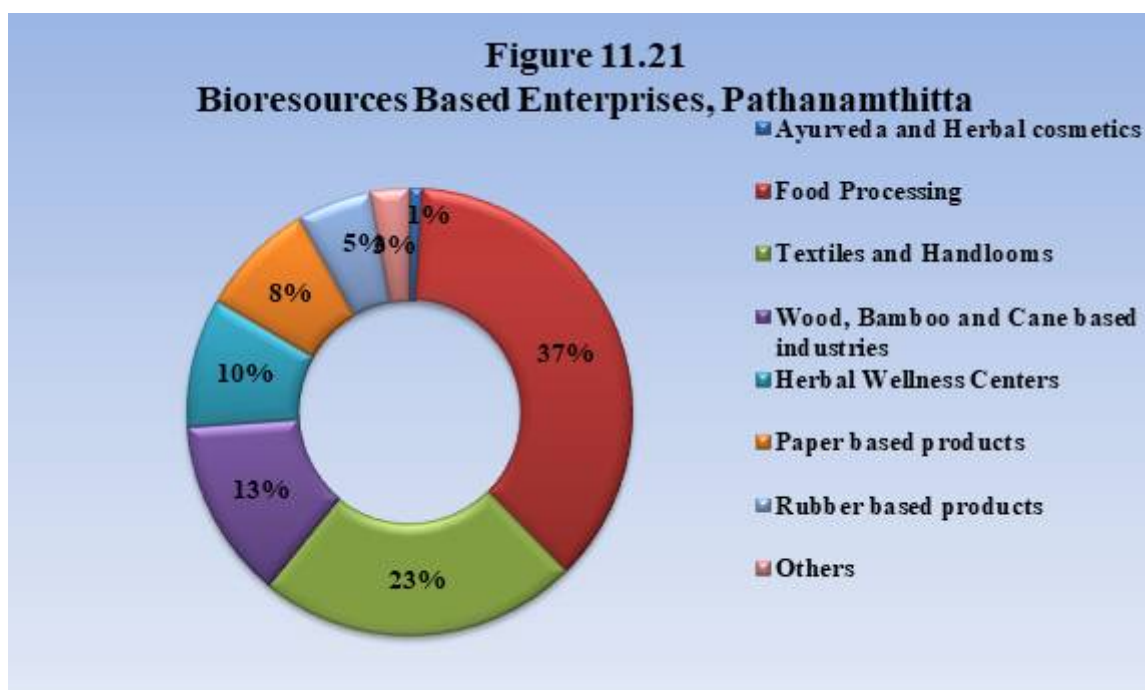


**BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)
PATHANAMTHITTA**

Total number of Bioresource based Enterprises: 2225

**Table 11.22
Category-wise number of Enterprises:**

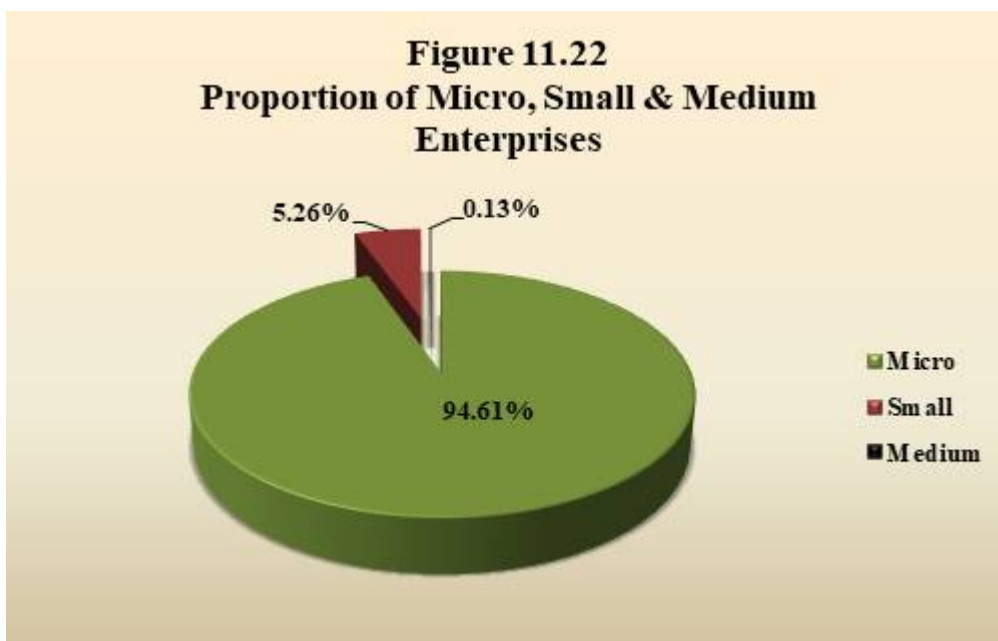
SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	22
	a. Ayurvedic medicines	16
	b. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	6
2	Food Processing	815
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	212
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	283
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	1
	d. Value added products (Pickle, Pappad etc)	23
	e. Meat Processing (Chicken, Meat)	14
	f. Copra and Coconut oil	5
	g. Restaurants, Hotels and Catering	61
	h. Milk/Dairy products	3
	i. Vegetable oils	9
	j. Others (Food Industry etc.)	204
3	Textiles and Handlooms	518
	a. Cotton	321
	b. Others	197
4	Wood, Bamboo and Cane based industries	289
	a. Wood items/furniture/saw mil	281
	b. Bamboo and cane furniture	8
5	Herbal Wellness Centers	211
6	Paper based products	187
	a. Paper based products	46
	b. Paper based secondary activities (Printing, photostat, binding)	141
7	Rubber based products (Tyres, Footwares etc.)	121
8	Others	62
	a. Wax products	49
	b. Oils other than coconut oil (Vegetable oils and essential oils)	13
	Total	2225



- Maximum bio-resource-based Enterprises belongs to the Food processing category (815).
- Textiles-Handlooms and Wood based industries are the 2nd and 3rd largest enterprises in Pathanamthitta.
- The least number of Enterprises are in the 'Ayurveda and Herbal wellness centers' (22).

Table 11.23
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	21	1		22
2	Food Processing	753	60	2	815
3	Textiles and Handlooms	509	8	1	518
4	Wood, Bamboo and Cane based industries	280	9		289
5	Herbal Wellness Centers	209	2		211
6	Paper based products	169	18		187
7	Rubber based products	103	18		121
8	Others	61	1		62
	Total	2105 (94.61%)	117 (5.26%)	3 (0.13)	2225 (100%)

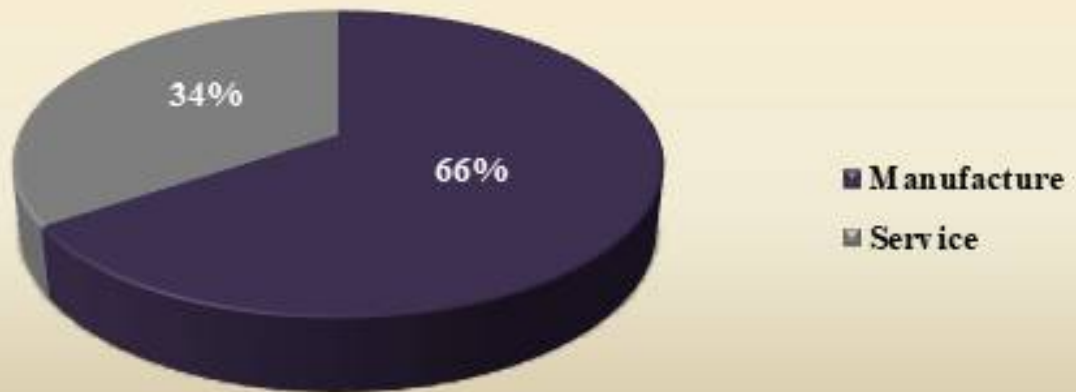


- Maximum enterprises (94.61%) are in the category micro enterprises. 5.26 % enterprises are in the small category and only 0.13% enterprises are in the medium category.

Table 11.24
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	20	2	22
2	Food Processing	647	168	815
3	Textiles and Handlooms	303	215	518
4	Wood, Bamboo and Cane based industries	211	78	289
5	Herbal Wellness Centers	11	200	211
6	Paper based products	141	46	187
7	Rubber based products	71	50	121
8	Others	56	6	62
	Total	1460 (65.62 %)	765 (34.38 %)	2225 (100%)

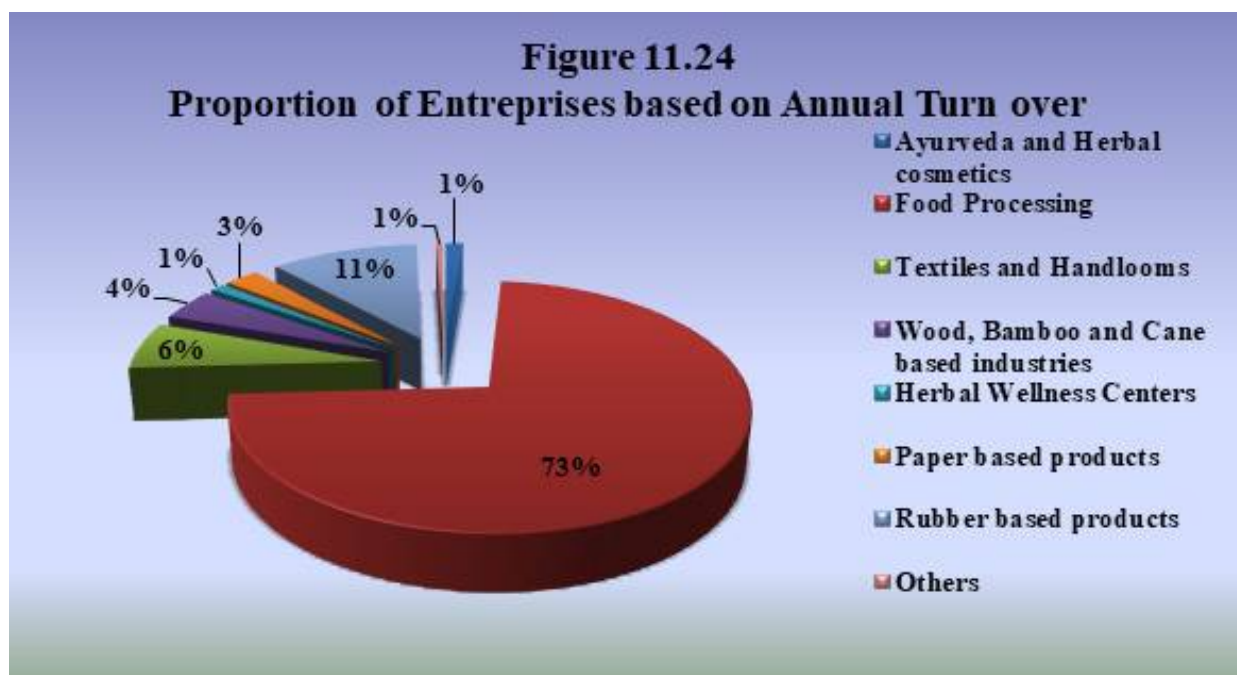
Figure 11.23
Proportion of Manufacture and Service based Enterprises



- Majority of enterprises are in manufacturing sector.
- In Food Processing, Textiles, and wood-based enterprises there is a higher proportion of manufacturing activity.
- In the Herbal wellness centres, the maximum enterprises are service-based ones.

Table 11.25
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	861.47	1.30
2	Food Processing	48137.74	72.80
3	Textiles and Handlooms	4196.22	6.35
4	Wood, Bamboo and Cane based industries	2799.42	4.23
5	Herbal Wellness Centers	705.01	1.07
6	Paper based products	1669.60	2.53
7	Rubber based products	7423.67	11.23
8	Others	329.00	0.50
	Total	66122.10	100

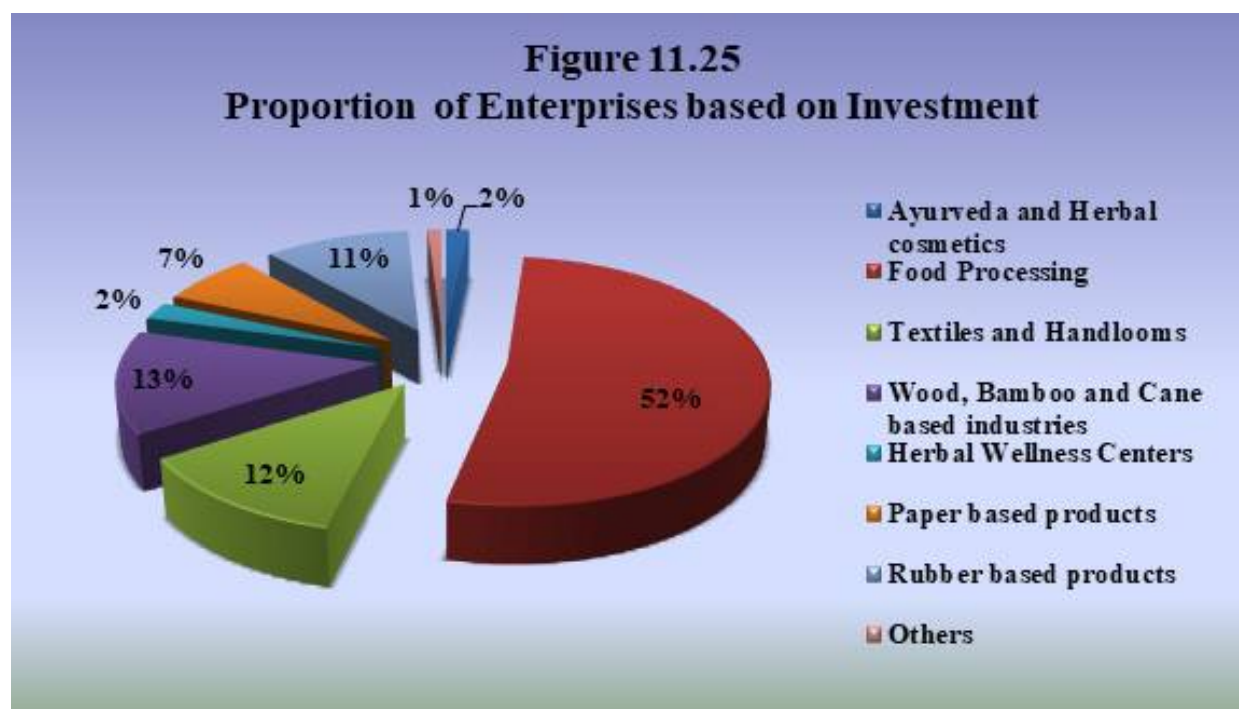


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 73% of total annual turnover.
- The percentage share of 'Rubber based products' (11%) to the total annual turnover is much higher despite the lower number of enterprises in this category.
- The lowest percentage share to total annual turnover is for the Ayurveda Herbal Cosmetics and Herbal Wellness Centers and this could be attributed to a lower number of enterprises in this category.

Table 11.26
Total Investment in different categories of
Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	640.00	1.67
2	Food Processing	19964.59	52.10
3	Textiles and Handlooms	4639.02	12.11
4	Wood, Bamboo and Cane based industries	5145.00	13.43
5	Herbal Wellness Centers	882.82	2.30
6	Paper based products	2619.49	6.84
7	Rubber based products	4054.65	10.58
8	Others	375.35	0.98
	Total	38320.92	100.00

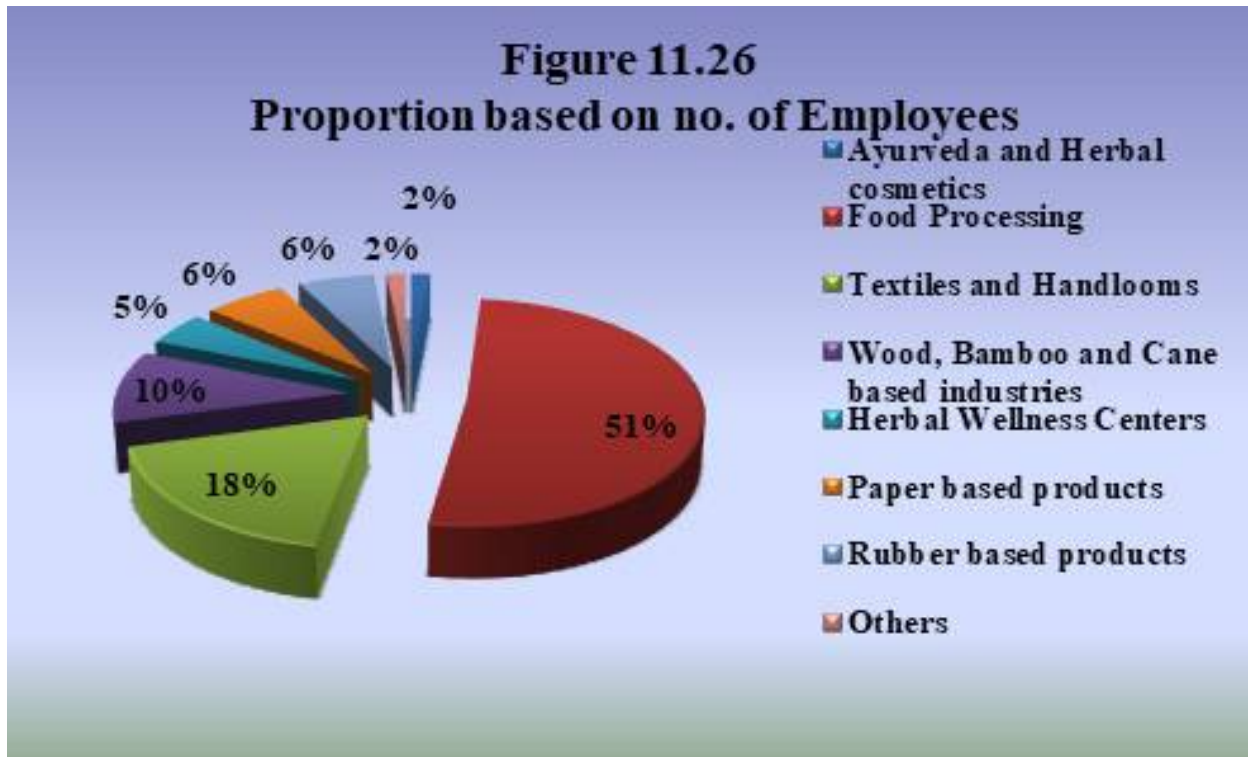
Figure 11.25
Proportion of Enterprises based on Investment



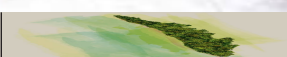
- The total investment is also highest in the Food processing category (52%)
- The 'Ayurveda and herbal cosmetics' and Herbal Wellness Centers categories which have lower annual turnover is also having a low total investment.

Table 11.27
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	151	1.52
2	Food Processing	5106	51.26
3	Textiles and Handlooms	1792	17.99
4	Wood, Bamboo and Cane based industries	1035	10.39
5	Herbal Wellness Centers	483	4.85
6	Paper based products	641	6.44
7	Rubber based products	600	6.02
8	Others	153	1.54
	Total	9961	100.00



- Interestingly, the number of employees is also higher in 'Food processing' sector.
- 'Ayurveda and Herbal cosmetic' sector had a lower share in number of employees mainly because of less number of enterprises in this sector.



**BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)
ALAPPUZHA**

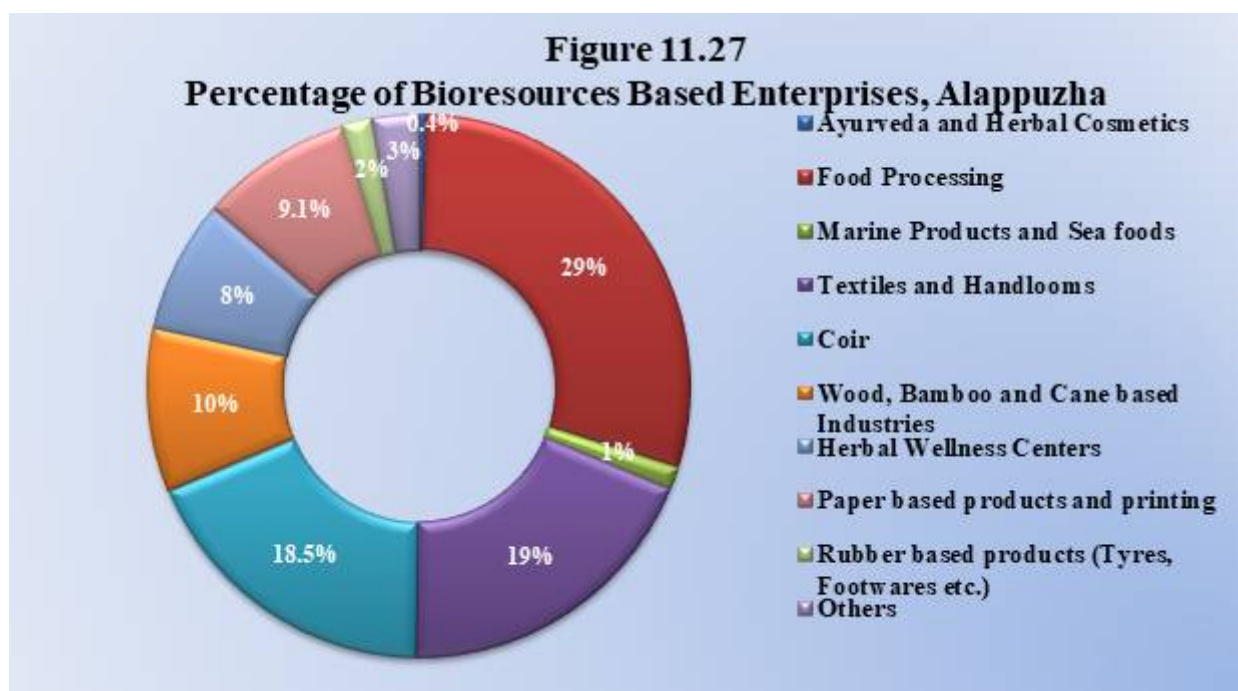
Total number of Bioresource based Enterprises: 3938

**Table 11.28
Category-wise number of Enterprises:**

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	17
	a. Ayurvedic medicines	13
	b. Herbal cosmetics	1
	c. Other Products	3
2	Food Processing	1158
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	224
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	606
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	6
	d. Value added products (Pickle, Pappad etc)	42
	e. Meat Processing (Chicken, Meat)	6
	f. Copra and Coconut oil	16
	g. Restaurants, Hotels and Catering	19
	h. Milk/Dairy products	6
	i. Frozen food products	9
	j. Other vegetable oils	18
	k. Others (Food Industry etc.)	206
	3	Marine products and Sea foods
a. Fish products and processing		48
b. Other marine products and sea food		7
4	Textiles and Handlooms	748
	a. Cotton	47
	b. Others	701
5	Coir	727
	a. Coir Fibre	59
	b. Coir Products	667
	c. Other	1
6	Wood, Bamboo and Cane based industries	384
	a. Wood items/furniture/saw mil	381
	b. Bamboo and cane furniture	3
7	Herbal Wellness Centers	312
8	Paper based products and printing	357
	a. Paper and paper based products	73
	b. Paper based secondary activities (Printing, photostat, binding)	284
9	Rubber based products (Tyres, Footwares etc.)	71
10	Others	109



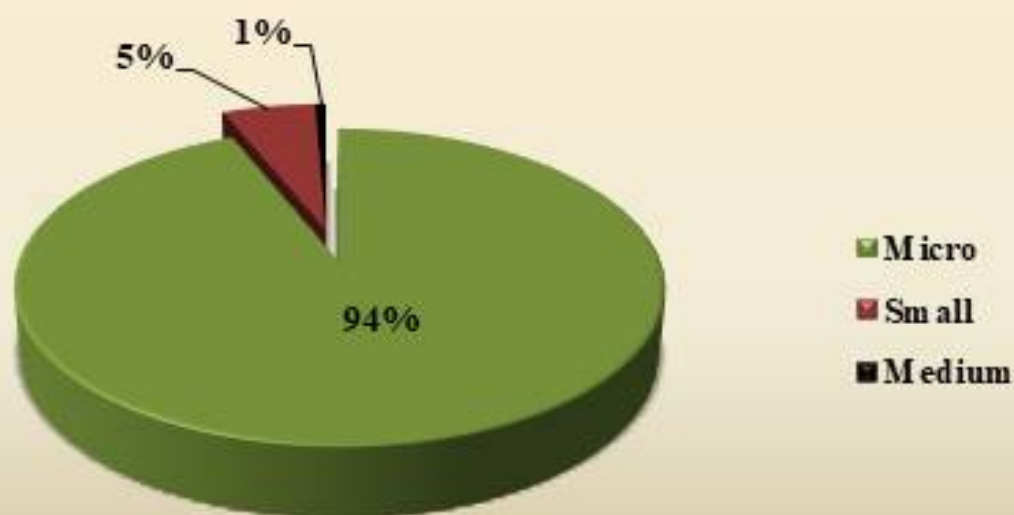
a. Leather products	15
b. Wax products	42
c. Animal and Poultry feed Supplements	3
d. Agriculture, Animal husbandary and forestry related activities	13
e. Organic fertilizers, manures and Biogas	10
f. Incense sticks and camphor	7
g. Handicrafts	6
h. Jute products	11
i. Others- Unclassified	2
Total	3938



- Maximum bio-resource-based Enterprises belong to the Food processing category (1158).
- Textiles-Handlooms and Coir industries are the 2nd and 3rd largest enterprises in Alappuzha
- The least number of Enterprises are in the 'Ayurveda and Herbal Cosmetic category' (17).



Figure 11.28
Proportion of Micro, Small & Medium Enterprises

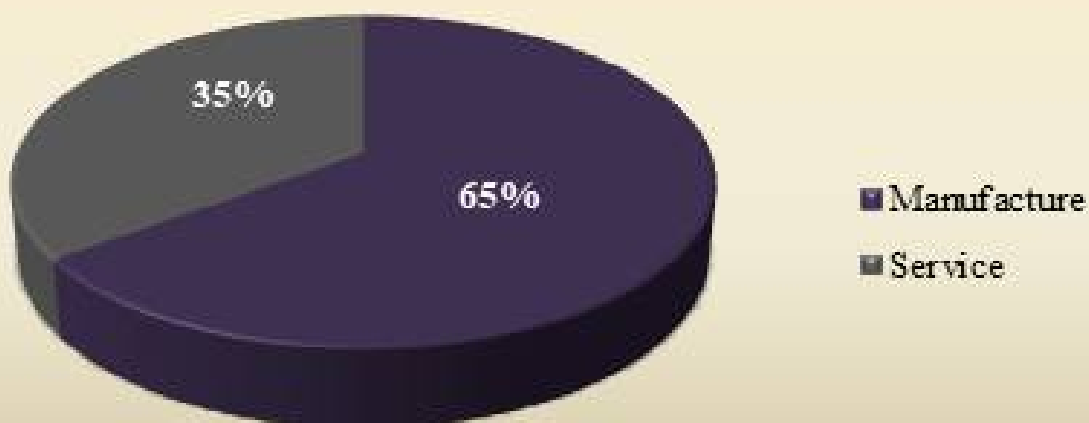


- Maximum enterprises (94%) are in the category micro enterprises. 5% enterprises are in the small category and only 1% enterprises are in the medium category.

Table 11.30 Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal Cosmetics	16	1	17
2	Food Processing	811	347	1158
3	Marine Products and Sea foods	49	6	55
4	Textiles and Handlooms	377	371	748
5	Coir	694	33	727
6	Wood, Bamboo and Cane based Industries	270	114	384
7	Herbal Wellness Centers	17	295	312
8	Paper based products and printing	192	165	357
9	Rubber based products (Tyres, Footwares etc.)	37	34	71
10	Others	91	18	109
	Total	2556 (64.86%)	1384 (35.14%)	3941 (100%)

Figure 11.29
Proportion of Manufacture and Service based Enterprises

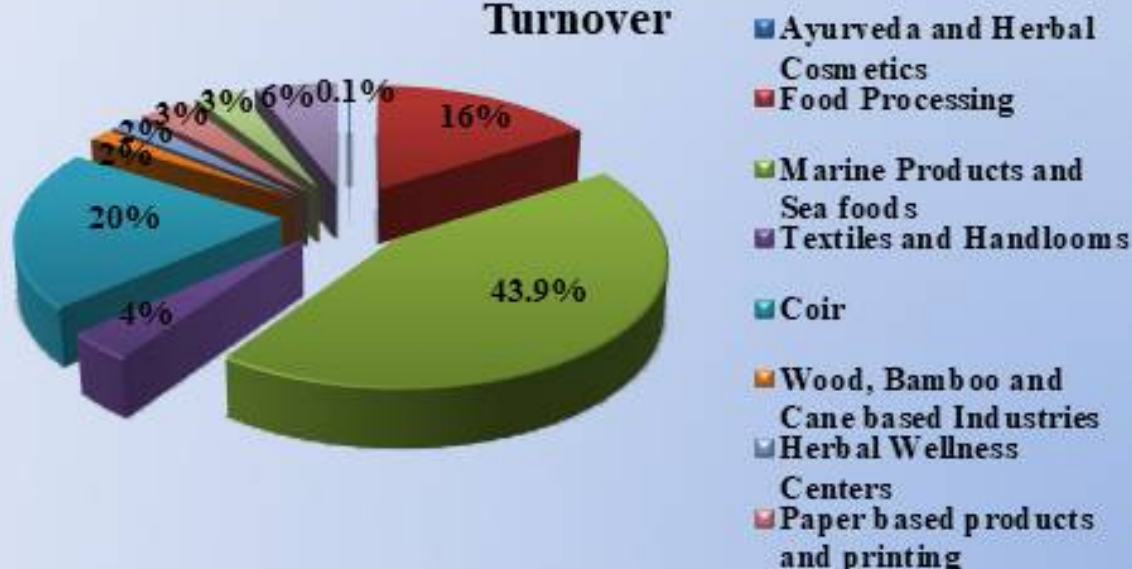


- The nature of the activity is manufacturing for the majority of enterprises (65%).
- In Food processing, Textiles-Handloom, Coir and Wood-based enterprises there is a higher proportion of manufacturing activity.
- Herbal wellness centres are the maximum number of enterprises which comes under the service-based category.

Table 11.31
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal Cosmetics	397.50	0.13
2	Food Processing	48256.00	15.75
3	Marine Products and Sea foods	134583.00	43.93
4	Textiles and Handlooms	11250.00	3.67
5	Coir	62675.00	20.46
6	Wood, Bamboo and Cane based Industries	4798.00	1.57
7	Herbal Wellness Centers	6067.00	1.98
8	Paper based products and printing	10587.00	3.45
9	Rubber based products (Tyres, Footwares etc.)	9910.26	3.23
10	Others	17849.00	5.83
	Total	306372.76	100

Figure 11.30
Proportion of Enterprises based on Annual Turnover

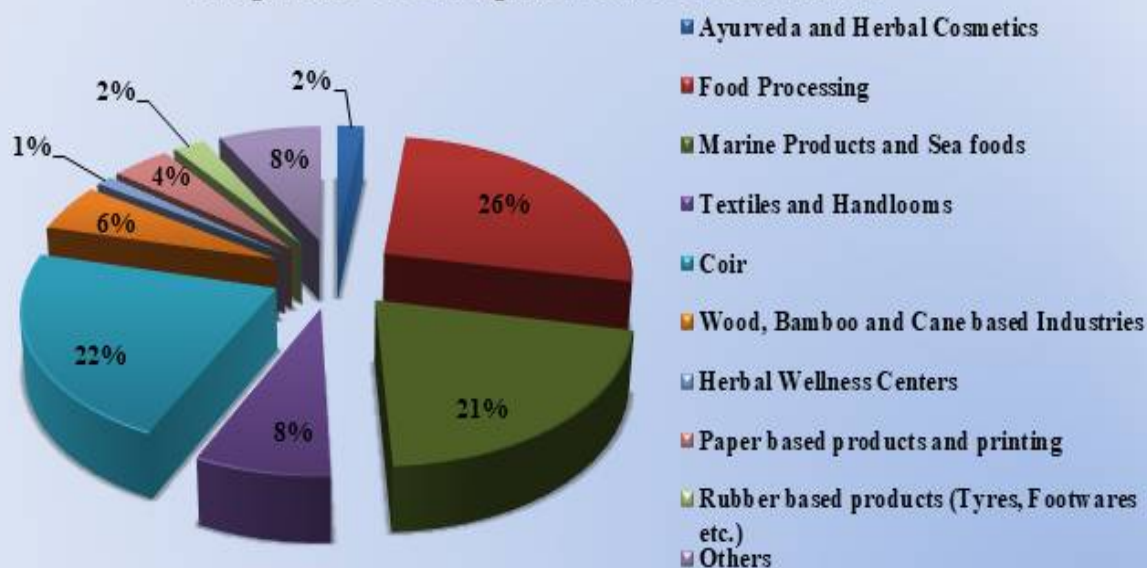


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Marine Products and Sea foods category which accounts for 43.93% of total annual turnover.
- The percentage share of 'Marine Products and Sea foods' to the total annual turnover is higher despite the lower number of enterprises in this category.
- Coir and food processing industries having the 2nd and 3rd positions in annual turnover respectively.
- The lowest percentage share to total annual turnover is for the Ayurveda and Herbal Cosmetics enterprises (0.13%) and this could be attributed to a lower number of enterprises in this category.

Table 11.32
Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal Cosmetics	2236.46	1.97
2	Food Processing	29920.69	26.32
3	Marine Products and Sea foods	23966.00	21.08
4	Textiles and Handlooms	8585.23	7.55
5	Coir	25094.39	22.07
6	Wood, Bamboo and Cane based Industries	6300.65	5.54
7	Herbal Wellness Centers	1329.83	1.17
8	Paper based products and printing	4903.39	4.31
9	Rubber based products (Tyres, Footwares etc.)	2666.96	2.35
10	Others	8681.53	7.64
	Total	113685.12	100.00

Figure 11.31
Proportion of Enterprises based on Investment

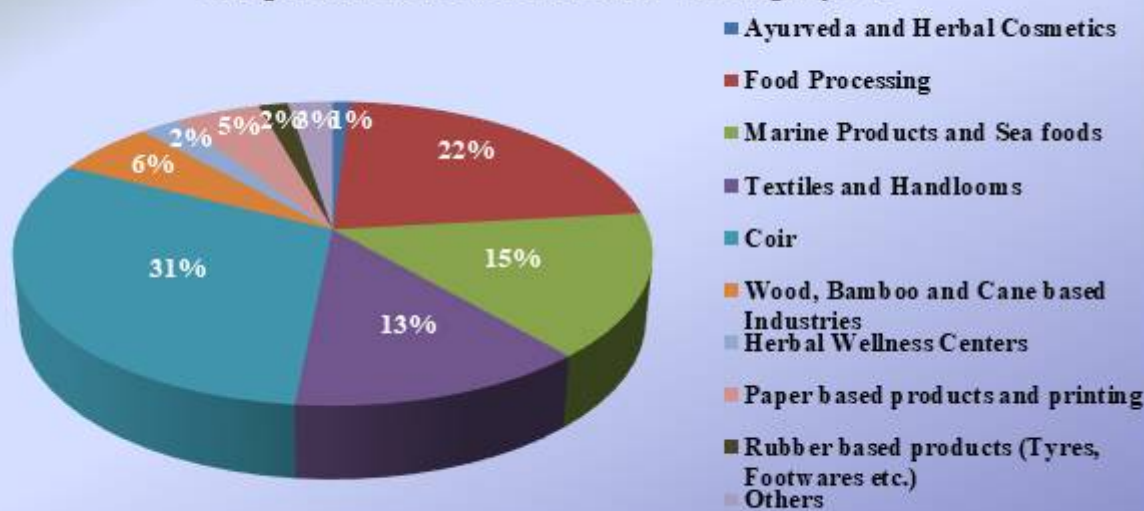


- The total investment is highest in the Food processing category (26.32%) which is immediately followed by Coir (22.07%) and Marine industries (21.08%).
- The Herbal Wellness Centres (1.17%) and Ayurveda & Herbal Cosmetics (1.97%) enterprises which had lower annual turnover also having a low total investment comparatively.

Table 11.33
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal Cosmetics	242	1.03
2	Food Processing	5215	22.19
3	Marine Products and Sea foods	3606	15.34
4	Textiles and Handlooms	3066	13.05
5	Coir	7238	30.80
6	Wood, Bamboo and Cane based Industries	1371	5.83
7	Herbal Wellness Centers	564	2.40
8	Paper based products and printing	1172	4.99
9	Rubber based products (Tyres, Footwares etc.)	409	1.74
10	Others	619	2.63
	Total	23504	100

Figure 11.32
Proportion based on number of Employees

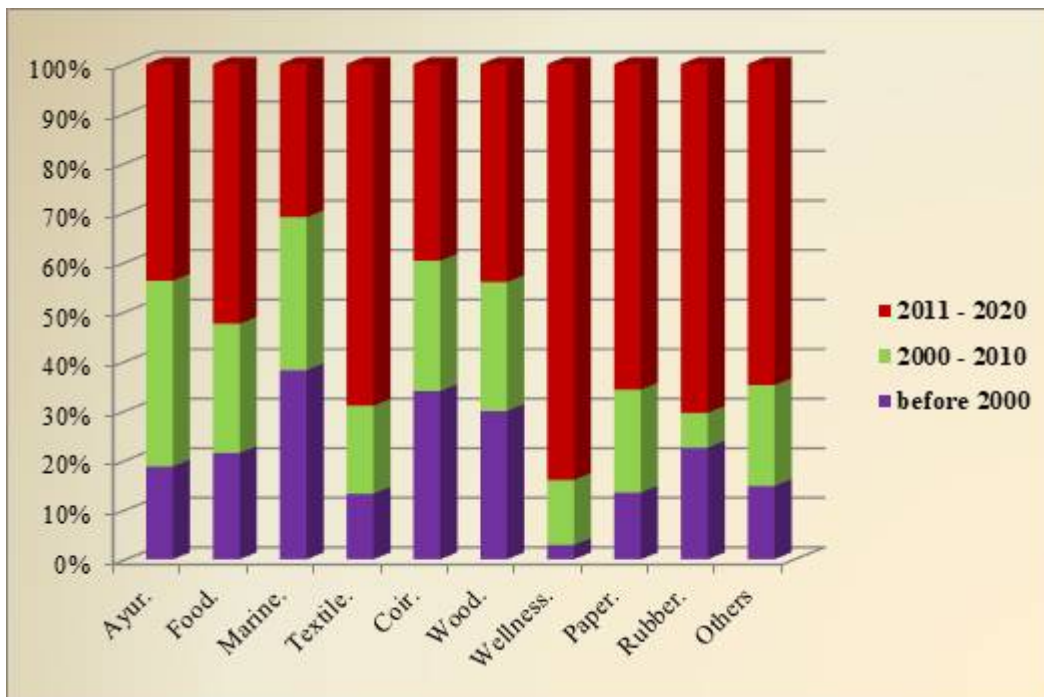


- Number of employees is higher in 'Coir' enterprises (30.80%).
- Food processing (22%), Marine (15%), Textiles – Hnadloom (13%) sectors comes next to 'Coir' sector.
- Ayurveda & Herbal Cosmetics (1%) and Rubber based (1.74 %) sectors have a lower share in number of employees mainly because of less number of enterprises in these sectors in Alappuzha.

Table 11.34
Classification based on year of establishment of various Enterprises

Sl.No.	Category	Enterprises established				Total
		Before 2000	2000 - 2010	2011 - 2020	Date not available	
1	Ayurveda and Herbal Cosmetics	3	6	7	1	17
2	Food Processing	248	302	606	2	1158
3	Marine Products and Sea foods	21	17	17		55
4	Textiles and Handlooms	99	133	516		748
5	Coir	244	189	285	9	727
6	Wood, Bamboo and Cane based Industries	115	100	169		384
7	Herbal Wellness Centers	9	41	262		312
8	Paper based products and printing	48	74	234	1	357
9	Rubber based products (Tyres, Footwares etc.)	16	5	50		71
10	Others	16	22	70	1	109
	Total	819	889	2216	14	3938

Figure 11.33
Classification based on year of establishment of various Enterprises



- Maximum number of enterprises were established between 2011 and 2020
- There is a rapid change in establishment of Herbal Wellness Centers after 2010, before 2000 number of enterprises in this sector is very low.



BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)**KOTTAYAM**

Total number of Bioresource based Enterprises: 4795

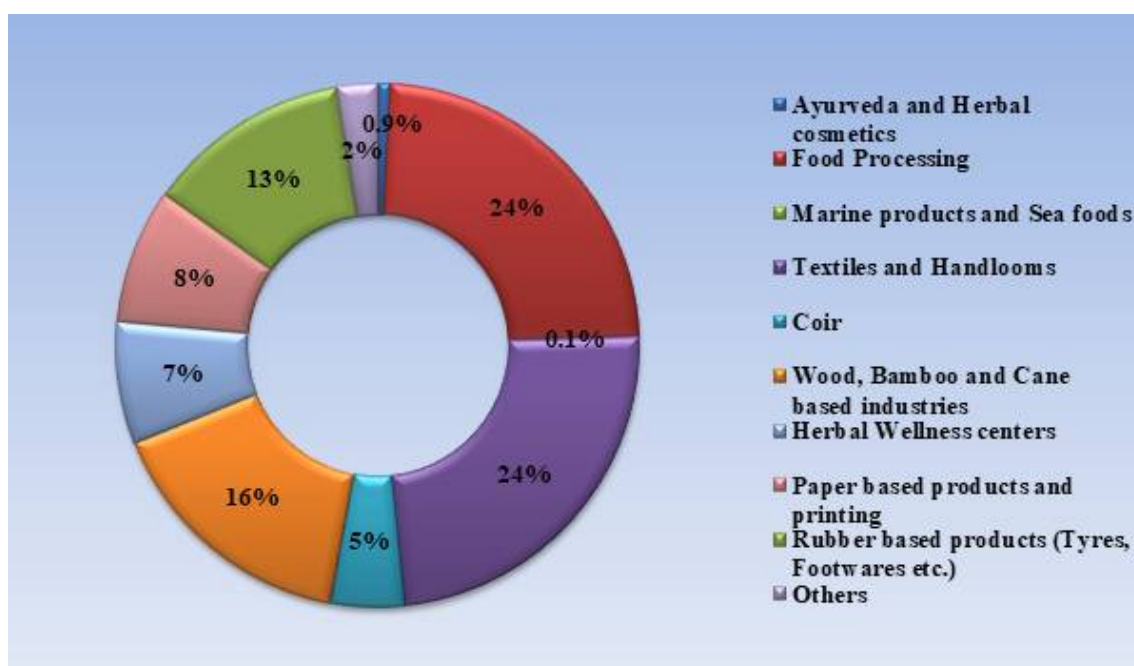
Table 11.35
Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	39
	a. Ayurvedic medicines	31
	b. Herbal cosmetics	2
	c. Ayurvedic oils/Thailams	3
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	3
2	Food Processing	1133
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	333
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	420
	c. Ready to cook food items (Chapathi, Pathiri etc.)	3
	d. Value added products (Pickle, Pappad etc)	63
	e. Copra, Coconut oil and other coconut products	14
	f. Restaurants, Hotels and Catering	40
	g. Milk/Dairy products	18
	h. Meat and meat products	10
	i. Coffee and Tea processing	30
	j. Spices processing	34
	k. Other edible oils	32
	l. Others	136
3	Marine products and Sea foods	4
4	Textiles and Handlooms	1142
	a. Cotton	34
	b. Other textile products, garments and tailoring	1108
5	Coir	221
	a. Coir Fibre	138
	b. Coir Products	83
6	Wood, Bamboo and Cane based industries	766
	a. Wood items/furniture/saw mil	752
	b. Bamboo and cane furniture	14



7	Herbal Wellness Centers	360
8	Paper based products and printing	401
	a. Paper and paper based products	112
	b. Paper based secondary activities (Printing, photostat, binding)	289
9	Rubber based products (Tyres, Footwares etc.)	605
10	Others	124
	a. Leather products	8
	b. Wax products	27
	c. Animal and Poultry feed Supplements	5
	d. Camphor and Incense sticks	1
	e. Manures, Fertilizers, Biogas and Bio-briquettes	17
	f. Agriculture related activities	16
	g. Vegetable Fibres and Products	19
	h. Handicrafts	15
	i. Match making	16
	Total	4795

Figure 11.34
Percentage of Bioresources Based Enterprises, Kottayam



- Maximum bio-resource-based Enterprises belong to the Textiles-Handloom (1142) and Food processing (1133) categories.
- Wood-bamboo-cane based and Rubber based industries are the 3rd and 4th largest enterprises in Kottayam
- Marine products and sea food (4) categories hold the least number of enterprises. The main reason for this is because Kottayam is not a coastal district. Number of enterprises in Ayurveda and Herbal Cosmetic category (39) is also very low.

Table 11.36
Proportion of Micro, Small, and Medium Enterprises

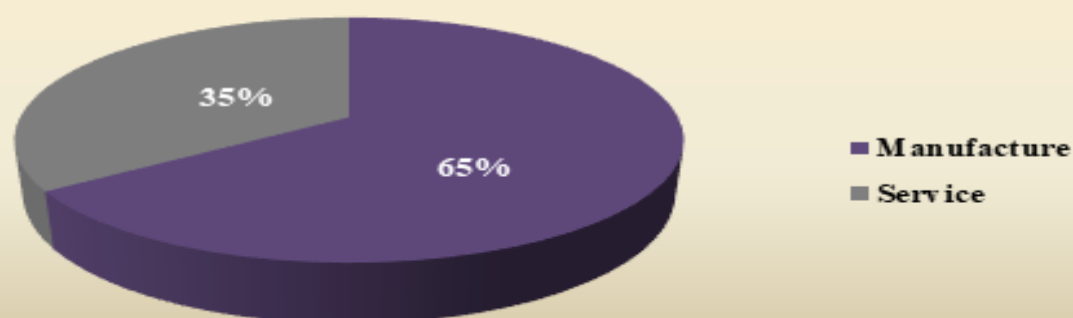
Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	33	6		39
2	Food Processing	1078	53	2	1133
3	Marine products and Sea foods	4			4
4	Textiles and Handlooms	1132	10		1142
5	Coir	218	3		221
6	Wood, Bamboo and Cane based industries	722	44		766
7	Herbal Wellness centers	358	2		360
8	Paper based products and printing	350	50	1	401
9	Rubber based products (Tyres, Footwares etc.)	489	115	1	605
10	Others	119.0	5.0		124
	Total	4503 (93.9%)	288 (6%)	4 (0.1%)	4795 (100%)

- Maximum enterprises (93.9%) are in the category micro enterprises. 6% enterprises are in the small category and only 0.1% enterprises are in the medium category.

Table 11.37
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	35	4	39
2	Food Processing	928	205	1133
3	Marine products and Sea foods	3	1	4
4	Textiles and Handlooms	393	749	1142
5	Coir	217	4	221
6	Wood, Bamboo and Cane based industries	651	115	766
7	Herbal Wellness centers	15	345	360
8	Paper based products and printing	251	150	401
9	Rubber based products (Tyres, Footwares etc.)	538	67	605
10	Others	110	14	124
	Total	3141 (65.5%)	1654 (34.5%)	4795 (100%)

Figure 11.36
Proportion of Manufacture and Service based Enterprises



- The nature of the activity is manufacturing for the majority of enterprises (65.5%).
- In Food processing, Coir, Wood-based and Rubber based enterprises, there is a higher proportion of manufacturing activity.
- Herbal wellness centres are the maximum number of enterprises comes under the service-based category.
- Textiles-Handloom sector have a higher proportion in both service and manufacturing activities.

Table 11.38
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	939.75	0.57
2	Food Processing	47396.00	28.54
3	Marine products and Sea foods	1618.00	0.97
4	Textiles and Handlooms	8072.00	4.86
5	Coir	2518.00	1.52
6	Wood, Bamboo and Cane based industries	12263.00	7.38
7	Herbal Wellness centers	1078.57	0.65
8	Paper based products and printing	1623.95	0.98
9	Rubber based products (Tyres, Footwares etc.)	82451.00	49.65
10	Others	8095.00	4.88
	Total	166055.27	100

Figure 11.37
Proportion of Entreprises based on Annual Turnover

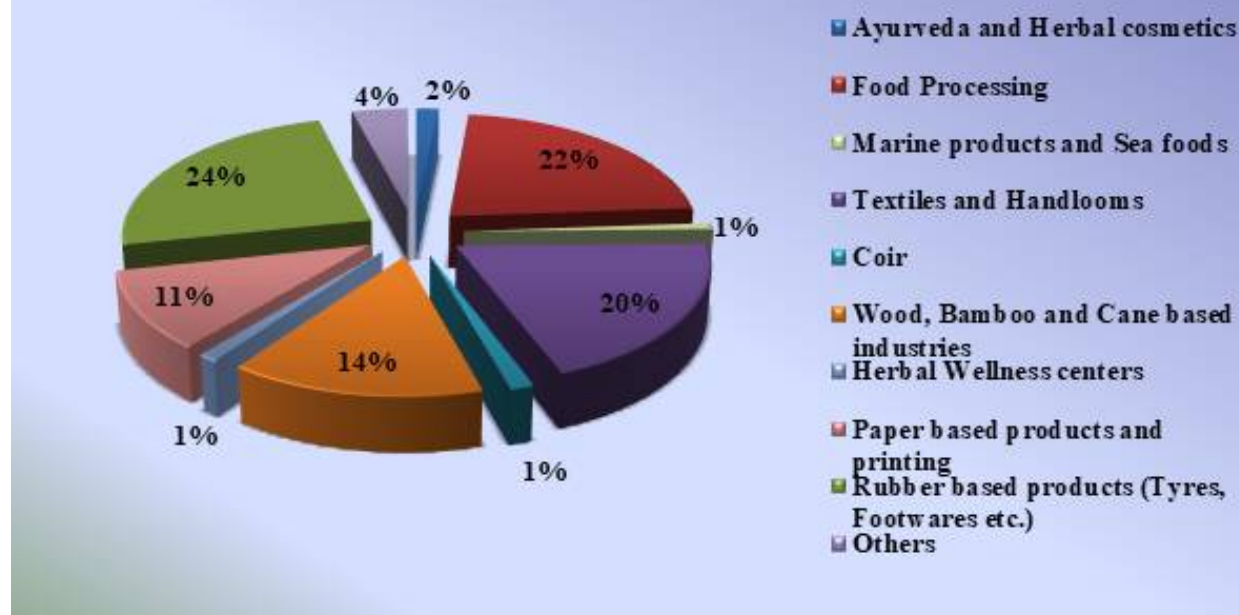


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Rubber based enterprises which accounts for 50% of total annual turnover, and this is because Kottayam is India's largest rubber producer.
- Enterprises in Food processing (28%) category holds the 2nd position in total annual turn over of Kottayam.
- The lowest percentage share to total annual turnover is for the Ayurveda and Herbal Cosmetics (0.57%), Herbal wellness centres (0.65%), Marine products and Sea foods (0.97%) and Paper based products and printing (0.98%) categories.

Table 11.39
Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	1594.25	1.64
2	Food Processing	21566.01	22.20
3	Marine products and Sea foods	803.00	0.83
4	Textiles and Handlooms	19010.38	19.57
5	Coir	1316.13	1.35
6	Wood, Bamboo and Cane based industries	13964.10	14.38
7	Herbal Wellness centers	1045.60	1.08
8	Paper based products and printing	10308.32	10.61
9	Rubber based products (Tyres, Footwares etc.)	23532.45	24.23
10	Others	3981.37	4.11
	Total	97121.61	100

Figure 11.38
Proportion of Entreprises based on Investment

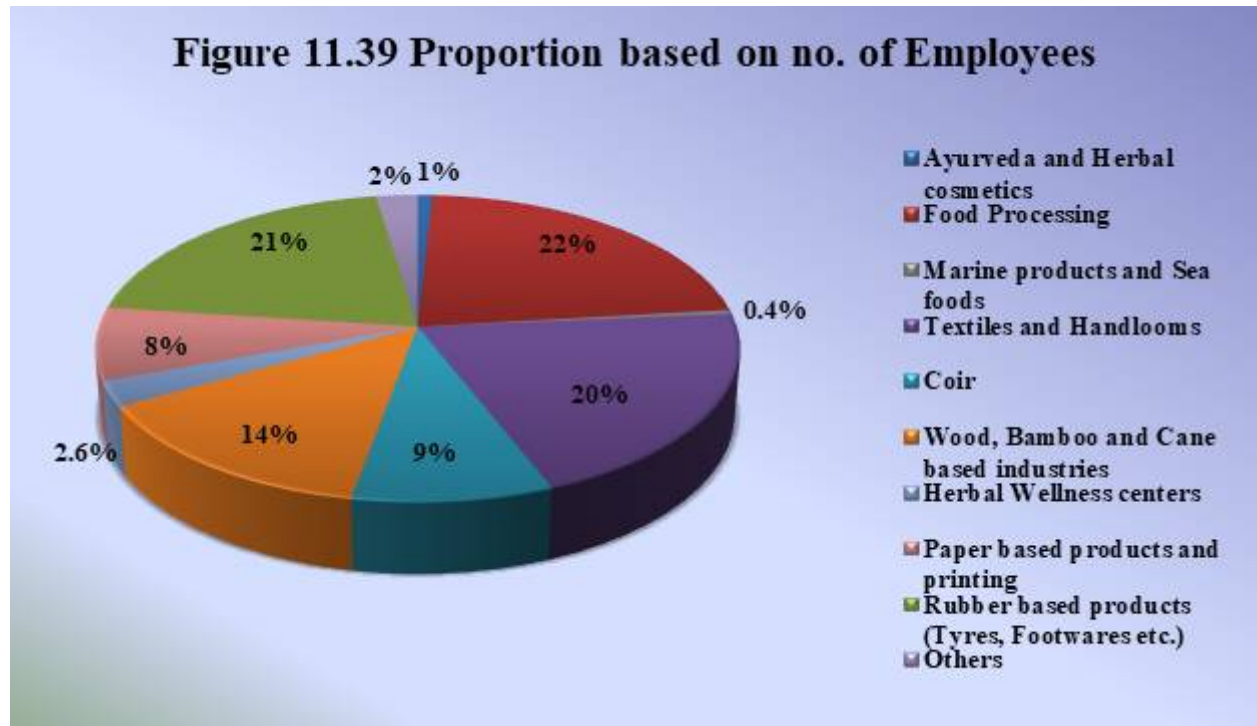


- The total investment is highest in the Rubber based products (24.23%) which is immediately followed by Food processing (22.20%) and Textile-Handloom (19.57%).
- The Marine products and Sea foods (0.83%), Herbal wellness centres (1.08%), Coir (1.35%) and Ayurveda & Herbal Cosmetics (1.64%) enterprises which had lower annual turnover also having a low total investment.

Table 11.40
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal cosmetics	217	0.84
2	Food Processing	5800	22.34
3	Marine products and Sea foods	114	0.44
4	Textiles and Handlooms	5301	20.42
5	Coir	2294	8.84
6	Wood, Bamboo and Cane based industries	3599	13.87
7	Herbal Wellness centers	684	2.64
8	Paper based products and printing	1996	7.69
9	Rubber based products (Tyres, Footwares etc.)	5335	20.55
10	Others	617	2.38
	Total	25957	100.00

Figure 11.39 Proportion based on no. of Employees



- Number of employees is higher in Food processing (22%), Rubber based (21%) and Textile-handloom (20%) sectors.
- Marine products and sea food (0.4%) and Ayurveda & Herbal Cosmetics (1%) enterprises have a lower share in number of employees mainly because of less number of enterprises in these sectors in Kottayam



BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)**IDUKKI**

Total number of Bioresource based Enterprises: 2702

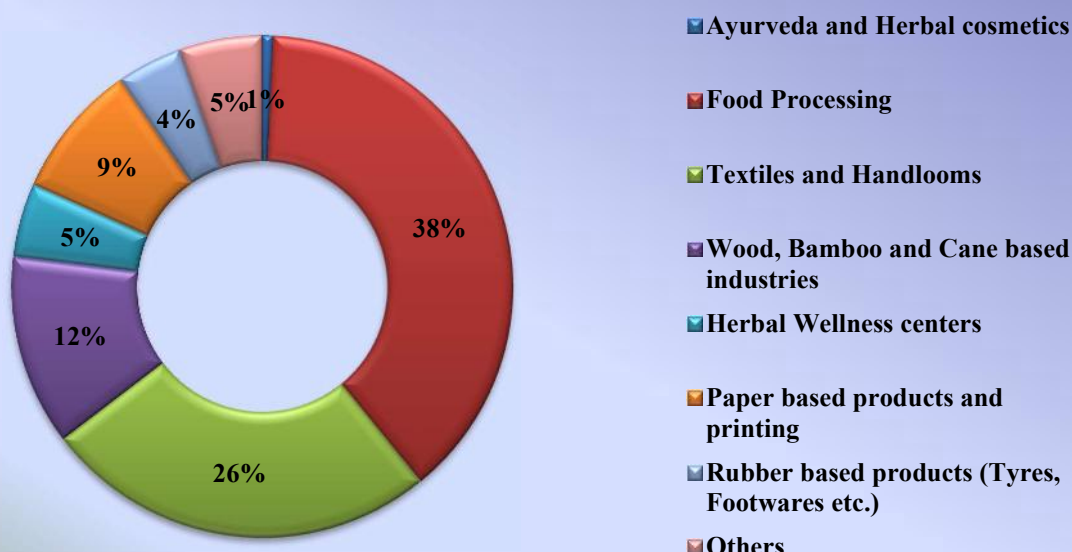
Table 11.41
Category-wise number of Enterprises:

Sl No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	19
	a. Ayurvedic medicines	17
	b. Herbal cosmetics	2
	c.	
2	Food Processing	1038
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	201
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	270
	c. Value added products (Pickle, Pappad etc)	51
	d. Copra, Coconut oil and other coconut products	5
	e. Restaurants, Hotels and Catering	21
	f. Milk/Dairy products	5
	g. Meat and meat products	2
	h. Coffee and Tea processing	69
	i. Cardamom products and Processing	184
	j. Spices processing	114
	k. Other edible oils	16
	l. Fish and Marine products	2
	m. Others	98
n.		
3	Textiles and Handlooms	689
	a. Cotton	7
	b. Other textile products, garments and tailoring	682
	c.	
4	Wood, Bamboo and Cane based industries	333
	a. Wood items/furniture/saw mil	327
	b. Bamboo and cane furniture	6
	c.	
5	Herbal Wellness Centers	128
6	Paper based products and printing	236



	a. Paper and paper based products	35
	b. Paper based secondary activities (Printing, photostat, binding)	201
	c.	
7	Rubber based products (Tyres, Footwares etc.)	114
10	Others	145
	a. Leather products	20
	b. Wax products	52
	c. Animal and Poultry feed Supplements	9
	d. Manures, Fertilizers, Biogas and Bio-briquettes	11
	e. Coir Products	1
	f. Camphor and Incense sticks	2
	g. Grass Brooms	4
	h. Agriculture related activities	31
	i. Vegetable Fibres and Textiles	3
	j. Handicrafts	12
	Total	2702

Figure 11.40
Percentage of Bioresources Based Enterprises, Idukki

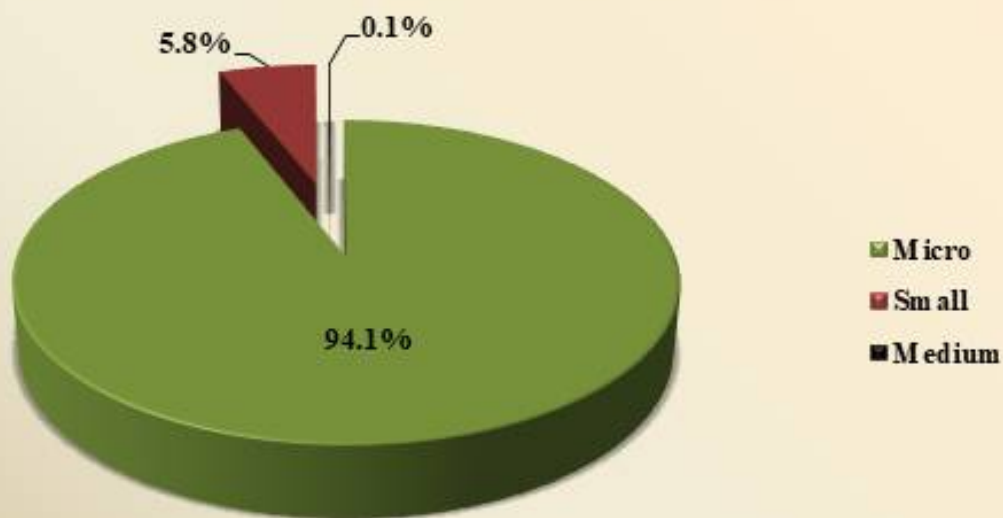


- Maximum bio-resource-based Enterprises belong to the Food processing category (1038).
- Textiles-Handlooms and Wood, bamboo and cane based industries are the 2nd and 3rd largest enterprises in Idukki
- The least number of Enterprises are in the 'Ayurveda and Herbal Cosmetic category' (19).

Table 11.42
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	18	1		19
2	Food Processing	935	101	2	1038
3	Textiles and Handlooms	680	9		689
4	Wood, Bamboo and Cane based industries	318	15		333
5	Herbal Wellness centers	127	1		128
6	Paper based products and printing	225	11		236
7	Rubber based products (Tyres, Footwares etc.)	100	13	1	114
8	Others	139	6		145
	Total	2542 (94.1%)	157 (5.8%)	3 (0.1%)	2702 (100%)

Figure 11.41
Proportion of Micro, Small & Medium Enterprises



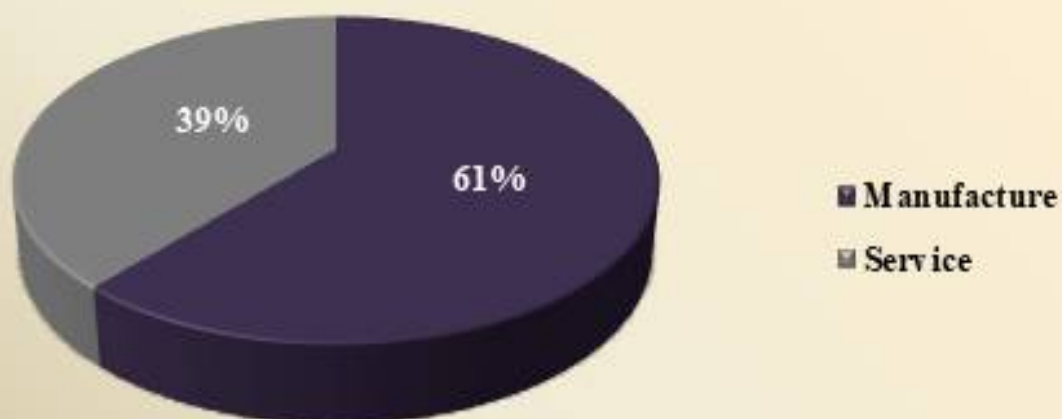
- Maximum enterprises (94.1%) are in the category micro enterprises. 5.8% enterprises are in the small category and only 0.1% enterprises are in the medium category.



Table 11.43
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	16	3	19
2	Food Processing	771	267	1038
3	Textiles and Handlooms	302	387	689
4	Wood, Bamboo and Cane based industries	302	31	333
5	Herbal Wellness centers	13	115	128
6	Paper based products and printing	108	128	236
7	Rubber based products (Tyres, Footwares etc.)	41	73	114
8	Others	106	39	145
	Total	1659 (61.4%)	1043 (38.6%)	2702 (100%)

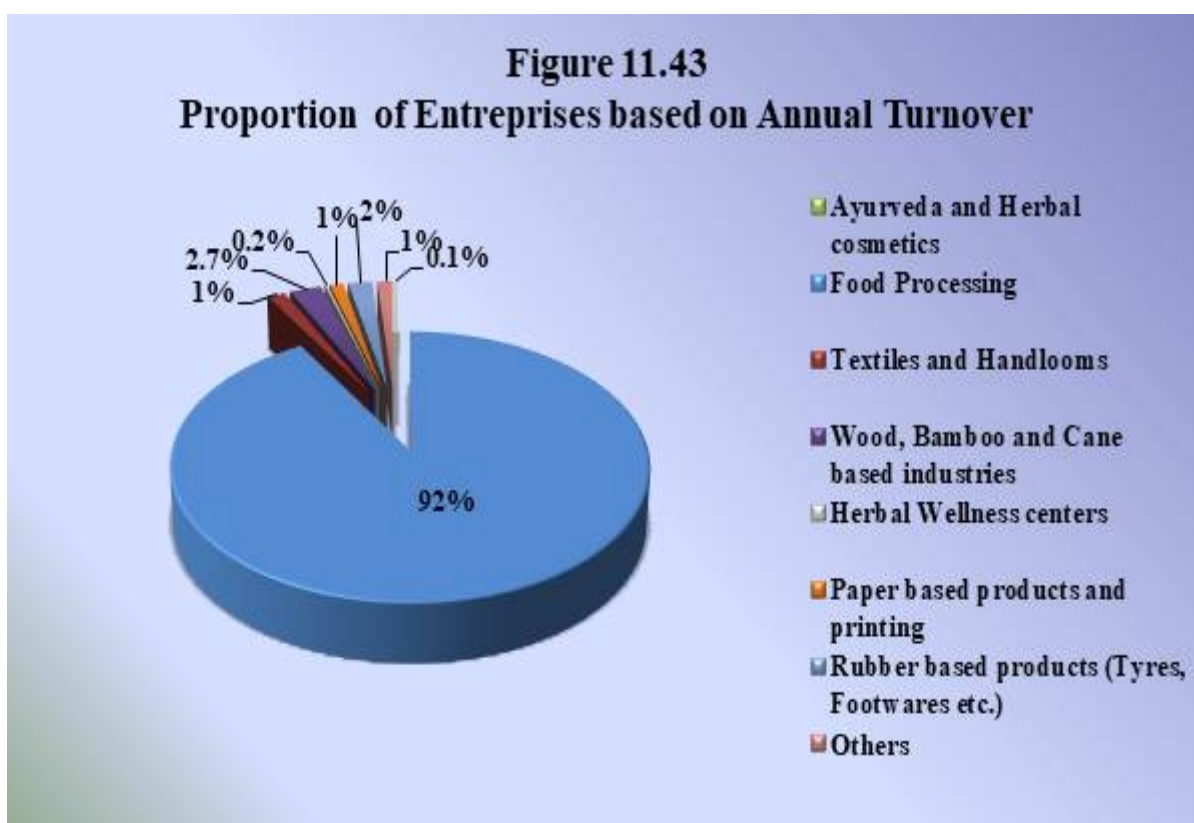
Figure 11.42
Proportion of Manufacture and Service based Enterprises



- The nature of the activity is manufacturing for the majority of enterprises (61.4%).
- In Food processing, Textiles-Handloom and Wood-based enterprises there is a higher proportion of manufacturing activity.
- Most of the Herbal wellness centres comes under the service-based category.

Table 11.44
Annual Turnover from different categories of Bioresource-based Enterprises

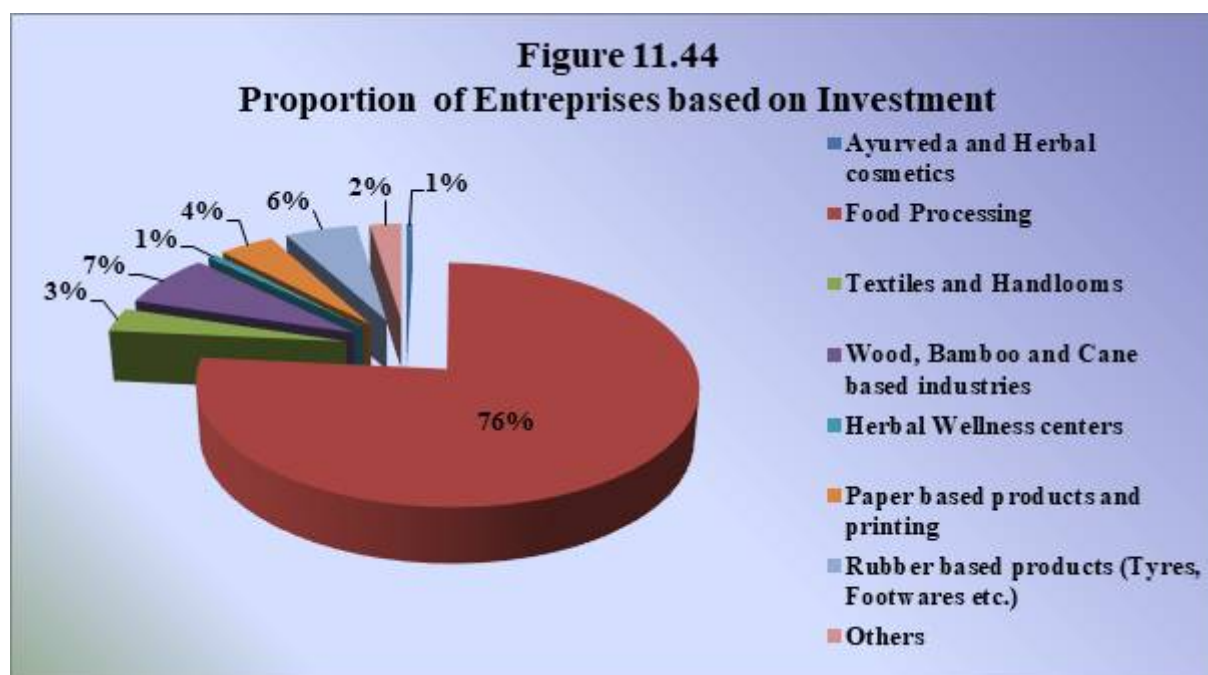
Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	176.90	0.13
2	Food Processing	126572.00	91.52
3	Textiles and Handlooms	1955.52	1.41
4	Wood, Bamboo and Cane based industries	3434.61	2.70
5	Herbal Wellness centers	326.35	0.24
6	Paper based products and printing	1499.20	1.08
7	Rubber based products (Tyres, Footwares etc.)	2653.45	1.92
8	Others	1680.99	1.00
	Total	138299.02	100



- In Idukki, the highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category, which accounts for 92% of total annual turnover.
- All other bio-resource-based enterprises percentage share to total annual turnover is just 8%

Table 11.45
Total Investment in different categories of Bioresource-based Enterprises

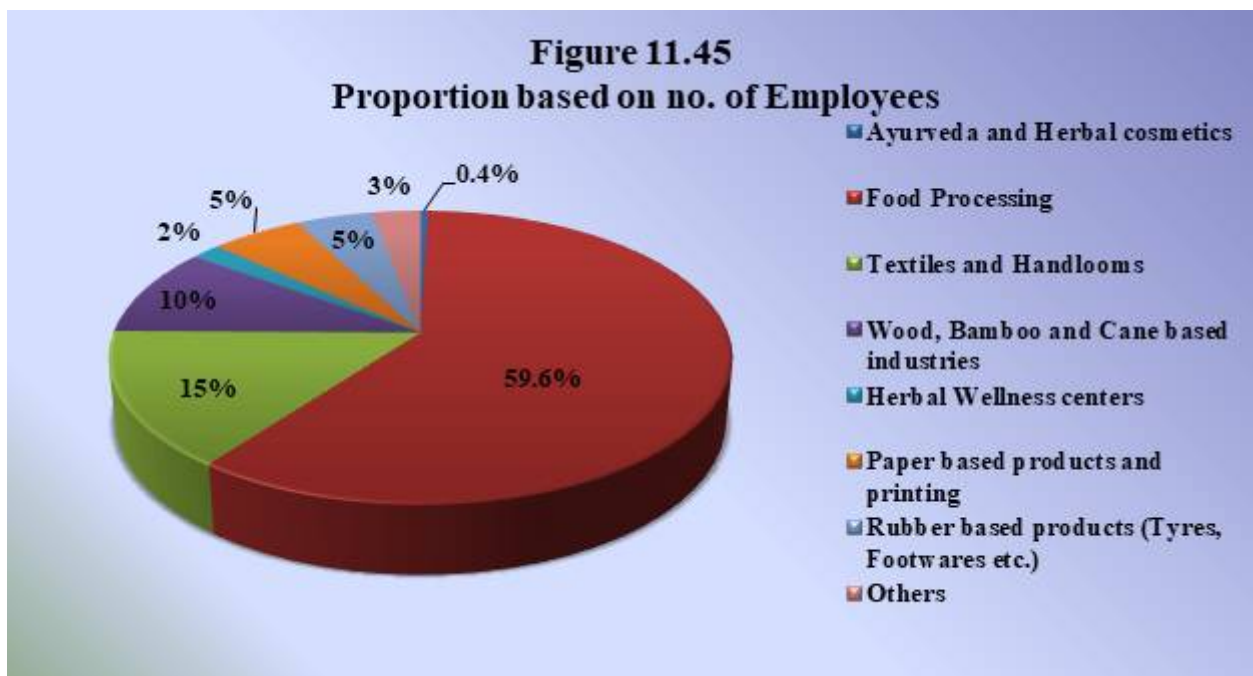
Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	207.45	0.46
2	Food Processing	33992.30	76.06
3	Textiles and Handlooms	1469.79	3.29
4	Wood, Bamboo and Cane based industries	3281.55	7.34
5	Herbal Wellness centers	312.45	0.70
6	Paper based products and printing	1873.60	4.19
7	Rubber based products (Tyres, Footwares etc.)	2471.71	5.53
8	Others	1085.25	2.43
	Total	44694.10	100



- The total investment is also highest in the Food processing category (76%).
- All other bio-resource-based enterprises percentage share to investment is 24%.

Table 11.46
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal cosmetics	51	0.40
2	Food Processing	7037	59.60
3	Textiles and Handlooms	1763	15.00
4	Wood, Bamboo and Cane based industries	1149	10.00
5	Herbal Wellness centers	215	2.00
6	Paper based products and printing	654	5.00
7	Rubber based products (Tyres, Footwares etc.)	553	5.00
8	Others	349	3.00
	Total	11771	100



- Number of employees is higher in 'Food processing' enterprises (59.6%).
- Ayurveda & Herbal Cosmetics (0.4%) had a lower share in number of employees mainly because of less number of enterprises in this sectors in Idukki.



BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

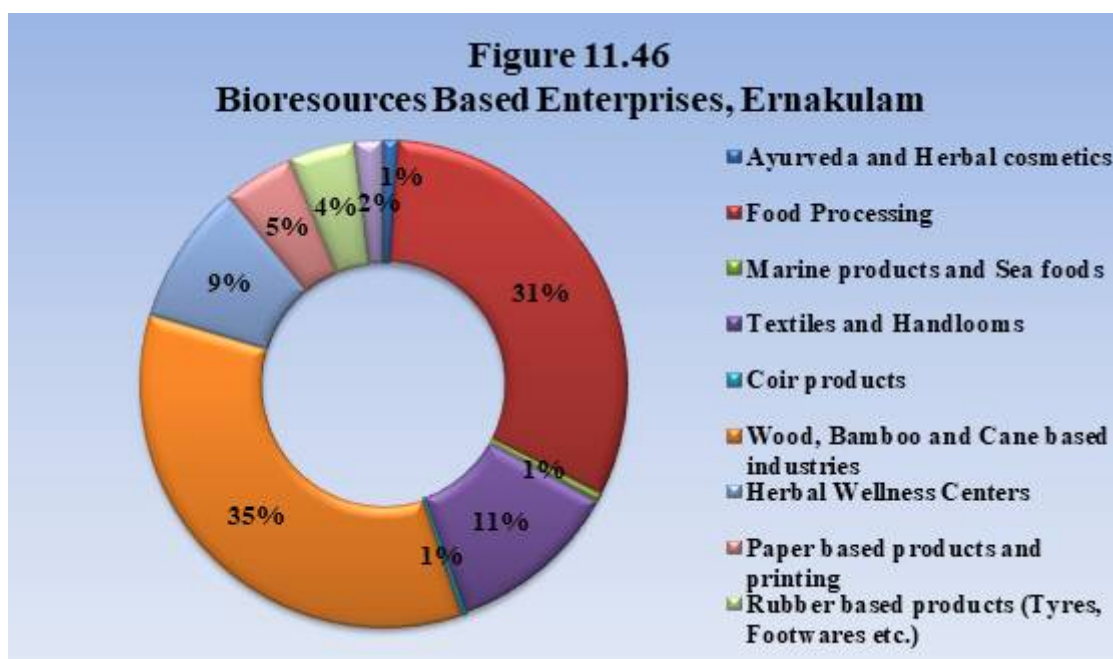
ERNAKULAM

Total number of Bioresource based Enterprises: 7318

Table 11.47
Category-wise number of Enterprises:

SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	76
	a. Ayurvedic medicines	69
	b. Herbal cosmetics	5
	c. Ayurvedic oils/Thailams	2
2	Food Processing	2300
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	432
	b. Rice, Wheat, Dry Flour, Wet Flour and other unprocessed items (Grain powders, Spices powder, Dosa mix, idli mix etc)	860
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	359
	d. Value added products (Pickle, Pappad etc)	133
	e. Copra and Coconut oil	43
	f. Restaurants, Hotels and Catering	123
	g. Milk/Dairy products	29
	h. Meat and meat products	3
	i. Vegetable Oil	50
	j. Other Oil	58
	k. Others (Food industry)	210
3	Marine products and Sea foods	43
	a. Fish products and processing	12
	b. Other sea foods	31
4	Textiles and Handlooms	834
	a. Cotton	30
	b. Cotton, Jute Bags and products other than garments	42
	c. Other textile products, garments and tailoring	762
5	Coir Products	32
6	Wood, Bamboo and Cane based industries	2540
	a. Wood items/furniture/saw mill	2512
	b. Bamboo and cane furniture	28
7	Herbal Wellness Centers	689
8	Paper based products and printing	342

	a. Paper, paper based products and secondary activities (Printing, bidding, Photostat)	342
9	Rubber based products (Tyres, Footwares etc.)	319
10	Others	143
	a. Leather products	34
	b. Camphor products	1
	c. Wax products	85
	d. Aquariums and pets	2
	e. Handicraft	21
	Total	7318

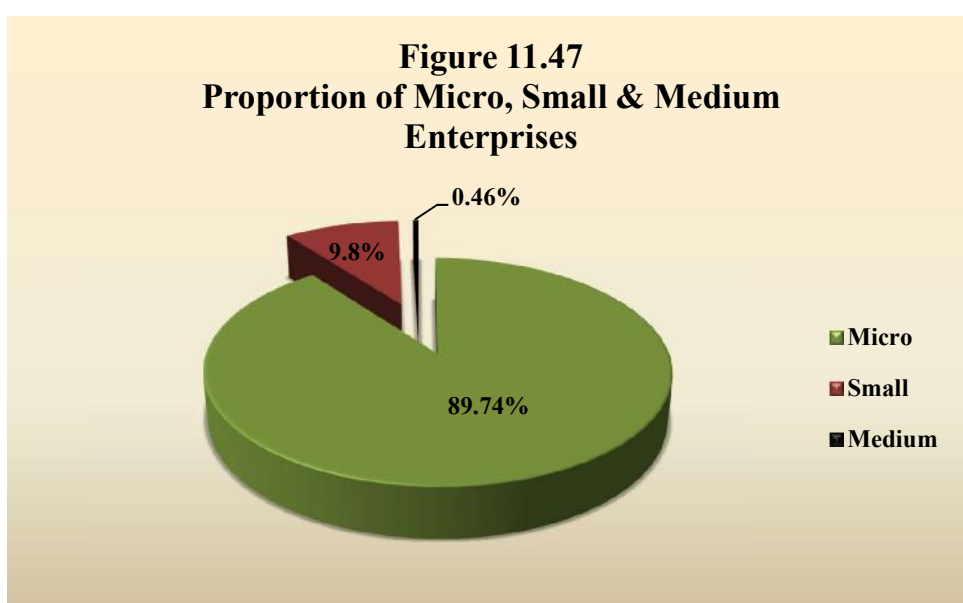


- Maximum bio-resource-based Enterprises belong to the 'Wood, Bamboo and Cane based industries (2540)' and 'Food processing category (2300)'.
- The least number of Enterprises belongs 'Ayurveda Herbal Cosmetics', (76) 'Marine products and Sea food' (43) and 'Coir' (32) sectors.

Table 11.48
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	62	13	1	76
2	Food Processing	2094	187	19	2300
3	Marine products and Sea foods	21	21	1	43
4	Textiles and Handlooms	815	18	1	834

5	Coir products	27	5		32
6	Wood, Bamboo and Cane based industries	2200	339	1	2540
7	Herbal Wellness Centers	684	4	1	689
8	Paper based products and printing	257	78	7	342
9	Rubber based products (Tyres, Footwares etc.)	264	52	3	319
10	Others	143			143
	Total	6567 (89.74%)	717 (9.8%)	34 (0.46%)	7318 (100%)

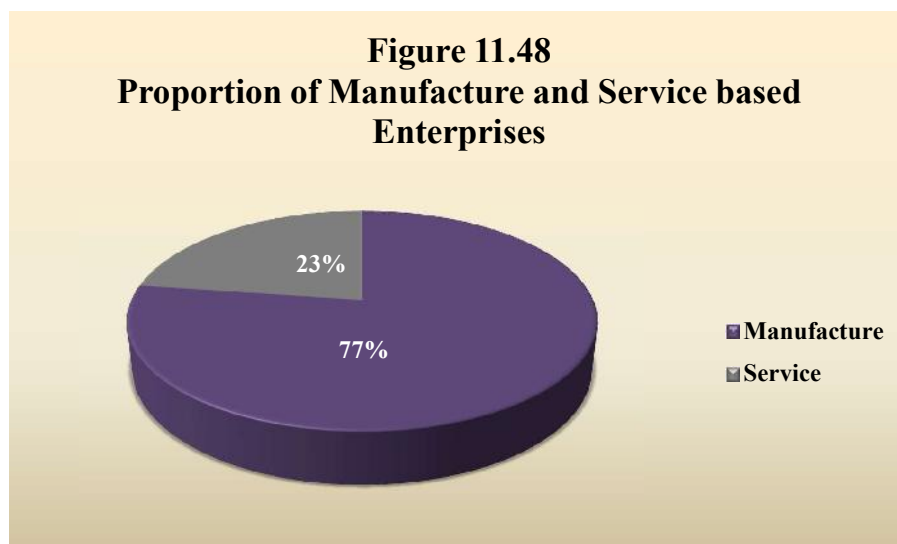


- Maximum enterprises (89.74%) are in the category micro enterprises. 9.8% enterprises are in the small category and only 0.46% enterprises are in the medium category.

Table 11.49
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	63	13	76
2	Food Processing	1900	400	2300
3	Marine products and Sea foods	31	12	43
4	Textiles and Handlooms	629	205	834
5	Coir products	31	1	32
6	Wood, Bamboo and Cane	2344	196	2540

	based industries			
7	Herbal Wellness Centers	31	658	689
8	Paper based products and printing	287	55	342
9	Rubber based products (Tyres, Footwares etc.)	212	107	319
10	Others	126	17	143
	Total	5654 (77.26%)	1664 (22.74%)	7318 (100%)

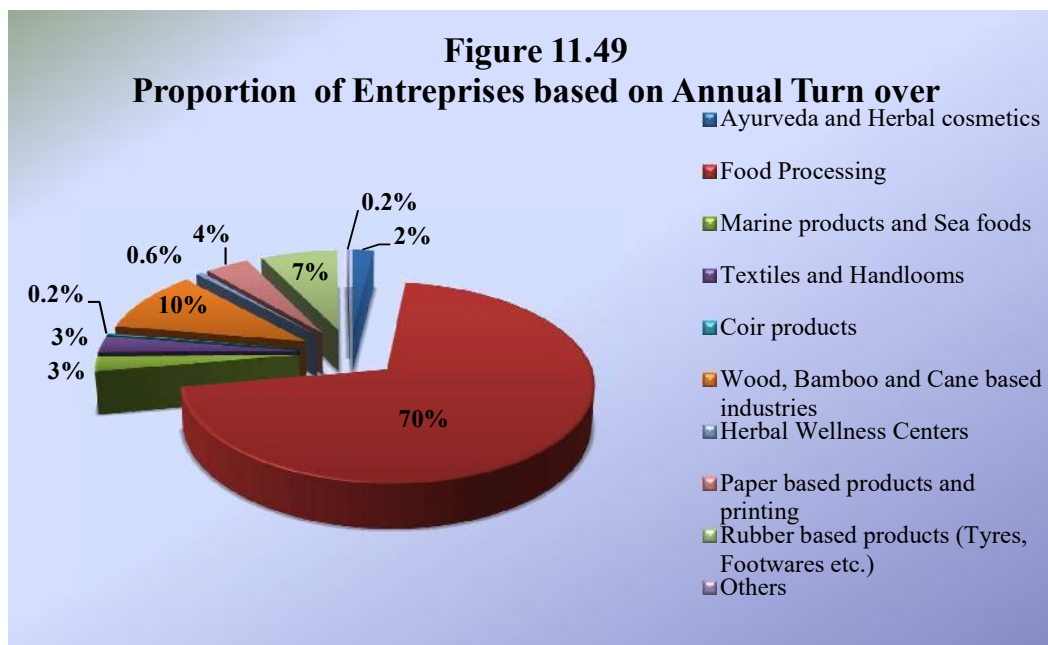


- Majority of enterprises are in manufacturing sector.
- In Food Processing, Textiles, and wood-based enterprises there is a higher proportion of manufacturing activity.
- In the Herbal wellness centres, the maximum enterprises are service-based ones.

Table 11.50
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	19,387.29	1.95
2	Food Processing	6,98,708.37	70.32
3	Marine products and Sea foods	25,163.06	2.53
4	Textiles and Handlooms	26,720.83	2.69

5	Coir products	2,164.68	0.22
6	Wood, Bamboo and Cane based industries	1,03,476.52	10.41
7	Herbal Wellness Centers	4,490.60	0.56
8	Paper based products and printing	41,214.19	4.04
9	Rubber based products (Tyres, Footwares etc.)	70,122.13	7.06
10	Others	2,175.50	0.22
	Total	9,93,623.17	100

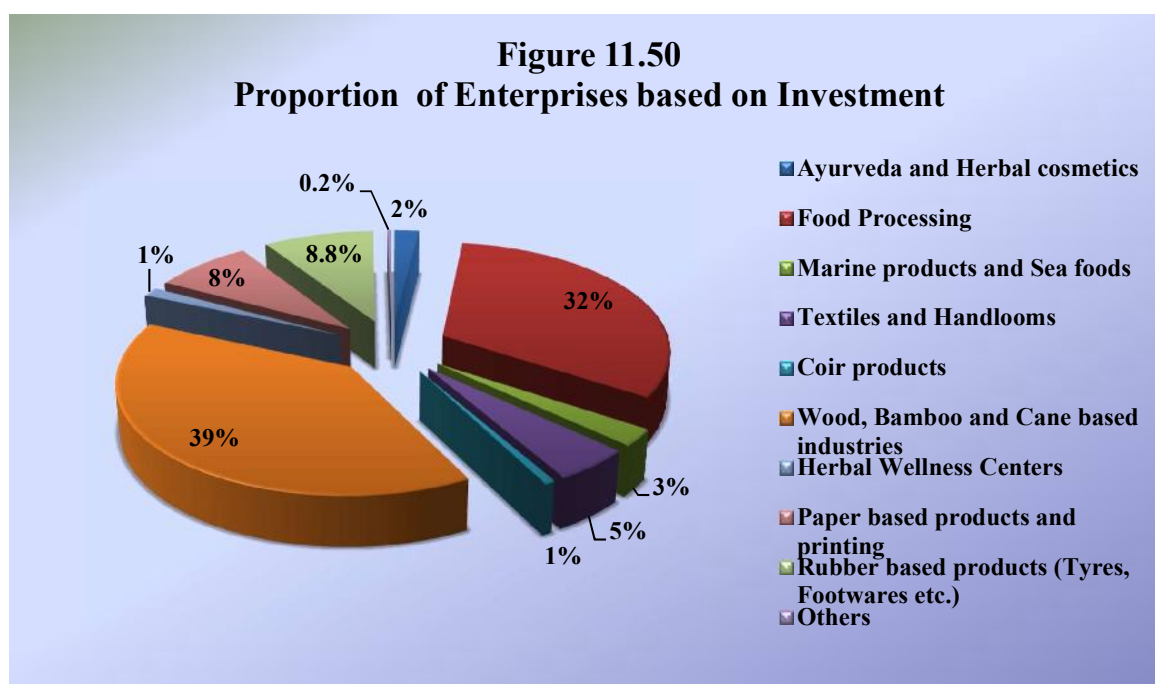


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 70% of total annual turnover.
- The lowest percentage share to total annual turnover is for the 'Coir' sector and this could be attributed to a lower number of enterprises in this category. Herbal wellness centers also have a lower share in Annual turn over.

Table 11.51
Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	4,625.28	1.98
2	Food Processing	75455.16	32.30
3	Marine products and Sea foods	5837.87	2.50
4	Textiles and Handlooms	11,331.61	4.85

5	Coir products	1,560.88	0.67
6	Wood, Bamboo and Cane based industries	91,664.73	39.25
7	Herbal Wellness Centers	3053.23	1.31
8	Paper based products and printing	18,591.42	7.96
9	Rubber based products (Tyres, Footwares etc.)	20,768.54	8.89
10	Others	676.92	0.29
	Total	2,33,565.64	100

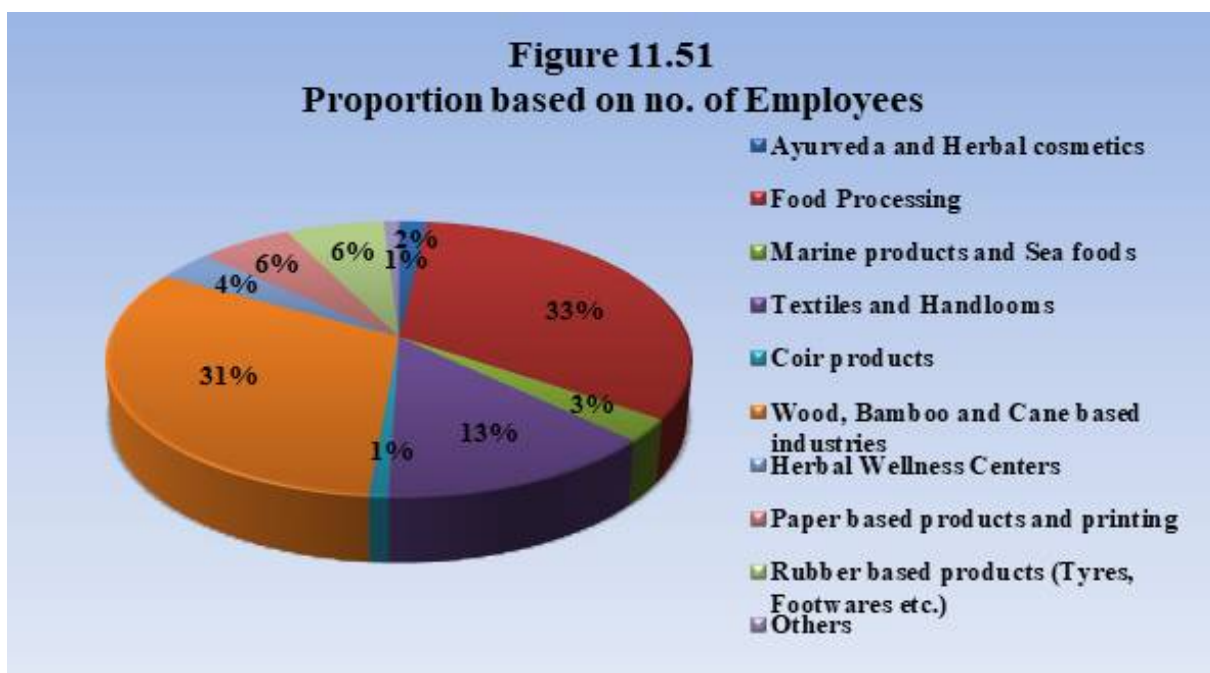


- The total investment is highest in the Wood, bamboo, cane based category which is immediately followed by Food processing industry.
- The 'Coir products' and 'Herbal Wellness Centers' having a low total investment.

Table 11.52
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	805	1.83
2	Food Processing	14412	32.67
3	Marine products and Sea foods	1174	2.66

4	Textiles and Handlooms	5882	13.33
5	Coir products	407	0.92
6	Wood, Bamboo and Cane based industries	13957	31.63
7	Herbal Wellness Centers	1605	3.64
8	Paper based products and printing	2643	5.99
9	Rubber based products (Tyres, Footwares etc.)	2798	6.34
10	Others	437	0.99
	Total	44120	100



- The number of employees is higher in 'Food processing' and 'Wood, bamboo, cane based' sectors.
- 'Coir products' have a lower share in number of employees mainly because of less number of enterprises in this sector.



BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

THRISSUR

Total number of Bioresource based Enterprises: 7517

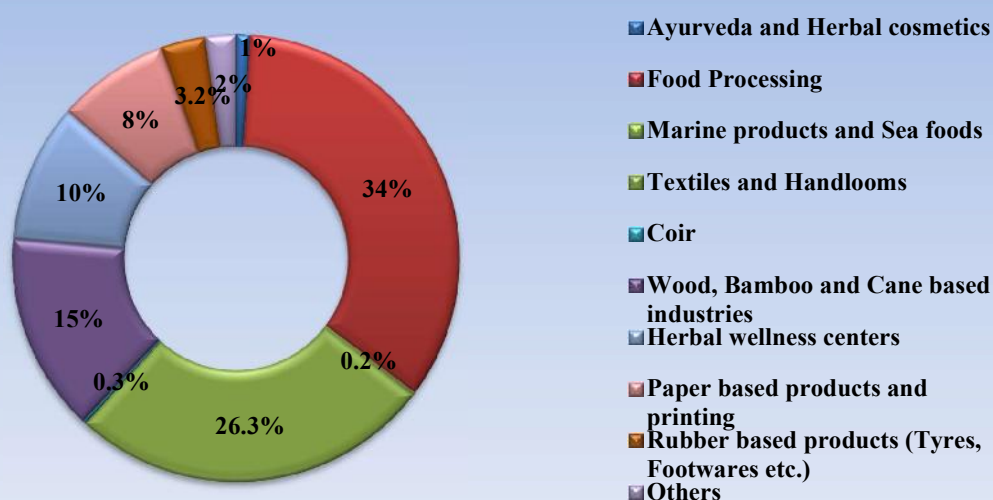
Table 11.53
Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	74
	a. Ayurvedic medicines	50
	b. Herbal cosmetics	16
	c. Ayurvedic oils/Thailams	4
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	4
2	Food Processing	2578
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	571
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	1437
	c. Ready to cook items (Chapathi, Pathiri etc.)	6
	d. Value added products (Pickle, Pappad etc)	154
	e. Copra, Coconut oil and other coconut products	29
	f. Restaurants, Hotels and Catering	47
	g. Milk/Dairy products	30
	h. Meat and meat products	10
	i. Coffee, Tea and spices processing	13
	j. Honey products	6
	k. Other edible oils	103
	l. Others	172
3	Marine products and Sea foods	14
4	Textiles and Handlooms	1977
	a. Cotton	38
	b. Other textile products, garments and tailoring	1939
5	Coir	20
	a. Coir Fibre	16
	b. Coir Products	4
6	Wood, Bamboo and Cane based industries	1079
	a. Wood items/furniture/saw mil	1058
	b. Bamboo and cane furniture	21
7	Beauty parlor and Physiotherapy	754
8	Paper based products and printing	611



	a. Paper and paper based products	153
	b. Paper based secondary activities (Printing, photostat, binding)	458
9	Rubber based products (Tyres, Footwares etc.)	243
10	Others	167
	a. Leather products	37
	b. Wax products	32
	c. Animal and Poultry feed Supplements	5
	d. Camphor and Incense sticks	8
	e. Manures, Fertilizers, Biogas and Bio-briquettes	16
	f. Agriculture related activities	32
	g. Vegetable Fibres and Textiles	7
	h. Handicrafts	14
	i. Palm and Palm leaf products	16
	Total	7517

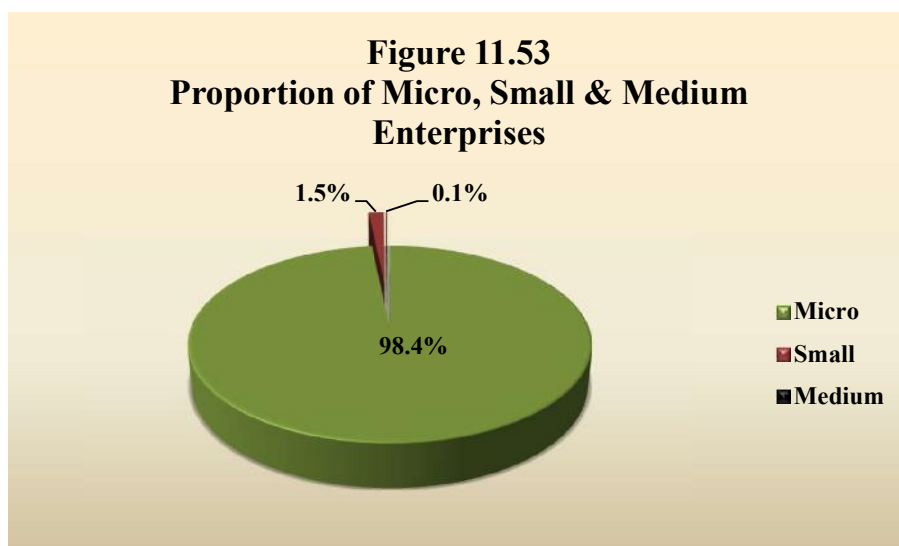
Figure 11.52
Percentage of Bioresources Based Enterprises, Thrissur



- Maximum bio-resource-based Enterprises belong to the Food processing category (2578).
- Textiles-Handlooms and Wood based industries are the 2nd and 3rd largest enterprises in Thrissur.
- The least number of enterprises are in the Marine products-sea food (17) and coir (20) categories.

Table 11.54
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	65	8	1	74
2	Food Processing	2529	47	2	2578
3	Marine products and Sea foods	12	2		14
4	Textiles and Handlooms	1970	7		1977
5	Coir	18	2		20
6	Wood, Bamboo and Cane based industries	1073	5	1	1079
7	Herbal wellness centers	752	2		754
8	Paper based products and printing	589	21	1	611
9	Rubber based products (Tyres, Footwares etc.)	225	17	1	243
10	Others	162	4	1	167
	Total	7395 (98.4%)	115 (1.5%)	7 (0.1%)	7517 (100%)



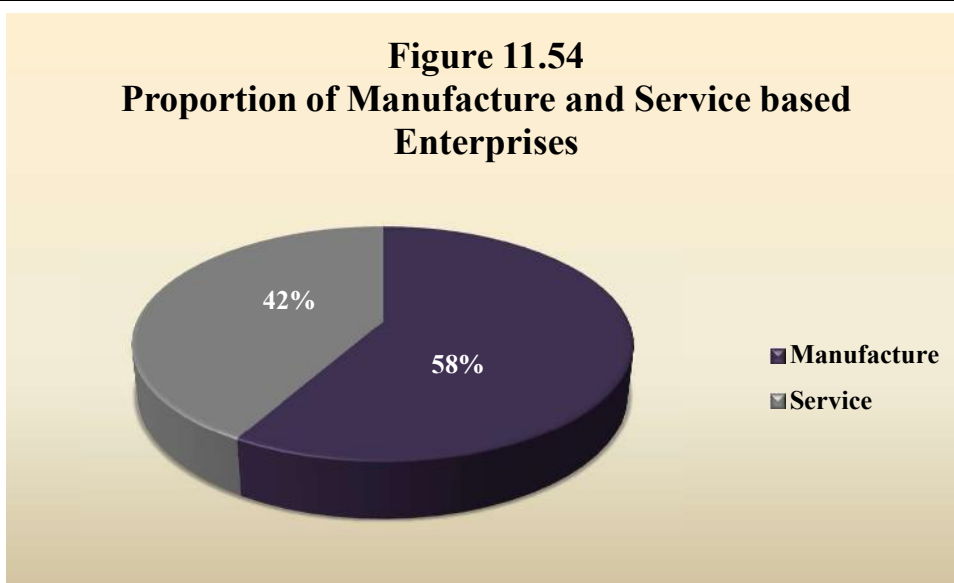
- Maximum enterprises (98.4%) are in the category micro enterprises. 1.5% enterprises are in the small category and only 0.1% enterprises are in the medium category.



Table 11.55
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	68	6	74
2	Food Processing	1897	681	2578
3	Marine products and Sea foods	13	1	14
4	Textiles and Handlooms	770	1207	1977
5	Coir	20		20
6	Wood, Bamboo and Cane based industries	909	170	1079
7	Herbal wellness centers	62	692	754
8	Paper based products and printing	339	272	611
9	Rubber based products (Tyres, Footwares etc.)	157	86	243
10	Others	147.0	20.0	167
	Total	4382 (58.3%)	3135 (41.7%)	7517 (100%)

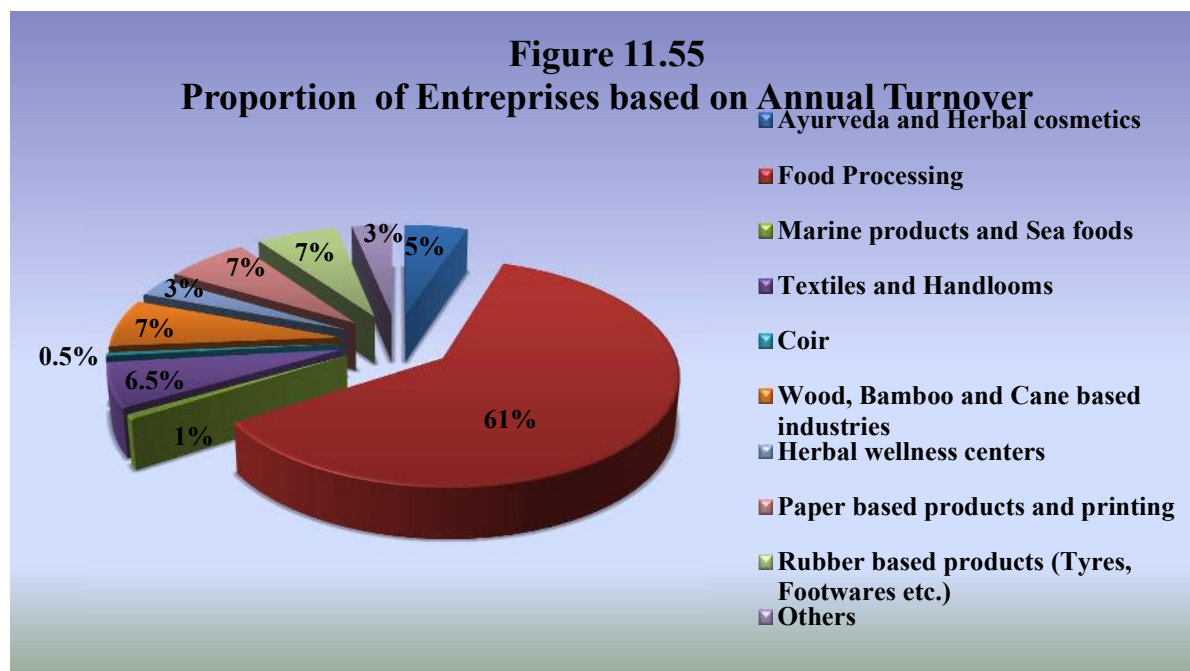
Figure 11.54
Proportion of Manufacture and Service based Enterprises



- The nature of the activity is manufacturing for the majority of enterprises (58%).
- In Food processing and Wood-based enterprises there is a higher proportion of manufacturing activity.
- Herbal wellness centres are the maximum number of enterprises comes under the service-based category.

Table 11.56
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	8,559.00	5.1
2	Food Processing	1,02,066.00	60.89
3	Marine products and Sea foods	1,215.50	0.72
4	Textiles and Handlooms	11,116.00	6.50
5	Coir	849.00	0.51
6	Wood, Bamboo and Cane based industries	11,727.78	6.98
7	Herbal wellness centers	4,564.17	2.72
8	Paper based products and printing	11,349.76	6.76
9	Rubber based products (Tyres, Footwares etc.)	11,042.73	6.58
10	Others	5,440.00	3.24
	Total	1,67,929.94	100.00

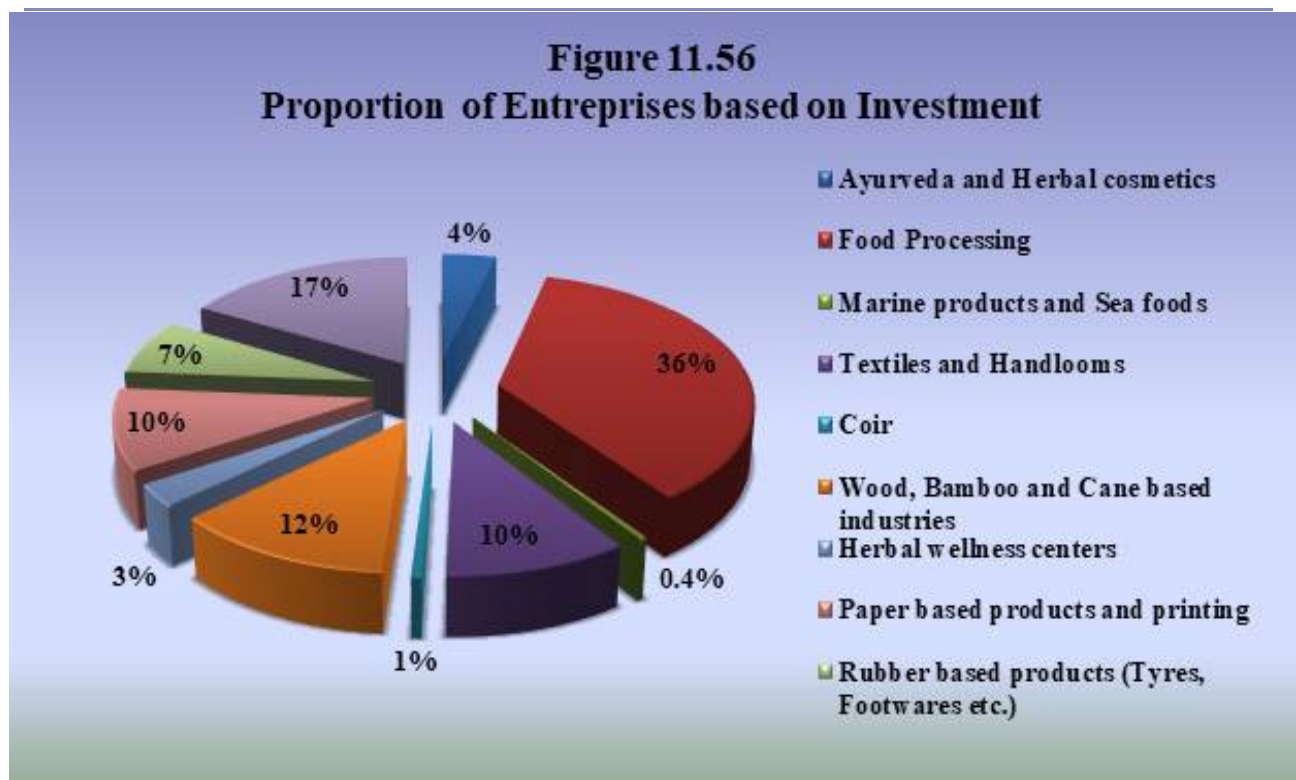


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 61% of total annual turnover.

- The lowest percentage share to total annual turnover is for the Coir sector (0.5%) and Marine products and sea food category and this could be attributed to a lower number of enterprises in these categories.

Table 11.57
Total Investment in different categories of Bioresource-based Enterprises

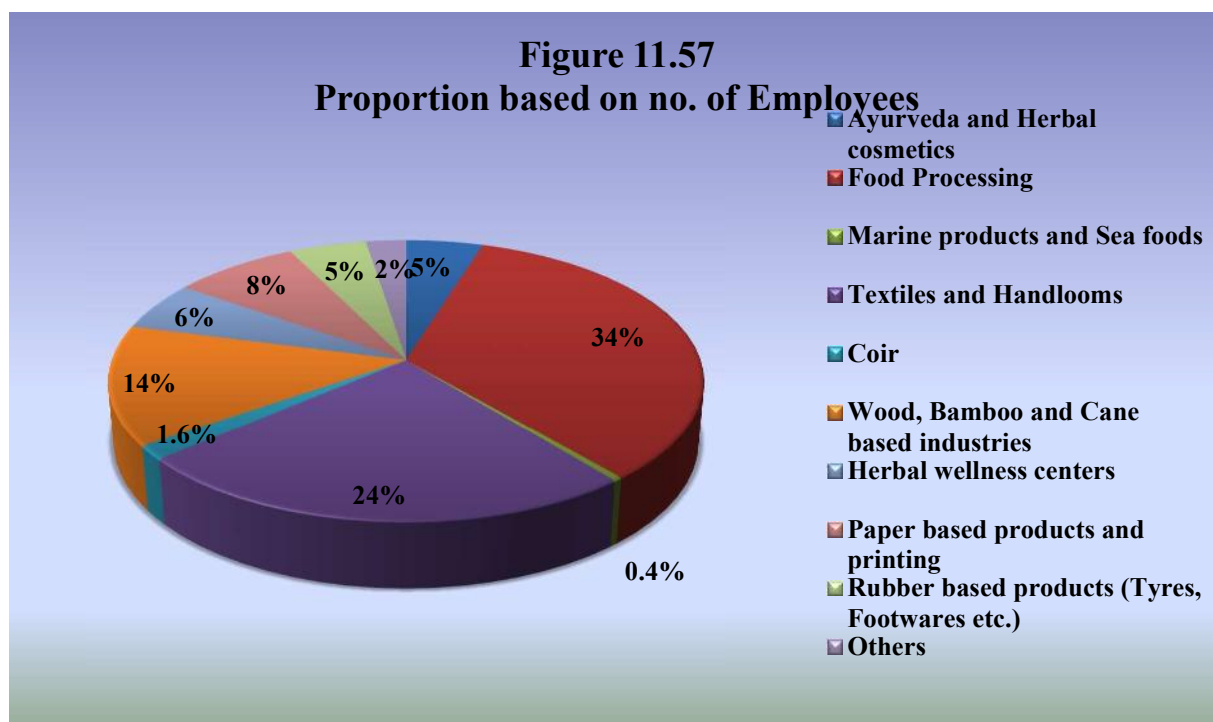
Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	4487.85	3.92
2	Food Processing	41471.10	36.21
3	Marine products and Sea foods	459.90	0.40
4	Textiles and Handlooms	11590.87	10.00
5	Coir	502.16	0.56
6	Wood, Bamboo and Cane based industries	13914.13	12.15
7	Herbal wellness centers	3254.15	2.84
8	Paper based products and printing	11641.47	10.17
9	Rubber based products (Tyres, Footwares etc.)	8001.33	6.99
10	Others	19190.93	16.76
	Total	114513.89	100.00



- The total investment is highest in the Food processing category (36).
- The Marine products and sea food category (0.4%) which had lower annual turnover also having a low total investment comparatively.

Table 11.58
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal cosmetics	1355	4.83
2	Food Processing	9524	33.92
3	Marine products and Sea foods	122	0.43
4	Textiles and Handlooms	6,885	24.52
5	Coir	452	1.62
6	Wood, Bamboo and Cane based industries	3859	13.74
7	Herbal wellness centers	1587	5.65
8	Paper based products and printing	2224	7.92
9	Rubber based products (Tyres, Footwares etc.)	1358	4.84
10	Others	711	2.53
	Total	28077	100.00



- Number of employees is higher in 'Food processing' category (34%).
- Textile and handloom (24%), sector comes next to 'Food processing' sector.
- Marine products and sea food (0.4 %) sector have a lower share in number of employees mainly because of less number of enterprises in these sectors in Thrissur

BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

PALAKKAD

Total number of Bioresource based Enterprises: 1082

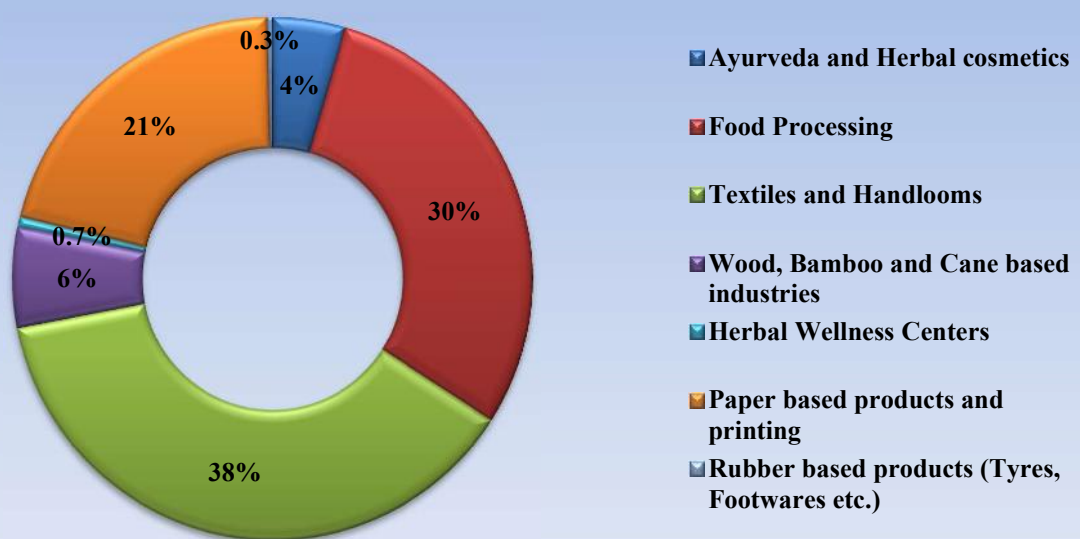
Table 11.59
Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	49
	a. Ayurvedic medicines	37
	b. Herbal cosmetics	3
	c. Ayurvedic oils/Thailams	7
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	2
2	Food Processing	320
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	49
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	98
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	20
	d. Value added products (Pickle, Pappad etc)	67
	e. Coconut based products (Oil and Powder)	5
	f. Restaurants, Hotels and Catering	11
	g. Pets feeding	2
	h. Others (Food Industry, retail of food products etc.)	68
3	Textiles and Handlooms	410
	a. Cotton	9
	b. Others	398
	c. Textile secondary	3
4	Wood, Bamboo and Cane based industries	67
	c. Wood items/furniture/saw mill	67
5	Herbal Wellness Centers	7
6	Paper based products and printing	225



	a. Printing/ Photostat and Binding	211
	b. Retail sale and production of Books, Brochures etc.	14
7	Rubber based products (Tyres, Footwares, etc.)	4
	Total	1082

Figure 11.58
Percentage of Bioresources Based Enterprises, Palakkad

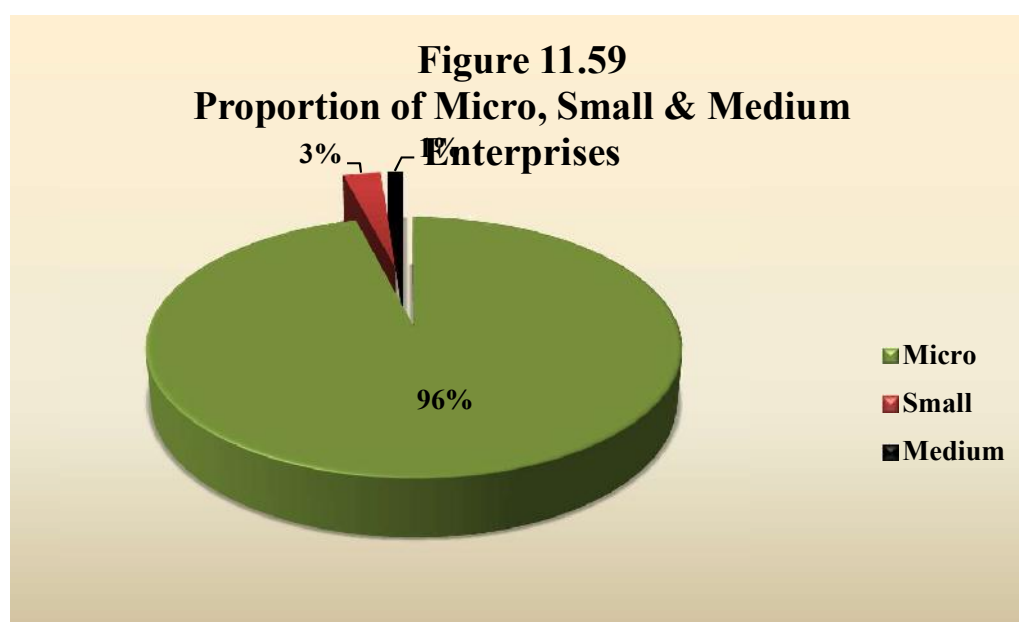


- Maximum bio-resource-based Enterprises belong to the Textiles-Handlooms (410) and which is immediately followed by Food processing category (320).
- The least number of Enterprises are in the 'Herbal Wellness Centers' (7) and 'Rubber based enterprises' (4).



Table 11.60
Proportion of Micro, Small and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	43	5	1	49
2	Food Processing	302	10	8	320
3	Textiles and Handlooms	405	2	3	410
4	Wood, Bamboo and Cane based industries	64	2	1	67
5	Herbal Wellness Centers	7			7
6	Paper based products and printing	214	11		225
7	Rubber based products (Tyres, Footwares etc.)	4			4
	Total	1039	30	13	1082

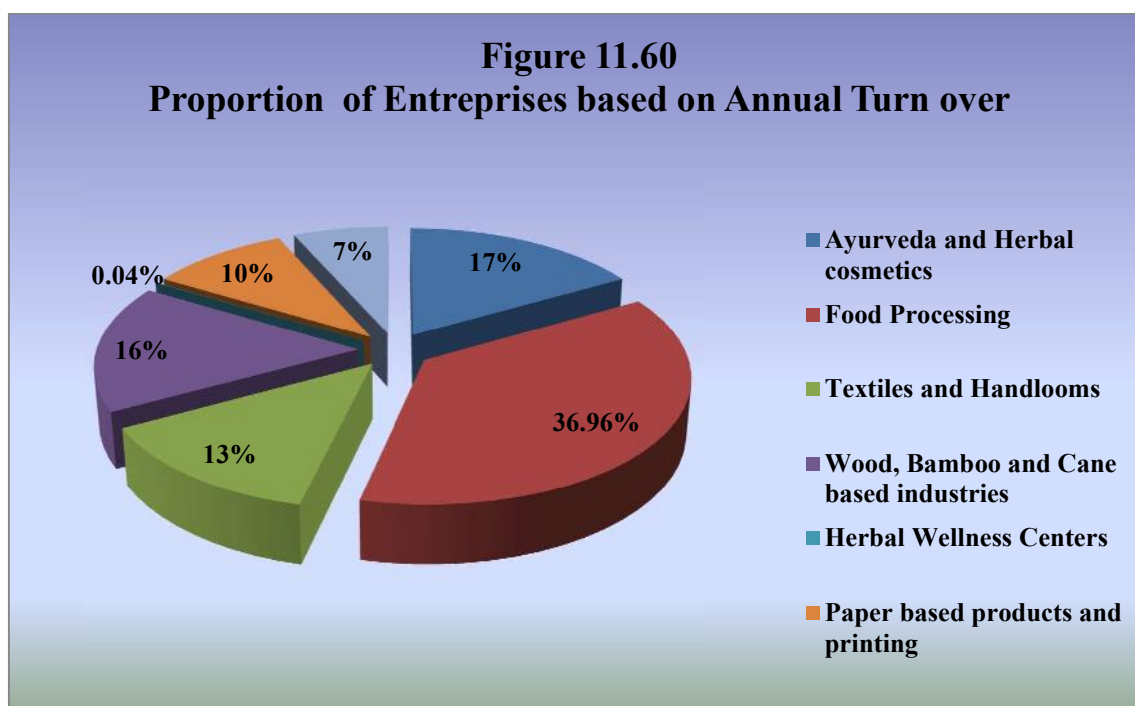


- Maximum enterprises (96%) are in the category micro enterprises. 3% enterprises are in the small category and only 1% enterprises are in the medium category.



Table 11.61
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	8,160.19	16.73
2	Food Processing	18,025.50	36.96
3	Textiles and Handlooms	6,534.25	13.39
4	Wood, Bamboo and Cane based industries	8,019.00	16.44
5	Herbal Wellness Centers	19.20	0.04
6	Paper based products and printing	4,762.46	9.76
7	Rubber based products (Tyres, Footwares etc.)	3,263.00	6.68
	Total	48783.60	100.00



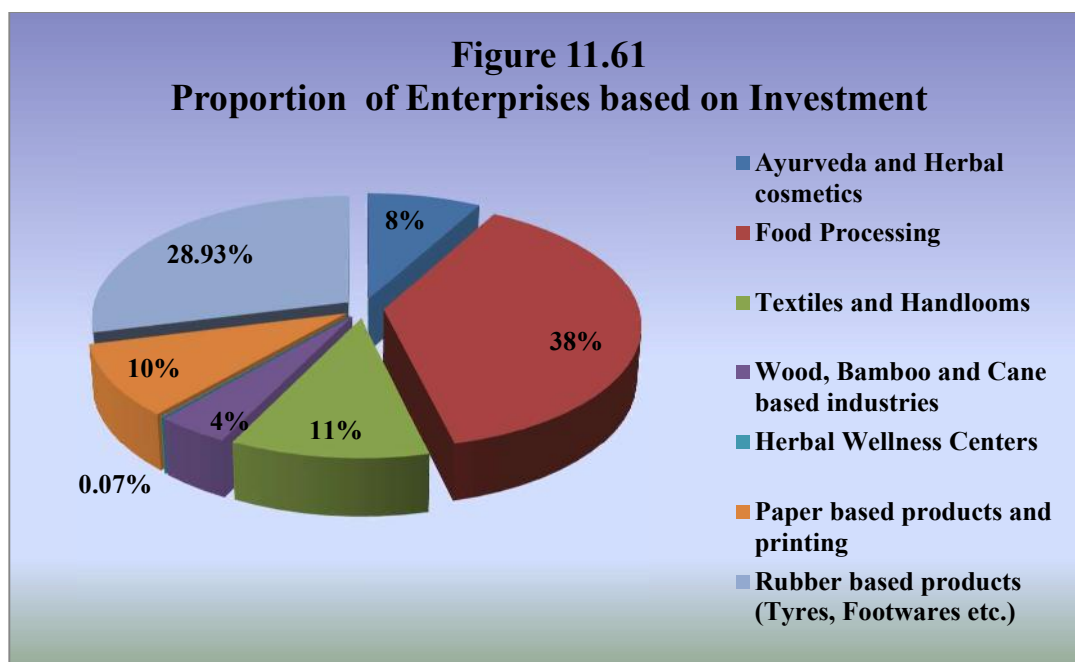
- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 36.96% of total annual turnover.
- The percentage share of 'Ayurveda and Herbal cosmetic enterprises' and 'Wood, Bamboo and Cane based enterprises' to the total annual turnover is much higher despite the lower number of enterprises in these categories.

- The lowest percentage share to total annual turnover is for the Herbal Wellness Centers and this could be attributed to a lower number of enterprises in this category.

Table 11.62

Total Investment in different categories of Bioresource-based Enterprises

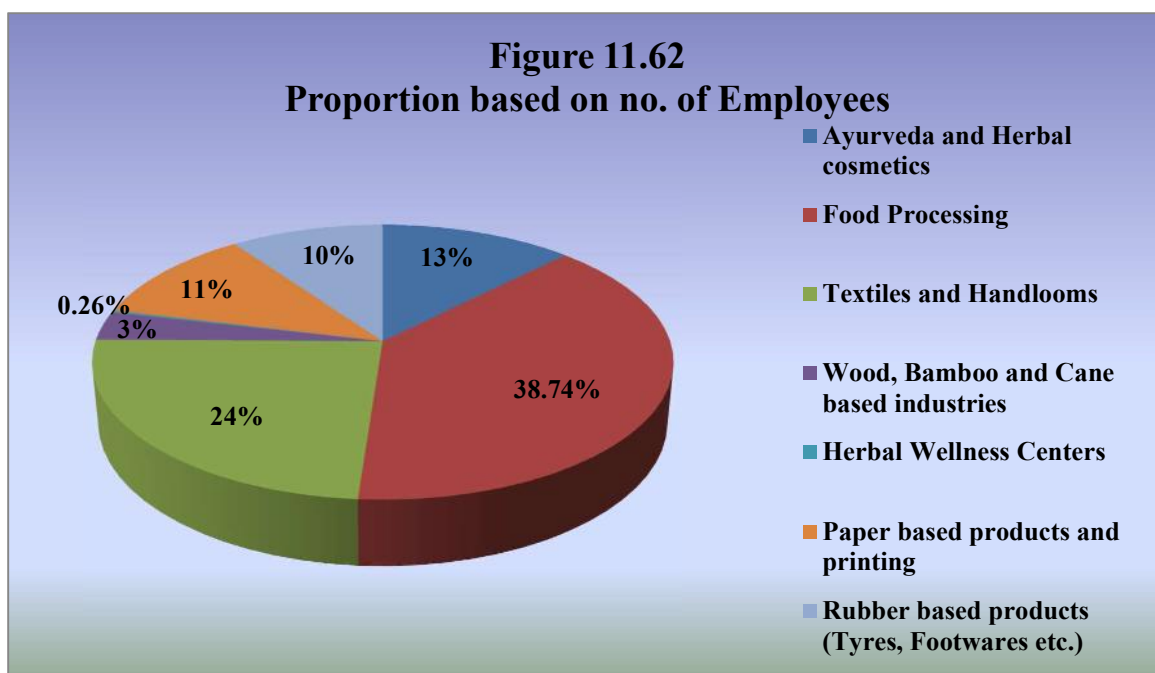
Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	3010.94	8.08
2	Food Processing	14217.96	38.13
3	Textiles and Handlooms	4181.09	11.13
4	Wood, Bamboo and Cane based industries	1627.40	4.12
5	Herbal Wellness Centers	27.00	0.07
6	Paper based products and printing	3548.73	9.53
7	Rubber based products (Tyres, Footwares etc.)	10637.00	28.93
	Total	37250.12	100.00



- The total investment is also highest in the Food processing (38%) category which is immediately followed by Rubber bases industries.
- The 'Herbal Wellness Centres' having a low total investment comparatively.

Table 11.63
Total number of employees in different categories of
Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	924	12.42
2	Food Processing	2883	38.74
3	Textiles and Handlooms	1788	24.03
4	Wood, Bamboo and Cane based industries	251	3.37
5	Herbal Wellness Centers	19	0.26
6	Paper based products and printing	842	11.32
7	Rubber based products (Tyres, Footwares etc.)	734	9.86
	Total	7441	100



- The number of employees is higher in 'Food processing' sector.
- 'Textiles and Handlooms' sector comes next to 'Food processing' sector.
- 'Herbal Wellness Centers' have a lower share in number of employees mainly because of less number of enterprises in this sector.

BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

MALAPPURAM

Total number of Bioresource based Enterprises: 6187

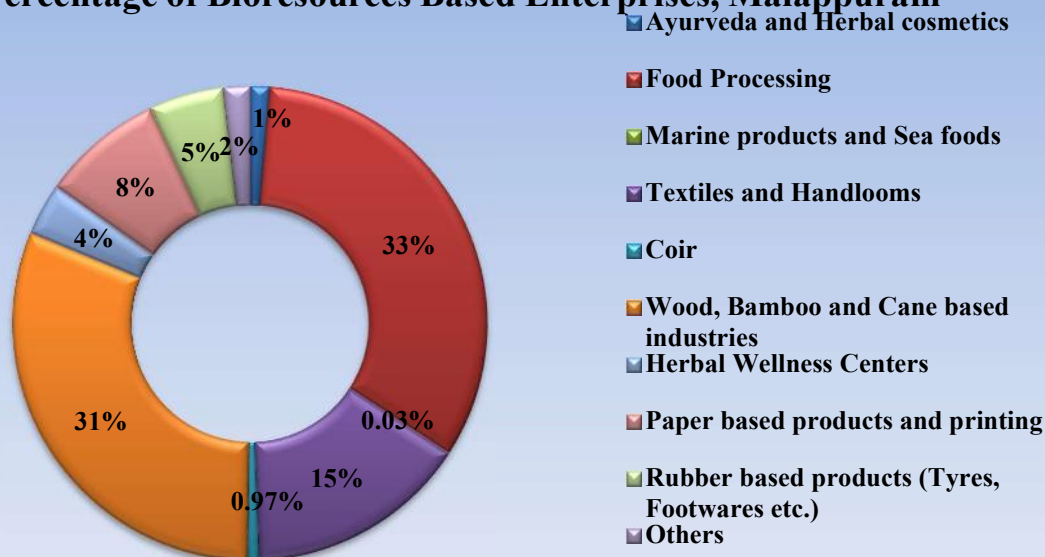
Table 11.64
Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	83
	a. Ayurvedic medicines	
	b. Herbal cosmetics	62
	c. Ayurvedic oils/Thailams	4
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	2 15
2	Food Processing	2033
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	406
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	1116
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	22
	d. Value added products (Pickle, Pappad etc)	143
	e. Copra, Coconut oil and other coconut products	29 28
	f. Restaurants, Hotels and Catering	12
	g. Milk/Dairy products	16
	h. Meat and meat products	7
	i. Coffee and Tea processing	45
	j. Spices processing	48
	k. Other edible oils	161
	l. Others	
3	Marine products and Sea foods	2
4	Textiles and Handlooms	936
	a. Cotton	26
	b. Other textile products, garments and tailoring	910
5	Coir	53
	a. Coir Fibre	9
	b. Coir Products	44
6	Wood, Bamboo and Cane based industries	1918



	a. Wood items/furniture/saw mil	1911
	b. Bamboo and cane furniture	7
7	Herbal Wellness Centers	220
8	Paper based products and printing	513
	a. Paper and paper based products	133
	b. Paper based secondary activities (Printing, photostat, binding)	380
9	Rubber based products (Tyres, Footwares etc.)	315
10	Others	114
	a. Leather products	32
	b. Wax products	31
	c. Animal and Poultry feed Supplements	1
	d. Camphor and Incense sticks	2
	e. Manures, Fertilizers, Biogas and Bio-briquettes	15
	f. Agriculture related activities	14
	g. Vegetable Fibres and Textiles	6
	h. Hatchery	2
	i. Handicrafts	7
	j. Others (Unclassified)	4
	Total	6187

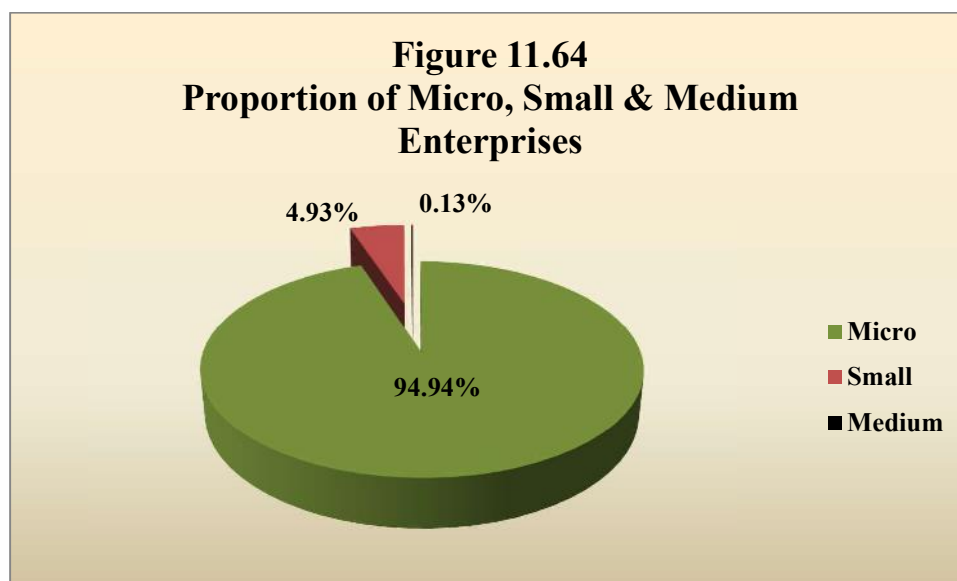
Figure 11.63
Percentage of Bioresources Based Enterprises, Malappuram



- Maximum bio-resource-based Enterprises belong to the Food processing category (2033) and which is immediately followed by Wood, Bamboo and Cane based category (1918).
- The least number of Enterprises are in the 'Marine products and Sea food' sector (2).

Table 11.65
Proportion of Micro, Small and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	79	4		79
2	Food Processing	1933	95	5	1933
3	Marine products and Sea foods	1	1		1
4	Textiles and Handlooms	915	20	1	915
5	Coir	47	6		47
6	Wood, Bamboo and Cane based industries	1851	66	1	1851
7	Herbal Wellness Centers	217	3		217
8	Paper based products and printing	474	39		474
9	Rubber based products (Tyres, Footwares etc.)	252	62	1	252
10	Others	105	9		105
	Total	5874 (94.94%)	305 (4.93%)	8 (0.13%)	6187 (100%)

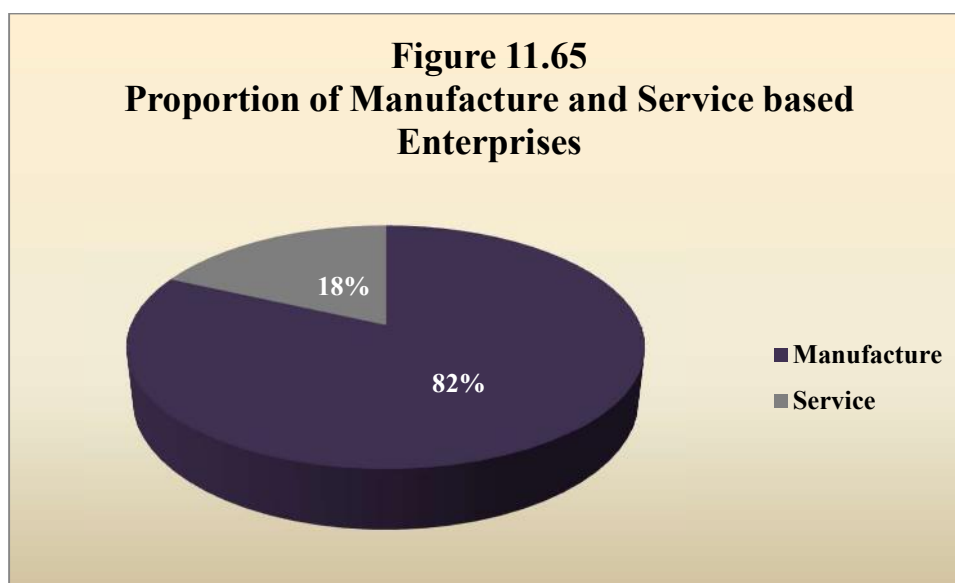


- Maximum enterprises (94.94%) are in the category micro enterprises. 4.93% enterprises are in the small category and only 0.13% enterprises are in the medium category.



Table 11.66
Proportion of Manufacture and Service based Enterprises

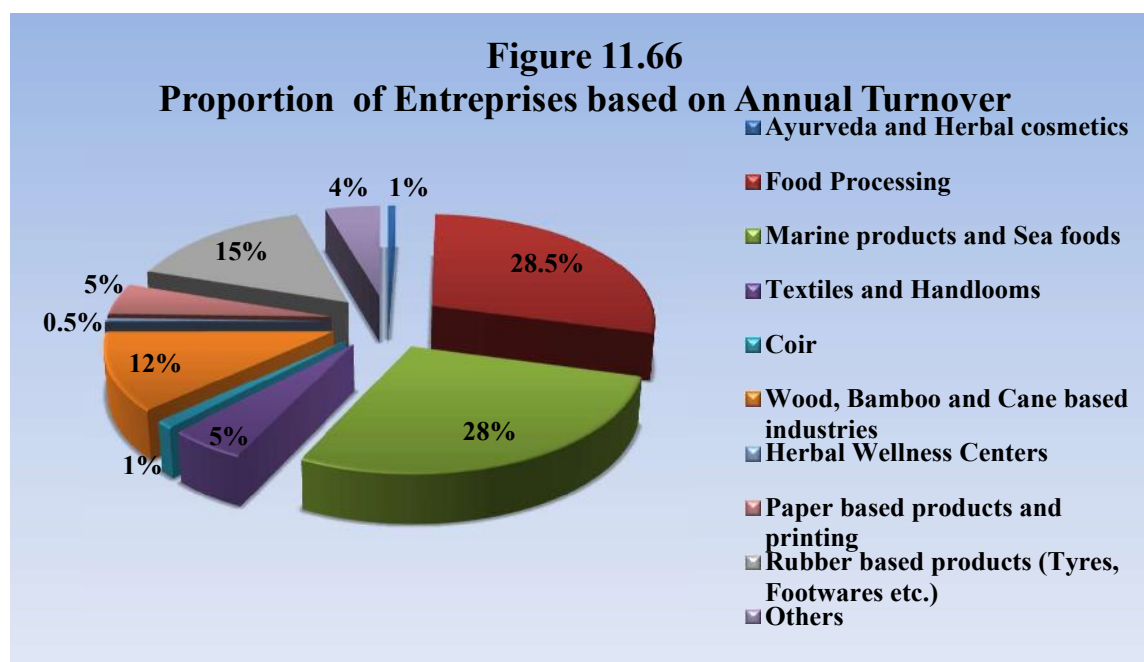
Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	80	3	83
2	Food Processing	1820	213	2033
3	Marine products and Sea foods	1	1	2
4	Textiles and Handlooms	569	367	936
5	Coir	49	4	53
6	Wood, Bamboo and Cane based industries	1834	84	1918
7	Herbal Wellness Centers	14	206	220
8	Paper based products and printing	373	140	513
9	Rubber based products (Tyres, Footwares etc.)	225	90	315
10	Others	98	16	114
	Total	5063 (81.83%)	1124 (18.17%)	6187 (100%)



- Majority of enterprises are in manufacturing (82%) sector.
- In Food Processing, Textiles, and wood-based enterprises there is a higher proportion of manufacturing activity.
- In the Herbal wellness centres, the maximum enterprises are service-based ones.

Table 11.67
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakh	%
1	Ayurveda and Herbal cosmetics	1315.45	0.61
2	Food Processing	61207.62	28.56
3	Marine products and Sea foods	60008.00	28.00
4	Textiles and Handlooms	10448.21	4.88
5	Coir	2465.00	1.15
6	Wood, Bamboo and Cane based industries	25181.78	11.75
7	Herbal Wellness Centers	1070.60	0.50
8	Paper based products and printing	9999.60	4.67
9	Rubber based products (Tyres, Footwares etc.)	33010.66	15.41
10	Others	9573.77	4.47
	Total	214280.69	100.00



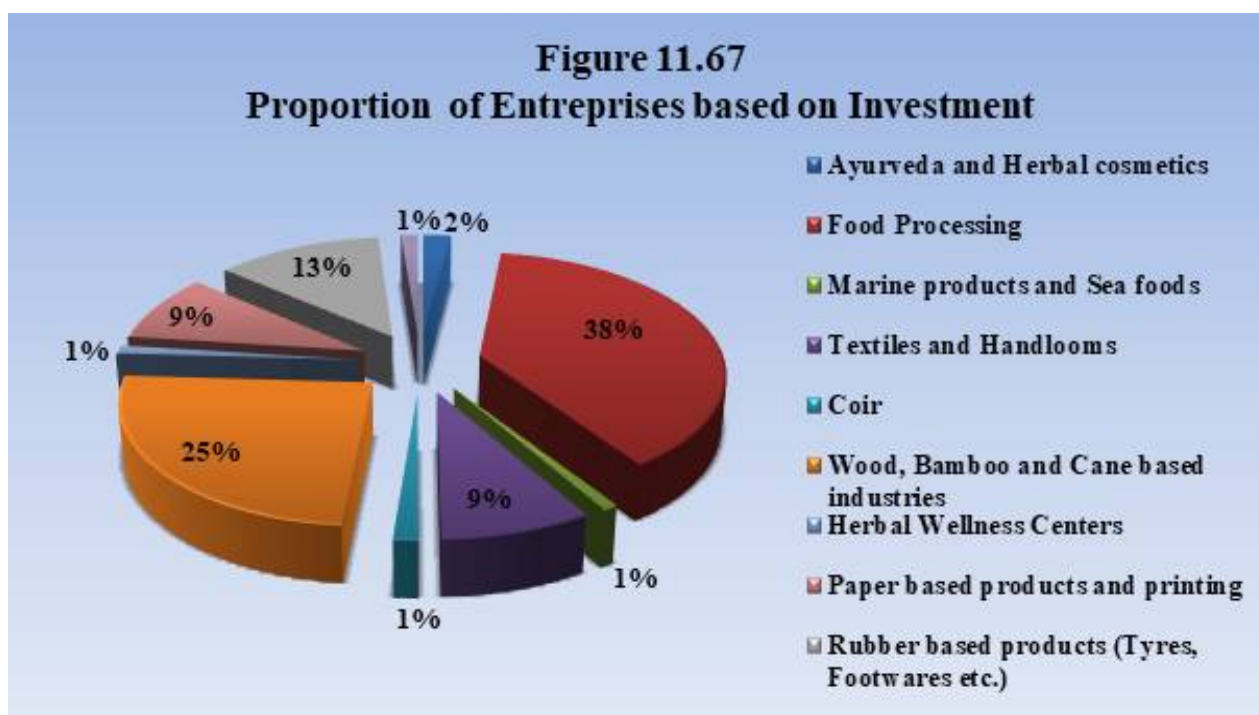
- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing (28.5%) and Marine products and Sea food (28%) categories.
- The percentage share of 'Marine Products and Sea foods' to the total annual turnover is higher despite the lower number of enterprises in this category.

- The lowest percentage share to total annual turnover is for the Herbal wellness centers.

Table 11.68

Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakh	%
1	Ayurveda and Herbal cosmetics	1527.70	2.08
2	Food Processing	28294.01	38.47
3	Marine products and Sea foods	637.00	0.87
4	Textiles and Handlooms	6255.57	8.51
5	Coir	1034.90	1.41
6	Wood, Bamboo and Cane based industries	18067.15	24.56
7	Herbal Wellness Centers	803.60	1.09
8	Paper based products and printing	6706.35	9.12
9	Rubber based products (Tyres, Footwares etc.)	9282.73	12.62
10	Others	939.35	1.28
	Total	73548.36	100.00



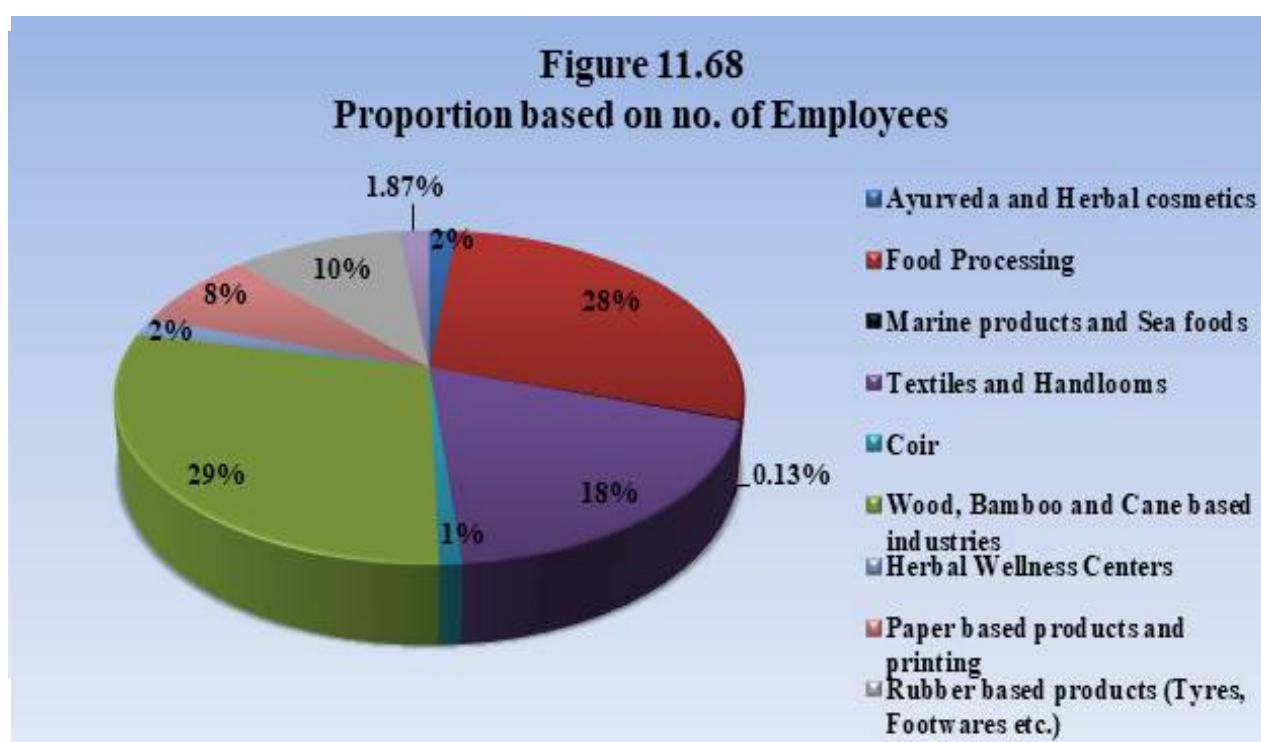
- The total investment is also highest in the Food processing category which is immediately followed by Wood, bamboo and cane based industries.



- The 'Marine products and sea foods' category which had higher annual turnover are having a low total investment comparatively.

Table 11.69
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	417	1.63
2	Food Processing	7265	28.32
3	Marine products and Sea foods	33	0.13
4	Textiles and Handlooms	4751	18.52
5	Coir	254	0.99
6	Wood, Bamboo and Cane based industries	7391	28.80
7	Herbal Wellness Centers	449	1.75
8	Paper based products and printing	1953	7.61
9	Rubber based products (Tyres, Footwares etc.)	2664	10.38
10	Others	478	1.87
	Total	25655	100.00



- The number of employees is higher in 'Wood-based industries' and 'Food processing' sector.
- 'Marine products and seafoods' and 'Coir' sector have a lower share in number of employees mainly because of less number of enterprises in these sectors.

BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

KOZHIKODE

Total number of Bioresource based Enterprises: 1257

Table 11.70

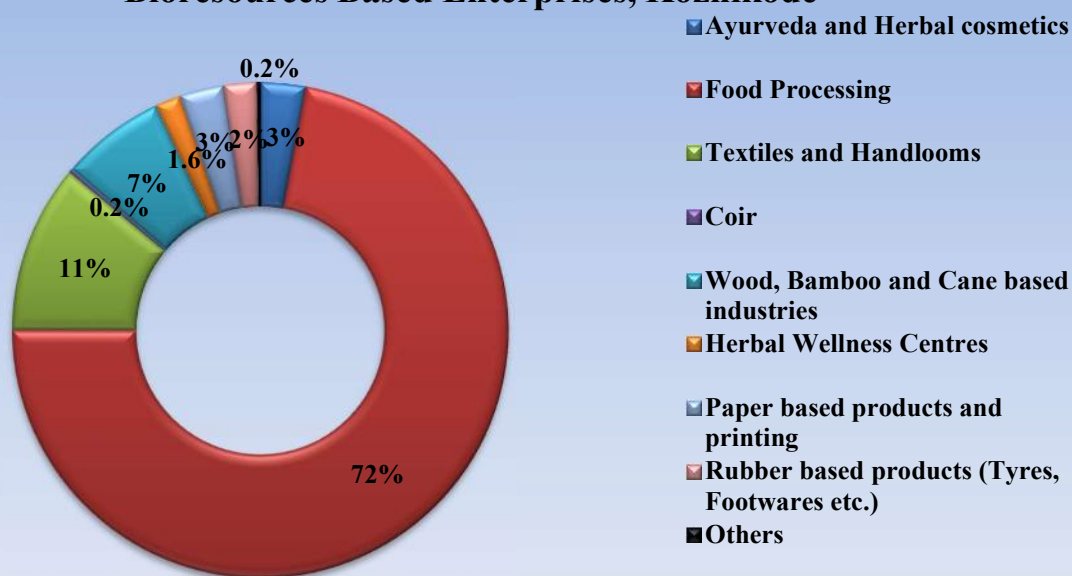
Category-wise number of Enterprises:

SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	37
	a. Ayurvedic medicines	18
	b. Ayurvedic oils/Thailams	10
	c. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	9
2	Food Processing	906
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	172
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	521
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	8
	d. Value added products (Pickle, Pappad etc)	36
	e. Meat Processing (Chicken, Meat)	1
	f. Copra, Coconut oil and other coconut products	140
	g. Restaurants, Hotels and Catering	8
	h. Milk/Dairy products	4
	i. Others	16
3	Textiles and Handlooms	138
	a. Cotton	21
	b. Other (textile products, garments and tailoring)	117
4	Coir	3
	a. Coir based	2
	b. Coconut shell products	1
5	Wood, Bamboo and Cane based industries	86
	a. Wood items/furniture/saw mil	85
	b. Bamboo and cane furniture	1
6	Herbal Wellness Centers	21
7	Paper based products and printing	36



	a. Paper and paper based products	6
	b. Paper based secondary activities (Printing, photostat, binding)	30
8	Rubber based products (Tyres, Footwares etc.)	27
9	Others	3
	a. Marine products and Sea foods	1
	b. Leather products	1
	c. Wax products	1
	Total	1257

Figure 11.69
Bioresources Based Enterprises, Kozhikode

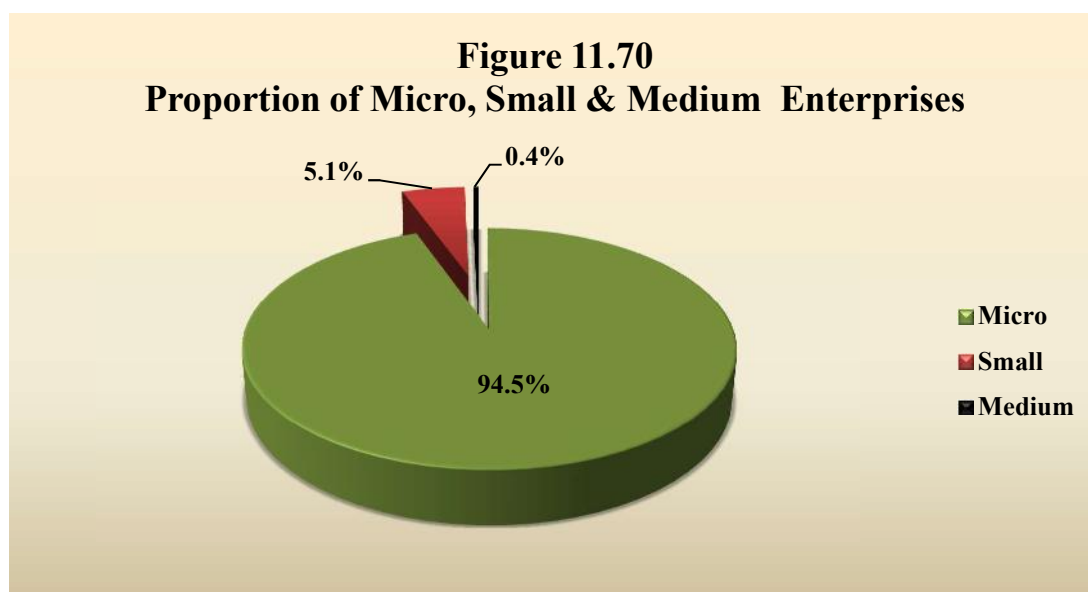


- Maximum bio-resource-based Enterprises belong to the Food processing category (906) which accounts 72% of total bioresource based industries.
- Textiles-Handlooms sector is in the 2nd position having only 11%.
- The least number of Enterprises are in the 'Coir' sector (3).

Table 11.71
Proportion of Micro, Small and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	33	3	1	37
2	Food Processing	854	50	2	906
3	Textiles and Handlooms	137		1	138
4	Coir	3			3
5	Wood, Bamboo and Cane based industries	84	2		86
6	Herbal Wellness Centres	21			21
7	Paper based products and printing	28	7	1	36
8	Rubber based products (Tyres, Footwares etc.)	25	2		27
9	Others	3			3
	Total	1188 (94.51%)	64 (5.09%)	5 (0.4%)	1257 (100%)

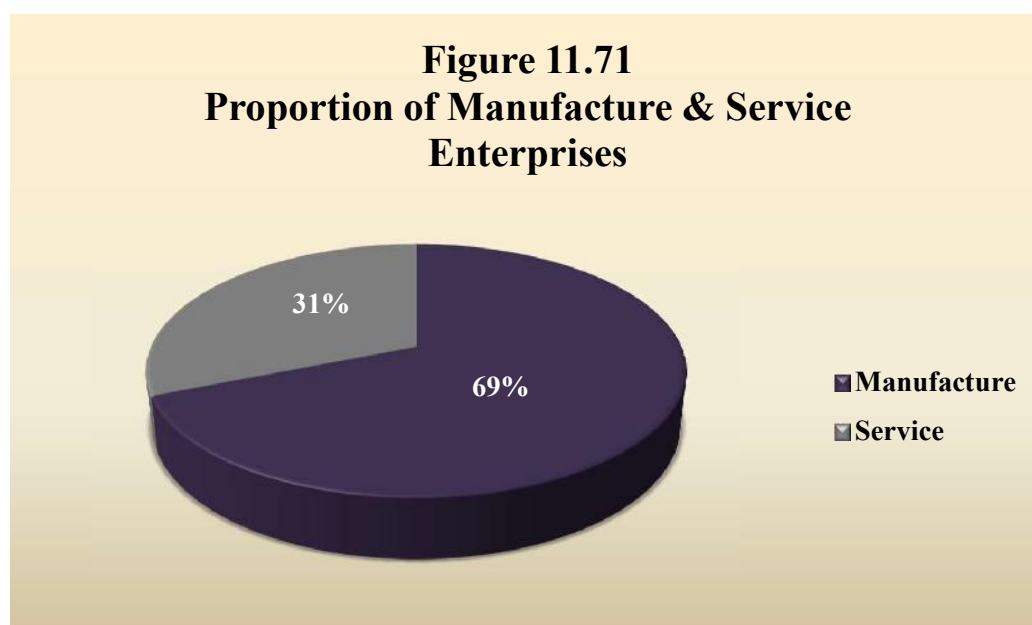
Figure 11.70
Proportion of Micro, Small & Medium Enterprises



- Maximum enterprises (94.5%) are in the category micro enterprises. 5.1% enterprises are in the small category and only 0.4% enterprises are in the medium category.

Table 11.72
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	33	4	37
2	Food Processing	663	243	906
3	Textiles and Handlooms	55	83	138
4	Coir	3		3
5	Wood, Bamboo and Cane based industries	66	20	86
6	Herbal Wellness Centres	3	18	21
7	Paper based products and printing	24	12	36
8	Rubber based products (Tyres, Footwares etc.)	17	10	27
9	Others	2	1	3
	Total	866 (68.89%)	391 (31.11%)	1257 (100%)

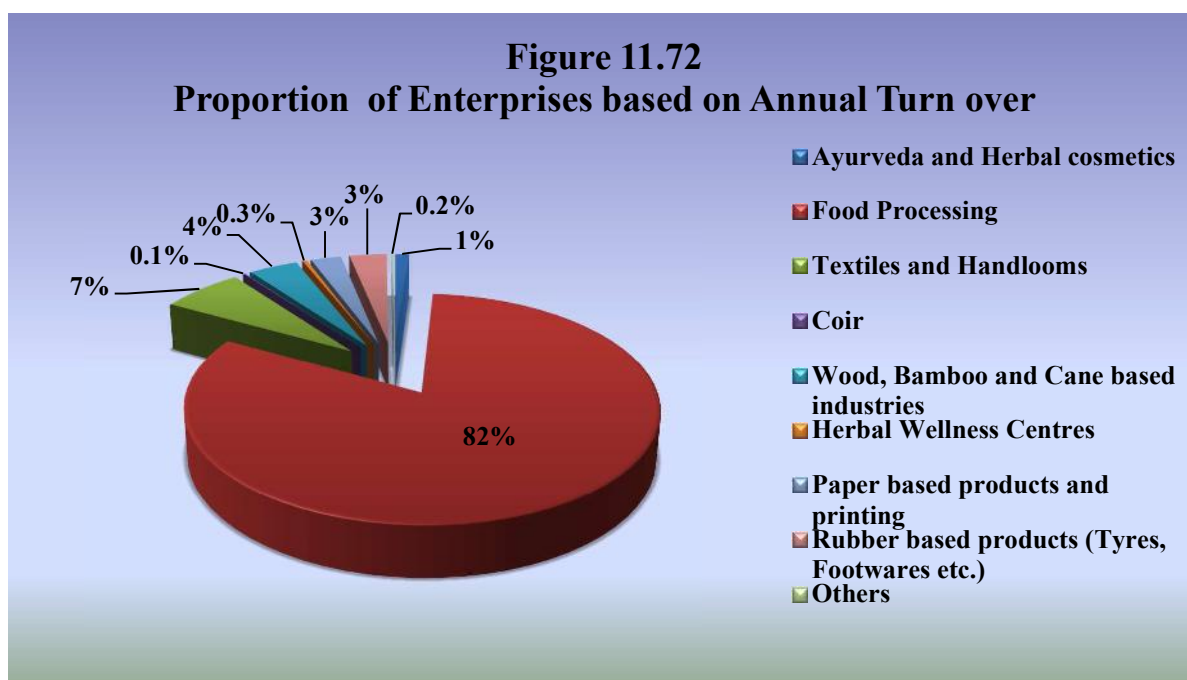


- Majority of enterprises are in manufacturing sector.



Table 11.73
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	437.00	1.12
2	Food Processing	31914.82	82.01
3	Textiles and Handlooms	2606.05	6.70
4	Coir	44.00	0.11
5	Wood, Bamboo and Cane based industries	1557.08	4.00
6	Herbal Wellness Centres	137.20	0.35
7	Paper based products and printing	965.00	2.48
8	Rubber based products (Tyres, Footwares etc.)	1187.52	3.05
9	Others	65.10	0.17
	Total	38913.77	100



- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 82% of total annual turnover.

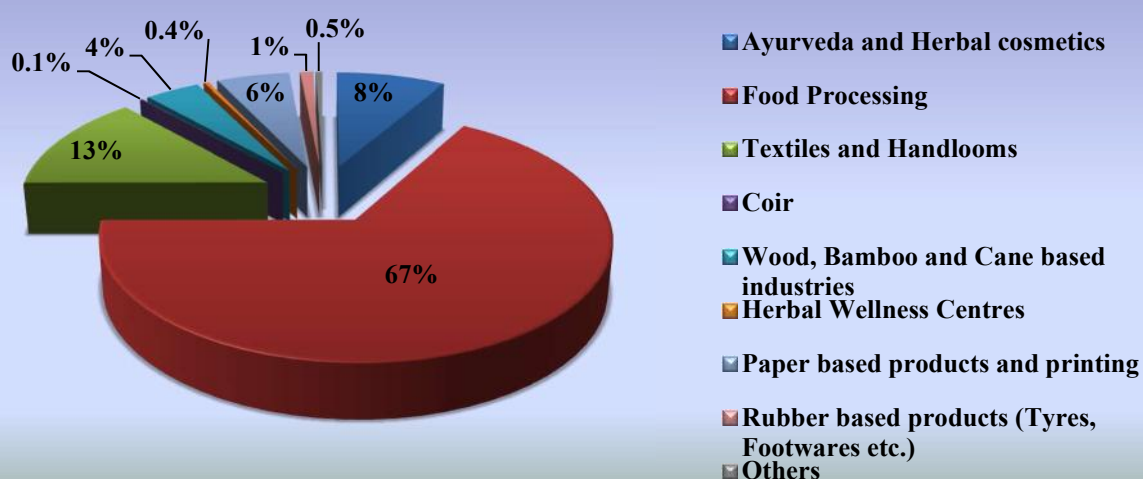
- The lowest percentage share to total annual turnover is for the Coir sector and this could be attributed to a lower number of enterprises in this category.

Table 11.74

Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	1659.79	8.32
2	Food Processing	13223.15	66.64
3	Textiles and Handlooms	2656.45	13.39
4	Coir	16.00	0.08
5	Wood, Bamboo and Cane based industries	824.80	4.16
6	Herbal Wellness Centres	72.00	0.36
7	Paper based products and printing	1101.75	5.55
8	Rubber based products (Tyres, Footwares etc.)	207.00	1.00
9	Others	81.20	0.50
	Total	19842.14	100

Figure 11.73
Proportion of Enterprises based on Investment

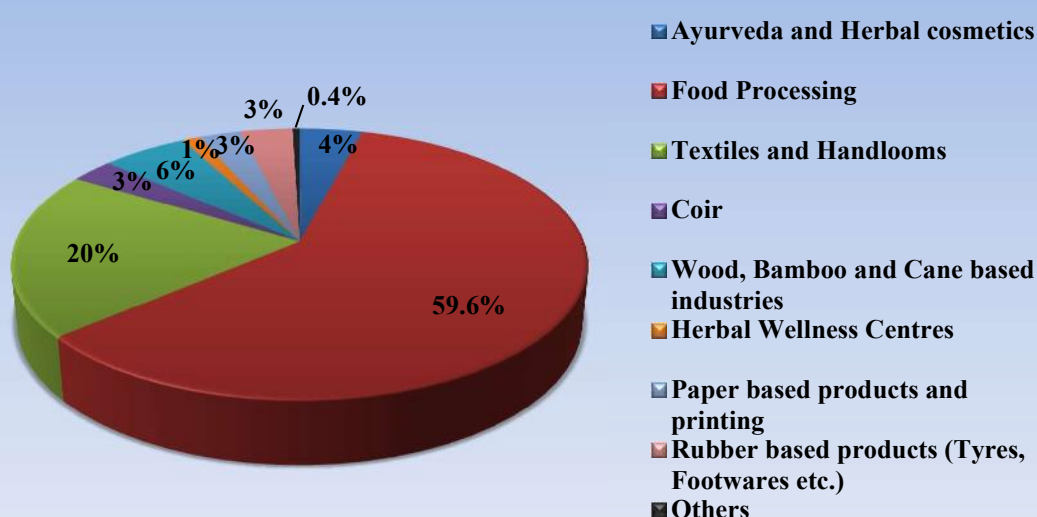


- The total investment is also highest in the Food processing category (67%)
- The 'Herbal wellness centers' having a low total investment comparatively.

Table 11.75
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	227	4.14
2	Food Processing	3269	59.60
3	Textiles and Handlooms	1092	19.91
4	Coir	156	2.84
5	Wood, Bamboo and Cane based industries	311	5.67
6	Herbal Wellness Centres	62	1.13
7	Paper based products and printing	152	2.77
8	Rubber based products (Tyres, Footwares etc.)	189	3.45
9	Others	27	0.49
	Total	5485	100

Figure 11.74
Proportion based on no. of workers



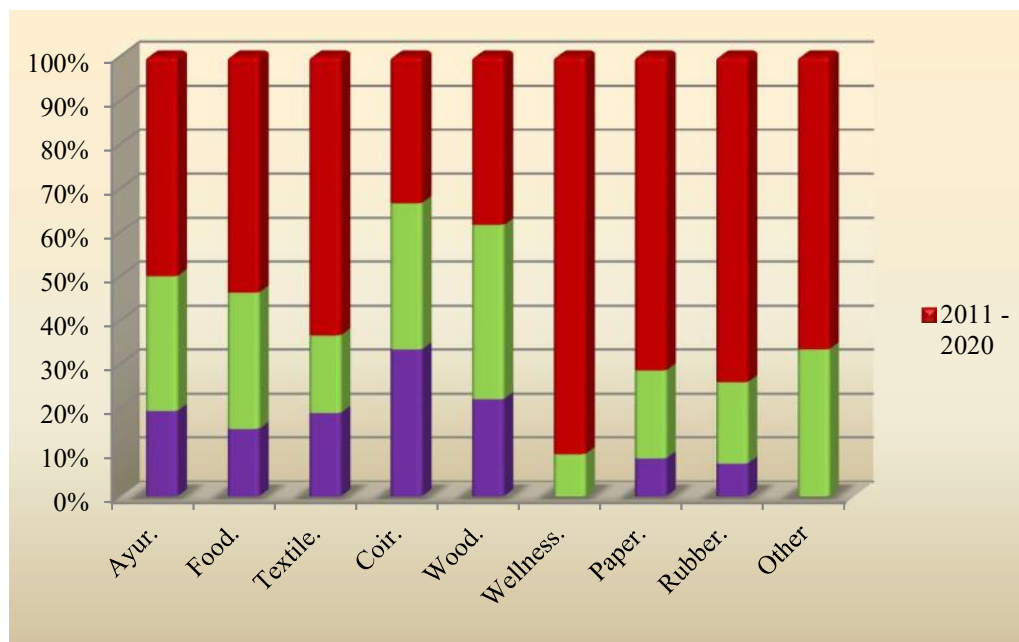
- The number of employees is also higher in 'Food processing' sector.
- In 'Textiles and handlooms' sector number of employees is comparatively higher despite the lower number of enterprises.
- 'Herbal wellness centers' have a lower share in number of employees.

Table 11.76
Classification based on year of establishment of various Enterprises

Sl.No.	Category	before 2000	2000 - 2010	2011 - 2020	Date not available	Total
1	Ayurveda and Herbal cosmetics	7	11	18	1	37
2	Food Processing	138	281	486	1	906
3	Textiles and Handlooms	26	24	87	1	138
4	Coir	1	1	1		3
5	Wood, Bamboo and Cane based industries	19	34	33		86
6	Herbal Wellness Centres		2	19		21
7	Paper based products and printing	3	7	25	1	36
8	Rubber based products (Tyres, Footwares etc.)	2	5	20		27
9	Others		1	2		3
	Total	196	366	691	4	1257



Figure 11.75
Classification based on year of establishment of various Enterprises



- Maximum number of enterprises established between 2011 and 2020.
- Herbal Wellness Centers are established after 2000.

BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

WAYANAD

Total number of Bioresource based Enterprises: 1911

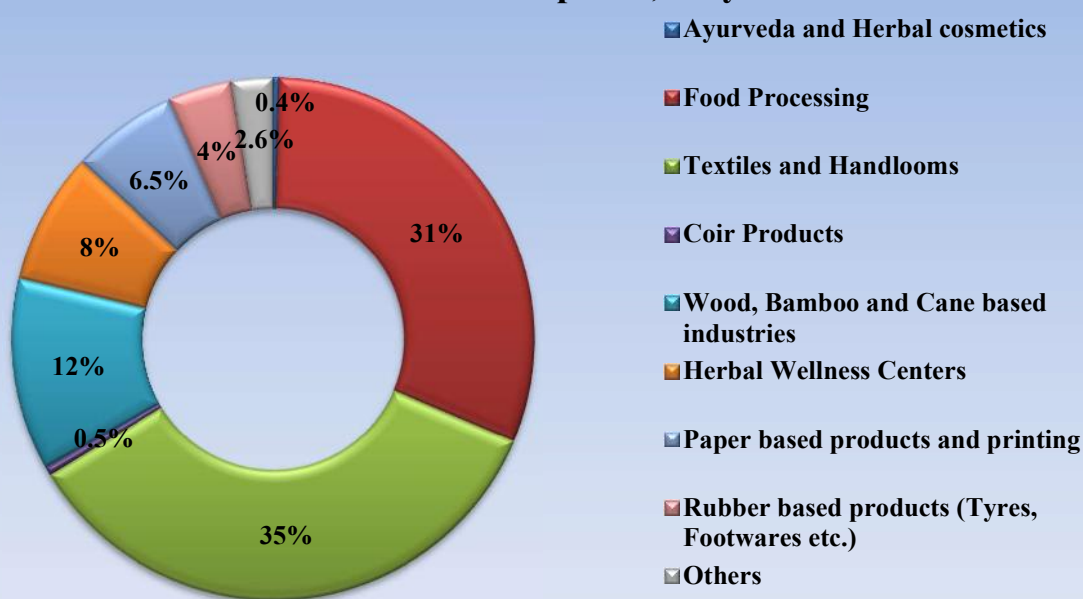
Table 11.77
Category-wise number of Enterprises:

SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	7
	a. Ayurvedic medicines	3
	b. Herbal cosmetics	1
	c. Ayurvedic oils/Thailams	1
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	2

2	Food Processing	593
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	107
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	317
	c. Ready to cook items (Chapathi, Pathiri etc.)	3
	d. Value added products (Pickle, Pappad etc)	22
	e. Copra and Coconut oil	5
	f. Restaurants, Hotels and Catering	3
	g. Milk/Dairy products	6
	h. Meat and meat products	3
	i. Coffee and Tea processing	65
	j. Spices processing	7
	k. Others	55
3	Textiles and Handlooms	667
	a. Cotton	6
	b. Other textile products, garments and tailoring	661
4	Coir Products	10
5	Wood, Bamboo and Cane based industries	228
	a. Wood items/furniture/saw mil	220
	b. Bamboo and cane furniture	8
	c.	
6	Herbal Wellness Centers	155
7	Paper based products and printing	126
	a. Paper and paper based products	21
	b. Paper based secondary activities (Printing, photostat, binding)	105
	c.	
8	Rubber based products (Tyres, Footwares etc.)	75
9	Others	50
	a. Leather products	8
	b. Wax products	10
	c. Animal and Poultry feed Supplements	11
	d. Handicrafts	19
	e. Agricultural related activities	2
Total		1911



Figure 11.76
Bioresources Based Enterprises, Wayanad

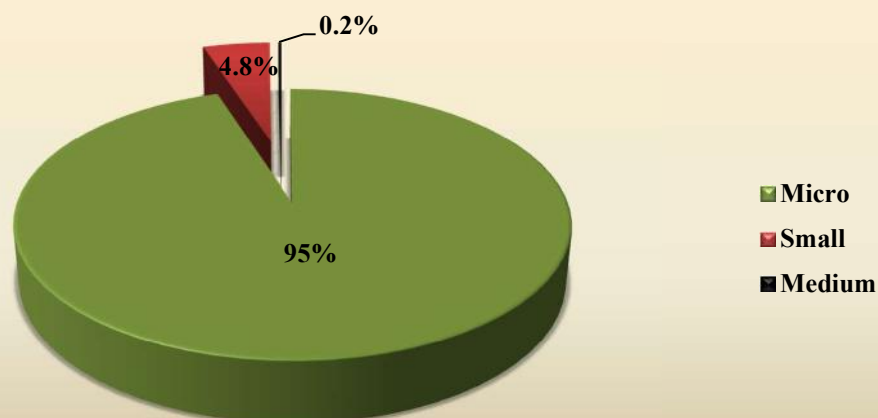


- Maximum bio-resource-based Enterprises belong to the Textiles-Handlooms sector (667) which is immediately followed by Food processing sector (593).
- The least number of Enterprises are in the 'Coir' sector (10).

Table 11.78
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	6	1		7
2	Food Processing	540	50	3	593
3	Textiles and Handlooms	661	6		667
4	Coir Products	10			10
5	Wood, Bamboo and Cane based industries	212	16		228
6	Herbal Wellness Centers	150	5		155
7	Paper based products and printing	117	9		126
8	Rubber based products (Tyres, Footwares etc.)	73	2		75
9	Others	47	3		50
	Total	1816 (95%)	92 (4.8%)	3 (0.2%)	1911 (100%)

Figure 11.77
Proportion of Micro, Small & Medium Enterprises

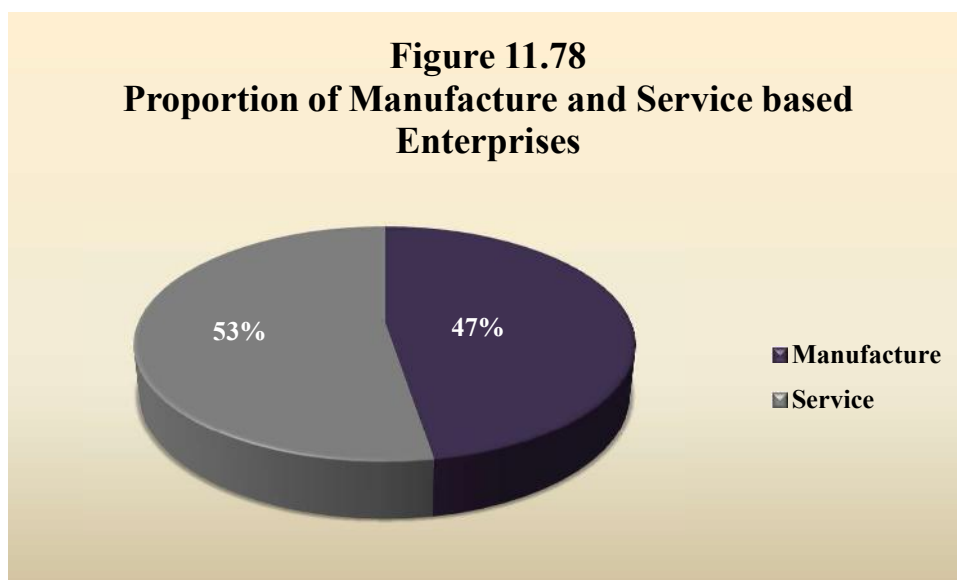


- Maximum enterprises (95) are in the category micro enterprises. 4.8% enterprises are in the small category and only 0.2% enterprises are in the medium category.

Table 11.79
Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal cosmetics	7		7
2	Food Processing	439	154	593
3	Textiles and Handlooms	135	532	667
4	Coir Products	5	5	10
5	Wood, Bamboo and Cane based industries	194	34	228
6	Herbal Wellness Centers	1	154	155
7	Paper based products and printing	71	55	126
8	Rubber based products (Tyres, Footwares etc.)	9	66	75
9	Others	45	5	50
	Total	906 (47.40%)	1005 (53%)	1911 (100%)

Figure 11.78
Proportion of Manufacture and Service based Enterprises

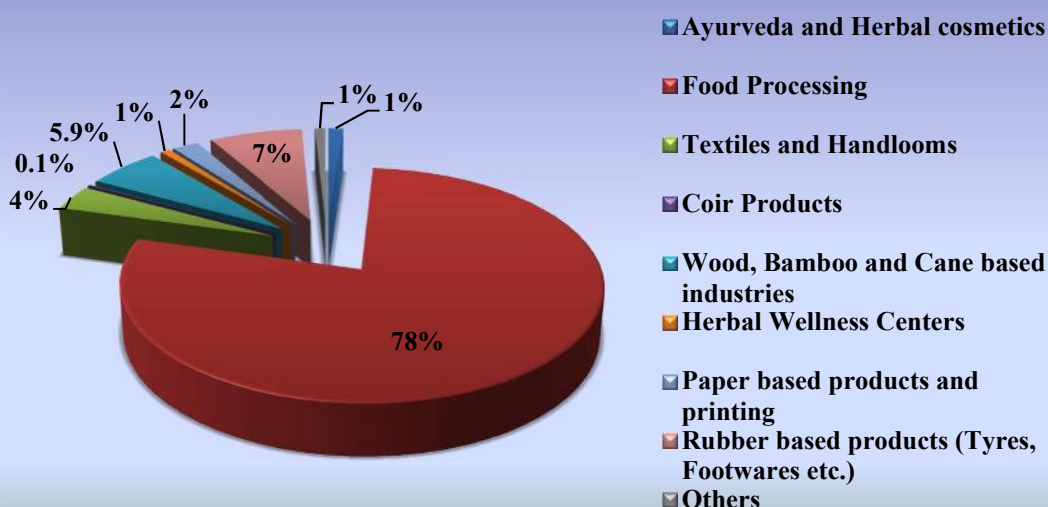


- Majority of enterprises are in service sector.
- In the Herbal wellness centres and Textiles-handloom sector, the maximum enterprises are service-based ones.
- In Food Processing and wood-based enterprises there is a higher proportion of manufacturing activity.

Table 11.80
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	538.31	1.16
2	Food Processing	36429.68	78.22
3	Textiles and Handlooms	1666.81	3.58
4	Coir Products	25.20	0.10
5	Wood, Bamboo and Cane based industries	2713.00	5.90
6	Herbal Wellness Centers	351.09	0.75
7	Paper based products and printing	955.71	2.05
8	Rubber based products (Tyres, Footwares etc.)	3484.00	7.41
9	Others	383.84	0.82
	Total	46547.64	100.00

Figure 11.79
Proportion of Enterprises based on Annual Turn over

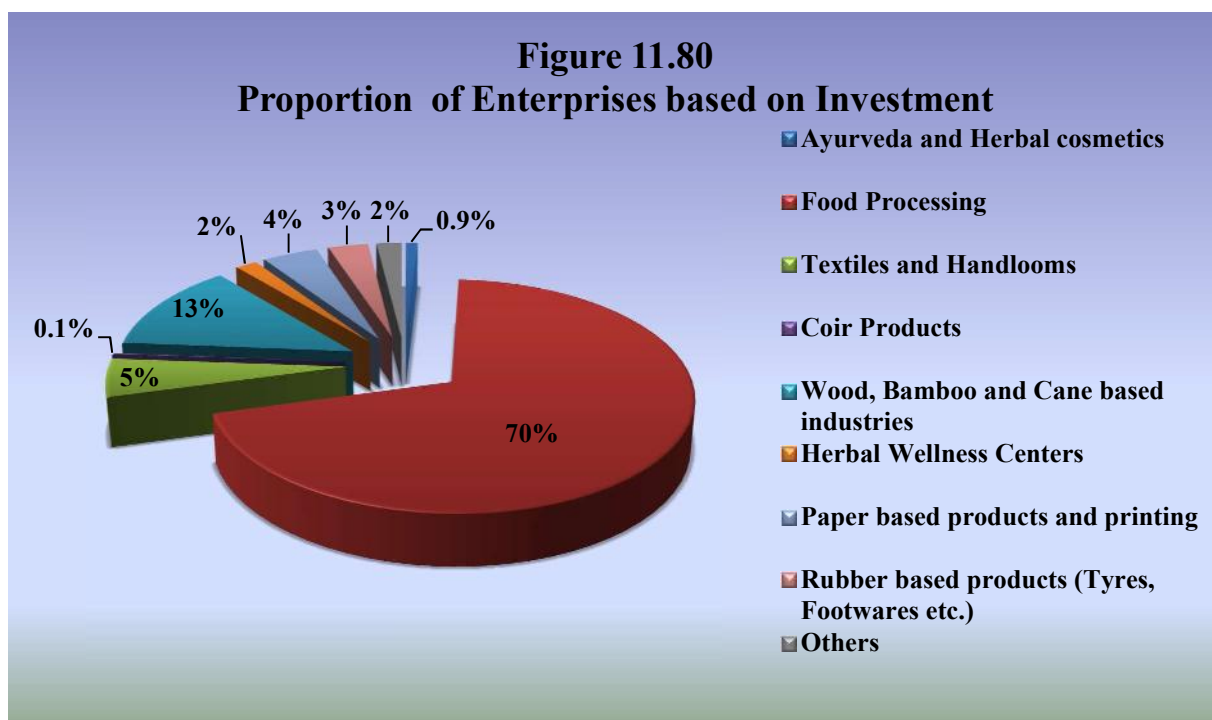


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 78% of total annual turnover.
- The lowest percentage share to total annual turnover is for the Coir sector and this could be attributed to a lower number of enterprises in this category.

Table 11.81

Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	238.40	0.91
2	Food Processing	18323.34	69.84
3	Textiles and Handlooms	1421.23	5.42
4	Coir Products	28.55	0.11
5	Wood, Bamboo and Cane based industries	3318.16	12.65
6	Herbal Wellness Centers	434.40	1.66
7	Paper based products and printing	1,135.31	4.33
8	Rubber based products (Tyres, Footwares etc.)	821.75	3.13
9	Others	515.49	1.96
	Total	26236.63	100

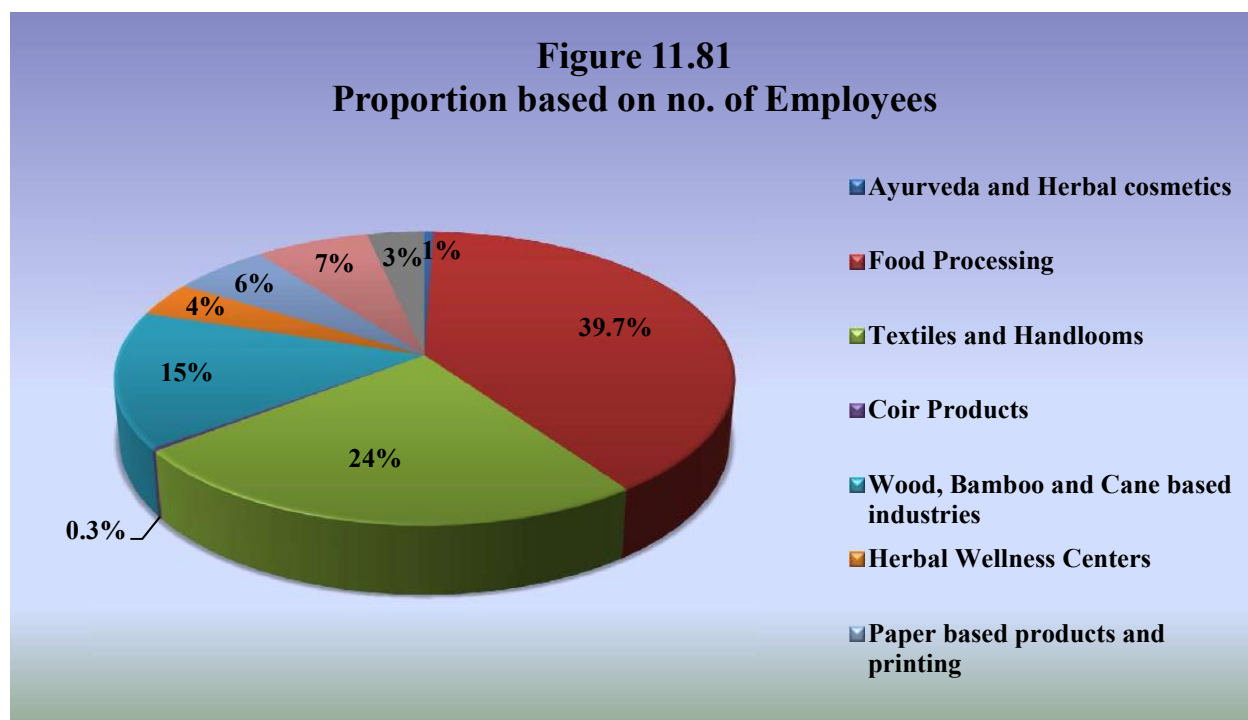


- The total investment is also highest in the Food processing category (70%)
- The 'Coir' sector having a low total investment comparatively.

Table 11.82
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		Number	%
1	Ayurveda and Herbal cosmetics	35	0.54
2	Food Processing	2587	39.70
3	Textiles and Handlooms	1599	24.38
4	Coir Products	19	0.29
5	Wood, Bamboo and Cane based industries	983	15.05
6	Herbal Wellness Centers	251	3.84
7	Paper based products and printing	381	5.83
8	Rubber based products (Tyres, Footwares etc.)	450	6.89
9	Others	228	3.49
	Total	6533	100

Figure 11.81
Proportion based on no. of Employees



- The number of employees is also higher in 'Food processing' sector which is immediately followed by 'Textiles and handlooms' sector.
- 'Coir' sector have a lower share in number of employees.

BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

KANNUR

Total number of Bioresource based Enterprises: 5208

Table 11.83

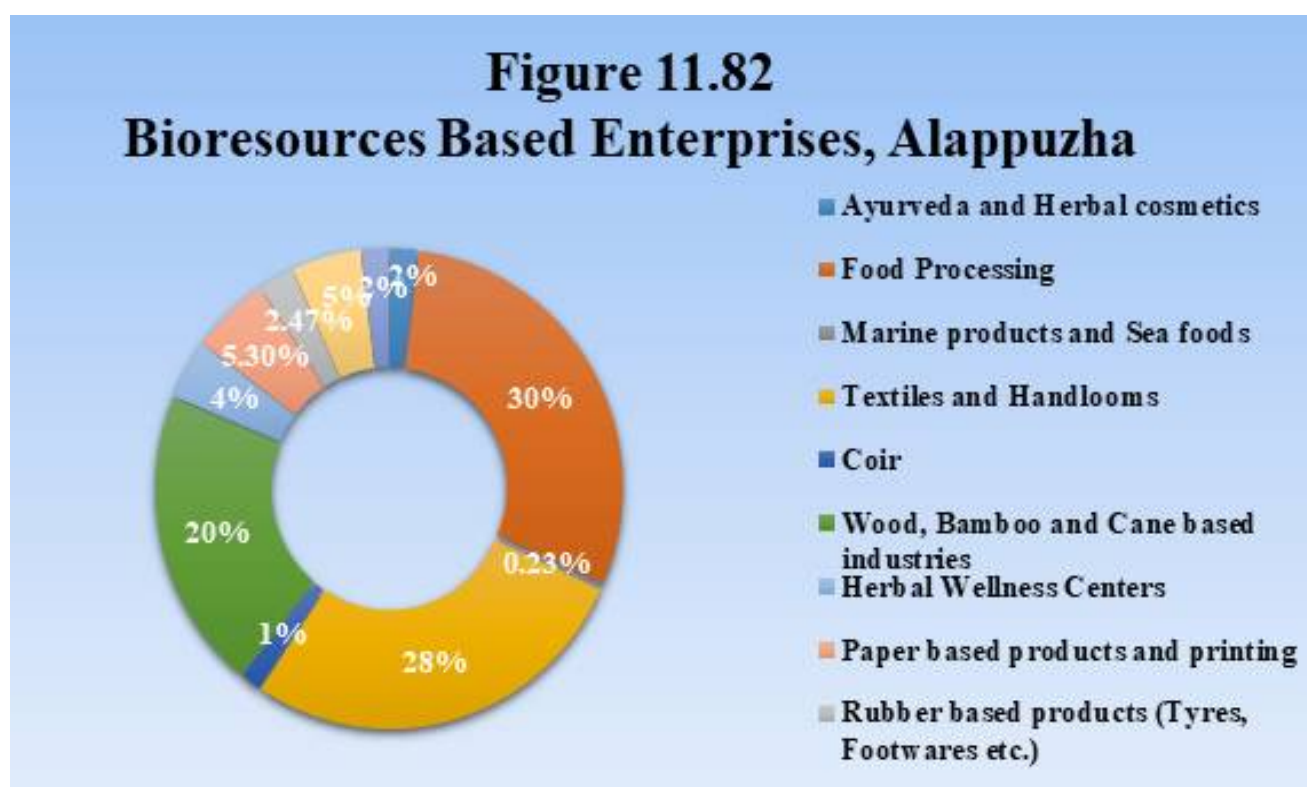
Category-wise number of Enterprises:

Sl. No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	101
	a. Ayurvedic medicines	28
	b. Herbal cosmetics	15
	c. Ayurvedic oils/Thailams	48
	d. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	10

2	Food Processing	1543
	a. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	483
	b. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	715
	c. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	10
	d. Value added products (Pickle, Pappad etc)	87
	e. Copra and Coconut oil	124
	f. Restaurants, Hotels and Catering	22
	g. Milk/Dairy products	15
	h. Poultry, Meat and meat products	14
	i. Vegetable oils and edible oils other than Coconut Oil	15
	j. Honey and Honey Products	22
	k. Others (Food industry)	36
3	Marine products and Sea foods	12
	a. Fish products and processing	9
	b. Other sea foods	3
4	Textiles and Handlooms	1437
	a. Cotton	275
	b. Other textile products, garments and tailoring	1162
5	Coir	75
	a. Coir Fibre	30
	b. Coir Products	41
	c. Coconut Shell Products	4
6	Wood, Bamboo and Cane based industries	1064
	a. Wood items/furniture/saw mil	1060
	b. Bamboo and cane furniture	4
7	Herbal wellness centres	210
8	Paper based products and printing	282
	a. Paper and paper based products	69
	b. Paper based secondary activities (Printing, photostat, binding)	213
9	Rubber based products (Tyres, Footwares etc.)	129
10	Wax products	254
11	Others	101



a. Leather products	10
b. Animal and Poultry feed Supplements	2
c. Aquariums and pets	2
d. Dry flowers and decorations	1
e. Agriculture and animal husbandary related services	25
f. Organic fertilizers and Manures	15
g. Handicrafts	5
h. Jute Products	6
i. Others	35
Total	5208

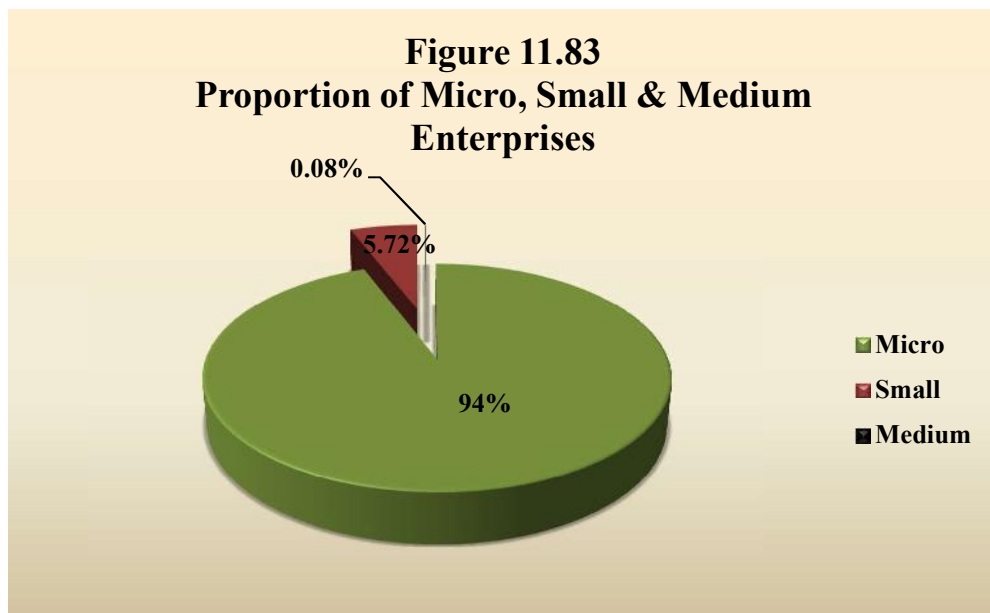


- Maximum bio-resource-based Enterprises belong to the Food processing category (1543).
- Textiles-Handlooms and Wood-bamboo-cane based enterprises are the 2nd and 3rd largest enterprises in Kannur.
- The least number of Enterprises are in the 'Marine products and Sea foods' sector (12).



Table 11.84
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal Cosmetics	101			101
2	Food Processing	1497	45	1	1543
3	Marine Products and Sea foods	10	2		12
4	Textiles and Handlooms	1391	44	2	1437
5	Coir	67	8		75
6	Wood, Bamboo and Cane based Industries	907	156	1	1064
7	Herbal Wellness Centers	210			210
8	Paper based products and printing	257	25		282
9	Rubber based products (Tyres, Footwares etc.)	120	9		129
10	Wax products	254			254
11	Others	92	9		101
	Total	4906 (94.20%)	298 (5.72%)	4 (0.08%)	5208 (100%)



- Maximum enterprises (94%) are in the category micro enterprises. 5.72% enterprises are in the small category and only 0.08% enterprises are in the medium category.

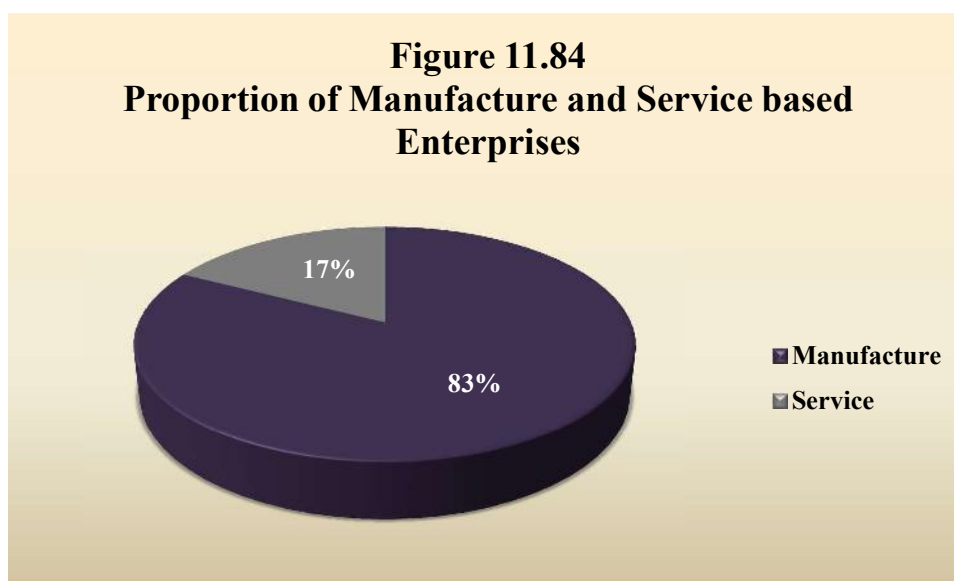


TABLE 11.85

Proportion of Manufacture and Service based Enterprises

Sl.No.	Category	Manufacture	Service	Total
1	Ayurveda and Herbal Cosmetics	99	2	101
2	Food Processing	1363	180	1543
3	Marine Products and Sea foods	9	3	12
4	Textiles and Handlooms	1190	247	1437
5	Coir	75		75
6	Wood, Bamboo and Cane based Industries	947	117	1064
7	Herbal Wellness Centers	5	205	210
8	Paper based products and printing	204	78	282
9	Rubber based products (Tyres, Footwares etc.)	66	63	129
10	Wax products	252	2	254
11	Others	89	12	101
	Total	4299 (82.55%)	909 (17.45%)	5208 (100%)

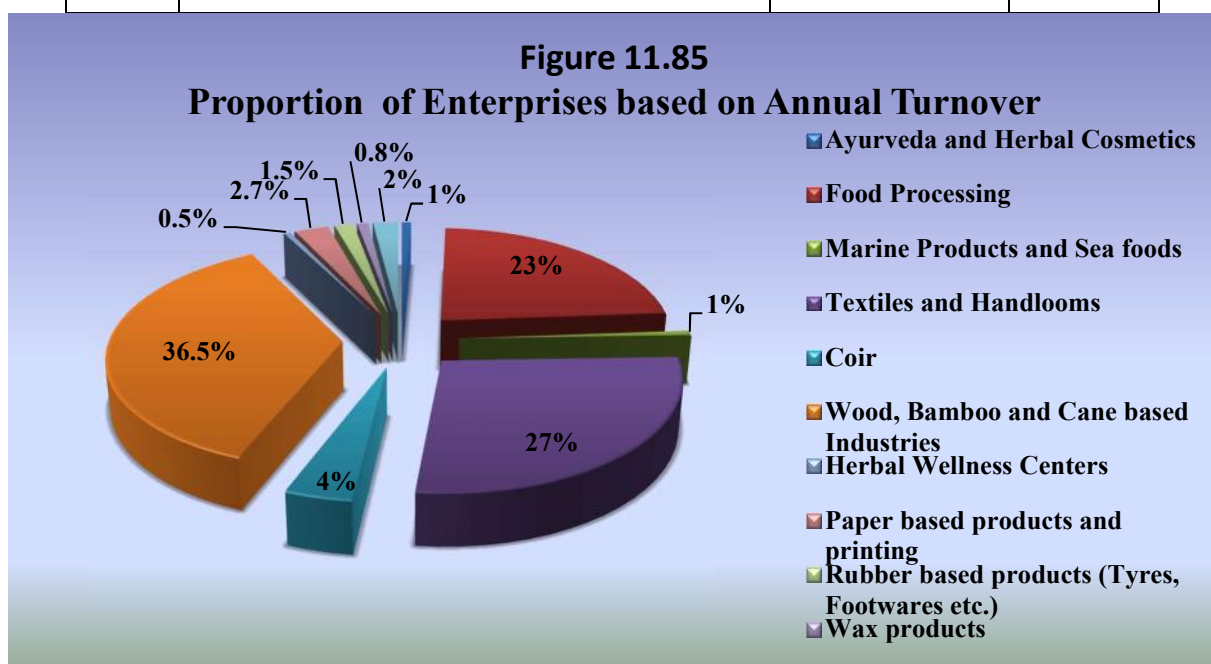
Figure 11.84
Proportion of Manufacture and Service based Enterprises



- The nature of the activity is manufacturing for the majority of enterprises (83%).
- In Food processing, Textiles-Handloom, Wood-based enterprises, Paper based enterprises and Wax products there is a higher proportion of manufacturing activity.
- Herbal wellness centres are the maximum number of enterprises comes under the service-based category.

Table 11.86
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal Cosmetics	997.40	0.72
2	Food Processing	31957.36	23.13
3	Marine Products and Sea foods	891.50	0.65
4	Textiles and Handlooms	37811.05	27.36
5	Coir	5538.03	4.01
6	Wood, Bamboo and Cane based Industries	50447.70	36.51
7	Herbal Wellness Centers	685.91	0.50
8	Paper based products and printing	3765.23	2.72
9	Rubber based products (Tyres, Footwares etc.)	2088.42	1.51
10	Wax products	1220.08	0.88
11	Others	2773.76	2.01
	Total	138176.44	100

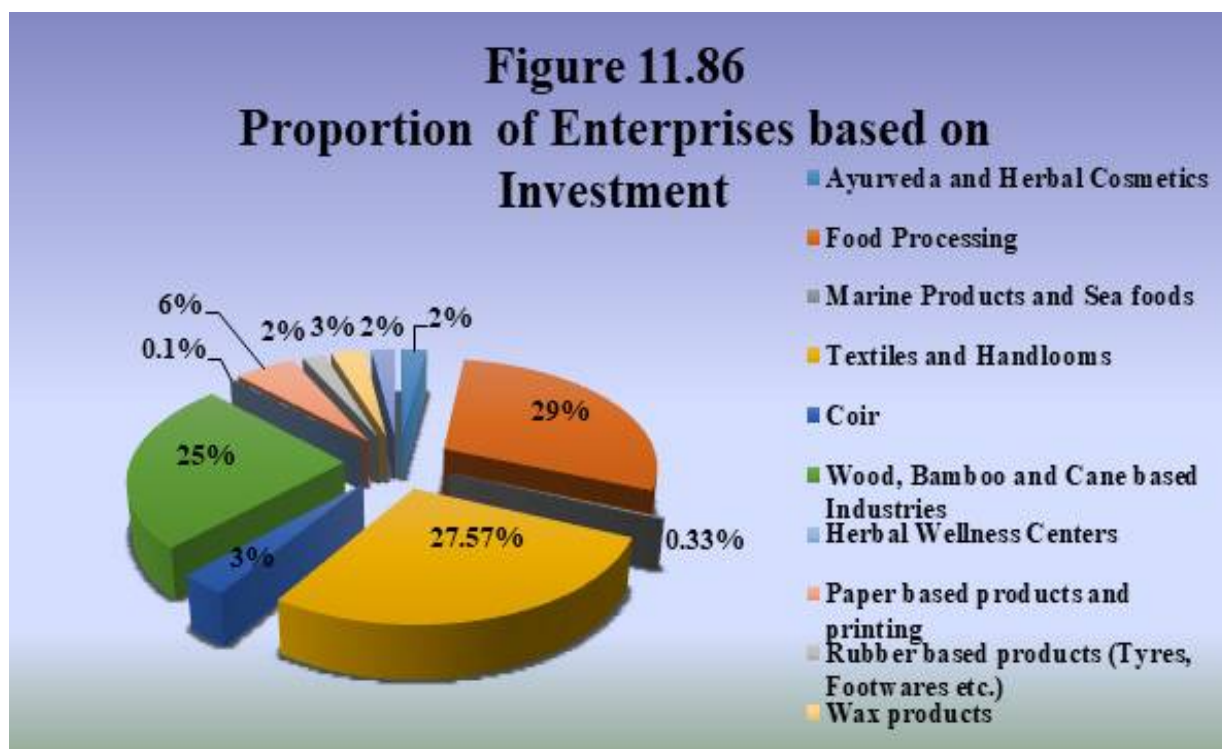


- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Wood, Bamboo and Cane based categories which accounts for 36.5% of total annual turnover.
- Textiles-handloom and Food processing enterprises having the 2nd and 3rd positions in annual turn over respectively.
- The lowest percentage share to total annual turnover is for the Herbal wellness centers (0.5%), Marine Products and Sea foods (0.65) Ayurveda and Herbal Cosmetics

enterprises (0.72%) and wax products (0.8%). This could be attributed to a lower number of enterprises in this category.

Table 11.87
Total Investment in different categories of Bioresource-based Enterprises

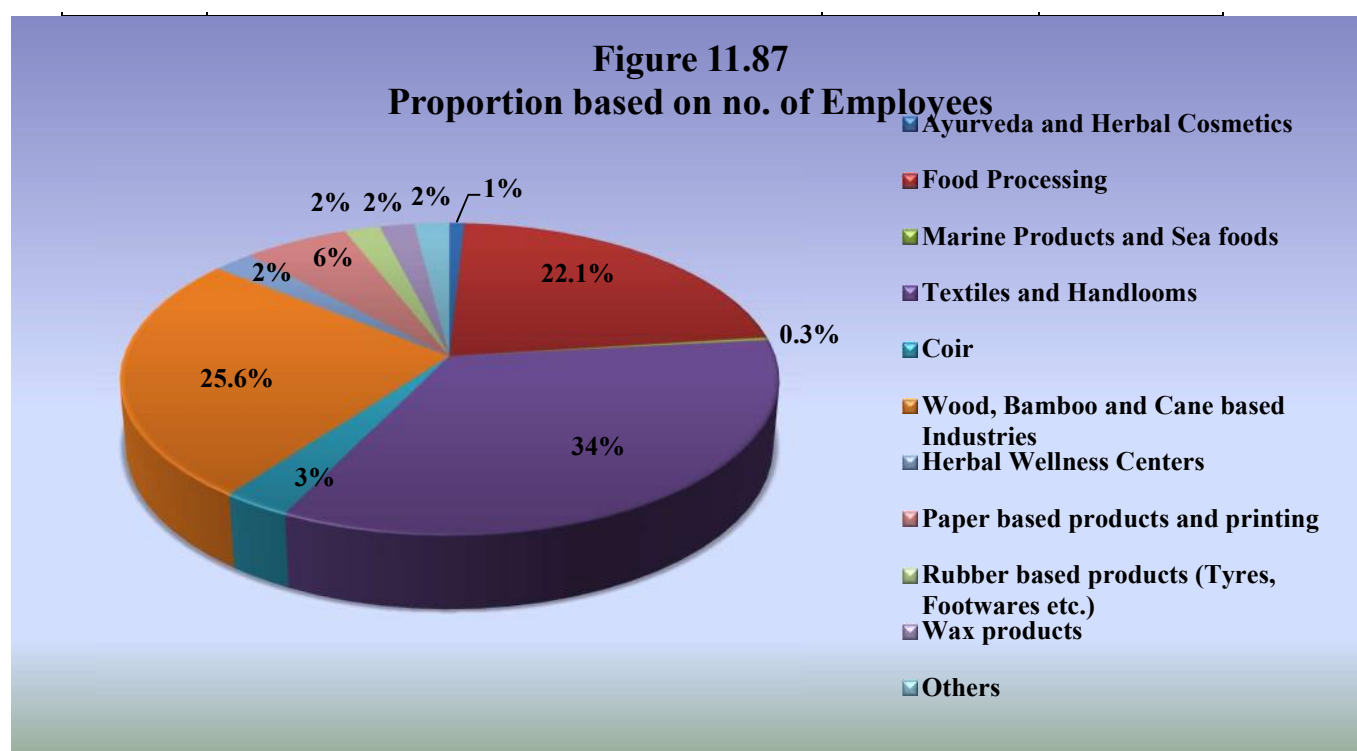
Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal Cosmetics	335.10	2.00
2	Food Processing	4270.65	29.00
3	Marine Products and Sea foods	48.00	0.33
4	Textiles and Handlooms	4065.98	27.57
5	Coir	460.82	3.00
6	Wood, Bamboo and Cane based Industries	3712.92	25.00
7	Herbal Wellness Centers	10.01	0.10
8	Paper based products and printing	803.23	6.00
9	Rubber based products (Tyres, Footwares etc.)	293.13	2.00
10	Wax products	436.13	3.00
11	Others	310.67	2.00
	Total	14746.63	100



- The total investment is highest in the Food processing category (29%) which is immediately followed by Textile-handloom enterprises (27.57%) and Wood-bamboo-cane enterprises (25%).
- The Herbal Wellness Centres (0.10%) and Marine Products and Sea foods (0.33) enterprises which had lower annual turnover also having a low total investment comparatively.

Table 11.88
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal Cosmetics	157	1.00
2	Food Processing	4100	22.10
3	Marine Products and Sea foods	50	0.30
4	Textiles and Handlooms	6284	34.00
5	Coir	545	3.00
6	Wood, Bamboo and Cane based Industries	4735	25.60
7	Herbal Wellness Centers	420	2.00
8	Paper based products and printing	1110	6.00
9	Rubber based products (Tyres, Footwares etc.)	372	2.00
10	Wax products	367	2.00
11	Others	363	2.00
	Total	18503	100



- Number of employees is higher in 'Textiles - Handloom' enterprises (34%).
- Wood-bamboo-cane enterprises (25.6%) and Food processing category (22.1%) comes next to 'Textiles - Handloom' sector.
- Marine Products & Sea foods (0.30%) and Ayurveda & Herbal Cosmetics (1%) sectors have a lower share in number of employees mainly because of less number of enterprises in these sectors in Kannur.

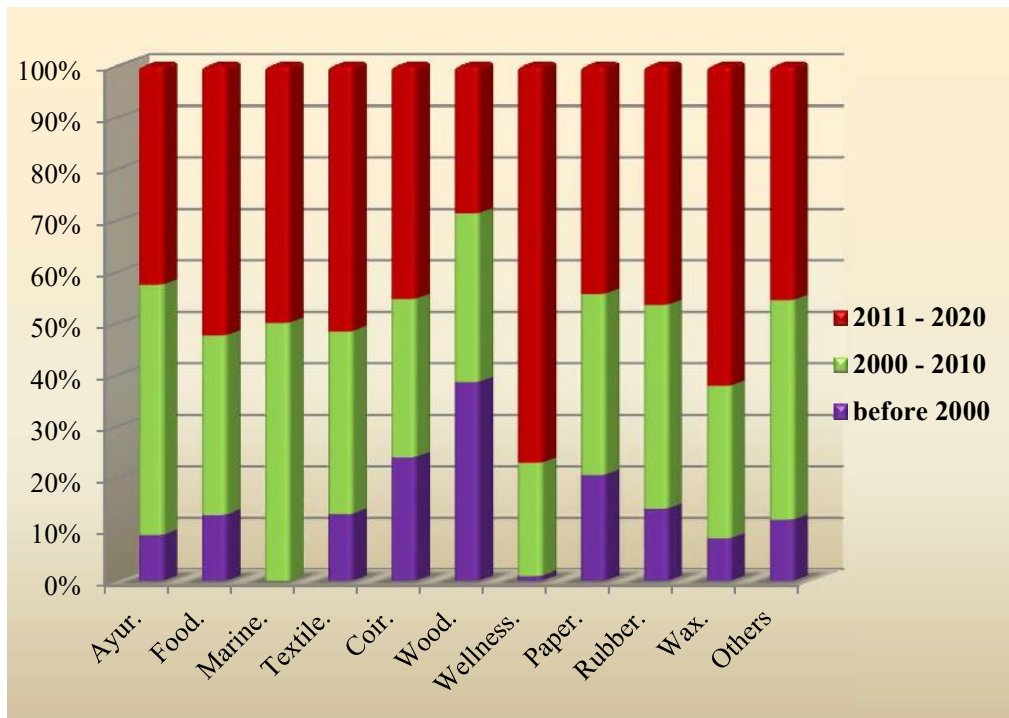
Table 11.89

Classification based on year of establishment of various Enterprises

Sl.No.	Category	Enterprises established				
		Before 2000	2000 - 2010	2011 - 2020	Date not available	Total
1	Ayurveda and Herbal Cosmetics	9	49	43		101
2	Food Processing	198	537	808		1543
3	Marine Products and Sea foods		6	6		12
4	Textiles and Handlooms	186	509	741	1	1437
5	Coir	18	23	34		75
6	Wood, Bamboo and Cane based Industries	410	349	305		1064
7	Herbal Wellness Centers	2	46	162		210
8	Paper based products and printing	58	99	125		282
9	Rubber based products (Tyres, Footwares etc.)	18	51	60		129
10	Wax products	21	75	158		254
11	Others	12	43	46		101
	Total	932	1787	2488	1	5208



Figure 11.88 Classification based on year of establishment of various Enterprises



- Maximum number of enterprises established between 2011 and 2020
- There is a rapid change in establishment of Herbal Wellness Centers after 2010, before 2000 number of enterprises in this sector is very low.



BIORESOURCE BASED ENTERPRISES (DISTRICT PROFILE)

KASARGODE

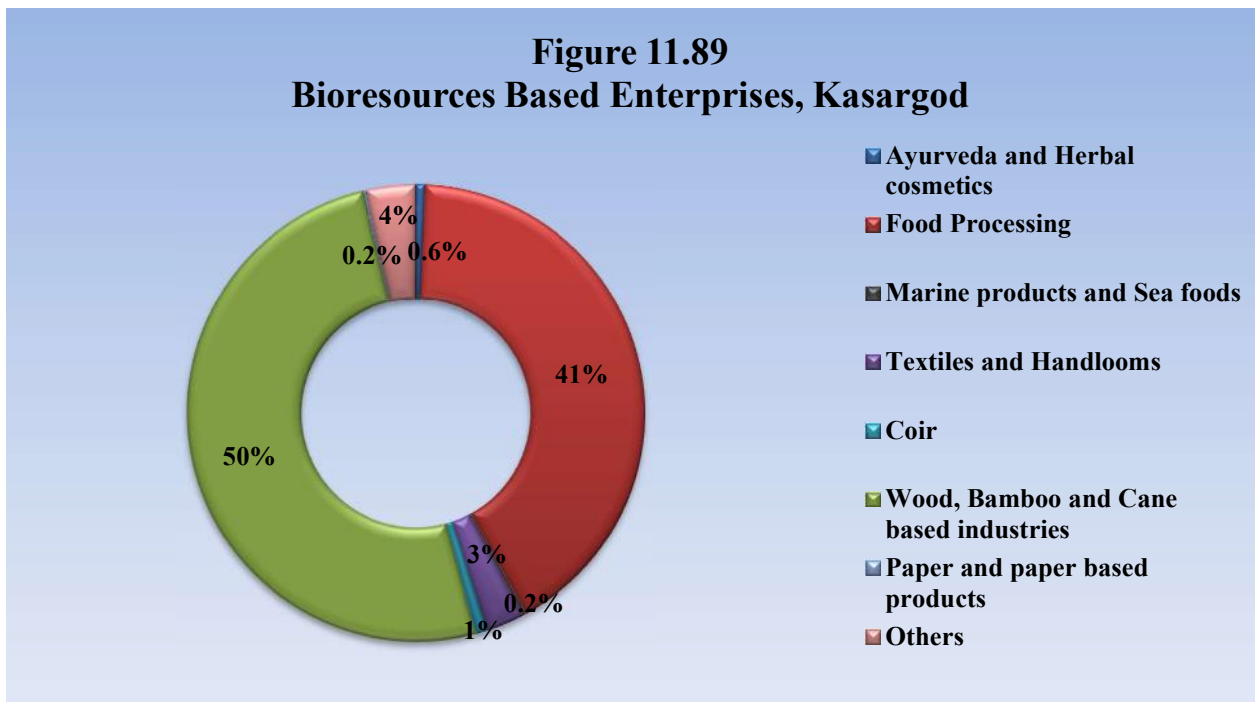
Total number of Bioresource based Enterprises: 483

Table 11.90
Category-wise number of Enterprises:

SI No.	Category/sub-category	Number of Enterprises
1	Ayurveda and Herbal cosmetics	3
	e. Ayurvedic medicines	1
	f. Ayurvedic oils/Thailams	1
	g. Other Ayurvedic Products (Soaps, dish wash powder, detergents etc.)	1
2	Food Processing	200
	l. Bakery Products (sweets, ice cream, nuts, snacks, soft drinks, other bakery items etc)	48
	m. Dry Flour and Wet Flour (Grain powders, Spices powder, Dosa mix, idli mix etc)	95
	n. Instant/ready to cook food items (Chapathi, Pathiri, noodles etc.)	1
	o. Value added products (Pickle, Pappad etc)	2
	p. Copra and Coconut oil	28
	q. Restaurants, Hotels and Catering	11
	r. Milk/Dairy products	3
	s. Meat and meat products	2
	t. Others (Food industry)	10
3	Marine products and Sea foods	1
	c. Dry fish	1
4	Textiles and Handlooms	13
	c. Cotton	2
	d. Other textile products, garments and tailoring	11
5	Coir	4
	d. Coir Fibre	1
	e. Coir Products	3
6	Wood, Bamboo and Cane based industries	244
	c. Wood items/furniture/saw mil	241
	d. Bamboo and cane furniture	3
7	Paper and paper based products	1
8	Others	16



j. Wax products	1
k. Animal and Poultry feed Supplements	1
l. Oils other than coconut oil (Vegetable oils and essential oils)	3
m. Leaf Plates	4
n. Agarbathies	1
o. Rubber products	1
p. Others (Unclassified)	5
Total	483

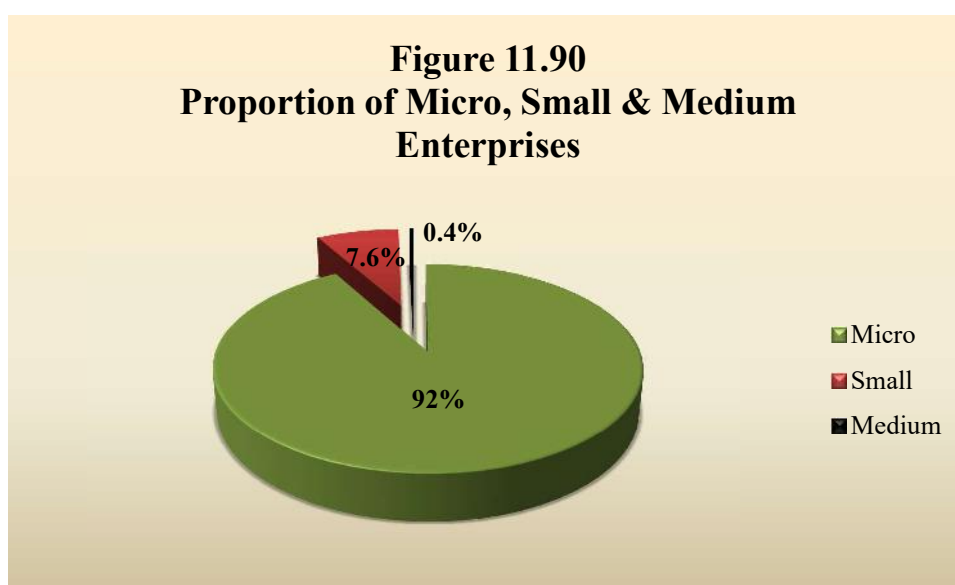


- Maximum bio-resource-based Enterprises belong to the Wood, Bamboo and Cane based (244) and Food processing (200) categories.
- Number of enterprises in Marine products, Paper based products and Coir sector is very low.

Table 11.91
Proportion of Micro, Small, and Medium Enterprises

Sl.No.	Category	Micro	Small	Medium	Total
1	Ayurveda and Herbal cosmetics	3			3
2	Food Processing	192	7	1	200
3	Marine products and Sea foods	1			1
4	Textiles and Handlooms	2	11		13

5	Coir	4			4
6	Wood, Bamboo and Cane based industries	227	17		244
7	Paper and paper based products	1			1
8	Others	14	2	1	17
	Total	444 (91.93%)	37 (7.66%)	2 (0.41%)	483 (100%)

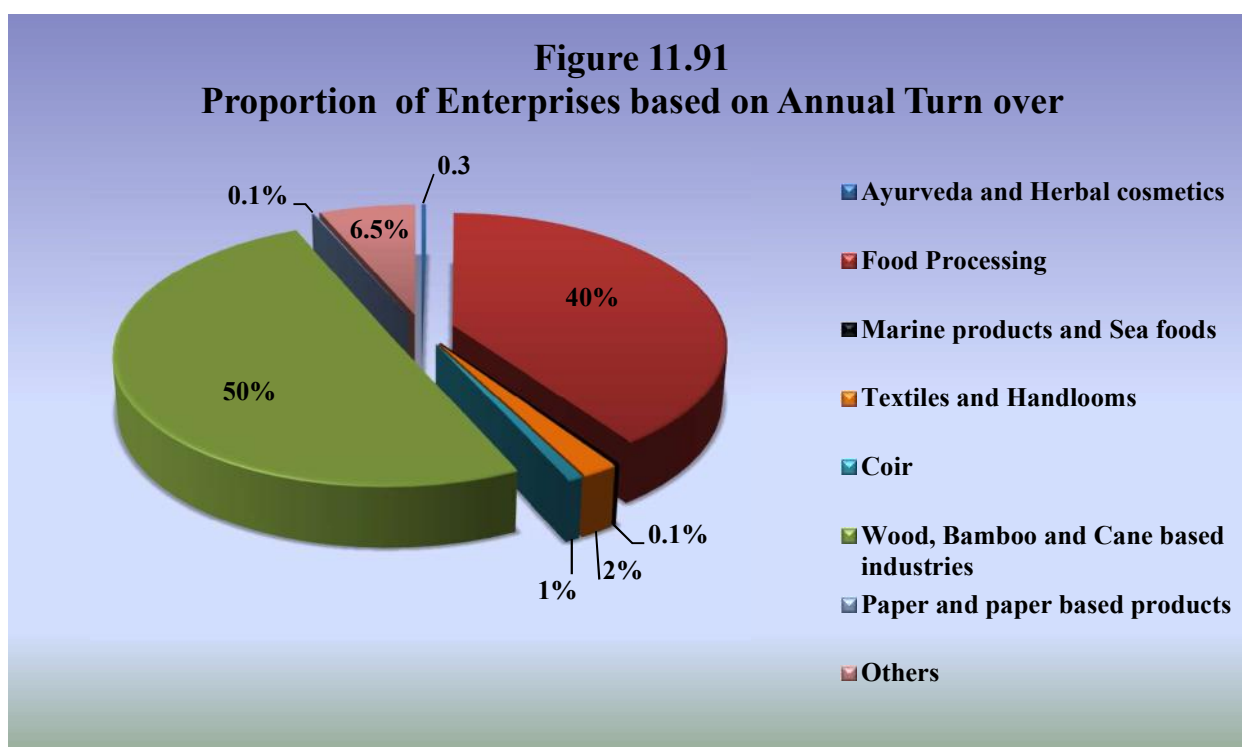


- Maximum enterprises (92%) are in the category micro enterprises. 7.6% enterprises are in the small category and only 0.4% enterprises are in the medium category.

Table 11.92
Annual Turnover from different categories of Bioresource-based Enterprises

Sl.No.	Category	Annual Turnover	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	25.00	0.30
2	Food Processing	3369.00	39.99
3	Marine products and Sea foods	15.00	0.18
4	Textiles and Handlooms	158.00	1.88

5	Coir	68.00	0.81
6	Wood, Bamboo and Cane based industries	4237.07	50.29
7	Paper and paper based products	9.00	0.11
8	Others	544.13	6.46
	Total	8425.20	100



- The highest total annual turnover among various categories of bio-resource-based enterprises is in the Wood, bamboo, cane based enterprises which accounts for 50% of total annual turnover.
- Enterprises in Food processing (40%) category holds the 2nd position in total annual turnover of Kasargod.
- Marine products and Sea foods (0.1%) and Paper based products and printing (0.1%) categories have lowest turnover and this could be attributed to a lower number of enterprises in these categories.

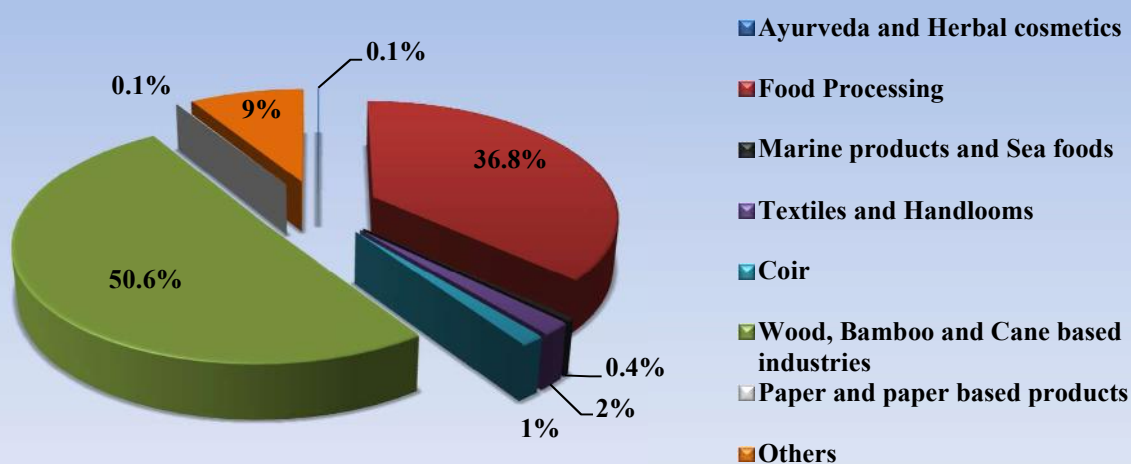
Table 11.93

Total Investment in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Investment	
		Rs. in Lakhs	%
1	Ayurveda and Herbal cosmetics	8.50	0.11
2	Food Processing	2915.38	36.79
3	Marine products and Sea foods	33.00	0.42
4	Textiles and Handlooms	136.00	1.72

5	Coir	110.00	1.39
6	Wood, Bamboo and Cane based industries	4012.18	50.63
7	Paper and paper based products	7.00	0.09
8	Others	702.50	8.86
	Total	7924.56	100

Figure 11.92
Proportion of Enterprises based on Investment



- The total investment is highest in the Wood, bamboo, cane based enterprises (50.6%) which is immediately followed by Food processing category (36.8%).
- Paper based products (0.1%) and Ayurveda & Herbal Cosmetics (0.1%) enterprises which had lower annual turnover also having a low total investment comparatively.

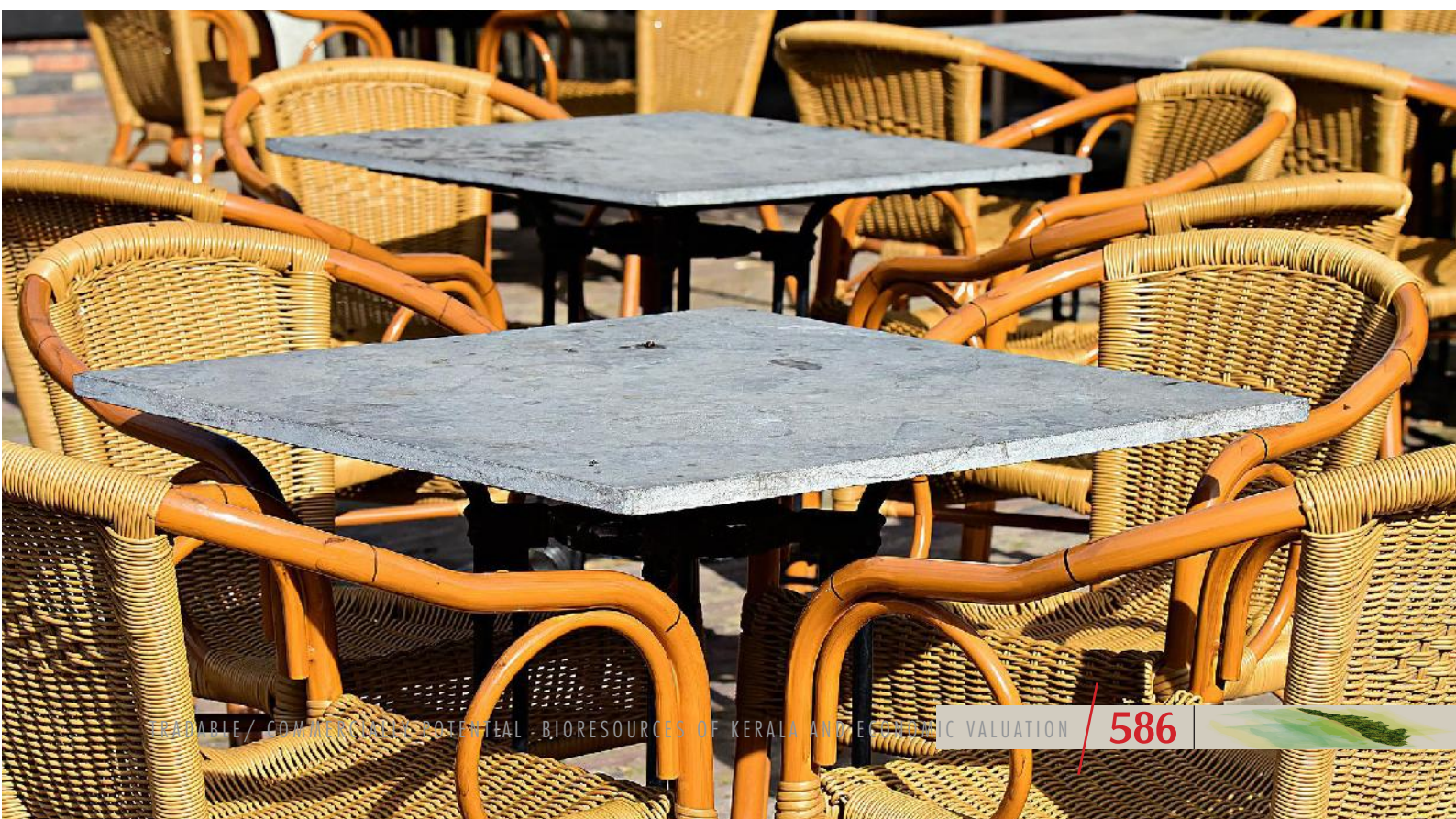
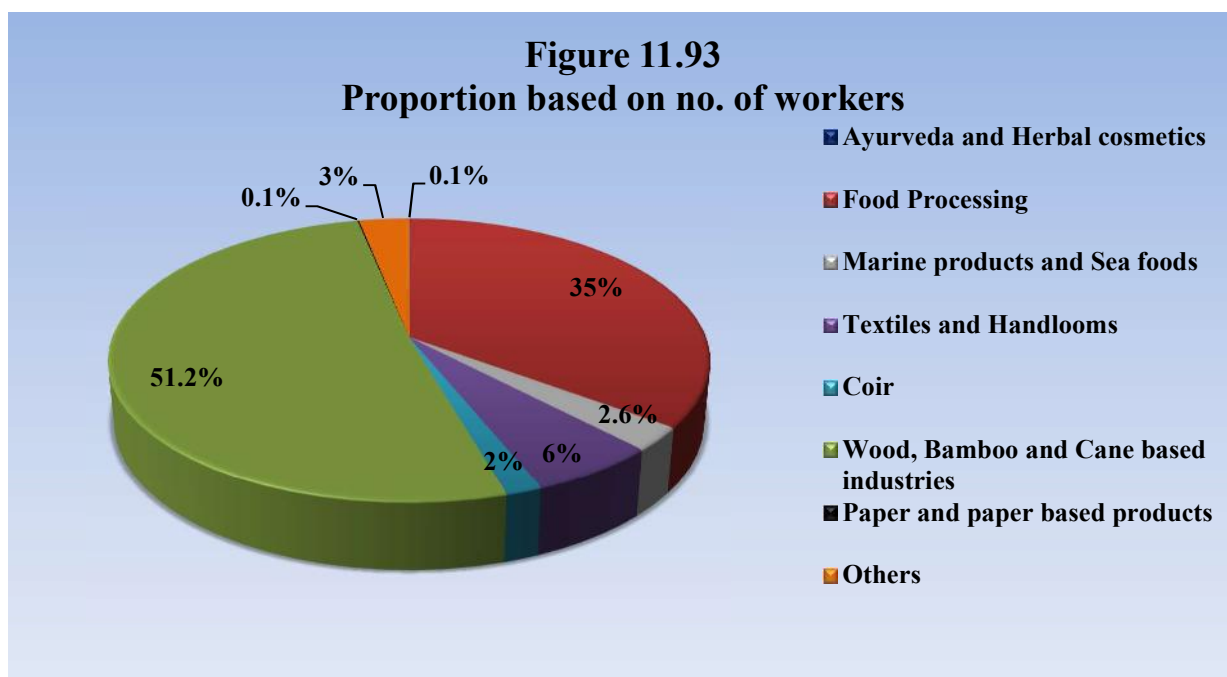


Table 11.94
Total number of employees in different categories of Bioresource-based Enterprises

Sl.No.	Category	Total Employees	
		No.	%
1	Ayurveda and Herbal cosmetics	2	0.09
2	Food Processing	806	35.00
3	Marine products and Sea foods	62	2.69
4	Textiles and Handlooms	139	6.04
5	Coir	39	1.69
6	Wood, Bamboo and Cane based industries	1180	51.24
7	Paper and paper based products	2	0.09
8	Others	73	3.17
	Total	2303	100



- Number of employees is higher in Wood, bamboo, cane based enterprises (51.2%).
- Food processing (35%) sector comes next to Wood, bamboo, cane based sector.
- Paper based products (0.1%) and Ayurveda & Herbal Cosmetics (0.1%) enterprises which have a lower share in number of employees mainly because of less number of enterprises in these sectors.

Conclusion

In the bioresources based manufacturing sector of Kerala, the highest percentage of MSME are in the area of food processing (34%), followed by textiles and handlooms (21%) and wood, bamboo and cane based industries (20%). But it may be noted that the majority of the industries in all the sectors analysed are in the micro category (94.5%) except for marine and seafoods where 37% are small scale industries. A major share of the enterprises in herbal wellness sector (93%) is in the service sector. The highest total annual turnover among various categories of bio-resource-based enterprises is in the Food processing category which accounts for 54% of total annual turnover of Kerala, while the investment is 37.4 % of total. The percentage share of 'Marine products and seafood categories' and 'Rubber based products' to the total annual turnover is much higher despite the lower number of enterprises in these categories. The investment in Wood, Bamboo and Cane based industries is also much higher (20.3%). Food processing sector provides the maximum employment potential (33%) followed by Textiles and handicrafts (17.4%) and Wood, Bamboo and cane (17.4%).



11.3 BIO-RESOURCES BASED FACTORIES (FULL AND PARTIAL) IN KERALA

The manufacturing sector in Kerala is relatively small in size. The manufacturing sector accounted for a share of only 12.5 per cent of Kerala's Gross State Value Added (GSVA) (at constant 2011-12 prices) in 2019-20. In comparison, the manufacturing sector accounted for 17.4 per cent of India's GDP in 2019-20. 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 (Kerala State Planning Board, 2020). According to data from Annual Survey of Industries 2017-18, 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.

According to Periodic Labour Force Survey (PLFS) 2017-18 data, the manufacturing sector in Kerala employed 15 lakh workers (which comprised 12.8 per cent of the State's total workforce of 127 lakh) in 2017-18. They include workers in the factory sector numbering 3.1 lakh in 2017-18. The Annual Survey of Industries (ASI) is the main source of data on the factory sector. Workers in traditional industries, importantly coir, cashew and handloom, form a substantial share of Kerala's manufacturing workforce. 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 are food products and beverages (cashew processing is a major component of this), beedi manufacturing, and textiles (which include coir processing and handlooms).

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 younger generation of educated workers from the traditional industries. At the same time, it is notable that a new set of modern industries are growing in size in Kerala. The top industries in Kerala with respect to value added are rubber and plastic products, electronic products, pharmaceuticals and botanical products, chemicals and refined petroleum products (Kerala State Planning Board, 2020).

Considering the immense contribution and further potential of bio-resources in fuelling the industrial factory growth, output and employment in Kerala especially within the traditional industries this study of bio-resources based factories has been carried out using the data from Annual Survey of Industries 2017-18. This data was meticulously analysed after classifying them into 2 categories: Fully Bio-resources Based Factories in Kerala and Partially Bio-resources Based Factories in Kerala. These were further sub divided into different types of factories based on the product manufactured.

The secondary sector is involved in value-addition and commercial utilisation of bio-resources extracted from the primary sector using capital and labour intensive process. This not only gives an economic value-addition for bio-resources but also generates employment and boosts the state GDP. It also fosters demand for further production of bio-resources. As per the mandate of ABS under the BD act, the utilisation of these bio-resources by the factories creates an opportunity for collection of ABS as per the guidelines of the act. For this purpose, an overall study of economic value produced solely from bio-resource based factories with sub-categorisation and district wise analysis is imperative for further estimation of ABS potential.



The following Box provides the Concepts and Definitions of the terms used in the report.

Box 11.1 **Concepts and Definitions**

Factory (as per the Factory Act 1948): Factory is one, which is registered under Sections 2m (i) and 2m(ii) of the Factories Act, 1948. The Sections 2m(i) and 2m(ii) refer to any premises including the precinct thereof (i) wherein ten or more workers are working, or were working on any day of the preceding twelve months, and in any part of which a manufacturing process is being carried on with the aid of power, or is ordinarily so carried on, or (ii) wherein twenty or more workers are working, or were working on any day of the preceding twelve months and in any part of which a manufacturing process is being carried on without the aid of power, or is ordinarily so carried on. Closed factories with fixed assets on site are also considered as registered factories till they are de-registered and removed from the live-register maintained by the Chief Inspector of Factories (CIF) in the State.

Products: These are defined to include the ex-factory value (i.e. exclusive of taxes, duties etc. on sale and inclusive of subsidies etc., if any) of all products and by-products, excluding intermediate products, that have been completed during the accounting year for sale whether actually sold during the accounting year or entered into books. Also include fixed assets produced by the factory for its own use.

Fixed Capital: Fixed Capital represents the depreciated value of fixed assets owned by the factory as on the closing day of the accounting year. Fixed assets are those, which have normal productive life of more than one year. Fixed capital covers all type of assets, new or used or own constructed, deployed for productions, transportation, living or recreational facilities, hospitals, schools, etc. for factory personnel. It would include land, building, plant and machinery, transport equipment etc. It includes the fixed assets of the head office allocable to the factory and also the full value of assets taken on hire-purchase basis (Whether fully paid or not) excluding interest element. It excludes intangible assets and assets solely used for postmanufacturing activities such as, sale, storage, distribution, etc.

Total Input: This comprises gross value of fuel materials etc. consumed (as defined above) and also other inputs viz. (a) cost of non-industrial services received from others (b) cost of materials consumed for repair and maintenance of factory's fixed assets including cost of work done by others to the factory's fixed assets (c) cost of contract and commission work done by others on materials supplied by the factory (d) cost of office supplies and products reported for sale during last year & used for further manufacture during the accounting year.

Gross / Total Output: Gross output is defined to include the ex-factory value, (i.e., exclusive of taxes, duties, etc. on sale and inclusive of subsidies etc., if any) of products and by-products manufactured during the accounting year, and the net value of the semi-finished goods, work-in-process, (represents the excess/deficit of value of semi-finished goods or work-in-process at the end of the accounting year over that of the beginning of the year plus net balance of semifinished fixed assets on factory's capital account) and also the receipts for industrial and nonindustrial services rendered to others, value of semi-finished goods of last year sold in the current year, sale value of goods sold in the same condition as purchased and value of electricity generated and sold. Value of gross output and total output has been used



in the text interchangeable to mean the same thing.

Net Value Added: This is the increment to the value of goods and services that is contributed by the factory and is obtained by deducting the value of total inputs and depreciation from gross value of output.

Invested Capital: Invested capital is the total of fixed capital and physical working capital.

Productive Capital: This is the total of fixed capital and working capital

Gross Value of Plant and Machinery: Gross value of plant and machinery represents the total original (un-depreciated) value of installed plant and machinery as at the end of the accounting year. It includes the book value of own constructed plant and machinery, if installed, and the approximate value of rented-in plant and machinery as at the time of renting in but excludes the value of rented-out plant and machinery. Total value of all the plant and machinery acquired on hire-purchase basis is also included. Thus it represents the gross value of plant and machinery engaged in production process.

Finished Goods: Finished Goods are those, which are manufactured by the factory for sale. Finished goods should conform to a prescribed standard.

Source: Annual Survey of Industries 2017-18 Vol 1



Table 11.95**District wise distribution of Factories of Kerala, 2017-18**

S. No	Districts	Number of factories	Percentage of factories
1	Kasaragod	370	4.87
2	Kannur	707	9.31
3	Wayanad	63	0.83
4	Kozhikode	500	6.58
5	Malappuram	285	3.75
6	Palakkad	511	6.73
7	Thrissur	852	11.22
8	Ernakulam	1467	19.31
9	Idukki	152	2.00
10	Kottayam	430	5.66
11	Alappuzha	613	8.07
12	Pathanamthitta	208	2.74
13	Kollam	1103	14.53
14	Thiruvananthapuram	335	4.40
Total		7596	100.00

Source: Annual Survey of Industries 2017-18

- The analysis of district-wise number of factories from the Annual Survey of Factories (2017-18) showed that the highest percentage of large industries were found in the Ernakulam district (19.31%) followed by Kollam (14.53%) and Thrissur (11.22%).
- The lowest percentage of large factories were found in Wayanad district (0.83%), with Idukki (2.00%) and Pathanamthitta (2.74%) also showing very low percentages.
- It is apparent that the favourable economic conditions of the coastal districts such as Ernakulam and Kollam, combined with geographical proximity to major ports and industrial clusters attract a large number of manufacturing industries to these districts.
- Whereas the relatively less developed and forested districts with rugged and unfavourable topography such as Wayanad and Idukki are bound to attract less industrial establishment



- For the purpose of economic valuation of bio-resources, the factories were classified into fully bio-resources based and partially bio-resources based to clearly differentiate the contributions of bio-resources to the different types of factories.
- Each of the two categories mentioned above (fully and partially bio-resources based factories) were further classified according to the products being manufactured.
- This would aid in creating a more realistic account for the purpose of ABS estimation.

Table 11.96
Bio-resources Based (Fully) Factories in Kerala
(Major factory group at 2-digit NIC 2008)

NIC Code	Description	Number of factories	Percentage of All Factories in Kerala (7596)
10	Manufacture of food products	1624	21.4
11	Manufacture of beverages	63	0.8
12	Manufacture of tobacco products	500	6.6
15	Manufacture of leather and related products	203	2.7
16	Manufacture of wood and products of wood and cork, except furniture ;manufacture of articles of straw and plaiting materials	857	11.3
17	Manufacture of paper and paper products	134	1.8
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	159	2.1
	Total	3540	46.7

Source: *Estimated based on Annual Survey of Industries 2017-18*

- The total number of factories (including both bio-resource and non bio-resource based) in Kerala were 7596
- The following analysis was done based on all these factories present in Kerala.
- The above table no. shows the overall percentages of various fully bio-resources based factories based on the products manufactured by them.
- The highest percentage of factories were those manufacturing food products (21.4%), followed by factories manufacturing wood products (11.3%).
- Factories manufacturing beverages constituted the lowest percentage (0.8%) of factories in Kerala.



Table 11.97

Bio-resources Based (Partially) Factories in Kerala
(Major factory group at 2-digit NIC 2008)

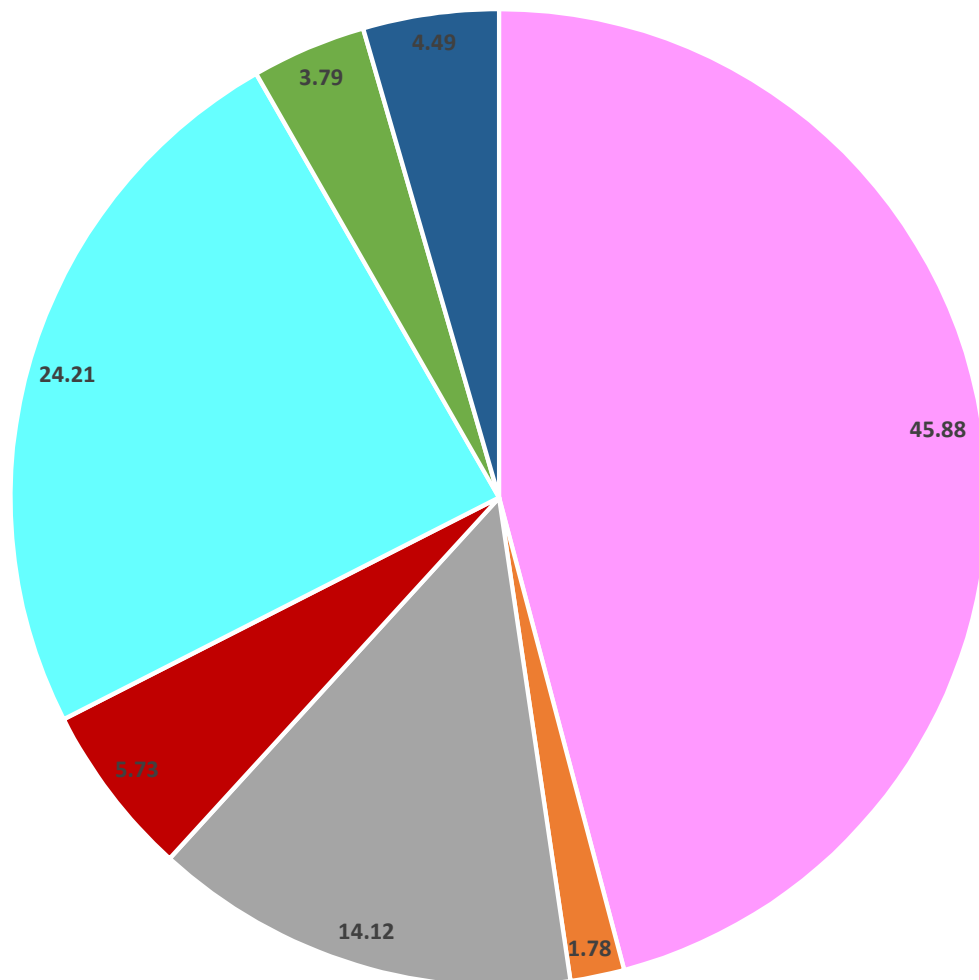
NIC Code	Description	Number of factories	Percentage of All Factories in Kerala (7596)
13	Manufacture of textiles	423	5.6
14	Manufacture of wearing apparel	51	0.7
22	Manufacture of rubber and plastic products	629	8.3
31	Manufacture of furniture	130	1.7
32	Other manufacturing	74	1.0
	Total	1307	17.3

Source: Estimated based on Annual Survey of Industries 2017-18

- The above table no. shows the overall percentages of various partially bio-resources based factories based on the products manufactured by them.
- Among the five types of partially bio-resources based factories, the highest percentage of factories were those manufacturing rubber and plastic products (8.3%), followed by textiles (5.6%).
- Factories manufacturing wearing apparel formed the lowest percentage (0.7%) of factories in this category.
- The factories manufacturing furniture (1.7%) and other products (1.0%) also constitute only a very small percentage of all large factories in Kerala.
- The relatively high percentage of rubber manufacturing factories shows the importance of rubber trees and plantations of Kerala in providing value added manufactured products for the industry.



Figure 11.94
Percentage Distribution of Bio-resources
Based (Fully) Factories in Kerala

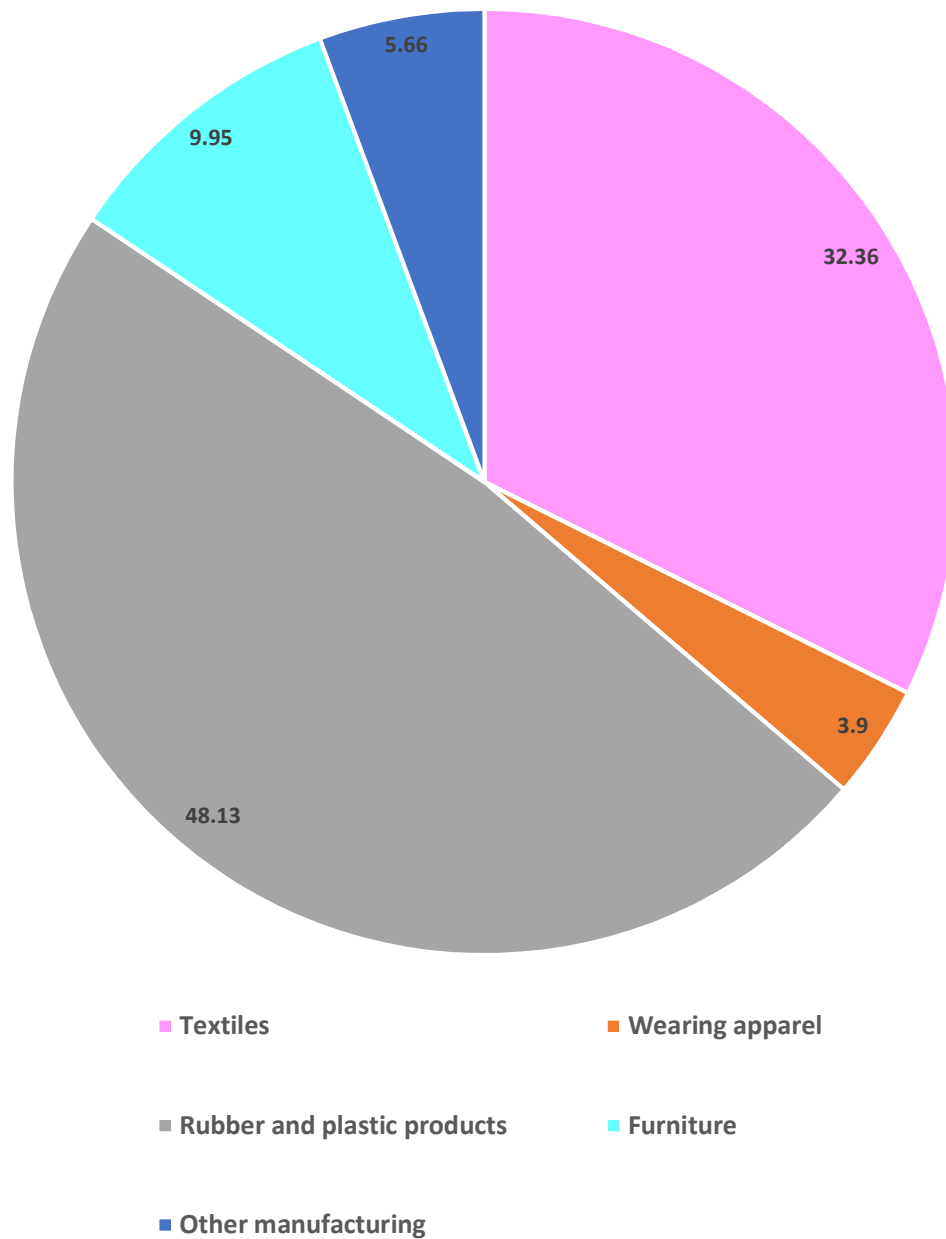


- Food products
- Beverages
- Tobacco products
- Leather and related products
- Wood and products of wood and cork
- Paper and paper products
- Pharmaceuticals, medicinal, chemical and botanical products

Source: Estimated based on Annual Survey of Industries 2017-18



Figure 11.95
Percentage Distribution of Bio-resources Based (Partially) Factories in Kerala



Source: Estimated based on Annual Survey of Industries 2017-18



- The industrial profile of each district showing some economic indicators such as fixed capital, total output and input, value added, net income and profit/loss of each type of factory (based on product manufactures) was analysed to understand the overall output of this sector.
- Such an analysis would also prove useful since ABS is collected as a percentage of the annual turnover and profit earned by an enterprise/factory which commercially utilises bio-resources to manufacture products.

Table 11.98
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kasargod

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	9	2	274	Nil	32	1	1	319
Fixed Capital	1431	193	458	Nil	1501	51	21	3655
Total Output	28362	1551	8100	Nil	10494	96	473	49076
Total Input	26492	1399	160	Nil	8276	65	316	36708
Gross Value Added (GVA)	1870	152	7941	Nil	2218	31	157	12369
Net Value Added (NVA)	1674	138	7907	Nil	2025	24	153	11921
Net Income	1348	131	7883	Nil	1571	23	155	11111
Profit	376	35	43	Nil	1221	2	75	1752

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.98 shows the fully bio-resources based factories (319) profile of Kasargod district.
- According to this data, all types of factories during the year under study earned a net profit.
- There were no factories manufacturing leather and related products.



- Factories manufacturing wood products earned the highest amount of total profit (Rs. 1221 lakh), with a total number of 32 factories.
- Factories manufacturing paper and paper products showed the lowest total profit (Rs. 2 lakh), with a total number of only 1 factory.
- Tobacco manufacturing factories with largest number of factories (274) and highest net income (Rs. 7883 lakh) could only register a profit of Rs. 43 lakh indicating the probable high expenditure incurred.
- The total profit earned from all factories in the district amounted to Rs. 1752 lakh , although net income generated was Rs. 1111 lakh .

Table 11.99
Sector wise Inventory of Bio-resources based (Partially) Factories
with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kasargod

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	6	1	2	6	Nil	15
Fixed Capital	25	24	90	563	Nil	702
Total Output	186	56	1714	693	Nil	2649
Total Input	66	9	1507	621	Nil	2203
Gross Value Added (GVA)	120	46	206	72	Nil	444
Net Value Added (NVA)	118	44	195	-16	Nil	341
Net Income	115	44	192	-36	Nil	315
Profit	16	-19	56	-118	Nil	-65

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.99 shows the partially bio-resources based factories (15) profile of Kasargod district.
- According to this data, 2 types of factories (textiles and rubber) earned a net profit and 2 (wearing apparel and furniture) suffered net loss during the year under study
- There were no “other manufacturing” factories in the district.



- Factories manufacturing rubber and plastic products earned the highest amount of total profit (Rs. 56 lakh), with a total number of 2 factories.
- Factories manufacturing furniture showed the highest loss (Rs. 118 lakh), with a total number of only 6 factories.
- The total loss incurred from all factories in the district amounted to Rs. 65 lakh , although net income generated was Rs. 315 lakh .

Table 11.100
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kannur

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	27	3	179	4	167	4	5	389
Fixed Capital	9786	243	632	278	4035	59	1104	16137
Total Output	45357	5232	2216	2157	15302	124	4203	74591
Total Input	42827	4727	231	1764	11756	87	3161	64553
Gross Value Added (GVA)	2530	505	1985	392	3546	37	1043	10038
Net Value Added (NVA)	1629	472	1974	356	3036	33	917	8417
Net Income	1246	402	1971	344	2645	31	888	7527
Profit	-1270	152	-70	-42	315	1	309	-605

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table no. shows the fully bio-resources based factories (389) profile of Kannur district.
- According to this data, 4 types of factories (beverages, wood products, paper products and pharmaceuticals) earned a net profit, while the 3 other types (food products, tobacco products and leather products) incurred net loss during the year under study.

- Factories manufacturing wood products earned the highest amount of total profit (Rs. 315 lakh), with a total number of 167 factories followed by pharmaceutical factories (Rs. 309 lakh) with a total number of 5 factories.
- The profit value of paper products manufacturing factories was very low (Rs. 1 lakh)
- Factories manufacturing food products showed the highest loss (Rs. 1270 lakh), with a total number of 27 factories.
- The total loss incurred from all types of factories in the district amounted to Rs. 605 lakh , although net income generated was Rs. 7527 lakh .

Table 11.101

Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kannur

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	120	13	33	19	3	188
Fixed Capital	14715	707	1993	1545	148	19108
Total Output	26626	6221	7519	8906	366	49638
Total Input	18995	3304	5779	5609	277	33964
Gross Value Added (GVA)	7631	2917	1740	3298	89	15675
Net Value Added (NVA)	6311	2853	1515	3134	74	13887
Net Income	4704	2767	1432	3021	85	12009
Profit	-2015	456	365	845	26	-323

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.101 shows the partially bio-resources based factories (188) profile of Kannur district.



- According to this data, 4 types of factories (wearing apparel, furniture, rubber and other manufacturing) earned a net profit while 1 (textiles) suffered net loss during the year under study
- Factories manufacturing furniture earned the highest amount of total profit (Rs. 845 lakh), with a total number of 19 factories.
- Factories manufacturing textiles suffered the highest loss (Rs. 2015 lakh), with a total number of 120 factories.
- The total loss incurred from all factories in the district amounted to Rs. 323 lakh , although net income generated was Rs. 12009 lakh .

Table 11.102
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Wayanad

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	31	Nil	Nil	1	6	1	1	40
Fixed Capital	7080	Nil	Nil	984	164	37	17	8282
Total Output	65687	Nil	Nil	5790	569	0	299	72345
Total Input	43720	Nil	Nil	4576	426	0	257	48979
Gross Value Added (GVA)	21966	Nil	Nil	1213	143	0	41	23363
Net Value Added (NVA)	21015	Nil	Nil	1048	119	-3	39	22218
Net Income	20873	Nil	Nil	860	88	-3	40	21858
Profit	18320	Nil	Nil	302	7	-3	11	18637

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products



- Table 11.102 shows the fully bio-resources based factories (40) profile of Wayanad district.
- According to this data, 3 types of factories (food products, leather products and wood products) earned a net profit, while paper and paper products incurred net loss during the year under study.
- Factories manufacturing food products earned the highest amount of total profit (Rs. 18320 lakh), with a total number of 31 factories followed by leather manufacturing factories (Rs. 302 lakh) with a total number of 1 factory.
- The profit value of wood products manufacturing factories (Rs. 7 lakh) and pharmaceutical manufacturing factories (Rs. 11 lakh) were very low.
- Factories manufacturing paper and paper products showed the highest loss (Rs. 3 lakh), with a total number of 1 factory.
- The total profit earned from all types of factories in the district amounted to Rs. 18637 lakh , although net income generated was Rs. 21858 lakh .

Table 11.103
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Wayanad

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	Nil	Nil	1	Nil	Nil	1
Fixed Capital	Nil	Nil	153	Nil	Nil	153
Total Output	Nil	Nil	52	Nil	Nil	52
Total Input	Nil	Nil	50	Nil	Nil	50
Gross Value Added (GVA)	Nil	Nil	2	Nil	Nil	2
Net Value Added (NVA)	Nil	Nil	-19	Nil	Nil	-19
Net Income	Nil	Nil	-20	Nil	Nil	-20
Profit	Nil	Nil	-29	Nil	Nil	-29

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing



- Table 11.104 shows the partially bio-resources based factories (1) profile of Wayanad district.
- According to this data, only 1 factory manufacturing rubber and plastic products functions in this district.
- This factory incurred a loss of Rs. 29 lakh in 2017-18.
- No other types of manufacturing industries in this category function in Wayanad district.

Table 11.105

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kozhikode

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	48	2	11	110	64	12	9	256
Fixed Capital	18229	2121	78	19400	199	629	441	41097
Total Output	148293	994	519	123443	2586	985	1223	278043
Total Input	142621	569	470	99557	2196	730	919	30979
Gross Value Added (GVA)	5672	424	49	23885	390	255	304	30979
Net Value Added (NVA)	4742	389	46	20919	361	149	273	26879
Net Income	4429	322	44	19263	335	101	262	24756
Profit	1086	7	-246	4393	45	-82	25	5228

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.105 shows the fully bio-resources based factories (256) profile of Kozhikode district.



- According to this data, 5 types of factories (food products, beverages, leather products, wood products and pharmaceuticals) earned a net profit, while 2 types of factories (tobacco products and paper products) incurred net loss during the year under study.
- Factories manufacturing leather products earned the highest amount of total profit (Rs. 4393 lakh), with a total number of 110 factories followed by food products manufacturing factories (Rs. 1086 lakh) with a total number of 48 factory.
- The profit value of beverages manufacturing factories (Rs. 7 lakh) and pharmaceutical manufacturing factories (Rs. 25 lakh) were very low.
- Factories manufacturing tobacco products showed the highest loss (Rs. 246 lakh), with a total number of 11 factories.
- The total profit earned from all types of factories in the district amounted to Rs. 5228 lakh , although net income generated was Rs. 24756 lakh .
-

Table 11.106
Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kozhikode

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	32	3	22	9	2	68
Fixed Capital	1719	143	1210	64	41	3177
Total Output	2128	1704	10405	877	753	15867
Total Input	1961	1282	9793	734	293	14063
Gross Value Added (GVA)	167	422	612	143	460	1804
Net Value Added (NVA)	-283	403	512	131	456	1219
Net Income	-341	343	297	109	449	857
Profit	-1217	84	-188	18	372	-931

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing



- Table 11.106 shows the partially bio-resources based factories (68) profile of Kozhikode district.
- According to this data, 3 types of factories (wearing apparel, furniture and other manufacturing) earned a net profit while 2 (textiles and rubber and plastic products) suffered net loss during the year under study.
- Other manufacturing Factories earned the highest amount of total profit (Rs. 372 lakh), with a total number of 2 factories.
- Factories manufacturing textiles suffered the highest loss (Rs. 1217 lakh), with a total number of 32 factories.
- The total loss incurred from all factories in the district amounted to Rs. 931 lakh , although net income generated was Rs. 857 lakh .

Table 11.107

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Malappuram

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	60	2	18	30	23	7	14	154
Fixed Capital	12152	189	1	3223	24	110	3495	19194
Total Output	131545	40	21	21684	625	473	31008	185396
Total Input	123736	35	11	18469	512	394	20580	163737
Gross Value Added (GVA)	7809	5	10	3215	113	78	10428	21658
Net Value Added (NVA)	5904	-22	10	2490	109	67	10058	18616
Net Income	5296	-22	9	1907	109	51	10334	17684
Profit	1401	-31	1	63	37	21	6109	7601

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products



21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.107 shows the fully bio-resources based factories (256) profile of Malappuram district.
- According to this data, 6 types of factories (food products, tobacco products, paper products, leather products, wood products and pharmaceuticals) earned a net profit, while beverages manufacturing factories incurred net loss during the year under study.
- Factories manufacturing pharmaceutical products earned the highest amount of total profit (Rs. 6109 lakh), with a total number of 14 factories followed by food products manufacturing factories (Rs. 1401 lakh) with a total number of 60 factory.
- The profit value of tobacco manufacturing factories (Rs. 1 lakh) and paper and paper products manufacturing factories (Rs. 21 lakh) were very low.
- Factories manufacturing beverages were the only ones which incurred loss (Rs. 31 lakh), with a total number of 2 factories.
- The total profit earned from all types of factories in the district amounted to Rs. 7601 lakh , although net income generated was Rs. 17684 lakh .

Table 13

Table 11.108

Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Malappuram

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	5	3	23	17	2	50
Fixed Capital	3309	1567	3599	149	225	8849
Total Output	4156	5770	16515	3433	2330	32204
Total Input	3882	4559	13532	3007	2260	27240
Gross Value Added (GVA)	274	1211	2983	426	71	4965
Net Value Added (NVA)	-7	1102	2507	403	62	4067
Net Income	-640	915	2197	27	61	2560
Profit	-2326	94	728	-173	0	-1677

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel



22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.108 shows the partially bio-resources based factories (50) profile of Malappuram district.
- According to this data, 2 types of factories (wearing apparel, and rubber and plastic products) earned a net profit while 2 (furniture and textiles) suffered net loss during the year under study.
- Factories manufacturing other products made neither profit nor loss.
- Rubber and plastic products manufacturing factories earned the highest amount of total profit (Rs. 728 lakh), with a total number of 23 factories.
- Factories manufacturing textiles suffered the highest loss (Rs. 2326 lakh), with a total number of 5 factories.
- The total loss incurred from all factories in the district amounted to Rs. 1677 lakh , although net income generated was Rs. 2560 lakh .

Table 11.109

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Palakkad

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	71	14	Nil	Nil	61	8	20	174
Fixed Capital	22588	14355	Nil	Nil	566	1849	2679	42037
Total Output	136862	50546	Nil	Nil	6275	3813	12629	210125
Total Input	125023	29108	Nil	Nil	5555	3126	8273	171085
Gross Value Added (GVA)	11839	21438	Nil	Nil	720	687	4356	39040
Net Value Added (NVA)	10352	19546	Nil	Nil	670	582	4080	35230
Net Income	8764	19424	Nil	Nil	553	549	3577	32867
Profit	2973	15247	Nil	Nil	141	148	1603	20112

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.109 shows the fully bio-resources based factories (174) profile of Palakkad district.
- According to this data, 5 types of factories (food products, beverages, paper products, wood products and pharmaceuticals) earned a net profit, while there were no factories manufacturing tobacco products or leather products in 2017-18.
- Factories manufacturing beverages earned the highest amount of total profit (Rs. 15247 lakh), with a total number of 14 factories followed by food products manufacturing factories (Rs. 2973 lakh) with a total number of 71 factory.
- The profit value of wood products manufacturing factories (Rs. 141 lakh) was the lowest among all types of factories.
- No factories incurred any loss in this district.
- The total profit earned from all types of factories in the district amounted to Rs. 20112 lakh , although net income generated was Rs. 32867 lakh .
-

Table 11.110

Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Palakkad

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	12	10	61	11	9	103
Fixed Capital	34972	685	20227	1798	1771	59453
Total Output	52394	832	74254	1940	5427	134847
Total Input	44280	621	63484	1749	3247	113381
Gross Value Added (GVA)	8113	211	10771	191	2180	21466
Net Value Added (NVA)	6812	136	8868	153	2050	18019
Net Income	3806	78	8030	93	1983	13990
Profit	-1549	-44	3622	1	654	2684

Source: Estimated based on Annual Survey of Industries 2017-18



Note: 2-digit NIC 2008 Code

- 13. Manufacture of textiles
- 14. Manufacture of wearing apparel
- 22. Manufacture of rubber and plastic products
- 31. Manufacture of furniture
- 32. Other manufacturing

- Table 11.110 shows the partially bio-resources based factories (103) profile of Palakkad district.
- According to this data, 2 types of factories (furniture, rubber and plastic products and other manufacturing) earned a net profit while 2 (textiles and wearing apparel) suffered net loss during the year under study.
- Rubber and plastic products manufacturing factories earned the highest amount of total profit (Rs. 3622 lakh), with a total number of 61 factories.
- Factories manufacturing textiles suffered the highest loss (Rs. 1549 lakh), with a total number of 12 factories.
- The total profit gained from all factories in the district amounted to Rs. 2684 lakh , although net income generated was Rs. 13990 lakh .

Table 11.111
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Thrissur

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	81	10	18	4	28	19	42	202
Fixed Capital	42891	7669	463	376	530	4421	20444	76794
Total Output	292706	46548	5227	2447	1423	15714	89065	453130
Total Input	265586	41680	4891	1684	1184	12197	68240	395462
Gross Value Added (GVA)	27120	4868	336	763	239	3517	20825	57668
Net Value Added (NVA)	24160	4572	324	704	176	2895	19116	51947
Net Income	21991	4005	324	658	137	2624	18149	47888
Profit	10019	1370	180	308	-41	586	10489	22911

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.111 shows the fully bio-resources based factories (202) profile of Thrissur district.
- According to this data, 6 types of factories (food products, beverages, tobacco products, leather products, paper products, and pharmaceuticals) earned a net profit, while wood products manufacturing factories incurred loss in 2017-18.
- Factories manufacturing pharmaceuticals earned the highest amount of total profit (Rs. 10489 lakh), with a total number of 42 factories followed by food products manufacturing factories (Rs. 10019 lakh) with a total number of 81 factory.
- The profit value of tobacco products manufacturing factories (Rs. 180 lakh) was the lowest among all types of factories.
- Wood products manufacturing factories incurred a loss of Rs. 41 lakh in this district.
- The total profit earned from all types of factories in the district amounted to Rs. 22911 lakh , although net income generated was Rs. 47888 lakh .

Table 11.112
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Thrissur

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	17	7	119	15	16	174
Fixed Capital	2246	158	28303	452	3805	34964
Total Output	10008	1762	245476	1233	7568	266047
Total Input	8857	1228	190365	933	5126	206509
Gross Value Added (GVA)	1152	534	55111	301	2442	59540
Net Value Added	957	516	52109	224	2194	56000

(NVA)						
Net Income	-1147	497	51400	111	1883	52744
Profit	-4777	59	29501	22	794	25599

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.112 shows the partially bio-resources based factories (174) profile of Thrissur district.
- According to this data, 4 types of factories (wearing apparel, furniture, rubber and plastic products and other manufacturing) earned a net profit while textiles manufacturing factories suffered net loss during the year under study.
- Rubber and plastic products manufacturing factories earned the highest amount of total profit (Rs. 29501 lakh), with a total number of 119 factories.
- The profit value of furniture manufacturing factories (Rs. 22 lakh) was the lowest among all types of factories, with a total number of 15 factories.
- Factories manufacturing textiles suffered the highest loss (Rs. 4777 lakh), with a total number of 17 factories.
- The total profit gained from all factories in the district amounted to Rs. 25599 lakh , although net income generated was Rs. 52744 lakh .

Table 11.113

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Ernakulam

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	256	16	Nil	6	352	41	26	697
Fixed Capital	104628	3053	Nil	504	16880	3187	15783	144035
Total Output	949005	7018	Nil	5034	100891	13501	68981	1144430
Total Input	823077	6089	Nil	4649	89098	10765	45430	979108



Gross Value Added (GVA)	103834	930	Nil	385	13681	2736	23551	145117
Net Value Added (NVA)	92631	554	Nil	331	11443	2214	21908	129081
Net Income	81478	421	Nil	271	9279	1924	20357	113730
Profit	40579	-220	Nil	-55	2686	178	10806	53974

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

- 10. Manufacture of food products
- 11. Manufacture of beverages
- 12. Manufacture of tobacco products
- 15. Manufacture of leather and related products
- 16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 17. Manufacture of paper and paper products
- 21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table no. shows the fully bio-resources based factories (697) profile of Ernakulam district.
- According to this data, 4 types of factories (food products, wood products, paper products, and pharmaceuticals) earned a net profit, while beverages and leather products manufacturing factories incurred loss in 2017-18.
- Factories manufacturing pharmaceuticals earned the highest amount of total profit (Rs. 40579 lakh), with a total number of 256 factories followed by pharmaceuticals manufacturing factories (Rs. 10806 lakh) with a total number of 26 factories.
- The profit value of paper and paper products manufacturing factories (Rs. 178 lakh) from a total number of 41 factories, was the lowest among all types of factories.
- Beverages manufacturing factories incurred the highest loss of Rs. 220 lakh in this district.
- The total profit earned from all types of factories in the district amounted to Rs. 53974 lakh , although net income generated was Rs. 113730 lakh .



Table 11.114
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Ernakulam

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	21	5	143	23	26	218
Fixed Capital	21794	20758	105280	3687	8001	159520
Total Output	85580	61611	206213	18913	1964102	2336419
Total Input	67441	36405	163450	13191	1893186	2173673
Gross Value Added (GVA)	18140	25206	42762	5722	70917	162747
Net Value Added (NVA)	16364	22844	37508	5326	70282	152324
Net Income	14621	22299	32978	4601	43847	118346
Profit	2529	12236	11343	2241	38457	66806

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.114 shows the partially bio-resources based factories (218) profile of Ernakulam district.
- According to this data, all types of factories earned a net profit during the year under study.
- Other manufacturing factories earned the highest amount of total profit (Rs. 38457 lakh), with a total number of 26 factories, followed by wearing apparel manufacturing factories (Rs. 12236 lakh) with a total number of 5 factories.
- The profit value of furniture manufacturing factories (Rs. 2241 lakh) was the lowest among all types of factories, with a total number of 23 factories.
- The total profit gained from all factories in the district amounted to Rs. 66806 lakh , although net income generated was Rs. 118346 lakh .



Table 11.115
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Idukki

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	78	2	Nil	3	6	Nil	3	92
Fixed Capital	40631	887	Nil	430	346	Nil	878	43172
Total Output	170697	501	Nil	1911	2196	Nil	6293	181598
Total Input	133075	437	Nil	1571	1840	Nil	3953	140876
Gross Value Added (GVA)	37622	64	Nil	340	356	Nil	2339	40721
Net Value Added (NVA)	34305	-56	Nil	286	305	Nil	2253	37093
Net Income	31972	-65	Nil	229	269	Nil	2035	34440
Profit	10785	-99	Nil	28	86	Nil	185	10985

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.115 shows the fully bio-resources based factories (92) profile of Idukki district.
- According to this data, 4 types of factories (food products, leather products, wood products, and pharmaceuticals) earned a net profit, while beverages manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing paper products and tobacco products in this district.



- Factories manufacturing food products earned the highest amount of profit (Rs. 10785 lakh), with a total number of 78 factories followed by pharmaceuticals manufacturing factories (Rs. 185 lakh) with a total number of 3 factories.
- The profit value of leather products manufacturing factories (Rs. 28 lakh) from a total number of 3 factories, was the lowest among all types of factories.
- Beverages manufacturing factories was the only type of factory that incurred loss of Rs. 99 lakh in this district, from a total number of 2 factories.
- The total profit earned from all types of factories in the district amounted to Rs. 10985 lakh , although net income generated was Rs. 34440 lakh .

Table 11.116
Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Idukki

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	1	Nil	15	4	Nil	20
Fixed Capital	133	Nil	12507	2010	Nil	14650
Total Output	518	Nil	5698	5155	Nil	11371
Total Input	352	Nil	5187	4504	Nil	10043
Gross Value Added (GVA)	166	Nil	511	652	Nil	1329
Net Value Added (NVA)	156	Nil	271	426	Nil	853
Net Income	173	Nil	243	0	Nil	416
Profit	-409	Nil	-24	-806	Nil	-1239

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing



- Table 11.116 shows the partially bio-resources based factories (20) profile of Idukki district.
- According to this data, 3 types of factories (textiles, rubber and furniture) incurred a net loss during the year under study.
- There were no factories manufacturing wearing apparel and other manufacturing.
- Furniture manufacturing factories incurred the highest amount of loss (Rs. 806 lakh), with a total number of 4 factories, followed by textiles manufacturing factories (Rs. 409 lakh) with a total number of 1 factory.
- The loss value of rubber and plastics manufacturing factories (Rs. 24 lakh) was the lowest among all types of factories, with a total number of 15 factories.
- The total loss suffered from all factories in the district amounted to Rs. 1239 lakh , although net income generated was Rs. 416 lakh .

Table 11.117

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kottayam

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	47	1	Nil	41	43	5	6	143
Fixed Capital	15071	2	Nil	4909	738	14393	1924	37037
Total Output	88233	788	Nil	75624	4996	33253	6252	209146
Total Input	14053	161	Nil	21755	485	2490	597	39541
Gross Value Added (GVA)	9675	63	Nil	10396	1371	1466	2356	25327
Net Value Added (NVA)	8292	63	Nil	9704	1289	809	2112	22269
Net Income	6311	63	Nil	9356	1066	-1344	1513	16965
Profit	1229	5	Nil	4758	-57	-8113	231	-1947

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products
11. Manufacture of beverages
12. Manufacture of tobacco products
15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.117 shows the fully bio-resources based factories (143) profile of Kottayam district.
- According to this data, 4 types of factories (food products, beverages, leather products and pharmaceuticals) earned a net profit, while wood products and paper products manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing tobacco products in this district.
- Factories manufacturing leather products earned the highest amount of profit (Rs. 4758 lakh), with a total number of 41 factories followed by food products manufacturing factories (Rs. 1229 lakh) with a total number of 47 factories.
- The profit value of beverages manufacturing factories (Rs. 5 lakh) from a total number of 1 factory, was the lowest among all types of factories.
- Paper and paper products manufacturing factories incurred highest loss of Rs. 8113 lakh in this district, from a total number of 5 factories.
- The total loss incurred from all types of factories in the district amounted to Rs. 1947 lakh , although net income generated was Rs. 16965 lakh .

Table 11.118

Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kottayam

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	5	1	119	5	1	131
Fixed Capital	3468	35	35394	922	112	39931
Total Output	3423	699	342054	5140	594	351910
Total Input	605	171	58165	752	114	59807
Gross Value Added (GVA)	147	131	53883	1343	213	55717
Net Value Added (NVA)	-170	125	49992	1251	195	51393
Net Income	-680	78	48238	1253	190	49079
Profit	-1641	43	27577	398	43	26420

Source: Estimated based on Annual Survey of Industries 2017-18



Note: 2-digit NIC 2008 Code

- 13. Manufacture of textiles
- 14. Manufacture of wearing apparel
- 22. Manufacture of rubber and plastic products
- 31. Manufacture of furniture
- 32. Other manufacturing

- Table 11.118 shows the partially bio-resources based factories (131) profile of Kottayam district.
- According to this data, 4 types of factories (wearing apparel, rubber, furniture and other manufacturing) earned profit, while textiles incurred loss during the year under study.
- Rubber and plastic products manufacturing factories earned the highest amount of profit (Rs. 27577 lakh), with a total number of 119 factories, followed by furniture manufacturing factories (Rs. 398 lakh) with a total number of 5 factory.
- The profit value of wearing apparel manufacturing factories (Rs. 43 lakh) from a total number of 1 factory, was the lowest among all types of factories.
- The loss incurred by textile manufacturing factories was Rs. 1641 lakh , with a total number of 5 factories.
- The total profit earned from all factories in the district amounted to Rs. 26420 lakh , although net income generated was Rs. 49079 lakh .

Table 11.119
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Alappuzha

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	164	3	Nil	1	20	22	14	224
Fixed Capital	80394	816	Nil	89	811	313	5329	87752
Total Output	644379	2572	Nil	290	2017	3473	10439	663170
Total Input	588486	1889	Nil	237	1651	2610	6481	601354
Gross Value Added (GVA)	55892	683	Nil	54	366	862	3958	61815
Net Value Added (NVA)	49239	479	Nil	44	284	815	3549	54410

Net Income	37063	467	Nil	42	273	787	3661	42293
Profit	13857	-186	Nil	20	123	225	1908	15947

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

- 10. Manufacture of food products
- 11. Manufacture of beverages
- 12. Manufacture of tobacco products
- 15. Manufacture of leather and related products
- 16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
- 17. Manufacture of paper and paper products
- 21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.119 shows the fully bio-resources based factories (224) profile of Alappuzha district.
- According to this data, 5 types of factories (food products, wood products, paper products, leather products and pharmaceuticals) earned a net profit, while beverages manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing tobacco products in this district.
- Factories manufacturing food products earned the highest amount of profit (Rs. 13857 lakh), with a total number of 164 factories followed by pharmaceuticals manufacturing factories (Rs. 1908 lakh) with a total number of 14 factories.
- The profit value of leather and related products manufacturing factories (Rs. 20 lakh) from a total number of 1 factory, was the lowest among all types of factories.
- Beverages manufacturing factories incurred loss of Rs. 186 lakh in this district, from a total number of 5 factories.
- The total profit gained from all types of factories in the district amounted to Rs. 15947 lakh , although net income generated was Rs. 42293 lakh .



Table 11.120
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Alappuzha

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	169	2	29	3	7	210
Fixed Capital	41612	40	19012	163	1745	62572
Total Output	207559	403	42784	471	18956	270173
Total Input	169157	220	33313	386	15374	218450
Gross Value Added (GVA)	38402	183	9470	85	3582	51722
Net Value Added (NVA)	35245	176	8052	66	3377	46916
Net Income	33806	177	7424	49	3626	45082
Profit	16107	38	3372	-12	3130	22635

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.120 shows the partially bio-resources based factories (210) profile of Alappuzha district.
- According to this data, 4 types of factories (textiles, wearing apparel, rubber and other manufacturing) earned profit, while furniture factories incurred loss during the year under study.
- Textile manufacturing factories earned the highest amount of profit (Rs. 16107 lakh), with a total number of 169 factories, followed by rubber and plastic products manufacturing factories (Rs. 3372 lakh) with a total number of 29 factories.
- The profit value of wearing apparel manufacturing factories (Rs. 38 lakh) from a total number of 2 factories, was the lowest among all types of factories.
- The loss incurred by furniture manufacturing factories was Rs. 12 lakh , with a total number of 3 factories.
- The total profit earned from all factories in the district amounted to Rs. 22635 lakh , although net income generated was Rs. 45082 lakh



Table 11.121
Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Pathanamthitta

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	51	4	Nil	2	12	Nil	2	71
Fixed Capital	11687	273	Nil	31	594	Nil	128	12713
Total Output	86589	6167	Nil	42	598	Nil	280	93676
Total Input	73295	5420	Nil	4	522	Nil	211	79452
Gross Value Added (GVA)	13293	747	Nil	38	76	Nil	69	14223
Net Value Added (NVA)	12261	717	Nil	35	9	Nil	59	13081
Net Income	10734	823	Nil	34	3	Nil	56	11650
Profit	4696	462	Nil	3	-43	Nil	27	5145

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.121 shows the fully bio-resources based factories (71) profile of Pathanamthitta district.
- According to this data, 4 types of factories (food products, beverages, leather products and pharmaceuticals) earned a net profit, while wood products manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing tobacco products and paper and paper products in this district.
- Factories manufacturing food products earned the highest amount of profit (Rs. 4696 lakh), with a total number of 51 factories followed by beverages manufacturing factories (Rs. 462 lakh) with a total number of 4 factories.



- The profit value of leather and related products manufacturing factories (Rs. 3 lakh) from a total number of 2 factories, was the lowest among all types of factories.
- Beverages manufacturing factories incurred loss of Rs. 43 lakh , from a total number of 5 factories.
- The total profit gained from all types of factories in the district amounted to Rs. 5145 lakh , although net income generated was Rs. 11650 lakh .

Table 11.122
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Pathanamthitta

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	6	Nil	17	3	2	28
Fixed Capital	9606	Nil	1206	99	9	10920
Total Output	573	Nil	15222	122	59	15976
Total Input	3354	Nil	12762	92	17	16225
Gross Value Added (GVA)	-2781	Nil	2459	29	42	-251
Net Value Added (NVA)	-3020	Nil	2317	16	41	-646
Net Income	-3039	Nil	2222	16	39	-762
Profit	-3729	Nil	1450	-35	2	-2312

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

- 13. Manufacture of textiles
- 14. Manufacture of wearing apparel
- 22. Manufacture of rubber and plastic products
- 31. Manufacture of furniture
- 32. Other manufacturing

- Table 11.122 shows the partially bio-resources based factories (28) profile of Pathanamthitta district.
- According to this data, 2 types of factories (rubber and other manufacturing) earned profit, while textiles and furniture factories incurred loss during the year under study.
- There were no factories manufacturing wearing apparel in this district.



- Rubber and plastic products manufacturing factories earned the highest amount of profit (Rs. 1450 lakh), with a total number of 17 factories,
- The profit value of other manufacturing factories (Rs. 2 lakh) from a total number of 2 factories, was the lowest among all types of factories.
- The highest loss was incurred by textile manufacturing factories (Rs. 3729 lakh , with a total number of 6 factories.
- The total loss incurred by all factories in the district amounted to Rs. 2312 lakh .

Table 11.123

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kollam

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	626	3	Nil	1	34	8	7	679
Fixed Capital	72578	215	Nil	0	1117	2234	307	76451
Total Output	614222	322	Nil	0	1259	4957	2415	623175
Total Input	557313	253	Nil	0	851	4063	1765	564245
Gross Value Added (GVA)	56909	69	Nil	0	408	894	650	58930
58114Net Value Added (NVA)	51406	37	Nil	0	375	672	610	53100
Net Income	40206	22	Nil	0	185	559	596	41568
Profit	-141	-10	Nil	0	59	93	225	226

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products

15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

21. Manufacture of pharmaceuticals, medicinal chemical and botanical products



- Table 11.123 shows the fully bio-resources based factories (679) profile of Kollam district.
- According to this data, 3 types of factories (wood products, paper and paper products, and pharmaceuticals) earned a net profit, while food products and beverages manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing tobacco products in this district.
- Factories manufacturing pharmaceuticals, medicinal, chemical and botanical products earned the highest amount of profit (Rs. 225 lakh), with a total number of 7 factories followed by paper and paper products manufacturing factories (Rs. 93 lakh) with a total number of 8 factories.
- The profit value of wood products manufacturing factories (Rs. 59 lakh) from a total number of 34 factories, was the lowest among all types of factories.
- Food products manufacturing factories incurred the highest loss (Rs. 141 lakh), from a total number of 626 factories.
- The total profit gained from all types of factories in the district amounted to Rs. 226 lakh , although net income generated was Rs. 41568 lakh .

Table 11.124
Sector wise Inventory of Bio-resources based (Partially) Factories with
Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Kollam

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	10	2	18	4	2	36
Fixed Capital	991	73	4473	132	82	5751
Total Output	1675	943	10476	102	2254	15450
Total Input	1516	569	8503	68	2052	12708
Gross Value Added (GVA)	159	373	1973	34	202	2741
Net Value Added (NVA)	128	362	1702	18	191	2401
Net Income	-1599	362	1655	-9	101	510
Profit	-2327	50	801	-31	-27	-1534

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.124 shows the partially bio-resources based factories (28) profile of Kollam district.
- According to this data, 2 types of factories (wearing apparel and rubber) earned profit, while textiles, furniture and other manufacturing factories incurred loss during the year under study.
- Rubber and plastic products manufacturing factories earned the highest amount of profit (Rs. 801 lakh), with a total number of 18 factories,
- The profit value of wearing apparel factories (Rs. 50 lakh) from a total number of 2 factories, was the lowest among all types of factories.
- The highest loss was incurred by textile manufacturing factories (Rs. 2327 lakh), with a total number of 6 factories.
- The total loss incurred by all factories in the district amounted to Rs. 1534 lakh , although net income generated was Rs. 510 lakh .

Table 30

Table 11.125

Sector wise Inventory of Bio-resources based (Fully) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Thiruvananthapuram

Sector (NIC Code) / Characterises	10	11	12	15	16	17	21	Total
Number of Factories	75	1	Nil	Nil	9	6	9	100
Fixed Capital	19222	139	Nil	Nil	1113	94	1729	22297
Total Output	123744	20	Nil	Nil	4261	1555	18654	148234
Total Input	106470	84	Nil	Nil	3577	1267	13565	124963
Gross Value Added (GVA)	17273	-64	Nil	Nil	684	287	5089	23269
Net Value Added (NVA)	15604	-66	Nil	Nil	573	252	4870	21233
Net Income	14375	-66	Nil	Nil	484	208	4519	19520
Profit	8370	-125	Nil	Nil	184	56	2496	10981

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

10. Manufacture of food products

11. Manufacture of beverages

12. Manufacture of tobacco products



15. Manufacture of leather and related products

16. Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials

17. Manufacture of paper and paper products

18. Manufacture of pharmaceuticals, medicinal chemical and botanical products

- Table 11.125 shows the fully bio-resources based factories (100) profile of Thiruvananthapuram district.
- According to this data, 4 types of factories (food products, wood products, paper and paper products, and pharmaceuticals) earned a net profit, while beverages manufacturing factories incurred loss in 2017-18.
- There were no factories manufacturing tobacco products and leather products in this district.
- Factories manufacturing food products earned the highest amount of profit (Rs. 8370 lakh), with a total number of 75 factories followed by pharmaceuticals, medicinal chemical and botanical products manufacturing factories (Rs. 2496 lakh) with a total number of 9 factories.
- The profit value of paper products manufacturing factories (Rs. 56 lakh) from a total number of 6 factories, was the lowest among all types of factories.
- Beverages manufacturing factories incurred the highest loss (Rs. 125 lakh), from a total number of 626 factories.
- The total profit gained from all types of factories in the district amounted to Rs. 10981 lakh , although net income generated was Rs. 19520 lakh .

Table 11.126

Sector wise Inventory of Bio-resources based (Partially) Factories with Key Characteristics

(2-digit NIC 2008 for the year 2017-18 - Values in Rs. lakh unless otherwise mentioned)

District: Thiruvananthapuram

Sector (NIC Code) / Characterises	13	14	22	31	32	Total
Number of Factories	19	4	27	11	4	65
Fixed Capital	2305	233	19404	226	108	22276
Total Output	32087	1119	75901	1104	1308	111519
Total Input	26097	762	49699	849	651	78058
Gross Value Added (GVA)	5990	358	26202	256	657	33463
Net Value Added (NVA)	5854	307	24022	221	647	31051
Net Income	4514	197	22594	148	639	28092
Profit	-2587	-1431	6824	-143	524	3187

Source: Estimated based on Annual Survey of Industries 2017-18

Note: 2-digit NIC 2008 Code

13. Manufacture of textiles

14. Manufacture of wearing apparel

22. Manufacture of rubber and plastic products

31. Manufacture of furniture

32. Other manufacturing

- Table 11.126 shows the partially bio-resources based factories (65) profile of Thiruvananthapuram district.
- According to this data, 2 types of factories (rubber and plastic products and other manufacturing) earned profit, while textiles, wearing apparel and furniture manufacturing factories incurred loss during the year under study.
- Rubber and plastic products manufacturing factories earned the highest amount of profit (Rs. 6824 lakh), with a total number of 27 factories,
- The profit value of other manufacturing factories (Rs. 524 lakh) from a total number of 4 factories, was the lowest among all types of factories.
- The highest loss was incurred by textile manufacturing factories (Rs. 2587 lakh), with a total number of 19 factories.
- The total profit gained from all types of factories in the district amounted to Rs. 3187 lakh , although net income generated was Rs. 28092 lakh .

Table 11.127
District wise Bio-resources based (Fully) Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	319	9.01	49076	1.12
2	Kannur	389	10.99	74591	1.70
3	Wayanad	40	1.13	72345	1.65
4	Kozhikode	256	7.23	278043	6.34
5	Malappuram	154	4.35	185396	4.23
6	Palakkad	174	4.92	210125	4.79
7	Thrissur	202	5.71	453130	10.33
8	Ernakulam	697	19.69	1144430	26.09
9	Idukki	92	2.60	181598	4.14
10	Kottayam	143	4.04	209146	4.77
11	Alappuzha	224	6.33	663170	15.12
12	Pathanamthitta	71	2.01	93676	2.14
13	Kollam	679	19.18	623175	14.21
14	Thiruvananthapuram	100	2.82	148234	3.38
	Total	3540	100	4386135	100

Source: Annual Survey of Industries 2017-18

- The district-wise number of bio-resources based (fully) factories and their output is given in the above Table 11.127
- The output value was highest from Ernakulam district (26.09%), which corresponds with this district having the highest percentage of factories (19.69%) in the state.
- The 2nd highest district in terms of output value was Alappuzha (15.12%) despite the district being only the 6th highest in terms of percentage of number of factories.
- The 3rd highest district in terms of output value was Kollam (14.21%) which had the 2nd highest percentage number of factories.
- The output value was lowest from Kasargod district (1.12%), despite being 4th highest in terms of number of factories (9.01%).
- Kannur district also had a very low output value percentage (1.70%) despite having a high number of factories (10.99%).
- As the output value is linked to the ABS potential, such high output districts like Ernakulam, Alappuzha, Kollam etc. can be specifically focused on for collecting ABS from commercial utilisation of bio-resources in factories.

Table 11.128
District wise Bio-resources based (Partially) Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	15	1.15	2649	0.07
2	Kannur	188	14.38	49638	1.37
3	Wayanad	1	0.08	52	0.00
4	Kozhikode	68	5.20	15867	0.44
5	Malappuram	50	3.83	32204	0.89
6	Palakkad	103	7.88	134847	3.73
7	Thrissur	174	13.31	266047	7.36
8	Ernakulam	218	16.68	2336419	64.65
9	Idukki	20	1.53	11371	0.32
10	Kottayam	131	10.02	351910	9.74
11	Alappuzha	210	16.07	270173	7.48
12	Pathanamthitta	28	2.14	15976	0.44
13	Kollam	36	2.75	15450	30.43
14	Thiruvananthapuram	65	4.98	111519	3.08
Total		1307	100	3614122	100

Source: Annual Survey of Industries 2017-18

- The district-wise number of bio-resources based (partially) factories and their output is given in the above Table 11.128

- The output value was highest from Ernakulam district (64.65%), which corresponds with this district having the highest percentage of factories (16.68%) in the state.
- The 2nd highest district in terms of output value was Kollam (30.43%) despite the district having only a small percentage of number of factories (2.75%).
- Other districts contributed less than 10% of total output in this category of factories.
- The output value was lowest from Wayanad district (0.001%), from the single factory belonging to this category.
- Kasargod district also had a very low output value percentage (0.07%), from a corresponding low percentage in terms of number of factories (1.15%).
- Despite having a high percentage number of factories (16.07%), the percentage of output value of Alappuzha district was relatively low (7.48%).
- As the output value is linked to the ABS potential, such high output districts like Ernakulam, Kollam etc. can be specifically focused on for collecting ABS from commercial utilisation of bio-resources in factories.

The district-wise and total output from different types of factories (based on product manufactured) was computed to understand the output from each type of factory contributed by each district in the state, which is given in the following tables.

1. Fully bio-resources based factories

Table 11.129
District wise food products Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	9	0.55	28362	0.80
2	Kannur	27	1.66	45357	1.29
3	Wayanad	31	1.91	65687	1.86
4	Kozhikode	48	2.96	148293	4.21
5	Malappuram	60	3.70	131545	3.73
6	Palakkad	71	4.37	136862	3.88
7	Thrissur	81	4.99	292706	8.30
8	Ernakulam	256	15.76	949005	26.92
9	Idukki	78	4.80	170697	4.84
10	Kottayam	47	2.89	88233	2.50
11	Alappuzha	164	10.10	644379	18.28
12	Pathanamthitta	51	3.14	86589	2.46
13	Kollam	626	38.55	614222	17.42
14	Thiruvananthapuram	75	4.62	123744	3.51
Total		1624	100	3525681	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from food products manufacturing factories is given in the above Table 11.129
- .Ernakulam district contributed towards the highest percentage output (26.92%) of food products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Alappuzha (18.28%) and Kollam (17.42%) districts.
- The lowest contribution was from Kasargod district (0.80%), corresponding to the lowest number of factories (0.55%).

Table 11.130
District wise beverages Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	2	3.18	1551	1.27
2	Kannur	3	4.76	5232	4.28
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	2	3.18	994	0.81
5	Malappuram	2	3.18	40	0.03
6	Palakkad	14	22.22	50546	41.33
7	Thrissur	10	15.87	46548	38.06
8	Ernakulam	16	25.40	7018	5.74
9	Idukki	2	3.18	501	0.41
10	Kottayam	1	1.59	788	0.64
11	Alappuzha	3	4.76	2572	2.10
12	Pathanamthitta	4	6.35	6167	5.04
13	Kollam	3	4.76	322	0.26
14	Thiruvananthapuram	1	1.59	20	0.02
Total		63	100.02	122299	99.99

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from beverages manufacturing factories is given in the above Table 11.130.
- Palakkad district contributed towards the highest percentage output (41.33%) of beverages manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Thrissur (38.06%) and Ernakulam (17.42%) districts.
- The lowest contribution was from Thiruvananthapuram district (0.02%), corresponding to the lowest number of factories (1.59%).
- Wayanad did not have any factories manufacturing beverages.



Table 11.131
District wise tobacco products Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	274	54.8	8100	50.36
2	Kannur	179	35.8	2216	13.78
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	11	2.2	519	3.23
5	Malappuram	18	3.6	21	0.13
6	Palakkad	Nil	Nil	Nil	Nil
7	Thrissur	18	3.6	5227	32.5
8	Ernakulam	Nil	Nil	Nil	Nil
9	Idukki	Nil	Nil	Nil	Nil
10	Kottayam	Nil	Nil	Nil	Nil
11	Alappuzha	Nil	Nil	Nil	Nil
12	Pathanamthitta	Nil	Nil	Nil	Nil
13	Kollam	Nil	Nil	Nil	Nil
14	Thiruvananthapuram	Nil	Nil	Nil	Nil
Total		500	100	16083	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from tobacco products manufacturing factories is given in the above Table 11.131.
- Kasargod district contributed towards the highest percentage output (50.36%) of tobacco products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Thrissur (32.5%) and Kannur (13.78%) districts.
- The lowest contribution was from Malappuram district (0.13%)
- The only other district having tobacco products manufacturing factories was Kozhikode with output percentage of 3.23%
- The rest of the 9 districts did not have any factory manufacturing tobacco products.



Table 11.132
District wise leather and related products Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	Nil	Nil	Nil	Nil
2	Kannur	4	1.97	2157	0.91
3	Wayanad	1	0.49	5790	2.43
4	Kozhikode	110	54.19	123443	51.78
5	Malappuram	30	14.78	21684	9.10
6	Palakkad	Nil	Nil	Nil	Nil
7	Thrissur	4	1.97	2447	1.03
8	Ernakulam	6	2.96	5034	2.11
9	Idukki	3	1.48	1911	0.80
10	Kottayam	41	20.20	75624	31.71
11	Alappuzha	1	0.49	290	0.11
12	Pathanamthitta	2	0.99	42	0.02
13	Kollam	1	0.48	0	0
14	Thiruvananthapuram	Nil	Nil	Nil	Nil
Total		203	100	238422	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from leather and related products manufacturing factories is given in the above Table 11.132..
- Kozhikode district contributed towards the highest percentage output (50.36%) of leather and related products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Kottayam (31.71%) and Malappuram (9.10%) districts.
- The lowest contribution was from Kollam district (0%), also having the lowest number of factories (1).
- Palakkad and Kasargod did not have any factory manufacturing leather and related products.



Table 11.133
District wise wood and products of wood and cork (except furniture) Factories in
Kerala, 2017-18

(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	32	3.73	10494	6.84
2	Kannur	167	19.49	15302	9.97
3	Wayanad	6	0.70	569	0.37
4	Kozhikode	64	7.47	2586	1.69
5	Malappuram	23	2.68	625	0.41
6	Palakkad	61	7.12	6275	4.09
7	Thrissur	28	3.27	1423	0.93
8	Ernakulam	352	41.07	100891	65.73
9	Idukki	6	0.70	2196	1.43
10	Kottayam	43	5.02	4996	3.26
11	Alappuzha	20	2.33	2017	1.31
12	Pathanamthitta	12	1.40	598	0.38
13	Kollam	34	3.97	1259	0.82
14	Thiruvananthapuram	9	1.05	4261	2.77
Total		857	100	153492	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from wood and products of wood and cork (except furniture) manufacturing factories is given in the above Table 11.133..
- Ernakulam district contributed towards the highest percentage output (65.73%) of wood and products of wood and cork (except furniture) manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Kannur (9.97%) and Kasargod (6.84%) districts.
- The lowest contribution was from Wayanad district (0.37%), also having the lowest number of factories (6).



Table 11.134
District wise paper and paper products Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	1	0.75	96	0.12
2	Kannur	4	2.99	124	0.16
3	Wayanad	1	0.75	0	0
4	Kozhikode	12	8.96	985	1.26
5	Malappuram	7	5.22	473	0.61
6	Palakkad	8	5.97	3813	4.89
7	Thrissur	19	14.18	15714	20.16
8	Ernakulam	41	30.60	13501	17.32
9	Idukki	Nil	Nil	Nil	Nil
10	Kottayam	5	3.73	33253	42.66
11	Alappuzha	22	16.42	3473	4.46
12	Pathanamthitta	Nil	Nil	Nil	Nil
13	Kollam	8	5.96	4957	6.36
14	Thiruvananthapuram	6	4.47	1555	2.00
Total		134	100	77944	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from paper and paper products manufacturing factories is given in the above Table 11.134.
- Kottayam district contributed towards the highest percentage output (42.66%) of paper and paper products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Thrissur (20.16%) and Ernakulam (17.32%) districts.
- The lowest contribution was from Wayanad district (0%), also having the lowest number of factories (1).
- Idukki and Pathanamthitta did not have any factory manufacturing leather and related products.



Table 11.135
District wise pharmaceuticals, medicinal chemical and botanical products Factories
in Kerala, 2017-18

(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	1	0.63	473	0.19
2	Kannur	5	3.15	4203	1.67
3	Wayanad	1	0.63	299	0.12
4	Kozhikode	9	5.66	1223	0.49
5	Malappuram	14	8.81	31008	12.29
6	Palakkad	20	12.58	12629	5.01
7	Thrissur	42	26.42	89065	35.31
8	Ernakulam	26	16.35	68981	27.34
9	Idukki	3	1.89	6293	2.50
10	Kottayam	6	3.77	6252	2.47
11	Alappuzha	14	8.81	10439	4.14
12	Pathanamthitta	2	1.25	280	0.11
13	Kollam	7	4.40	2415	0.96
14	Thiruvananthapuram	9	5.67	18654	7.40
Total		159	100	252214	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from pharmaceuticals, medicinal chemical and botanical products manufacturing factories is given in the above Table 11.135.
- Thrissur district contributed towards the highest percentage output (35.31%) of pharmaceuticals, medicinal chemical and botanical products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Ernakulam (27.34%) and Malappuram (12.29%) districts.
- The lowest contribution was from Pathanamthitta district (0.11%), from a total number of 2 factories.



2. Partially bio-resources based factories

Table 11.136
District wise textiles Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	6	1.42	186	0.04
2	Kannur	120	28.37	26626	6.24
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	32	7.57	2128	0.50
5	Malappuram	5	1.18	4156	0.97
6	Palakkad	12	2.84	52394	12.27
7	Thrissur	17	4.02	10008	2.34
8	Ernakulam	21	4.97	85580	20.05
9	Idukki	1	0.24	518	0.12
10	Kottayam	5	1.18	3423	0.80
11	Alappuzha	169	39.95	207559	48.62
12	Pathanamthitta	6	1.42	573	0.13
13	Kollam	10	2.36	1675	0.39
14	Thiruvananthapuram	19	4.48	32087	7.53
Total		423	100	426913	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from textiles manufacturing factories is given in the above Table 11.136.
- Alappuzha district contributed towards the highest percentage output (48.62%) of textiles manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Ernakulam (20.05%) and Palakkad (12.27%) districts.
- The lowest contribution was from Kasargod district (0.04%), also having very low number of factories (6).
- Wayanad did not have any factory manufacturing textiles.



Table 11.137
District wise wearing apparel Factories in Kerala, 2017-18

(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	1	1.96	56	0.07
2	Kannur	13	25.49	6221	7.67
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	3	5.88	1704	2.10
5	Malappuram	3	5.88	5770	7.11
6	Palakkad	10	19.61	832	1.03
7	Thrissur	7	13.73	1762	2.17
8	Ernakulam	5	9.80	61611	75.95
9	Idukki	Nil	Nil	Nil	Nil
10	Kottayam	1	1.96	699	0.86
11	Alappuzha	2	3.92	403	0.50
12	Pathanamthitta	Nil	Nil	Nil	Nil
13	Kollam	2	3.92	943	1.16
14	Thiruvananthapuram	4	7.85	1119	1.38
Total		51	100	81120	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from wearing apparel manufacturing factories is given in the above Table 11.137.
- Ernakulam district contributed towards the highest percentage output (75.95%) of wearing apparel manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Kannur (7.67%) and Malappuram (7.11%) districts.
- The lowest contribution was from Kasargod district (0.07%), also having very low number of factories (1).
- Idukki and Wayanad did not have any factory manufacturing wearing apparel.

Table 11.138
District wise rubber and plastic products Factories in Kerala, 2017-18

(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	2	0.32	1714	0.16
2	Kannur	33	5.25	7519	0.71
3	Wayanad	1	0.16	52	0.001



4	Kozhikode	22	3.50	10405	0.99
5	Malappuram	23	3.66	16515	1.57
6	Palakkad	61	9.70	74254	7.04
7	Thrissur	119	18.92	245476	23.28
8	Ernakulam	143	22.74	206213	19.57
9	Idukki	15	2.39	5698	0.54
10	Kottayam	119	18.92	342054	32.44
11	Alappuzha	29	4.61	42784	4.06
12	Pathanamthitta	17	2.70	15222	1.44
13	Kollam	18	2.85	10476	0.99
14	Thiruvananthapuram	27	4.28	75901	7.21
Total		629	100	1054283	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from rubber and plastic products manufacturing factories is given in the above Table 11.138.
- Kottayam district contributed towards the highest percentage output (32.44%) of rubber and plastic products manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Thrissur (23.28%) and Ernakulam (19.57%) districts.
- The lowest contribution was from Wayanad district (0.001%), from a total number of just 1 factory.

Table 11.139
District wise furniture Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	6	4.62	693	1.44
2	Kannur	19	14.62	8906	18.52
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	9	6.92	877	1.82
5	Malappuram	17	13.08	3433	7.14
6	Palakkad	11	8.46	1940	4.03
7	Thrissur	15	11.54	1233	2.56
8	Ernakulam	23	17.69	18913	39.33
9	Idukki	4	3.08	5155	10.72
10	Kottayam	5	3.85	5140	10.69
11	Alappuzha	3	2.31	471	0.98
12	Pathanamthitta	3	2.31	122	0.25
13	Kollam	4	3.07	102	0.21
14	Thiruvananthapuram	11	8.45	1104	2.22
Total		130	100	48089	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from furniture manufacturing factories is given in the above Table 11.139.
- Ernakulam district contributed towards the highest percentage output (39.33%) of furniture manufacturing.
- The 2nd and 3rd highest contributions in terms of output were from Kannur (18.52%) and Idukki (10.72%) districts.
- The lowest contribution was from Kollam district (0.21%), also having very low number of factories (4).
- Wayanad did not have any factory manufacturing furniture.

Table 11.140
District wise Other Factories in Kerala, 2017-18
(2-digit NIC 2008 for the year 2017-18)

S. No	Districts	Factories		Total Output	
		Number	%	Value (in Rs. Lakh)	%
1	Kasaragod	Nil	Nil	Nil	Nil
2	Kannur	3	4.05	366	0.02
3	Wayanad	Nil	Nil	Nil	Nil
4	Kozhikode	2	2.70	753	0.04
5	Malappuram	2	2.70	2330	0.12
6	Palakkad	9	12.16	5427	0.27
7	Thrissur	16	21.62	7568	0.38
8	Ernakulam	26	35.14	1964102	98.01
9	Idukki	Nil	Nil	Nil	Nil
10	Kottayam	1	1.35	594	0.03
11	Alappuzha	7	9.46	18956	0.95
12	Pathanamthitta	2	2.70	59	0.00
13	Kollam	2	2.70	2254	0.11
14	Thiruvananthapuram	4	5.42	1308	0.07
Total		74	100	2003717	100

Source: Annual Survey of Industries 2017-18

- The district-wise and total output from other manufacturing factories is given in the above Table 11.140.
- Ernakulam district contributed towards the highest percentage output (98.01%) of other manufacturing.
- Other districts had negligible contribution.
- The lowest contribution was from Kannur district (0.02%), also having very low number of factories (3).
- Idukki, Kasargod and Wayanad did not have any factory manufacturing furniture.

Conclusion

The study and analysis of data gathered from the The Annual Survey of Industries (ASI) provided an in-depth view of the contribution of various bio-resources based factories to the industrial output of Kerala. A detailed district-wise and category wise analysis was made to assess the status and industrial profile of each district and category.

As expected, the districts with favorable industrial factors like Ernakulam and Kollam recorded the highest number of factories in the state, whereas the relatively less developed and forested districts with rugged and unfavourable topography such as Wayanad and Idukki recorded fewer factories.

Among the seven types of fully bio-resources based factories, the highest percentage of factories are those manufacturing food products (21.4%), followed by factories manufacturing wood products (11.3%). Factories manufacturing beverages constituted the lowest percentage (0.8%) of factories in Kerala. Among the five types of partially bio-resources based factories, the highest percentage of factories were those manufacturing rubber and plastic products (8.3%), followed by textiles (5.6%). Factories manufacturing wearing apparel formed the lowest percentage (0.7%) of factories in this category. The relatively high percentage of rubber manufacturing factories shows the importance of rubber trees and plantations of Kerala in providing value added manufactured products for the industry. The industrial profile of each district showing some economic indicators such as fixed capital, total output and input, value added, net income and profit/loss of each type of factory (based on product manufactures) was analysed to understand the overall output of this sector. These indicators are important to know the total output and profit which are linked to the potential ABS estimate that can be collected from the factories. Within the category of fully bio-resources based factories, 12 districts except Kannur and Kottayam earned a net profit from their production. Among the partially bio-resources based factories, 8 districts suffered loss and 6 districts earned a profit. Hence, the fully bio-resource based factories are clearly more profit-making in the state comparatively.

Food products manufacturing factories mostly performed profitably in most districts, while wood products manufacturing factories gained profit in some districts and loss in others. It is interesting to note that textile manufacturing factories, which come under partially bio-resources based factories, suffered losses in most of the districts, while rubber and plastic products performed profitably in most districts. The structural and systemic issues in loss-making factories need to be addressed to bring about a positive change and create better outlook for bio-resource based factories.

Based on total output from fully bio-resource based factories, the output value was highest from Ernakulam district (26.09%), which corresponds with this district having the highest percentage of factories (19.69%) in the state. The output from partially bio-resource based factories also was highest from Ernakulam district (64.65%) As the output value is linked to the ABS potential, such high output districts like Ernakulam, Alappuzha, Kollam etc. can be specifically focused on for collecting ABS from commercial utilisation of bio-resources in factories. Thrissur district contributed towards the highest percentage output (35.31%) of pharmaceuticals, medicinal chemical and botanical products manufacturing. The presence of traditional medicine related pharmaceutical companies in Thrissur such as Oushadhi could be contributing to this high value. It is especially important since most of the traditional knowledge is utilised in the manufacture of these pharmaceutical products. High percentage of rubber and plastic products output from the central districts of Kerala such as Kottayam show the importance of rubber plantations in this district.

In brief, the high value addition of manufactured products in factories provide the industrial growth from bio-resources which augment the economic value of these resources. This also provides opportunities for economic growth and employment in the state. The high output value factories may be focused on for collecting the ABS amount as per the BD act after proper assessment of its potential.



External Trade

CHAPTER-12

EXPORT OF KEY BIO-RESOURCES / BIO-RESOURCES BASED PRODUCTS FROM KERALA

This chapter presents the overall export of bio-resources/ bio-resources based products from Kerala during the years 2019-2020 and 2020-2021 from different ports of Kerala to multiple destinations. The export value (Rs Crores) of major commodity groups was considered for the analysis. The data is collected from the Directorate General of Commercial Intelligence and Statistics (DGCIS), Govt of India. The major commodity groups covered/selected in the analysis include:

1. food products
2. marine products
3. textiles and fabrics
4. rubber and rubber products
5. wood and wood products
6. essential oils
7. medicinal and other pharmaceutical products
8. ayush and herbal products
9. floriculture products
10. tobacco manufactured
11. leather and leather products and
12. Others.

Food products are further classified to spices, tea, cashew, fruits and vegetables, coffee, cereals and cereal preparations, vegetable seeds and oils, milled products, meat/diary/poultry products, alcoholic beverages, sugar, cocoa products and pulses. Similarly, textiles are further categorized to cotton manufactures, coir and coir manufactures, jute manufactures, handloom products, silk manufactures and wool manufactures. Due to the lack of adequate data on export quantity, the analysis made here is exclusively based on export value.



Indian base ingredients market is currently sized at about USD 2.8bn. Over 75% of this market is constituted by natural ingredients. The organized nutraceutical market stood at ~USD 550mn in 2016. Nutraceutical ingredients can be extracted from natural bases (herbs, spices, fruits and flowers) or can be derived synthetically (synthetic vitamins, glucosamine, etc.). The Indian flavour and fragrance production market is USD 1.1bn in size, close to 30% of which is exported. Natural flavour and fragrance ingredients are derived from spices, herbs or other naturally available crops. India caters to 60% of the global spice oleoresin demand and 80% of the global mint extracts demand. In other products (mint, ginger, chilly, pepper, star anise, fennel, coriander, lemongrass, nutmeg, mace, cardamom), India ranks among the top 3 producers in the world. A large number of the natural base ingredient manufacturers are based in Kerala, as seen in the Table below.

Table 12.1a

SL No	Company	HQ	FY16 revenue (USD mn)	5-year CAGR	Product range
1	Sharp Mint	Delhi	254	6%	Mint
2	Synthite	Kerala	203	15%	Spices Oleoresins and others
3	Plant Lipids	Kerala	134	18%	Spices Oleoresins and others
4	Privi Organics	Mumbai	93	9%	Aroma Chemicals
5	Eternis Fine Chemicals	Mumbai	73	8%	Aroma Chemicals
6	Kancor Ing. (Mane)	Kerala	70	14%	Spices Oleoresins and others
7	KV Aromatics	Noida	65	27%	Mint
8	Camphor & Allied	Mumbai	54	NA	Aroma Chemicals
9	AVT Natural	Kerala	49	6%	Spices Oleoresins and others
10	Anthea Group	Mumbai	46	NA	Aroma Chemicals

Table 12.1b

Export value of major commodity groups during the years 2019-2020 and 2020-2021 from Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value (Rs Crores)	%
		Value (Rs Crores)	%	Value (Rs Crores)	%		
1	Food products	9144.50	43.31	10547.14	47.07	9845.82	45.25
2	Marine products	5060.21	23.97	5052.47	22.55	5056.34	23.24
3	Textiles and fabrics	4286.46	20.30	4594.08	20.50	4440.27	20.41
4	Rubber and rubber products	1489.71	7.06	1556.71	6.95	1523.21	7.00
5	Wood and wood products	876.13	4.15	306.78	1.37	591.46	2.72
6	Essential oils	106.63	0.51	187.93	0.84	147.28	0.68
7	Medicinal and other pharmaceutical products	41.81	0.20	80.26	0.36	61.04	0.28
8	Ayush and herbal products	35.61	0.17	38.03	0.17	36.82	0.17
9	Floriculture products	22.81	0.11	25.29	0.11	24.05	0.11
10	Tobacco manufactured	33.01	0.16	10.95	0.05	21.98	0.10
11	Leather and leather products	13.40	0.06	5.06	0.02	9.23	0.04
12	Others	3.51	0.02	1.58	0.01	2.55	0.01
	Total	21113.78	100.00	22406.27	100.00	21760.03	100.00



- Table 12.1b represents the export value of major commodity groups from Kerala during the years of 2019-2020 and 2020-2021 in Rs Crores, their percentage share in total exports, average and its percentage.
- Food products are the most important export commodity during the years 2019-2020 and 2020-2021 from Kerala.
- The export value of food products increased from 9144.50 crores during 2019-2020 to 10547.14 crores during 2020-2021 with a percentage share of 43.31% and 47.07% respectively in total commodities.
- Marine products, the second most important export commodity, marked a slight decline in total export value from 2019-2020 (5060.21 crores; 23.97%) to 2020-2021 (5052.47 crores; 22.55%).
- Textiles and fabrics recorded a slight increase in export at 4286.46 crores (20.30%) and 4594.08 (20.50%) during 2019-2020 and 2020-2021 respectively.
- Rubber and rubber products (1489.71 crores-7.06% to 1556.71 crores -6.95%), essential oils (106.63 crores -0.51% to 187.93 crores -0.84%), medicinal and other pharmaceutical products (41.81 crores -0.20% to 80.26 crores -0.36%; total value doubled*), ayush and herbal products (35.61 crores -0.17% to 38.03 crores -0.17%) and floriculture products (22.81 crores -0.11% to 25.29 crores -0.11%) marked an increase in export value from 2019-2020 to 2020-2021.
- Wood and wood products (876.13 crores -7.06% to 306.78 crores -6.95%), tobacco manufactured (33.01 crores -0.16% to 10.95 crores -0.05%) and leather and leather products (13.40 crores -0.06% to 5.06 crores -0.02%) registered a decline in total export value during the years of 2019-2020 and 2020-2021.

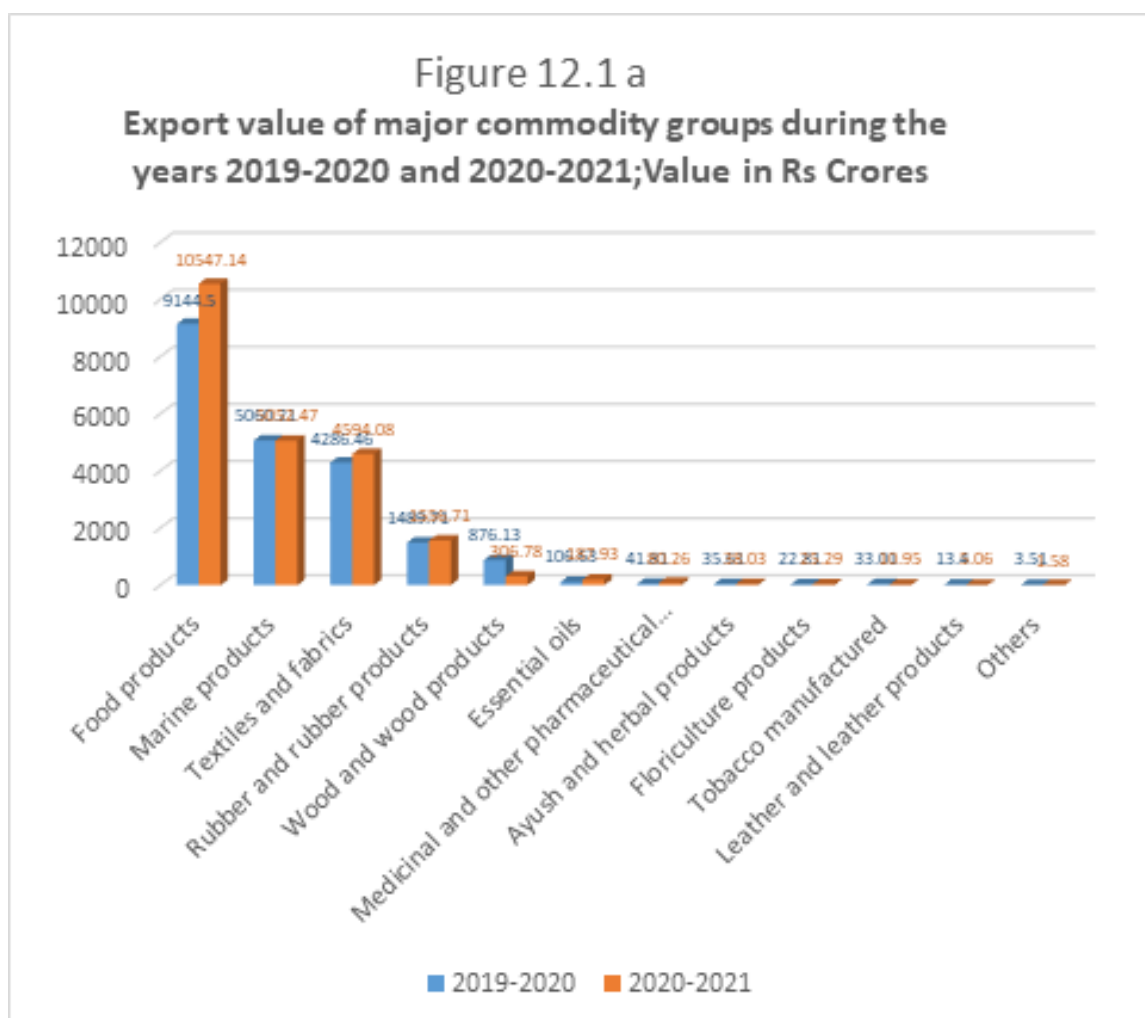


Figure 12.1b

Export value of major commodity groups during the years 2019-2020 and 2020-2021; Average Value in Rs Crores

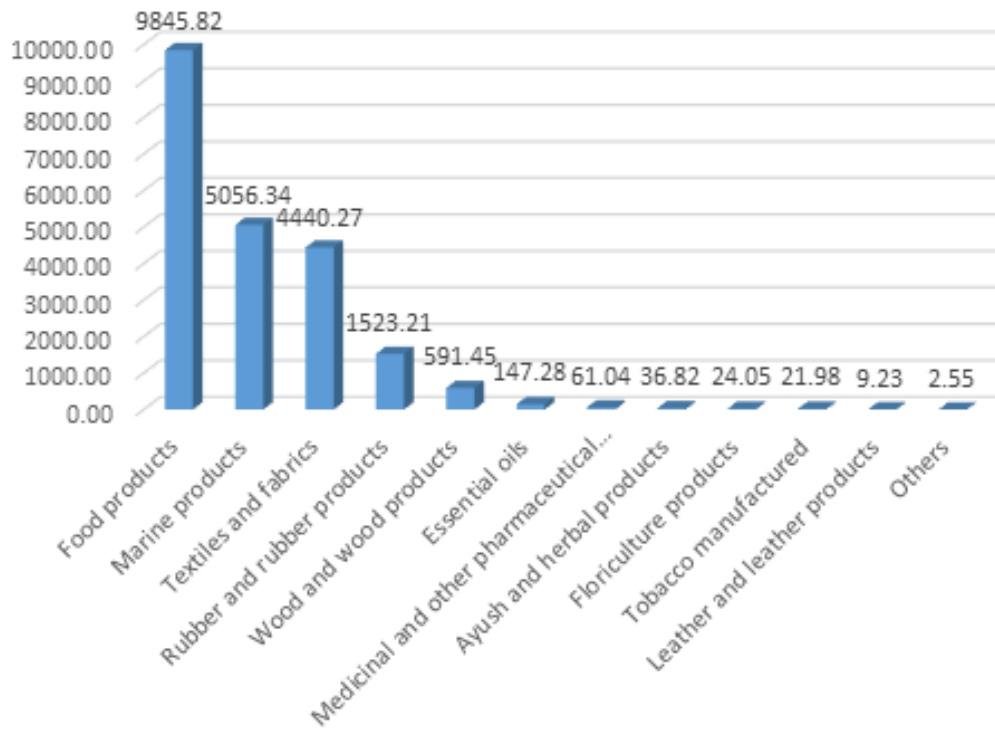
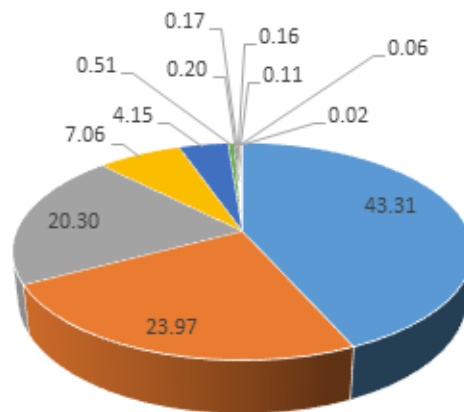


Figure 12.1c

Export of major commodity groups during 2019-2020 from Kerala; Value in Rs Crores; Percentage share



- Food products
- Marine products
- Textiles and fabrics
- Rubber and rubber products
- Wood and wood products
- Essential oils
- Medicinal and pharmaceutical products
- Ayush and heral products
- Tobacco manufactured
- Floriculture products
- Leather and leather products
- Others



Figure 12.1 d
Export of major commodity groups during 2020-2021; Value in Rs Crores; Percentage share

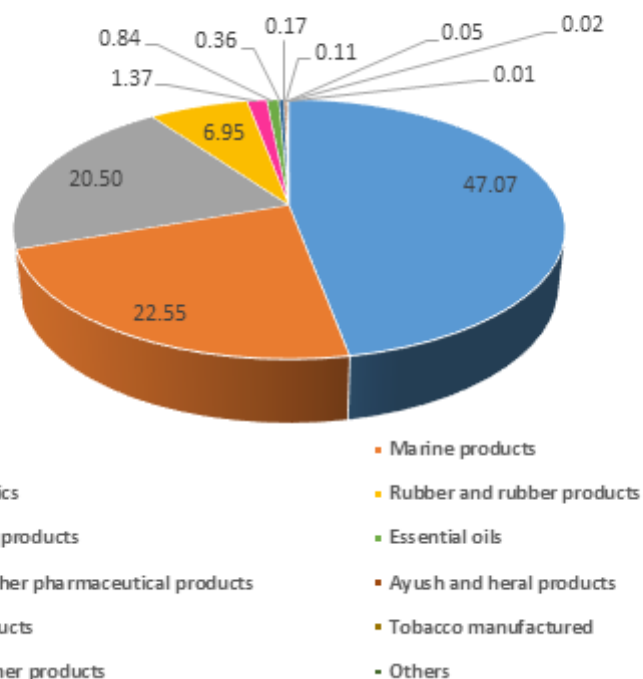


Table 12.2
Export of food products during the years 2019-2020 and 2020-2021 from Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value (Rs Crores)	%
		Value (Rs Crores)	%	Value (Rs Crores)	%		
1	Spices	3309.9	36%	4597.06	44%	3953.48	40%
2	Tea	1498.64	16%	1573.29	15%	1535.97	16%
3	Cashew	1798.02	20%	1461.68	14%	1629.85	17%
4	Fruits and vegetables	949.69	10%	972.25	9%	960.97	10%
5	Coffee	575.86	6%	647.25	6%	611.555	6%
6	Cereals and cereal preparations	427.4	5%	593.82	6%	510.61	5%
7	Vegetable seeds and oils	152.15	2%	226.24	2%	189.195	2%
8	Milled products	105.61	1%	144.4	1%	125.005	1%
9	Meat/Diary/Poultry products	98.79	1%	107.96	1%	103.375	1%
10	Alcoholic beverages	97.61	1%	48.33	0%	72.97	1%
11	Sugar	23.83	0%	37.66	0%	30.745	0%
12	Cocoa products	24.42	0%	12.81	0%	18.615	0%
13	Pulses	1.1	0%	7.29	0%	4.195	0%
14	Others	81.46	1%	117.09	1%	99.275	1%
	Total	9144.48	100%	10547.13	100%	9845.805	100%

Export of major commodities 2019-20 and 2020-21

- The above table 12.2 represents the export value of food products during the years of 2019-2020 and 2020-2021 in Rs Crores, their percentage share in total exports, average and its percentage.
- Spices are the most important commodity among food products and its export value increased from 3309.90 crores during 2019-2020 to 4597.06 crores during 2020-2021. Spices contributed to 36.20% of the total commodities during 2019-2020 and 43.79% of the total commodities during 2020-2021.
- The export value of tea (1498.64-1573.29 crores), fruits and vegetables (949.69-972.25 crores), coffee (575.86-647.25 crores), cereals and cereal preparations (427.40-593.82 crores), vegetable seeds and oils (152.15-226.24 crores), milled products (105.61-144.40 crores), sugar (23.83-37.66 crores) and pulses (1.10-7.29 crores) increased during the years of 2019-2020 and 2020-2021.
- However, the total export value of cashew (1798.02-1461.68 crores), alcoholic beverages (97.61-48.33 crores) and cocoa products (24.42-12.81 crores) decreased significantly during the years of 2019-2020 and 2020-2021.
- Spices, tea, cashew, fruits and vegetables, coffee, cereals and cereal preparations contributed to 93% of the total export value of food products during the years of 2019-2020 and 2020-2021.

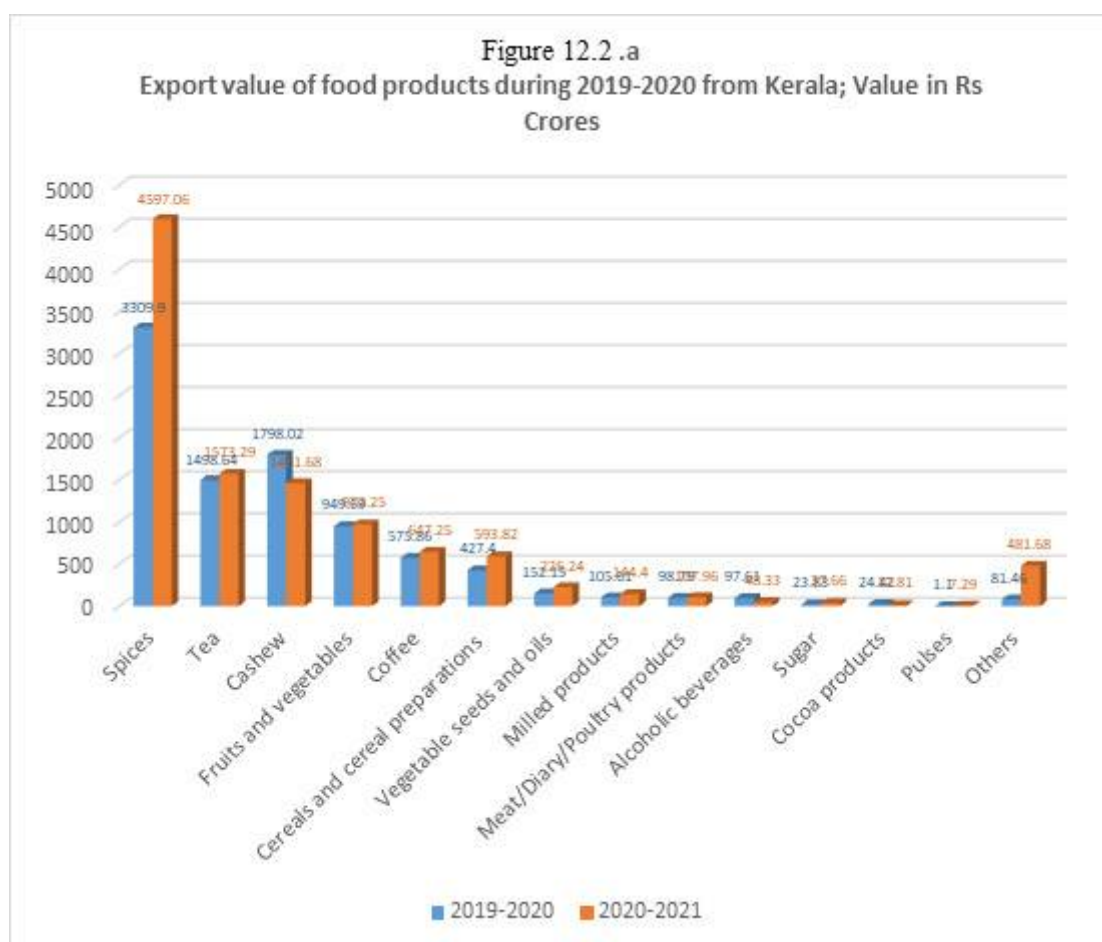


Figure 12.2.b
Export value of food products during 2019-2020 from Kerala; Average Value in Rs Crores

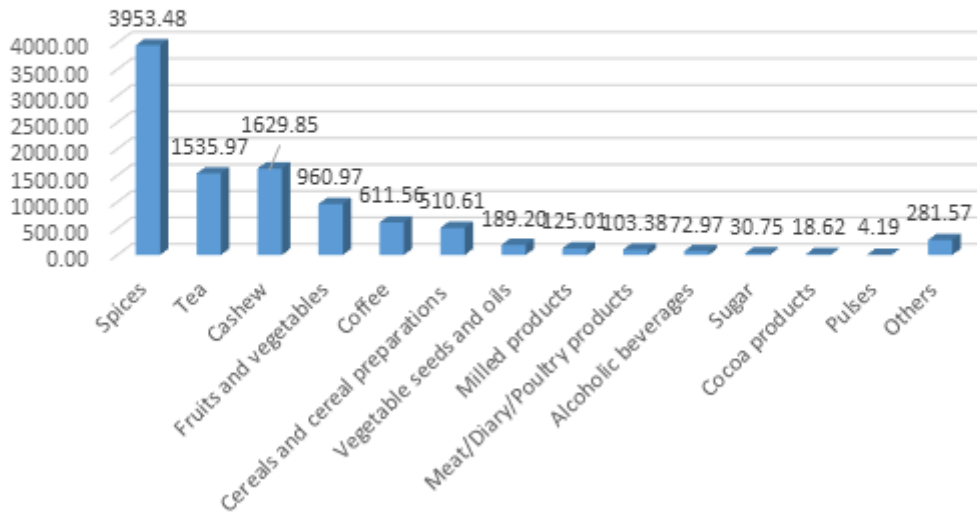


Figure 12.2 .c
Export of food products during 2019-2020 from Kerala; Value in Rs Crores; Percentage share

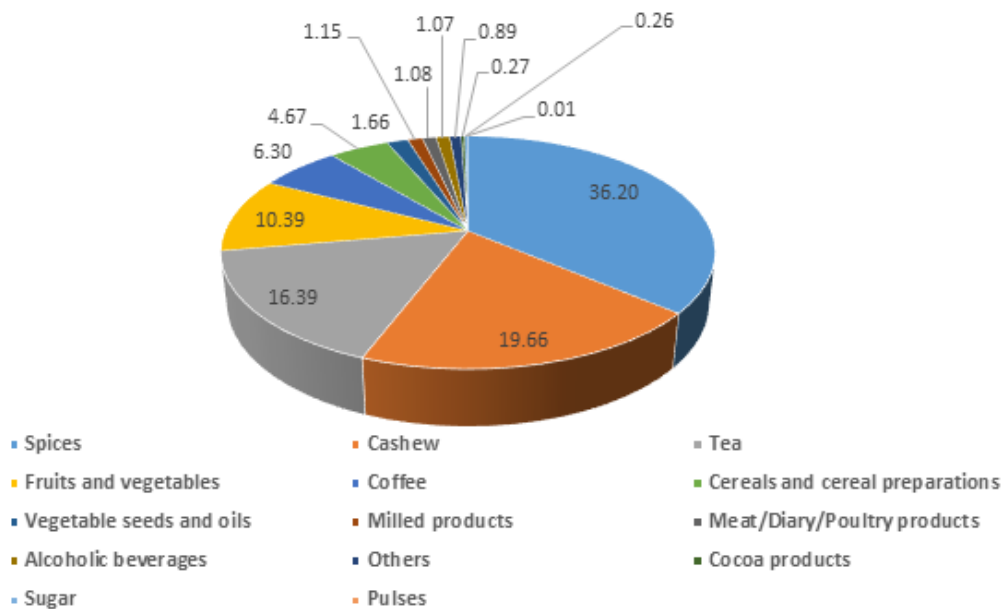


Figure 12.2.d
Export of food products during 2020-2021; Value in Rs Crores; Percentage share

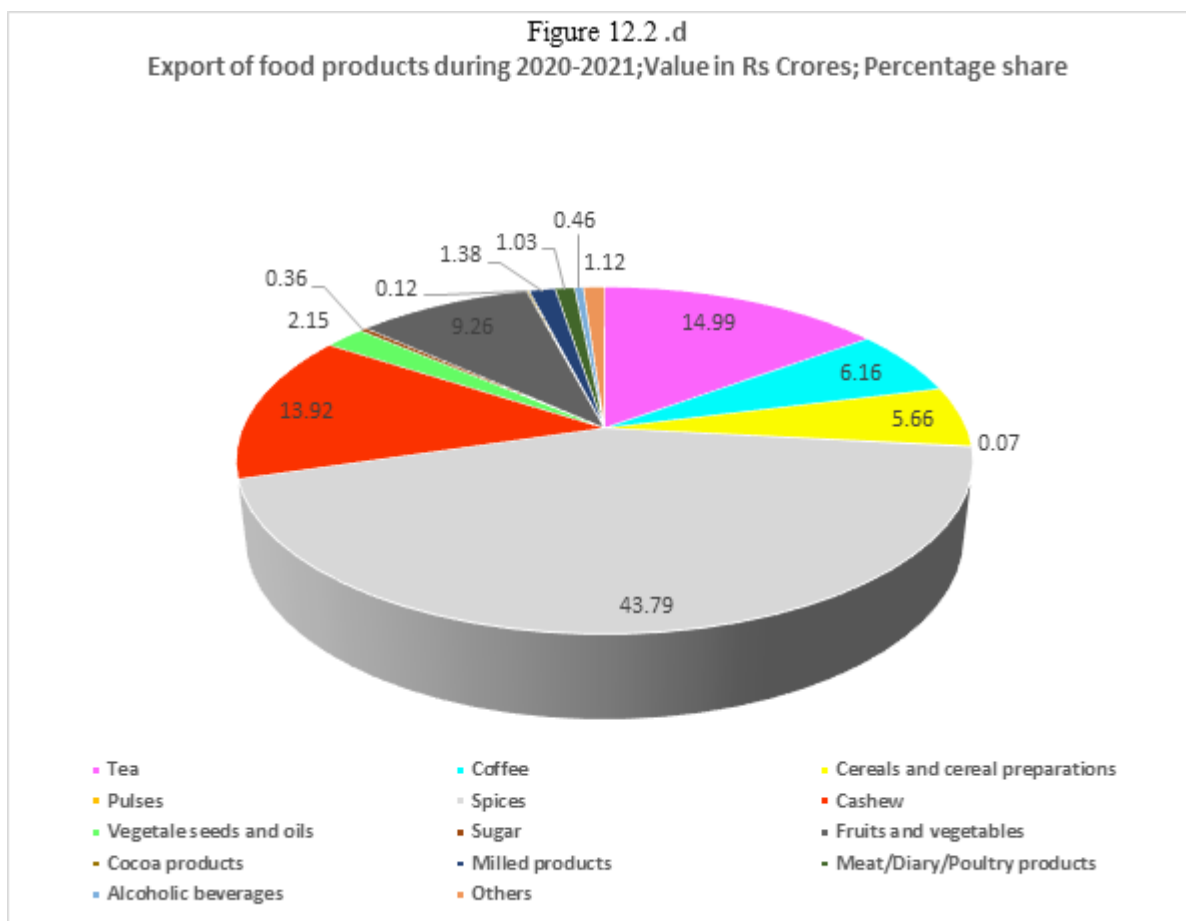


Table 12.3
Export of textiles during the years 2019-2020 and 2020-2021 from Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value (Rs Crores)	%
		Value (Rs Crores)	%	Value (Rs Crores)	%		
1	Cotton manufactures	2440.67	56.94	2287.89	49.80	2364.28	53.25
2	Coir and coir manufactures	626.54	14.62	1005.03	21.88	815.79	18.37
3	Jute manufactures	797.45	18.60	792.39	17.25	794.92	17.90
4	Handloom products	18.54	0.43	15.43	0.34	16.99	0.38
5	Silk manufactures	14.42	0.34	6.08	0.13	10.25	0.23
6	Wool manufactures	3.62	0.08	5.58	0.12	4.61	0.10
7	Others	385.20	8.99	481.68	10.48	433.45	9.77
	Total	4286.45	100.00	4594.08	100.00	4440.28	100.00

- Table 12.3 represents the export value of textiles during the years of 2019-2020 and 2020-2021 in Rs Crores, their percentage share in total exports, average and its percentage.
- Cotton manufactures export at 2440.67 crores (56.94%) during 2019-2020 and it decreased during 2020-2021 at 2287 crores (49.80), marking most important textile commodity in Kerala's export (50% share).

- Coir and coir manufactures (626.54 crores-1005.03 crores) and wool manufactures (3.63 crores-5.58 crores) registered an increase in total export value during the years of 2019-2020 to 2020-2021.
- The export value of jute manufactures (797.45 crores-792.39 crores), handloom products (18.54 crores-15.43 crores) and silk manufactures (14.42 crores to 6.08 crores) decreased during the years of 2019-2020 to 2020-2021.

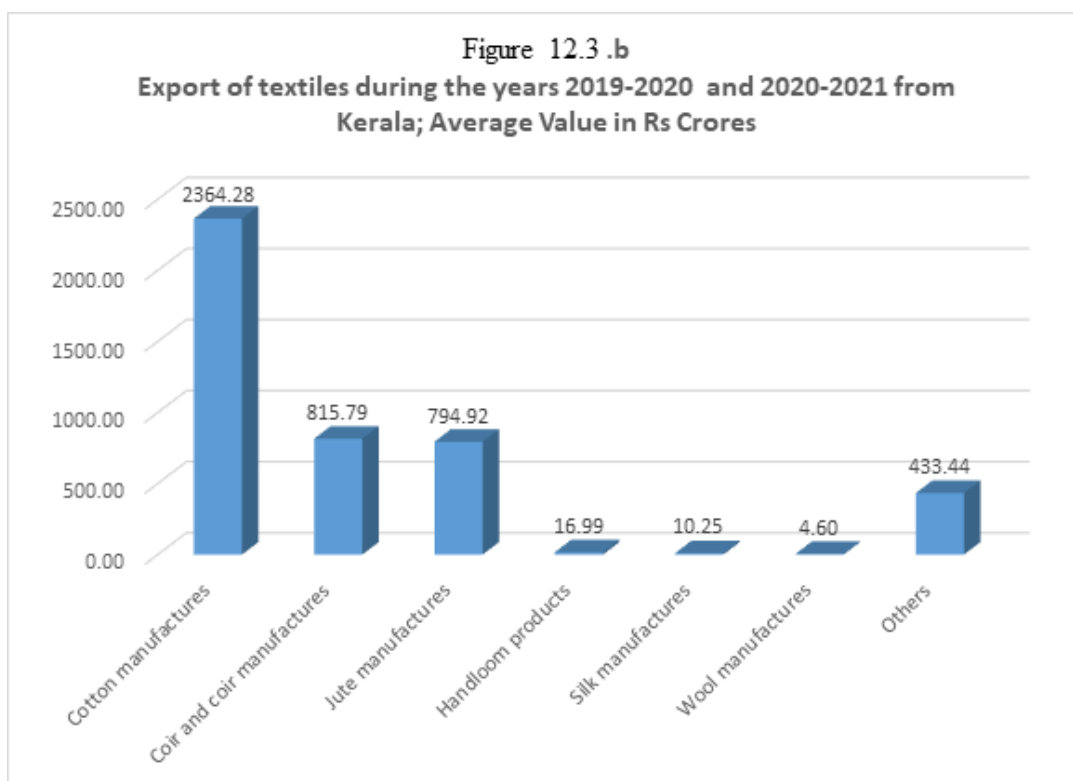
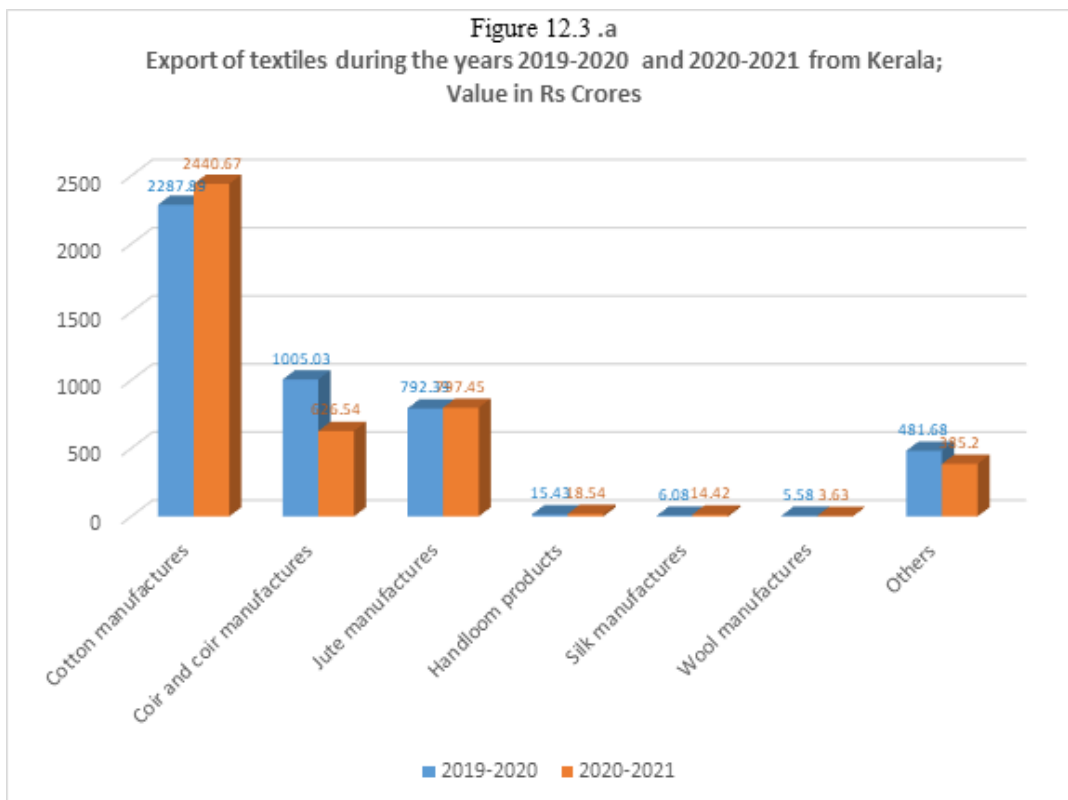


Figure 12.3 .c
Export of textiles during 2019-2020 from Kerala; Value in Rs Crores; Percentage share

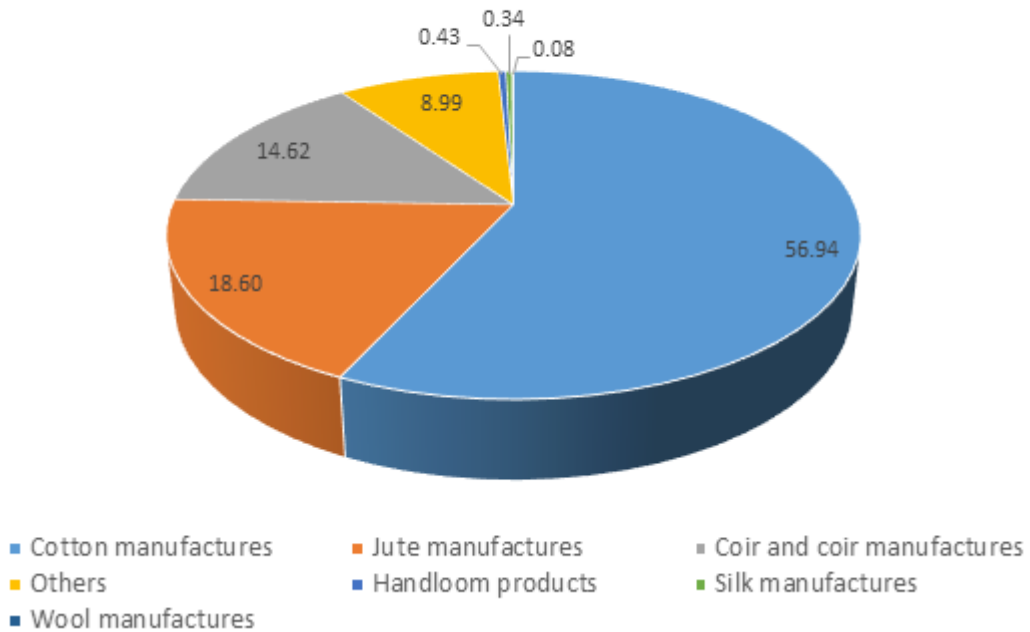
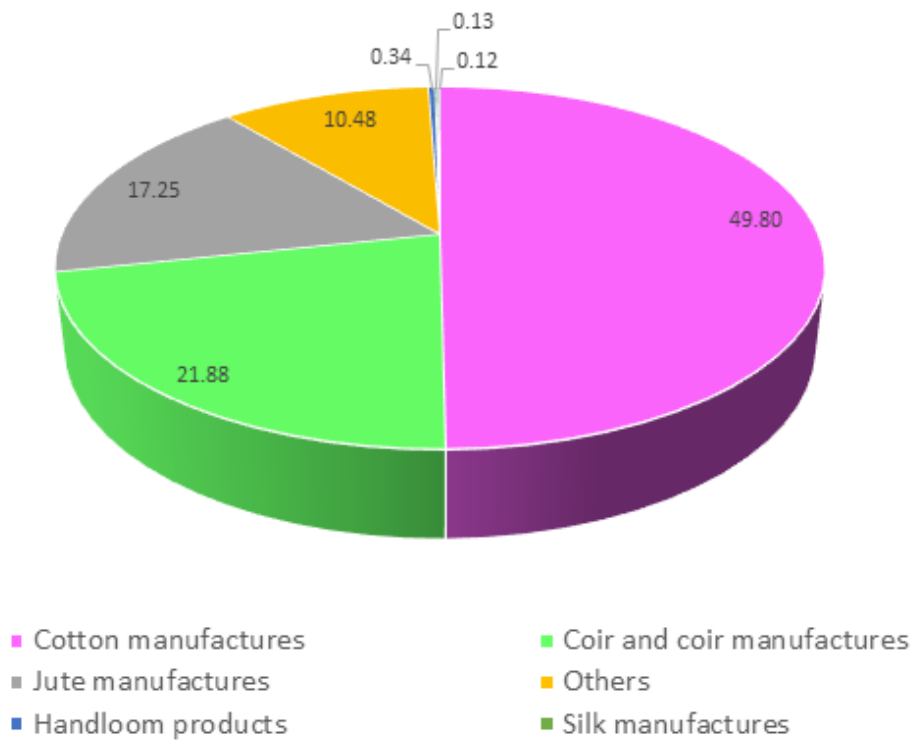


Figure 12.3 .d
Export of textiles during 2020-2021; Value in Rs Crores; Percentage share



Conclusion

Kerala has 17 ports including 1 major port (Cochin), 3 intermediate ports (Beypore, Alappuzha and Neendkara) and 13 minor ports (Kovalam- Vizhinjam, Valiyathura, Thankasseri, Kayamkulam, Munambam/ Kodungalloor, Ponnani, Vada-kara, Thalasseri, Kannur, Azhikal, Neeleswaram, Kasaragod and Manjeswaram). SEZ Cochin account for 61 % and Cochin sea more than 31 % of total exports from Kerala. In several agro-based products, Kerala has a major share in India's overall exports. Kerala is the largest exporter of natural rubber in India, with a share of 63.6 % in India's total exports during 2018-19. Kerala is also the largest exporter of cashews in the country, with a share of 47.2 % in India's total exports. Other major commodities exported include floor coverings of jute (share of 56.9% in India's overall exports), jewellery made of gold or other precious metals (45.3 %), vegetable oil (15.5 %), coir and coir products (15.4 %), spices (13.4 %), tea (13.0 %) and marine products (12.7 %). Kerala is one of the top exporters of coir, and coir products and geo-textiles in India, accounting for more than 98 % of the total exports from the country (India Exim Bank 2020).

As per our analysis based on data collected from DGCIS, the export value of major bioresources based products from Kerala during 2020-21 was Rs 22406.27 crores. Food products with a value of Rs 10547 crores is the principal commodity which contributed to about 47 % of total value. Among food products spices (Rs 4597.06 crores, 44%), Tea (Rs 1573.29 crores, 15%) and Cashew (Rs 1461.58 crores , 14%) are the principal commodities exported. The major spices include Pepper, Cardamom, Ginger, Clove, Tamarind and Nutmeg. Vegetables are mainly exported to UAE, Maldives, Qatar, Kuwait, Saudi Arabia. Marine products with a value of Rs 5052 crore (22.5 %) and Textiles with a value of Rs 4594 .08 crores (20.50%), Rubber with a value of Rs 1556.71 crores (6.9%) are other major items exported.

Pepper is one of the major spices exported from Kerala, in 2019-20, export of pepper was 14,198.2 MT valued ₹471.3 crore. Cardamom (small) valued at ₹242.3 crore was exported from Kerala through Cochin and Thiruvananthapuram ports in 2019-20 . Export of chilli was 26,460 MT valued at ₹469.68 crore. Export of curry powder/mixture in 2019-20 was 11,208 MT valued ₹251.9 crore (Economic review 2020)

Product	QTY.(KGS)
GARCINIA EXTRACT	104794
OLEORESIN CAPSICUM	89804
OLEORESIN CARDAMOM	1458
OLEORESIN CELERY	18290
OLEORESIN CHILLIES	34357
OLEORESIN CLOVE	1040
OLEORESIN CORIANDER	20832
OLEORESIN CUMIN SEED	23065
OLEORESIN CURCUMIN	300
OLEORESIN FENNEL	123
OLEORESIN FENUGREEK	7068
OLEORESIN GARLIC	9355
OLEORESIN GINGER	29595
OLEORESIN LAUREL LEAF	345



OLEORESIN MACE	770
OLEORESIN MARJORAM	300
OLEORESIN MUSTARD	6
OLEORESIN NUTMEG	6952
OLEORESIN ONION	270
OLEORESIN PAPRIKA	157472
OLEORESIN PEPPER	271117
OLEORESIN PIMENTO	750
OLEORESIN ROSEMARY	400
OLEORESIN THYME	1245
OLEORESIN TURMERIC	58808
OLEORESIN VANILA	11591
OLEORESINS	6179
OLEORESINS OF SPICES	8714286
SYTRAX BENZION EXTRACT	4410
GRAND TOTAL	9574982

Source : Cochin Chamber of Commerce

A total quantity of 9574982 kg of oleoresins valued ₹1,894.1 crore are exported from Kerala with oleoresins from Pepper and Garcinia occupying the major share during 2019-20. Kerala is also a major producer and exporter of nutraceuticals including turmeric extract, Omega 3, boswella, amla extracts etc. Arjuna naturals is the only manufacturer of high-purity Omega-3 fish oil in India and BCM – 95 is one of the few USD 15mn+ nutraceutical ingredient brands in India (Singh and Bhattacharyya 2016) . Kerala accounts for nearly 80% of the country's Rs 2,281-crore coir product exports. In 2019-20, a total of 2,17,390 MT of coir and coir products were exported through Cochin Port.

According to estimates, Kerala has an untapped merchandise export potential of nearly US\$ 6.7 billion. Currently, cereals such as rice are important export items for the state, but exports of high value-added cereal preparations are low. Existing export of cereal products largely comprise semi/wholly milled rice, diversification of exports towards high value-added cereal preparations like snacks, ready to cook/ready to eat products including rice pasta and noodles, fermented rice flour, puffed or flaked rice items can earn greater exports from the state.

In 2019-20 cashew kernel export from Kerala was 30,478 MT valued at ₹1,798 crore. The share of Kerala in export of cashew kernel from India was 45.05% in terms of quantity and 45.06% in terms of value. India imported 9.38 lakh tonnes of raw cashewnut worth ₹8861 crore of which import to Kerala was 13202 metric tonnes worth ₹125.5 crore (Directorate of Cashewnut and Cocoa Development, CEPCI). Export of cashew from the state is mostly in the form of cashew kernels. In addition to cashew kernels, focus could also be on exporting cashew butter, which is increasingly gaining popularity as a substitute for peanut butter and is being used in confectioneries, snack and bakery products. Exporting processed spices, in the form of spice oleoresins is another emerging opportunity for the state. Export earnings can be enhanced by product diversification and value addition. The state can focus on greater processing of spices, marine products and rubber. Kerala is among the top producers of agro-based products such as spices, coconut, tea, as well as marine products in the country. There is need for well-developed cold storage and warehousing facilities in the state. In addition the state can also diversify the countries to where the products are being exported by focussing on value addition and ensuring better quality.

Kerala has a total of 31 Geographical Identifications (GI) across agriculture (19) and handicraft



sector (11) . The GI tags can be marketed to obtain better export earnings. More products including Kodungallur Snap Melon, Vatawada Garlic and Onattukara Sesame are in various stages of evaluation for GI certification. India exported fresh & dried pineapple worth 2.68 million US \$ during 2020-21 in which around 44% share is from Kerala. Pineapple produced in the Vazhakulam area of Kerala received GI tag in 2009 due to its delicious taste, unique aroma and flavour. APEDA promoted the export of the first consignment of GI Tagged “Vazhakulam Pineapple” from Vazhakulam, Ernakulam, Kerala to Dubai& Sharjah, UAE virtually on 2022. This will promote GI farmers of Vazhakulam to get better income in global market.

No doubt that the future scope of bio resources and bio resources based products export from Kerala is enormous. What is more important is to come up with diversified and value added products having more demand in the overseas market

Table 12.5
Opportunities of Diversification in Kerala’s Export

Sector	Existing Product	Prospective High Value-Added Exports	Comments
	Rice (Semi/wholly milled), Brown Rice	Processing of rice to high-value products like snacks, ready to cook/ ready to eat products such as rice-based noodles, fermented rice flour, puffed/flaked rice, products from GI crops	Largest markets for rice pasta and noodles are in Asia and Europe, with revenues in the APAC region expected to register a CAGR of 6 percent during 2019- 2025, to reach US\$ 855.2 million by 202517.
	Coconut, coconut oil	Processed coconut items like desiccated coconut, beverages such as packaged flavoured coconut water, coconut cream, coconut cakes, copra, ready to eat coconut chutney; shell-based products etc.	Global market for packaged coconut water is expected to reach US\$ 3.9 billion by 2025, registering a CAGR of nearly 16 percent during 2020-2518
Agriculture and Allied sector	Spices Pepper, Cardamom, Turmeric, chilli, nutmeg	Spice oleoresins, functional; food, Nutraceuticals, Natural flavors and fragrances	Globally, oleoresins market size stood at an estimated US\$ 1.4 billion in 2018, and is expected to register a CAGR of 4.7 percent during 2019- 202519.
	Cashew Kernels	Cashew butter; processed snacks made of cashews	Global nut butter market is expected to garner revenues of nearly US\$ 4 billion by 2024, registering a CAGR of 4 percent during 2019-2024, presenting significant opportunity20.
	Marine products- frozen fishes, frozen shrimps, and live fishes such as shrimps, prawns, cuttle fish, squid, crabs, lobsters, tuna, mackerel, pomfret etc.	Prepared fish/ shrimp products such as ready to cook fish curries/ prawn curries; and fish oils (HS-1504), squalene, omega 3 fatty acids etc	Organic aquaculture could fetch higher margins and garner greater revenues.
	Coir and Rubber products such as floor coverings. gloves and mittens.	High value-added rubber and coir products	There exists an estimated US\$ 0.18 billion of untapped potential for exports of rubber and plastic products from



	tyres. sheath contraceptives, non- cellular rubber. technically specified natural rubber etc.		Kerala. Kerata could tap markets such as ASEAN, China. Australia.
Textiles	Flax woven fabrics, coir yarn. jute yam	Medical textiles, geo textiles. industrial textiles. hometech and protective clothing	The Indian technical textile market size is expected to increase from US\$ 16 billion in 2018-19 to US\$ 40 billion in 2023-24". while the global technical textile market is expected to reach US\$ 220 billion by 2022 ²²

(Adapted from Exim Bank Report 2020)

12.2 . IMPORT OF KEY BIO-RESOURCES / BIO-RESOURCES BASED PRODUCTS IN KERALA

This report presents the overall import of key Bio-resources /Bio-resources based products in Kerala during the years 2019-2020 and 2020-2021 from different Countries. The import value (Rs Crores) of major commodity groups was considered for the analysis. The data is collected from the Directorate General of Commercial Intelligence and Statistics (DGCIIS), Govt. of India.

The major commodity groups covered/selected in this chapter are:

1. food products
2. marine products
3. textiles and fabrics
4. rubber and rubber products
5. wood and wood products
6. essential oils
7. medicinal and other pharmaceutical products
8. Ayush and herbal products
9. floriculture products
10. tobacco manufactured
11. Leather* and other leather products*.
12. Others

Food products are further classified to spices, tea, cashew, fruits and vegetables, coffee, cereals and cereal preparations, vegetable seeds and oils, milled products, meat/diary/poultry products, alcoholic beverages, sugar, cocoa products and pulses. Similarly, textiles are further categorized to cotton manufactures, coir and coir manufactures, jute manufactures, handloom products, silk manufactures and wool manufactures. Due to the lack of adequate data on import quantity, the analysis made here is exclusively based on import value.



Table 12.6
Import of major commodity groups during the
years 2019-2020 and 2020-2021 to Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value	
		Value (Rs. Crores)	%	Value (Rs. Crores)	%	(Rs Crores)	%
1	Food products	2230.06	49.00	2459.80	57.52	2344.93	53.13
2	Marine products	145.60	3.20	138.38	3.24	141.99	3.22
3	Textiles and fabrics	396.43	8.71	215.88	5.05	306.16	6.94
4	Rubber and rubber products	568.34	12.49	579.29	13.55	573.82	13.00
5	Wood and wood products	1094.72	24.05	808.30	18.90	951.51	21.56
6	Essential oils	7.07	0.16	9.46	0.22	8.27	0.19
7	Medicinal and other pharmaceutical products	13.41	0.29	31.31	0.73	22.36	0.50
8	Ayush and herbal products	2.01	0.04	7.74	0.18	4.87	0.10
9	Floriculture products	0.00	0.00	0.00	0.00	0.00	0.00
10	Tobacco manufactured	75.69	1.66	20.46	0.48	48.08	1.09
11	Leather and leather products	5.76	0.13	1.92	0.04	3.84	0.09
12	Others	12.31	0.27	3.69	0.09	8.00	0.18
	Total	4551.40	100.00	4276.23	100.00	4413.83	100.00



- Table 12.6 represents the import value of major commodity groups to Kerala during the years of 2019-2020 and 2020-2021 value in Crores, their percentage share in total imports, average and its percentage.
- Food products are the most important import commodity during the years 2019-2020 and 2020-2021 to Kerala.
- The import value of food products increased from 2230.06 crores during 2019-2020 to 2459.80 crores during 2020-2021 with a percentage share of 49.00% and 57.52% respectively in total commodities.
- Wood and wood products, the second most important imported commodity, marked a slight decline in total import value from 2019-2020 (1094.72 crores; 24.05%) to 2020-2021 (808.30 crores; 18.90%).
- Rubber and rubber products having a slight increase in import at 568.34 crores (12.49%) and 579.29 (13.55%) during 2019-2020 and 2020-2021 respectively.
- Medicinal and other pharmaceutical products (13.41 crores - 0.29% to 31.31 crores - 0.73%) and Essential oils (7.07crores - 0.16 % to 9.46 crores - 0.22 %) marked an increase in import value from 2019-2020 to 2020-2021.
- Marine products (145.60 crores - 3.20 % to 138.38 crores – 3.24 %), Tobacco manufactured (75.69 crores - 1.66 % to 20.46 crores - 0.48 %);, Textiles and fabrics (396.43 crores- 8.71 % to 215.88 crores – 5.05%), Ayush and herbal products (2.01 crores - 0.04 % to 7.74 crores – 0.18 %), Leather and leather products (5.76 crores - 0.13 % to 1.92 crores - 0.04 %) and Floriculture products (0.0045 crores - 0.0001 % to 0.000060 crores - 0.000001 %) registered a decline in total import value during the years of 2019-2020 and 2020-2021.

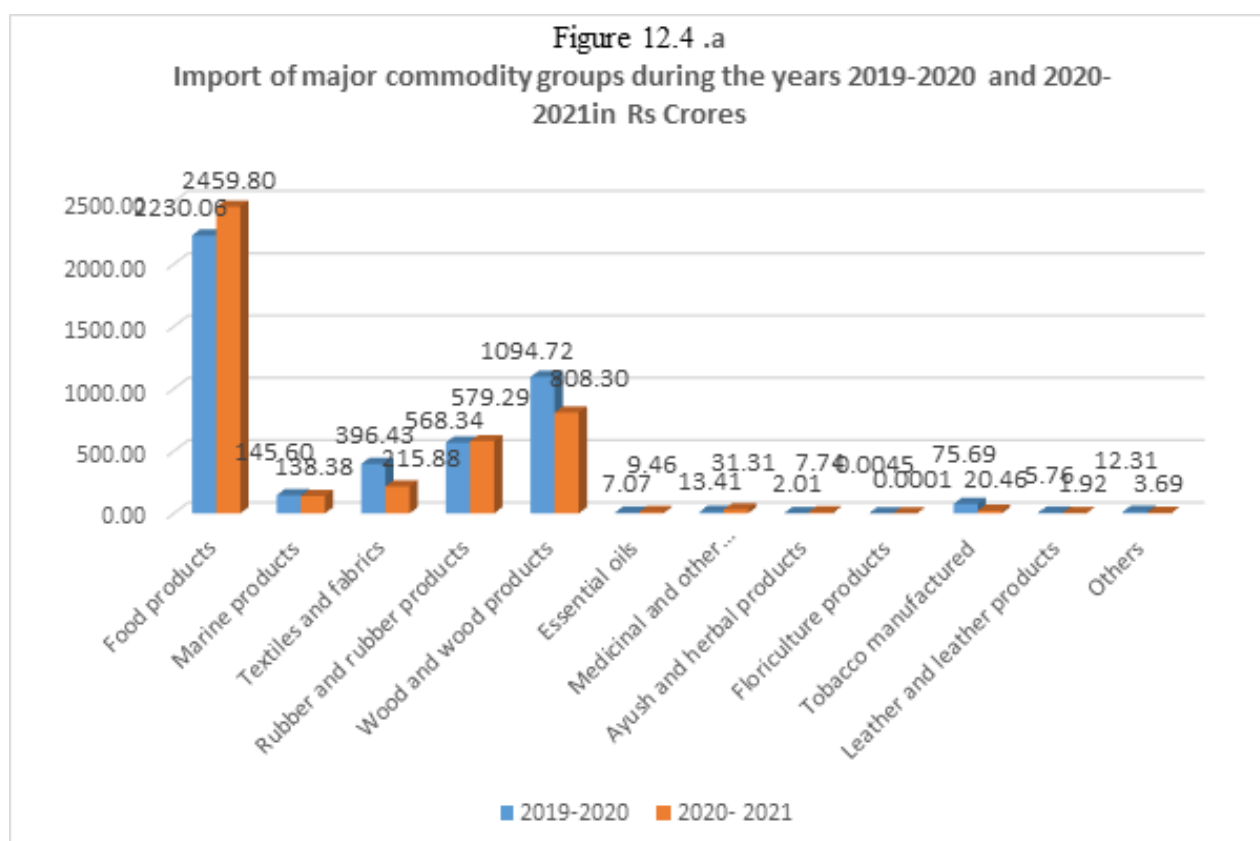


Figure 12.4 .b
Import of major commodity groups during the years 2019-2020 and 2020-2021;
Average Value in Rs Crores

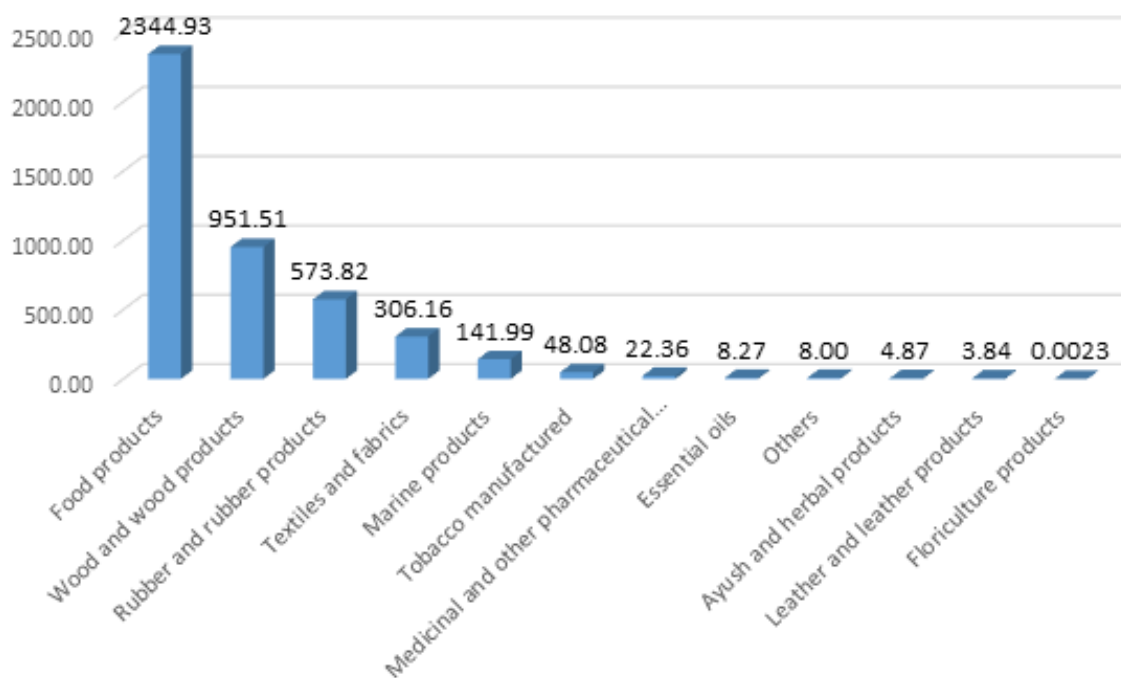


Figure 12.4 c.
Import of major commodity groups during 2019-2020 to
Kerala; Value in Rs Crores; Percentage share

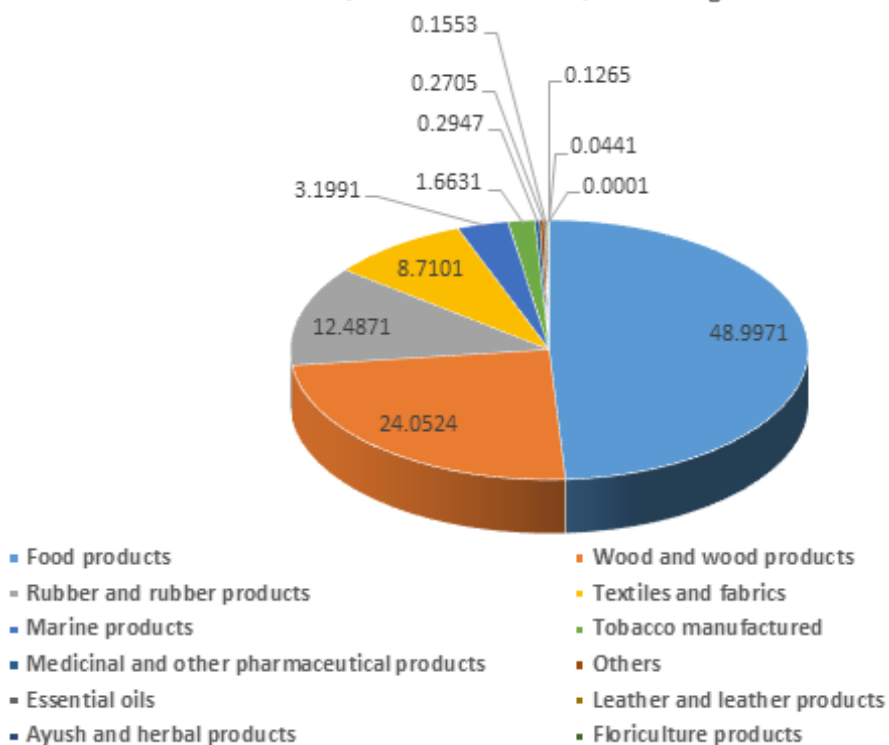


Figure 12.4 d.
**Import of major commodity groups during 2020-2021 to Kerala;
 Percentage of Value**

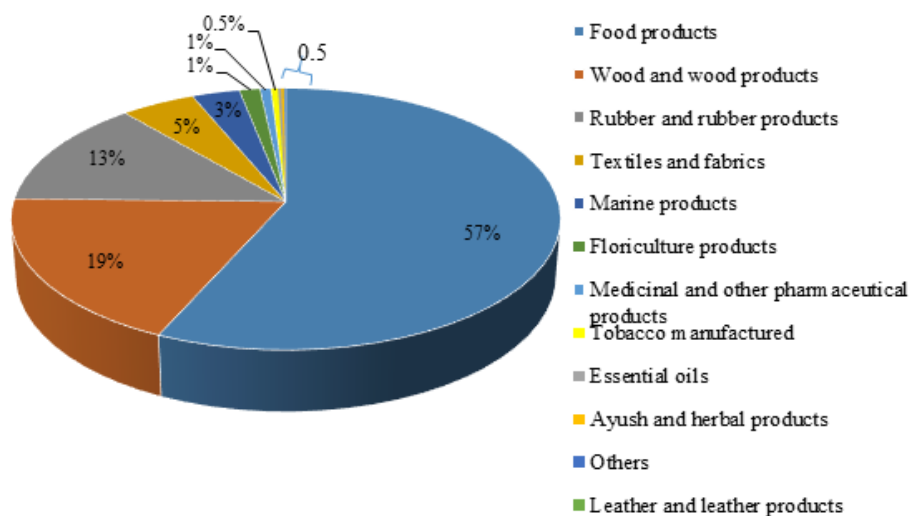
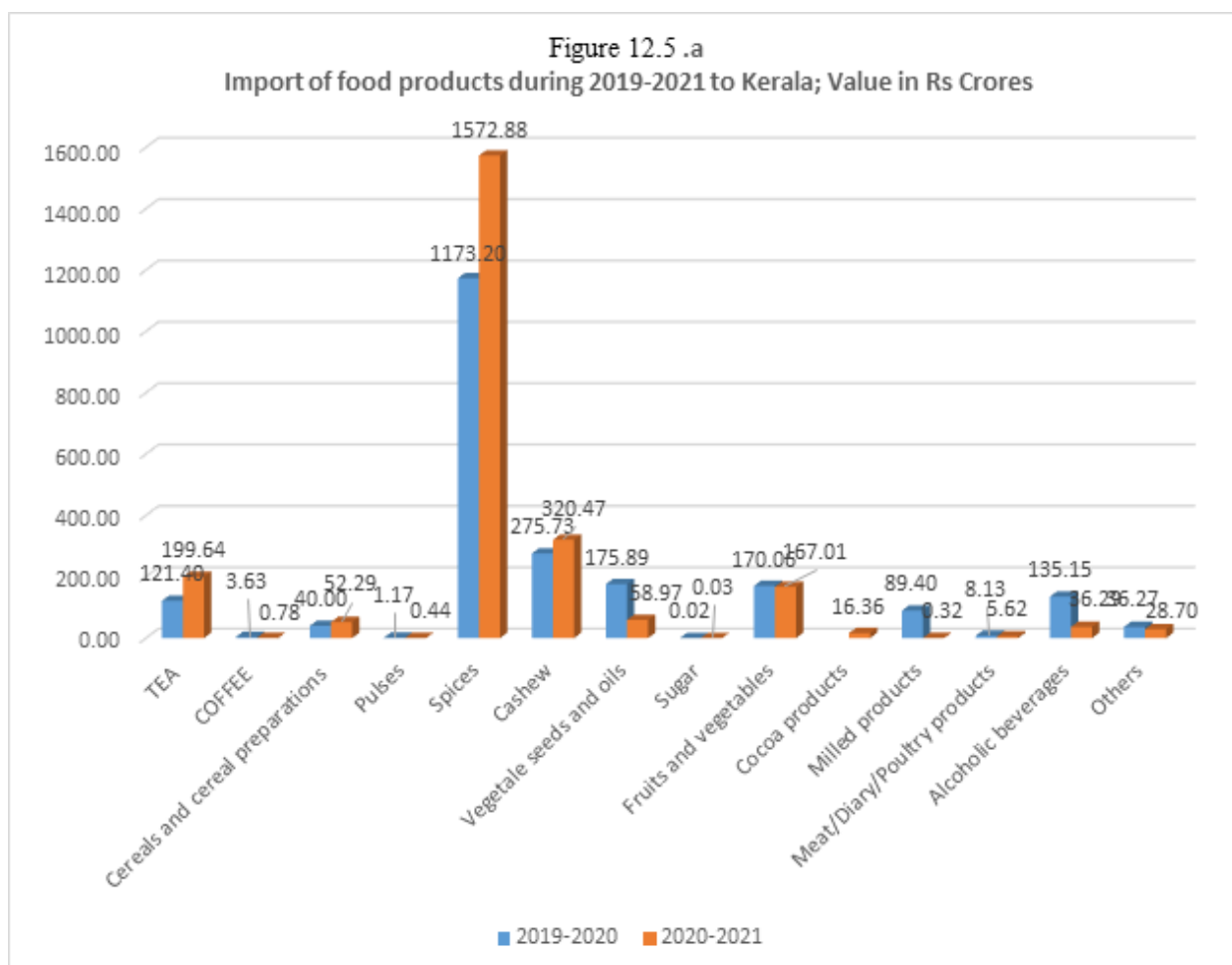


Table 12.7

Import of food products during the years 2019-2020 and 2020-2021 to Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value (Rs Crores)	%
		Value (Rs crores)	%	Value (Rs crores)	%		
1	Tea	121.40	5.44	199.64	8.12	160.52	6.85
2	Coffee	3.63	0.16	0.78	0.03	2.20	0.09
3	Cereals and cereal preparations	40.00	1.79	52.29	2.13	46.14	1.97
4	Pulses	1.17	0.05	0.44	0.02	0.81	0.03
5	Spices	1173.20	52.61	1572.88	63.94	1373.04	58.55
6	Cashew	275.73	12.36	320.47	13.03	298.10	12.71
7	Vegetable seeds and oils	175.89	7.89	58.97	2.40	117.43	5.01
8	Sugar	0.02	0.00	0.03	0.00	0.0589	0.0025
9	Fruits and vegetables	170.06	7.63	167.01	6.79	168.54	7.19
10	Cocoa products	-	-	16.36	0.67	8.18	0.35
11	Milled products	89.40	4.01	0.32	0.01	44.86	1.91
12	Meat/Diary/Poultry products	8.13	0.36	5.62	0.23	6.88	0.29
13	Alcoholic beverages	135.16	6.06	36.29	1.48	85.33	3.66
14	Others	36.27	1.64	28.70	1.15	32.49	1.39
	Total	2230.06	100.00	2459.80	100.00	2344.93	100.00

- Table 12.7 represents the import value of food products during the years of 2019-2020 and 2020-2021 in Rs Crores, their percentage share in total imports, average and its percentage.
- Spices are the most important commodity among food products and its import value increased from 121.40 crores during 2019- 2020 to 199.64 crores during 2020-2021. Spices contributed to 52.61% of the total commodities during 2019-2020 and 63.94% of the total commodities during 2020-2021.
- The import value of cashew (275.73 - 320.47 crores), tea (121.40 - 199.64 crores), cereals and cereal preparations (40.00- 52.29 crores), sugar (0.02- 0.03 crores) and cocoa products (0.00 -16.36 crores) increased during the years of 2019-2020 and 2020-2021
- However, the total import value of fruits and vegetables (170.06 -167.01 crores), vegetable seeds and oils (175.89 - 58.97crores), alcoholic beverages (135.15- 36.29 crores), milled products (89.40-0.32 crores), Meat/Diary/Poultry products, coffee (3.63-0.78 crores), pulses (1.17 -0.44 crores) decreased significantly during the years of 2019-2020 and 2020-2021.



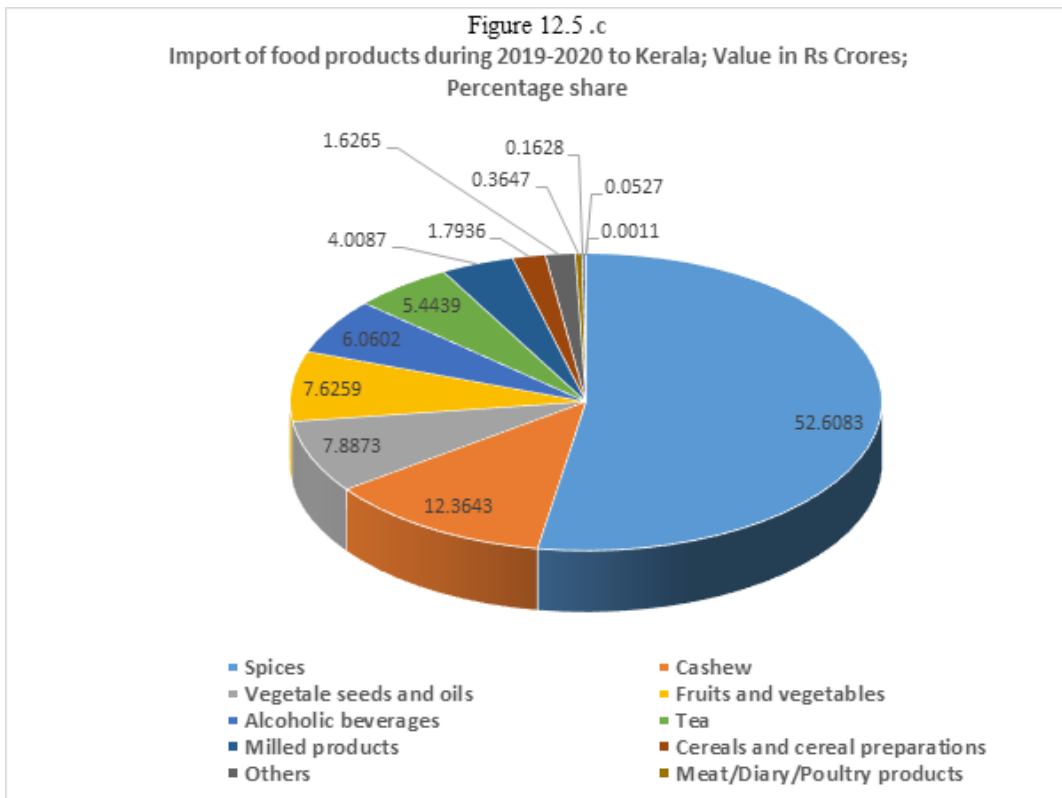
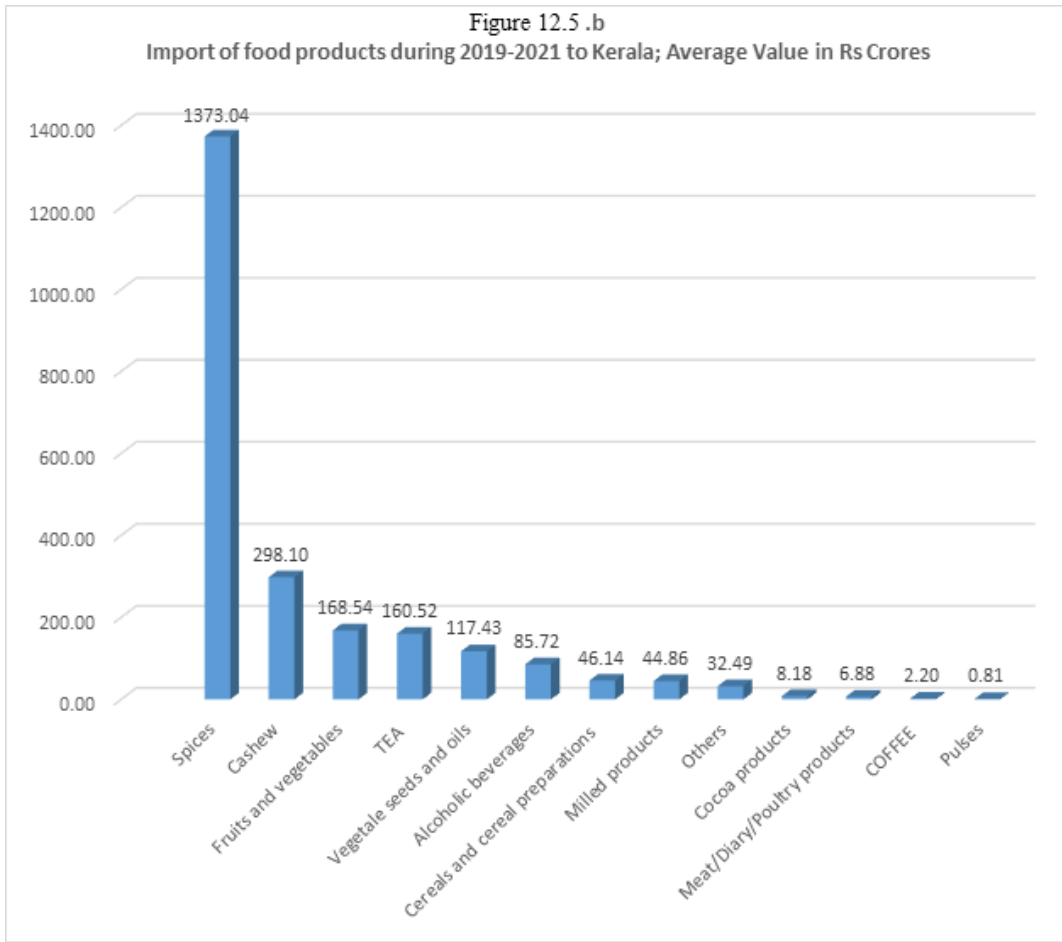


Figure 12.5 .d
Import of food products during 2020-2021; Value in Rs Crores;
Percentage share

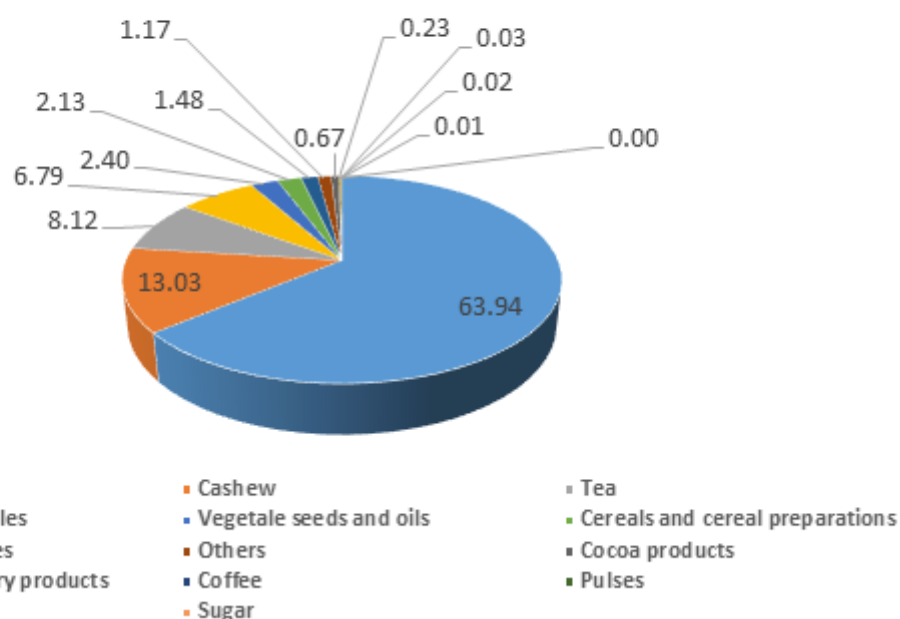


Table 12.8

Import of textiles during the years 2019-2020 and 2020-2021 to Kerala

Sl. No.	Commodity	2019-2020		2020-2021		Average Value (Rs Crores)	%
		Value (Rs Crores)	%	Value (Rs Crores)	%		
1	Handloom products	0.01	0.00	0.02	0.01	0.01	0.00
2	Jute manufactures	6.12	1.55	12.55	5.81	9.34	3.05
3	Silk manufactures	0.11	0.03	0.08	0.04	0.09	0.03
4	Cotton manufactures	232.71	58.70	98.75	45.74	165.73	54.13
5	Wool manufactures	0.15	0.04	0.17	0.08	0.16	0.05
6	Coir and coir manufactures	0.42	0.11	1.28	0.59	0.85	0.28
7	Others	156.91	39.57	103.03	47.73	129.98	42.46
	Total	396.43	100.00	215.88	100.00	306.16	100.00

- Table 12.8 represents the import value of textiles during the years of 2019-2020 and 2020-2021 in Rs Crores, their percentage share in total imports, average and its percentage.
- Cotton manufactures import at 232.71 crores (58.70%) during 2019-2020 and it decreased during 2020-2021 at 98.75 crores (45.74%).
- The import value of Coir and coir manufactures (0.42 crores-1.28 crores), wool manufactures (0.15 crores-0.17 crores), jute manufactures (6.14 crores-12.55 crores) and handloom products (0.01 crores-0.02crores) registered an increase in total import value during the years of 2019-2020 to 2020-2021.
- The import value of silk manufactures (0.11 crores to 0.08crores) decreased during the years of 2019-2020 to 2020-2021.

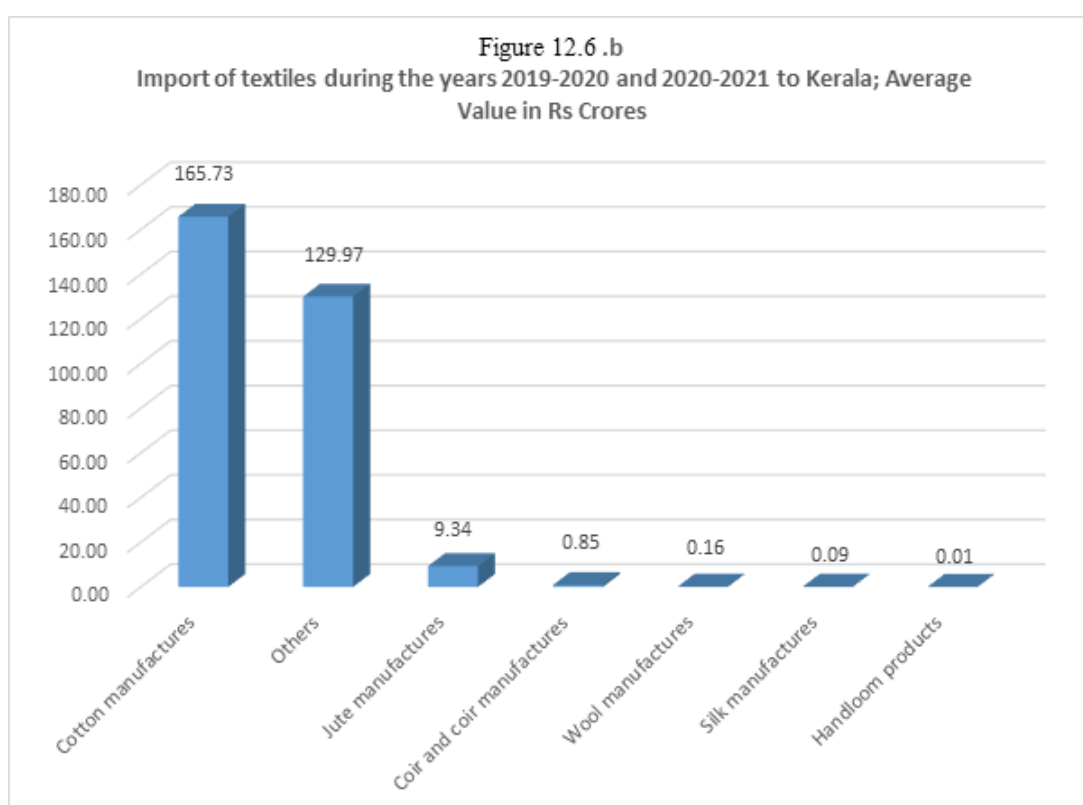
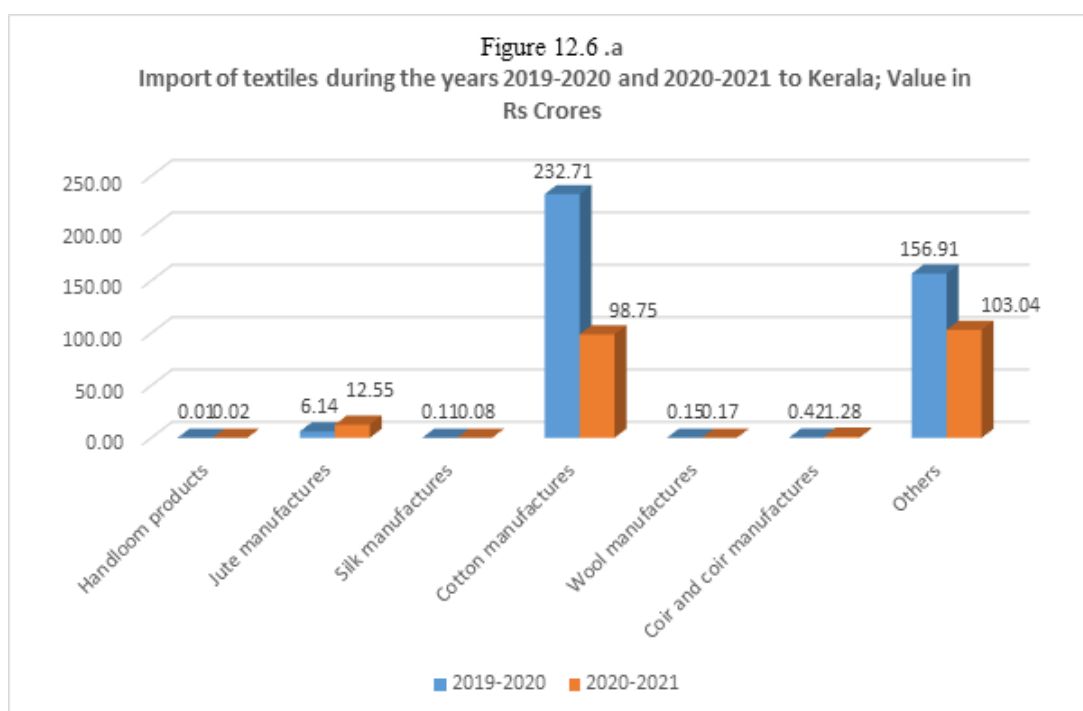


Figure 12.6 .c
 Import of textiles during 2019-2020 to Kerala; Value in Rs Crores;
 Percentage share

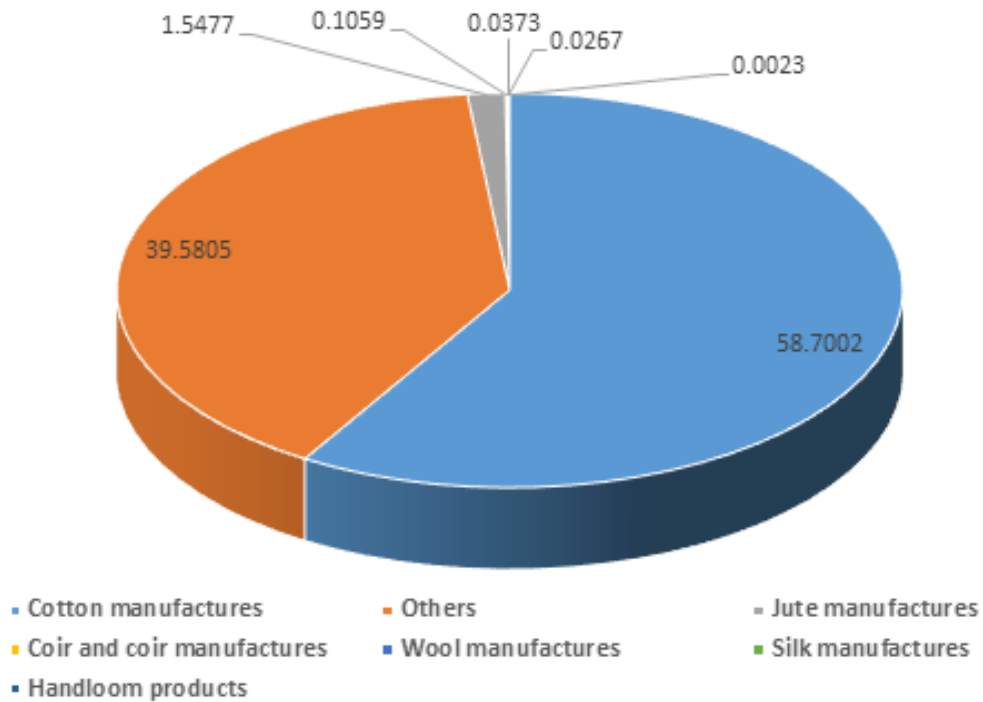
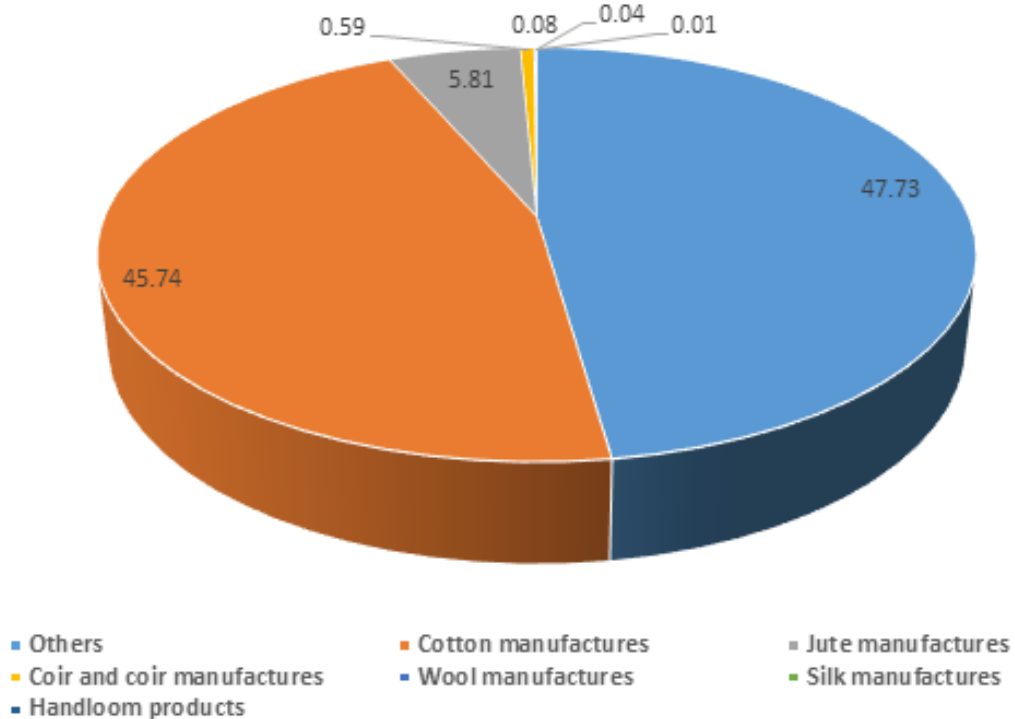


Figure 12.6 .d
 Import of textiles during 2020-2021; Value in Rs Crores;
 Percentage share



Conclusion

Bio-resource imports by the state were studied in this chapter to understand the dependence of the state which can give an idea of the balance of trade as well. Kerala, being a state endowed with rich natural resource wealth has not historically depended much on imports of bio-resources for satisfying the domestic needs. However, in recent times the quantity of imports has seen an increase due to various factors like increase in demand, lower prices of imported products and domestic regulatory regime.

Yet, according to the data collected from the Directorate General of Commercial Intelligence and Statistics (DGCIIS), Govt. of India regarding import values of the years 2019-20 and 2020-21, it was observed that there was a decline in import value from Rs. 4551.40 crore to Rs. 4276.23 crore. This decline could also be attributed to the sudden decline in demand experienced across the country in 2020-21 due to the nationwide pandemic induced lockdown and other restrictions. However, it can be observed that import of food products actually showed a slight increase in 2020-21 as compared to the previous year, highlighting the importance of these essential products.

The import value of food products increased from 2230.06 crores during 2019-2020 to 2459.80 crores during 2020-2021 with a percentage share of 49.00% and 57.52% respectively in total commodities. Wood and wood products, the second most important imported commodity, marked a slight decline in total import value from 2019-2020 (1094.72 crores; 24.05%) to 2020-2021 (808.30 crores; 18.90%).

Among the food products imports under study, it was observed that Spices were the most important commodity among food products and its import value increased from 121.40 crores during 2019- 2020 to 199.64 crores during 2020-2021. Spices contributed to 52.61% of the total commodities during 2019-2020 and 63.94% of the total commodities during 2020-2021. This is especially of concern since Kerala has been historically considered as the hub of spice production since many centuries. The shortfall in fulfilment of demand has to be filled by imports, and this may indicate the declining rates of spice productivity which are not able to keep pace with demand.

The import value of commodities such as cashew (275.73 - 320.47 crores), tea (121.40 - 199.64 crores), cereals and cereal preparations (40.00- 52.29 crores), sugar (0.02- 0.03 crores) and cocoa products (0.00 -16.36 crores) also increased during the years of 2019-2020 and 2020-2021.

However, the total import value of commodities such as fruits and vegetables (170.06 -167.01 crores), vegetable seeds and oils (175.89 - 58.97crores), alcoholic beverages (135.15- 36.29 crores), milled products (89.40- 0.32 crores), Meat/Diary/Poultry products, coffee (3.63-0.78 crores), pulses (1.17 -0.44 crores) decreased significantly during the years of 2019-2020 and 2020-2021.

Textiles comprise another important category of products imported by the state. Although the import value showed a decline in 2020-21 compared to the previous year, the value of Rs. 215.88 crore still remains a substantial amount. Import value of Cotton products at 232.71 crores (58.70%) during 2019-2020 and at 98.75 crores (45.74%) during 2020-2021 showed a year on year decline but remained the highest value imports among textiles category.

The import value of Coir and coir manufactures (0.42 crores-1.28 crores), wool manufactures (0.15 crores-0.17 crores), jute manufactures (6.14 crores-12.55 crores) and handloom products (0.01 crores-0.02 crores) registered an increase in total import value during the years of 2019-2020 to 2020-2021. The import value of silk manufactures (0.11 crores to 0.08crores) decreased during the years of 2019-2020 to 2020-2021.



12.3 . BALANCE OF TRADE OR THE NET EXPORT

Balance of Trade or commercial balance is known as the Net Export. It is the difference between the money value of a nation's export and import over a time period. In this respect the balance of trade of various bio-resources based raw-materials and products of Kerala has estimated based on the export and import data collected from DGCIS for the period of 2019-20 and 2020-2021 as well as for the average of the two years.



Table 12.9
Balance of Trade of major bio-resources based commodity groups during the years
2019-2020 and 2020-2021 from Kerala (Rs. in Crores)

Sl. No.	Commodity	2019-2020			2020-2021		
		Export Value	Import Value	Balance of Trade	Export Value	Import Value	Balance of Trade
1	Food products	9144.50	2230.06	6914.44	13006.94	2459.80	10547.14
2	Marine products	5060.21	145.60	4914.61	5190.85	138.38	5052.47
3	Textiles and fabrics	4286.46	396.43	3890.03	4809.96	215.88	4594.08
4	Rubber and rubber products	1489.71	568.34	921.37	2136	579.29	1556.71
5	Wood and wood products	876.13	1094.72	-218.59	1115.08	808.30	306.78
6	Essential oils	106.63	7.07	99.56	197.39	9.46	187.93
7	Medicinal and other pharmaceutical products	41.81	13.41	28.40	111.57	31.31	80.26
8	Ayush and herbal products	35.61	2.01	33.60	45.77	7.74	38.03
9	Floriculture products	22.81	0.00	22.81	25.29	0.00	25.29
10	Tobacco manufactured	33.01	75.69	-42.68	31.41	20.46	10.95
11	Leather and leather products	13.40	5.76	7.64	6.98	1.92	5.06
12	Others	3.51	12.31	-8.80	5.27	3.69	1.58
	Total	21113.79	4551.40	16562.39	26682.51	4276.23	22406.28

Table 12.10
Average Balance of Trade of major bio-resources based commodity groups during
the years 2019-2020 and 2020-2021 from Kerala (Rs in Crores)

Sl. No	Commodity	Average Export Value	Average Import Value	Balance of Trade
1	Food products	9845.82	2344.93	7500.89
2	Marine products	5056.34	141.99	4914.35
3	Textiles and fabrics	4440.27	306.16	4134.11
4	Rubber and rubber products	1523.21	573.82	949.39
5	Wood and wood products	591.46	951.51	-360.05
6	Essential oils	147.28	8.27	139.01
7	Medicinal and other pharmaceutical products	61.04	22.36	38.68
8	Ayush and herbal products	36.82	4.87	31.95
9	Floriculture products	24.05	0.002301	24.05
10	Tobacco manufactured	21.98	48.08	-26.10
11	Leather and leather products	9.23	3.84	5.39
12	Others	2.55	8	-5.45
	Total	21760.05	4413.8323	17346.22



Conclusion

The balance of trade of any economy, whether at the state level or at the country level is a significant indicator of its self sufficiency in terms of manufacturing potential and ability to fulfill domestic demand as well as produce enough surplus to export goods and earn valuable foreign exchange. Although the balance of trade for merchandise (secondary sector) on a whole for India is negative ie India suffers a trade deficit in merchandise products (-20.88\$ Billion) according to Economic Division, Department of Commerce (2022), the encouraging finding from this study was the positive trade balance by Kerala in the domain of bio-resource products (DGCIS, 2021).

The study was conducted for 2 consecutive financial years ie. 2019-20 and 2020-21, to maintain consistency with the studies on import and export. This analysis found that the balance of trade was around Rs. 16562.39 crore in 2019-20, which increased to around Rs. 22406.28 crore in 2020-21. Both an increase in export and a decrease in import value during the year 2020-21 facilitated this improvement in the balance of trade of bio-resources and bio-resource based products. The average balance of trade from both years was calculated to be Rs. 17346.22 crores.

The highest average sector-wise balance of trade value was also estimated, in which food products obtained the highest value (Rs. 7500.89 crore) followed by Marine products (Rs. 4914.35 crore) and Textiles (Rs. 4134.11 crore). A trade deficit was observed in 3 sectors namely, Wood products, tobacco products and others of which wood products showed highest deficit (Rs. -360.05 crore).

Thus, it is important that steps be taken to improve the domestic sector capabilities and competitiveness to continue this growth in positive balance of trade of bio-resources and bio-resource based products.



12.4. MARINE PRODUCTS EXPORT FROM KERALA: ANALYSIS OF MPEDA DATA

Fish is one of the common and major bio-resources from the marine, coastal and fresh water ecosystems in Kerala. Apart from the domestic use, both the inland and marine fisheries resources from Kerala are substantially going to other States in India as well as exporting to different countries. This chapter examines the different aspects of marine products exports from Kerala based on the data collected from the Marine Products Export Development Authority (MPEDA).

- The first part of the chapter discusses the (a) item wise, (b) market wise and (c) port wise export of marine products from Kerala over the last decade (2010-2020).
- The second part examines the trend of marine products exports based on past 25 years data (1995-2020).
- The third part focuses on the different items of marine products export during 2019-20 to 2020-21.

PART I

(a) Item wise Export of Marine Products from Kerala

The item wise export of marine products from Kerala reveals the following conclusions:

- The major export items from Kerala during 2010-2020 were frozen shrimp (29.61% by quantity and 47.75% by total value), frozen fish (23.94% by quantity and 10.07% by total value), frozen squid (18.98% by quantity and 15.69% by total value) and frozen cuttle fish (15.28% by quantity and 16.50% by total value).
- The relatively low value items such as dried items and live items account for 1.39% and 0.21% respectively by quantity and 0.56% and 0.86% respectively by total value.
- Shrimp is the most important item in the export of marine products from Kerala. The export of shrimp from Kerala significantly increased both in quantity (20.30% in 2010 to 36.32% in 2020) and total value 32.73% in 2010 to 51.68% in 2020) over the last decade.
- Even though the total value of the cuttle fish exported declined (24.06% in 2010 to 16.04% in 2020), its quantity exported remained the same over years (16.55% in 2010 to 16.38% in 2020) and the cuttle fish occupies second position after shrimp in terms of total value of exported items from Kerala.
- The total value of frozen squid (15.69%) among the exported items during 2010 to 2020 showed that it is the third most important item in export items of Kerala. Both export quantity (25.66% in 2010 to 17.26% in 2020) and total value (19.95% in 2010 to 14.96% in 2020) of squid declined over years.
- Similarly, both export quantity (28.60% in 2010 to 17.13% in 2020) and total value (13.15% in 2010 to 7.26% in 2020) of frozen fish declined over years.
- The following table and the figures provide more details on the item wise export of marine products from Kerala.



Table 12.11
Item wise export of marine products from Kerala ports (Quantity)

Sl. No.	2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		Total
	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	
20.30	33030.57	21.21	37212.80	22.36	45081.51	27.21	54438.36	32.65	50460.63	33.83	45132.51	28.36	63501.99	35.55	65073.04	35.55	53832.68	36.32	473064.99
28.60	47674.96	30.62	55563.30	33.39	43819.65	26.45	36523.91	21.90	26633.01	17.86	38195.46	24.00	32566.21	18.23	40448.01	22.10	25394.38	17.13	382454.82
16.55	20360.82	13.08	19655.10	11.81	24972.00	15.07	31604.21	18.95	25815.82	17.31	24730.94	15.54	29657.22	16.60	22354.74	12.21	24278.90	16.38	244054.88
25.66	35810.68	23.00	25918.58	15.58	36606.11	22.09	21273.47	12.76	27635.61	18.53	33180.58	20.85	32530.01	18.21	32648.83	17.83	25580.24	17.26	303156.95
0.14	2953.46	1.90	11923.60	7.17	126.03	0.08	2213.97	1.33	610.76	0.41	324.28	0.20	639.84	0.36	3167.18	1.73	141.90	0.10	22275.51
0.30	426.08	0.27	371.60	0.22	390.50	0.24	463.52	0.28	352.80	0.24	288.06	0.18	199.60	0.11	281.42	0.15	248.96	0.17	3394.13
2.26	3082.20	1.98	4048.43	2.43	4839.31	2.92	4717.75	2.83	6254.95	4.19	4403.29	2.77	3525.35	1.97	3332.27	1.82	2219.83	1.50	39237.91
6.19	12375.33	7.95	11705.75	7.03	9862.58	5.95	15518.45	9.31	11374.57	7.63	12886.00	8.10	16026.24	8.97	15758.33	8.61	16529.48	11.15	129755.98
100.00	155714.10	100.00	166399.15	100.00	165697.69	100.00	166753.62	100.00	149138.14	100.00	159141.12	100.00	178646.45	100.00	183063.82	100.00	148226.36	100.00	1597395.18





Figure 12.7a Trend of export of marine products from Kerala ports during 2010-2020; Quantity in tonnes

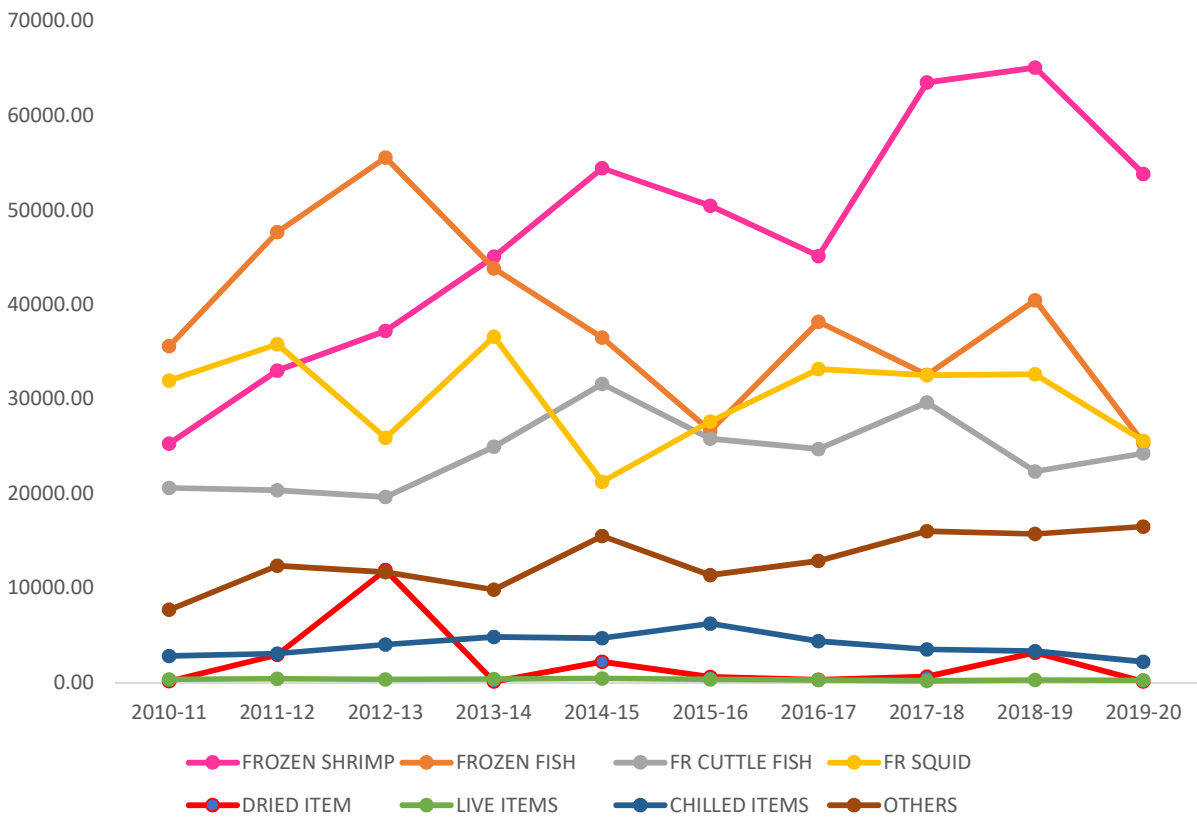


Figure 12.7b Cumulative Average (2010-2020) of quantity of marine export products from Kerala ports; Quantity in tonnes

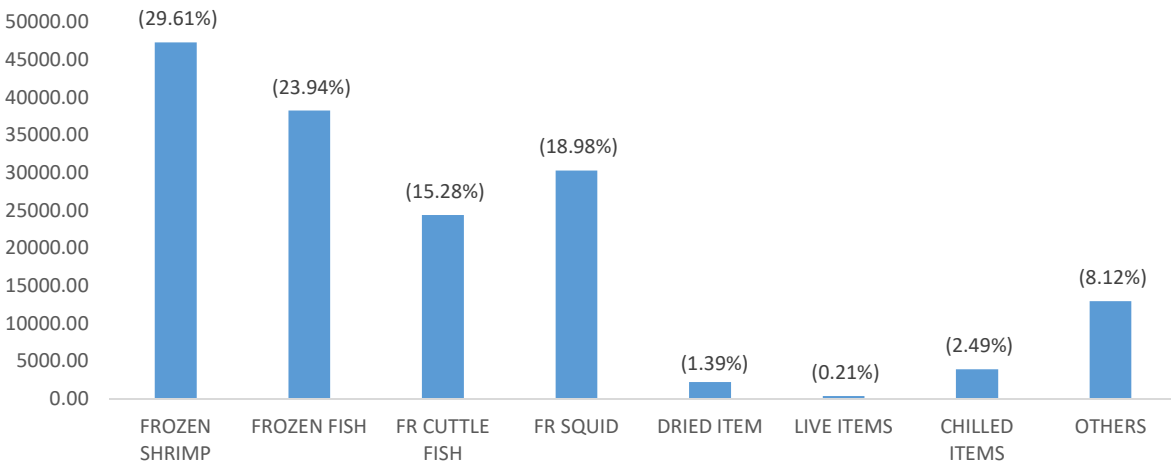


Figure 12.7c Item wise percentage share of marine export (in quantity) from Kerala; 2010-2020

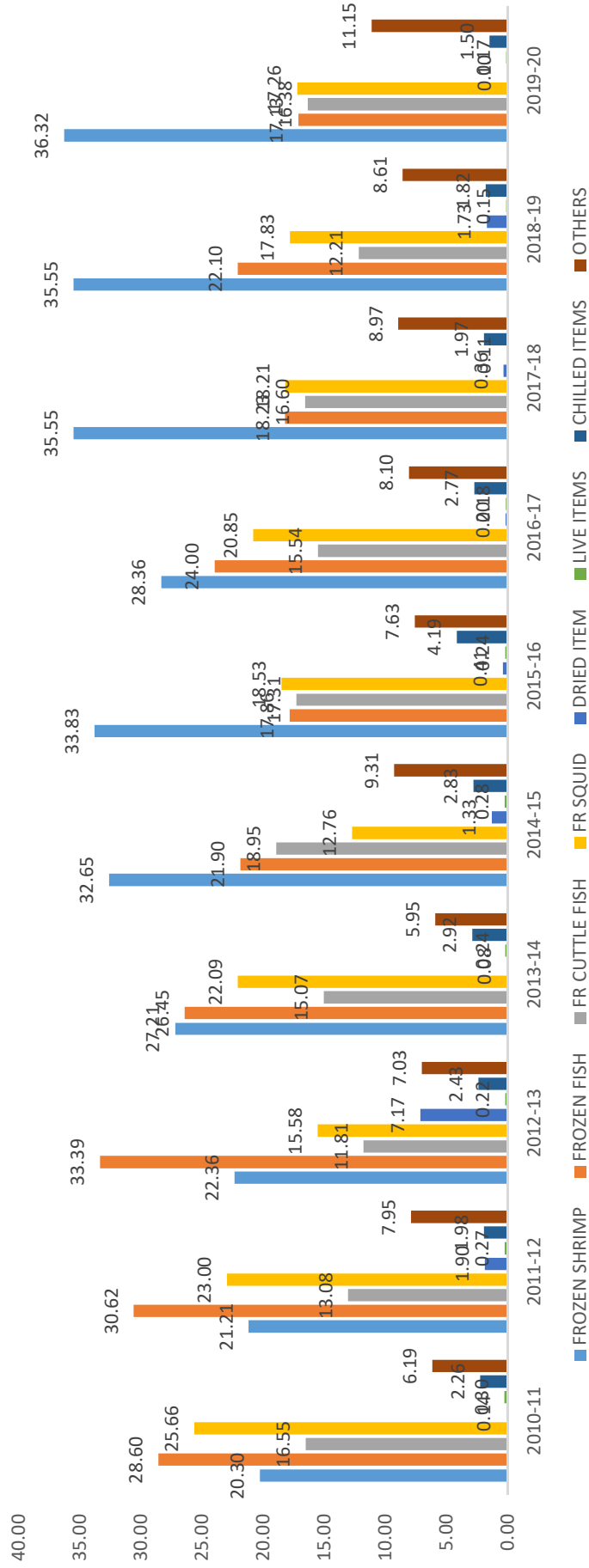


Figure 12.8a Item wise export of marine products from Kerala port during 2010-11; Quantity MT

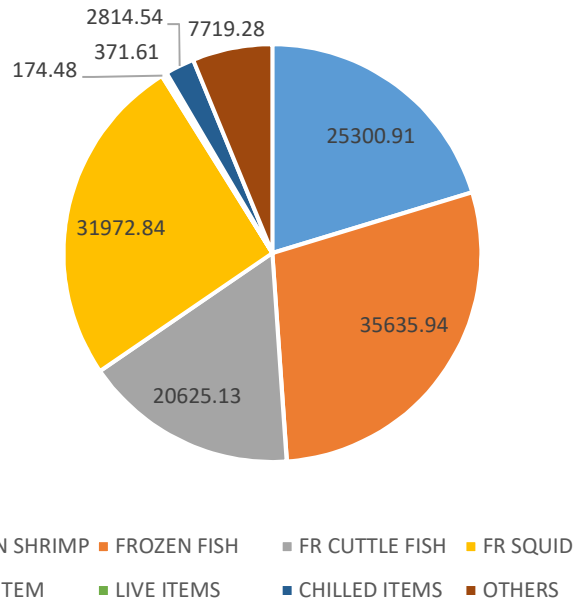


Figure 12.8b Item wise export of marine products from Kerala port during 2011-12; Quantity MT

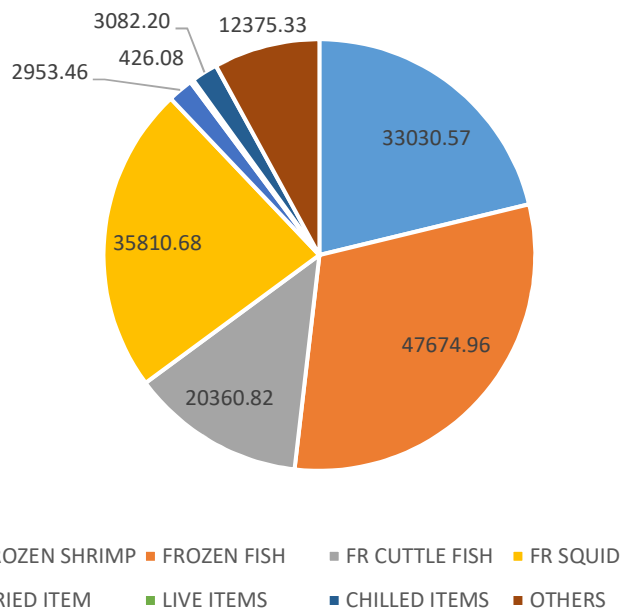


Figure 12.8c Item wise export of marine products from Kerala port during 2012-13; Quantity MT

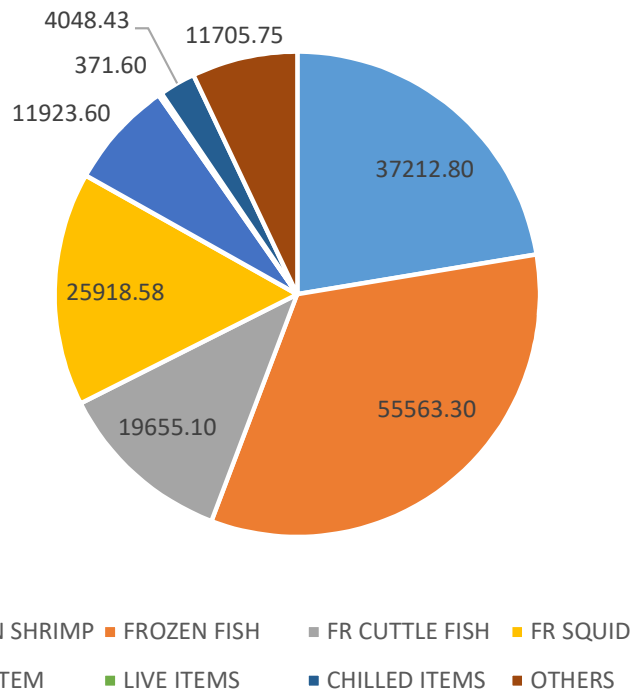


Figure 12.8d Item wise export of marine products from Kerala port during 2013-14; Quantity MT

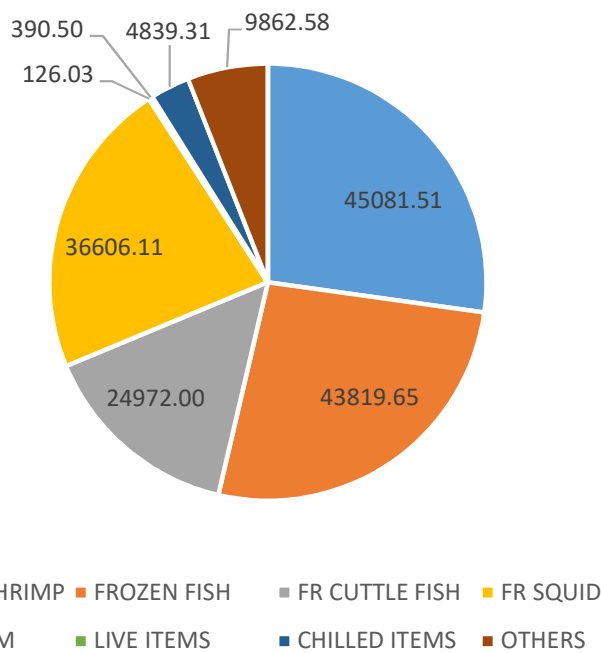


Figure 12.8e Item wise export of marine products from Kerala port during 2014-15; Quantity MT

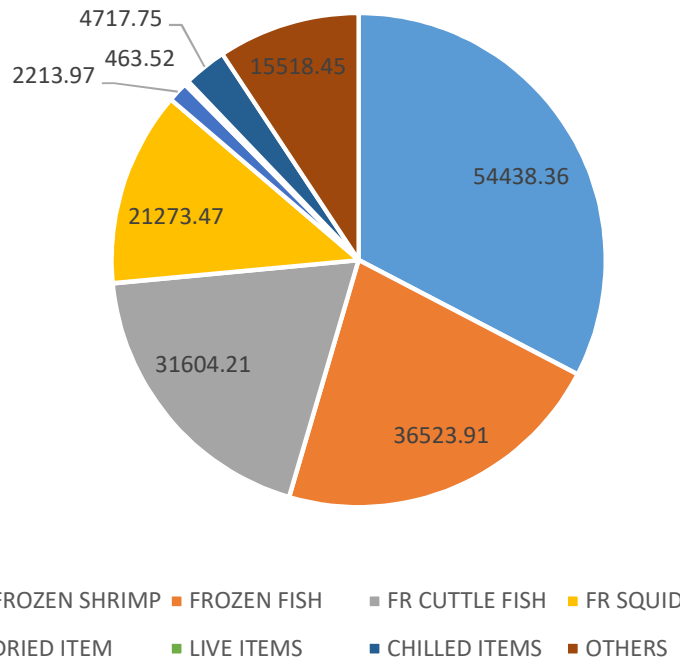


Figure 12.8f Item wise export of marine products from Kerala port during 2015-16; Quantity MT

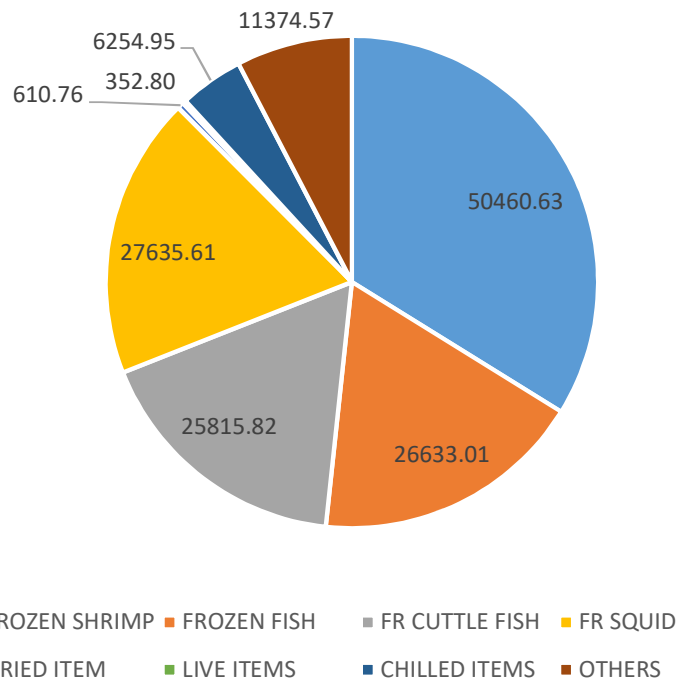


Figure 12.8g Item wise export of marine products from Kerala port during 2016-17; Quantity MT

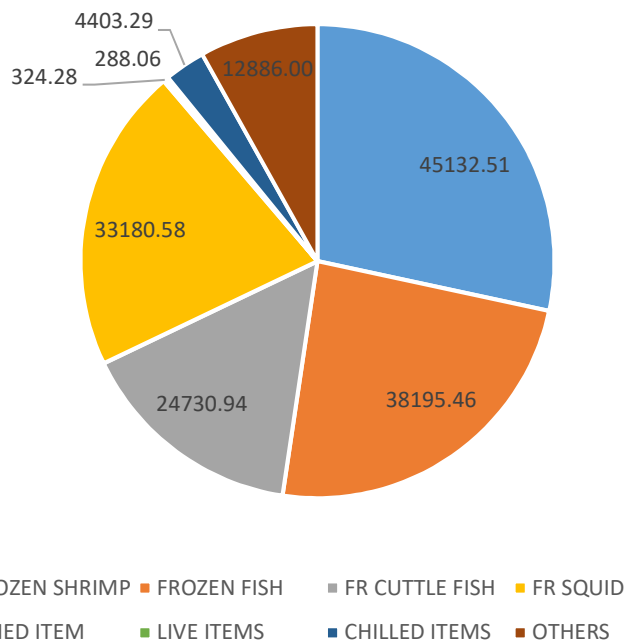


Figure 12.8h Item wise export of marine products from Kerala port during 2017-18; Quantity MT

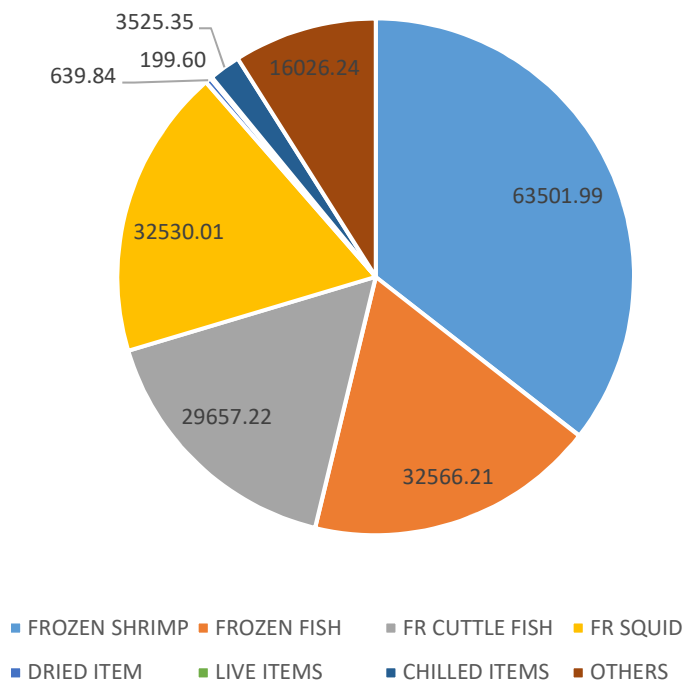


Figure 12.8i Item wise export of marine products from Kerala port during 2018-19; Quantity MT

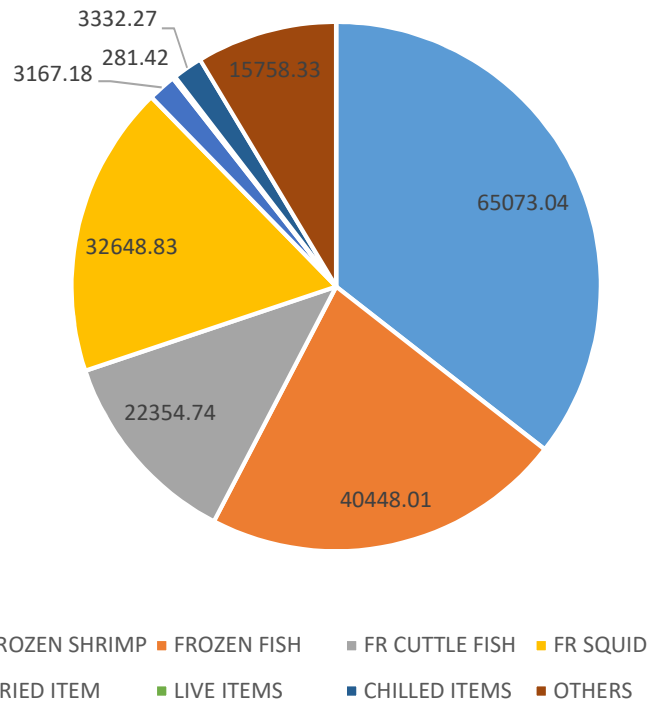


Figure 12.8j Item wise export of marine products from Kerala port during 2019-20; Quantity MT

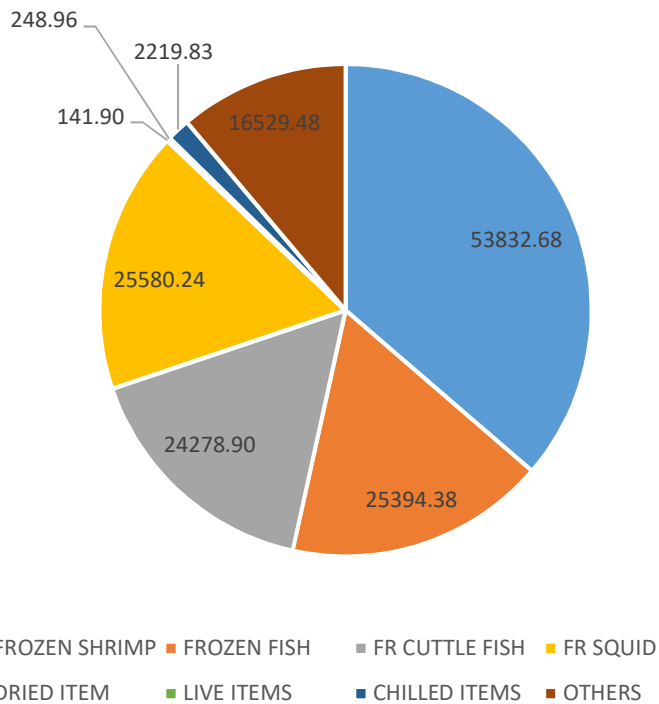


Table 12.12
Item wise export of marine products from Kerala ports (Value)

Sl. No.	ITEM	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		TOTAL		Cumulative Average	
		Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%
1	Frozen shrimp	655.19	32.73	1081.97	36.21	1449.15	42.18	2276.62	48.37	2855.96	55.28	2381.93	51.29	2178.01	43.49	2924.73	49.41	3045.75	50.64	2594.35	51.68	21443.66	47.75	2144.37	47.75
2	Frozen fish	263.27	13.15	387.38	12.96	484.98	14.12	548.06	11.65	473.84	9.17	433.13	9.33	583.58	11.65	419.45	7.09	565.77	9.41	364.31	7.26	4523.76	10.07	452.38	10.07
3	cuttle fish	481.66	24.06	585.40	19.59	536.85	15.63	604.81	12.85	813.95	15.76	706.34	15.21	861.47	17.20	1156.23	19.53	856.10	14.23	805.28	16.04	7408.10	16.50	740.81	16.50
4	Fr squid	399.38	19.95	607.24	20.32	548.95	15.98	836.43	17.77	472.40	9.14	605.90	13.05	956.86	19.10	915.97	15.47	952.06	15.83	751.28	14.96	7046.46	15.69	704.65	15.69
5	Dried item	4.02	0.20	22.60	0.76	83.39	2.43	5.43	0.12	27.51	0.53	30.36	0.65	12.52	0.25	7.11	0.12	35.77	0.59	24.29	0.48	252.99	0.56	25.30	0.56
6	Live items	31.78	1.59	27.84	0.93	43.01	1.25	52.50	1.12	50.36	0.97	46.84	1.01	39.48	0.79	21.05	0.36	38.20	0.64	32.90	0.66	383.96	0.86	38.40	0.86
7	Chilled items	67.75	3.38	90.23	3.02	115.66	3.37	165.98	3.53	169.33	3.28	229.00	4.93	156.91	3.13	127.33	2.15	133.64	2.22	87.92	1.75	1343.75	2.99	134.38	2.99
8	Others	99.05	4.95	185.68	6.21	173.85	5.06	216.53	4.60	302.74	5.86	210.92	4.54	219.70	4.39	347.16	5.87	387.41	6.44	360.01	7.17	2503.06	5.57	250.31	5.57
	Total	2002.10	100.00	2988.33	100.00	3435.85	100.00	4706.36	100.00	5166.08	100.00	4644.42	100.00	5008.54	100.00	5919.03	100.00	6014.70	100.00	5020.33	100.00	44905.74	100	4490.57	100



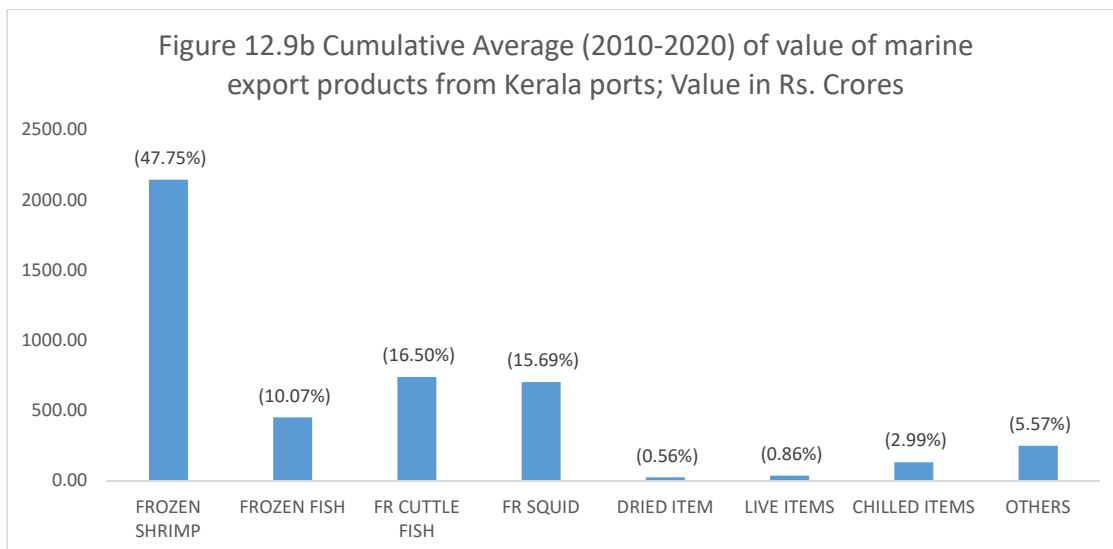
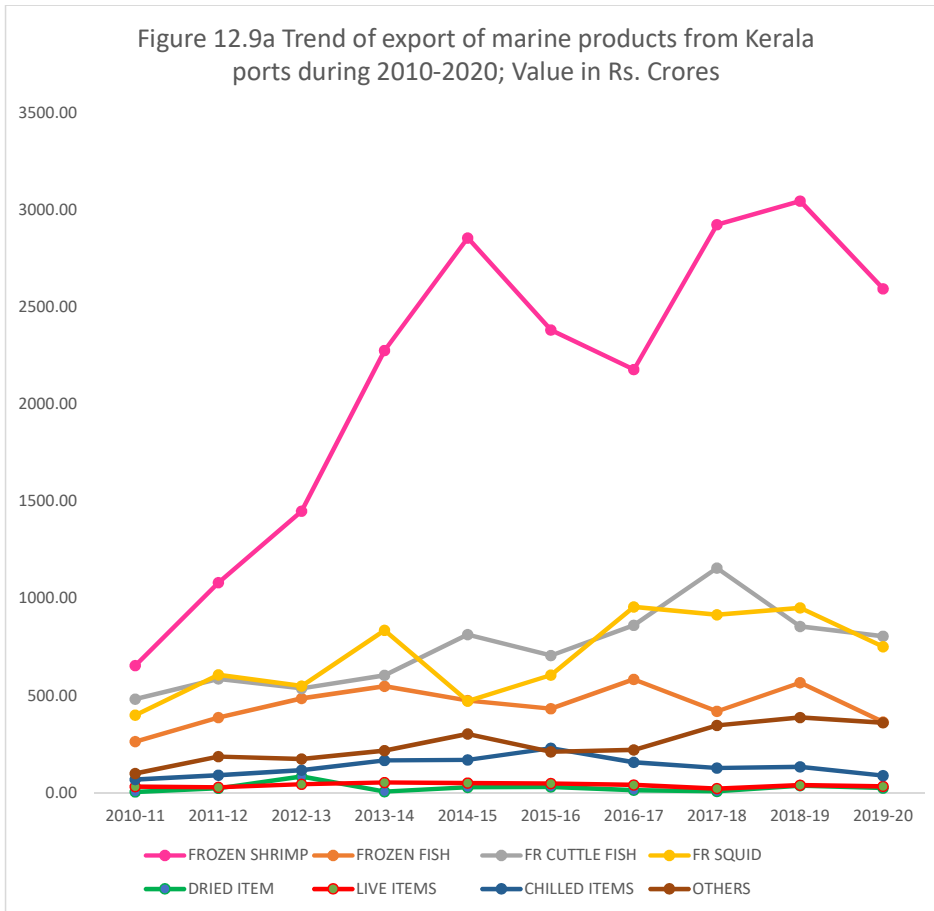


Figure 12.9c Item wise percentage share of marine export
(in total value) from Kerala; 2010-2020

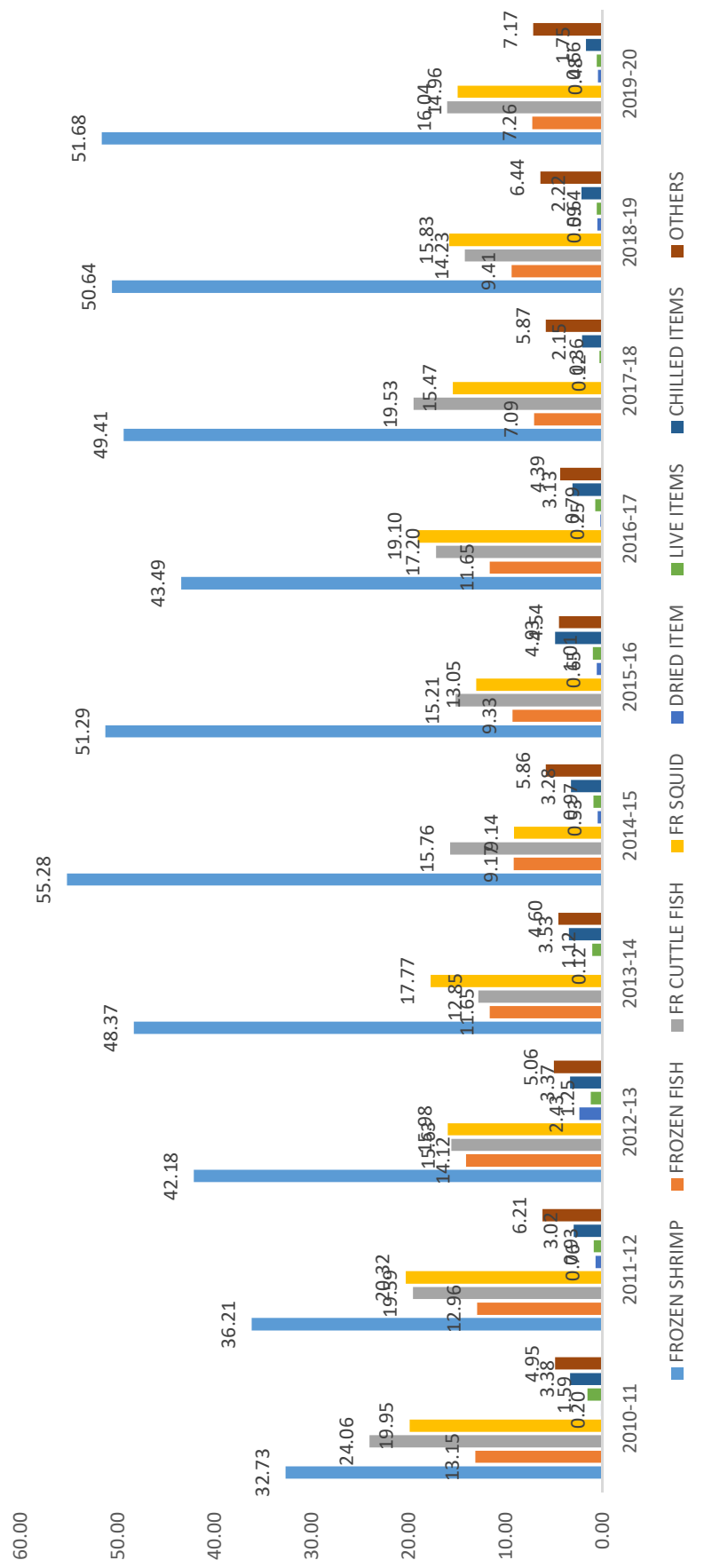


Figure 12.10a Item wise export of marine products from Kerala port during 2010-11; Value Rs Crores

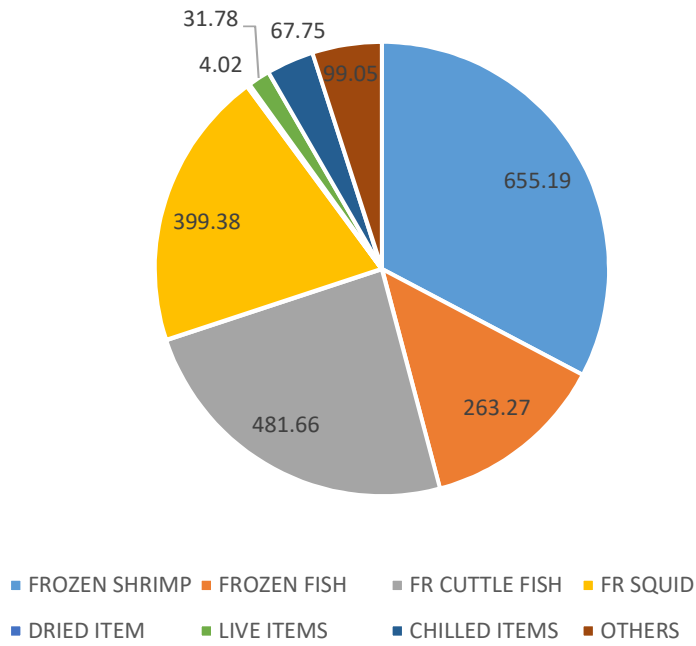


Figure 12.10b Item wise export of marine products from Kerala port during 2011-12; Value Rs Crores

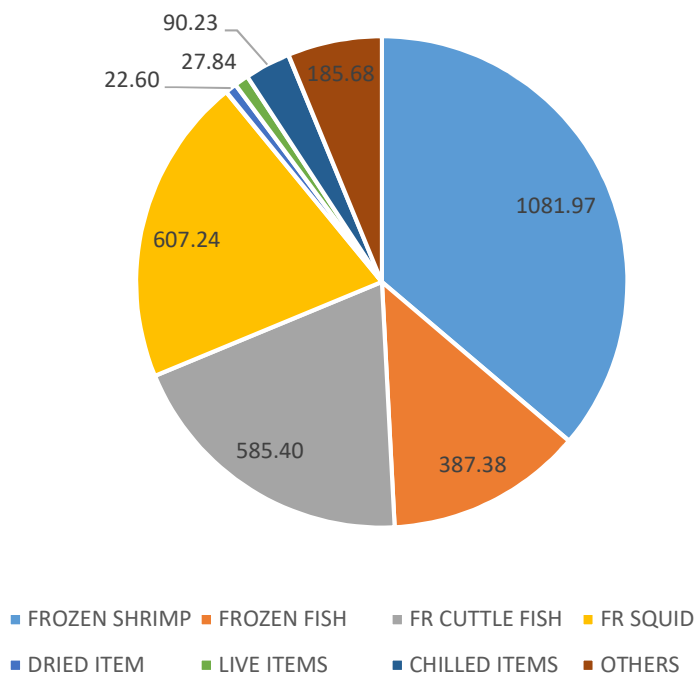


Figure 12.10c Item wise export of marine products from Kerala port during 2012-13; Value Rs Crores

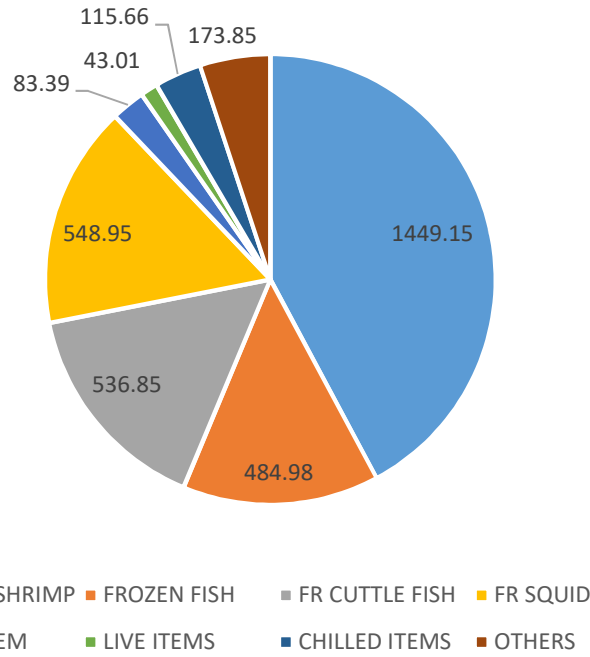


Figure 12.10d Item wise export of marine products from Kerala port during 2013-14; Value Rs Crores

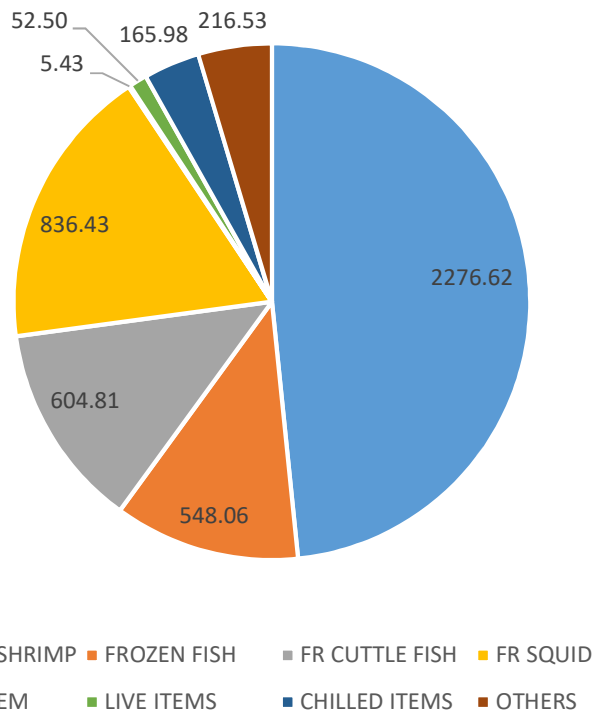


Figure 12.10e Item wise export of marine products from Kerala port during 2014-15; Value Rs Crores

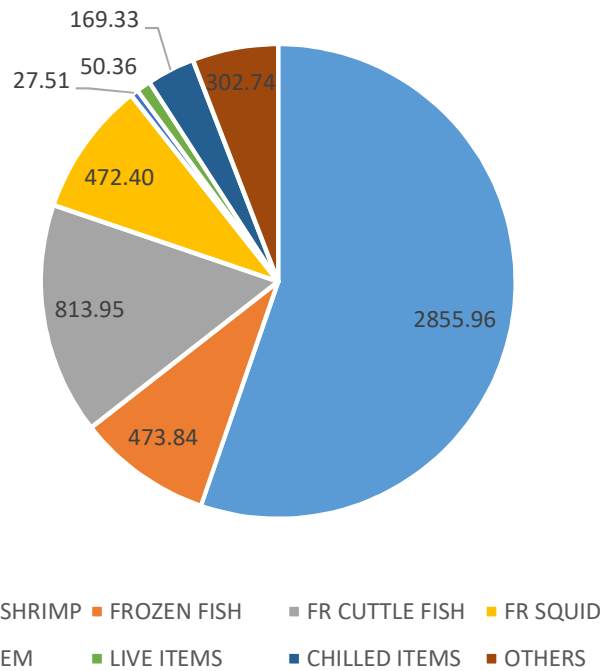


Figure 12.10f Item wise export of marine products from Kerala port during 2015-16; Value Rs Crores

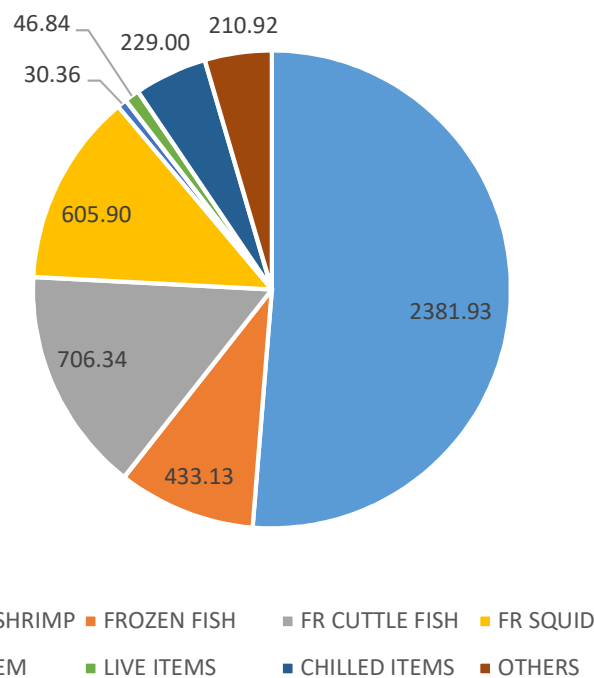


Figure 12.10g Item wise export of marine products from Kerala port during 2016-17; Value Rs Crores

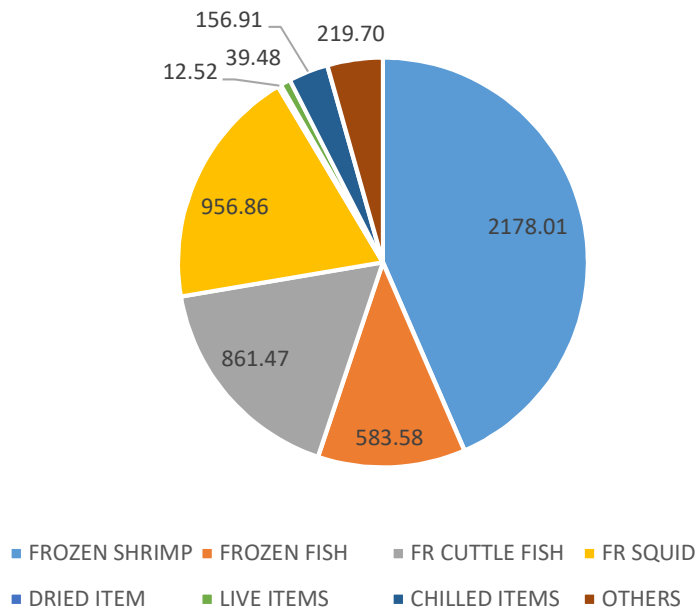


Figure 12.10h Item wise export of marine products from Kerala port during 2017-18; Value Rs Crores

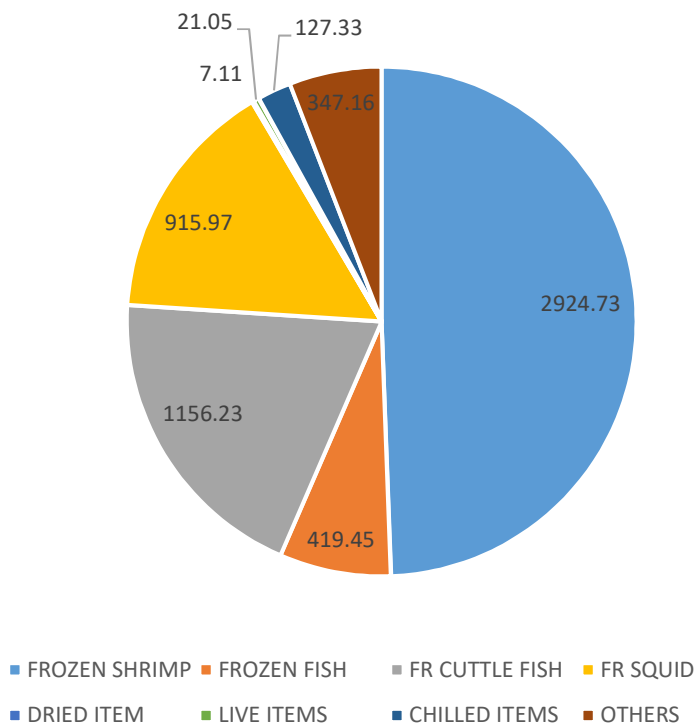


Figure 12.10i Item wise export of marine products from Kerala port during 2018-19; Value Rs Crores

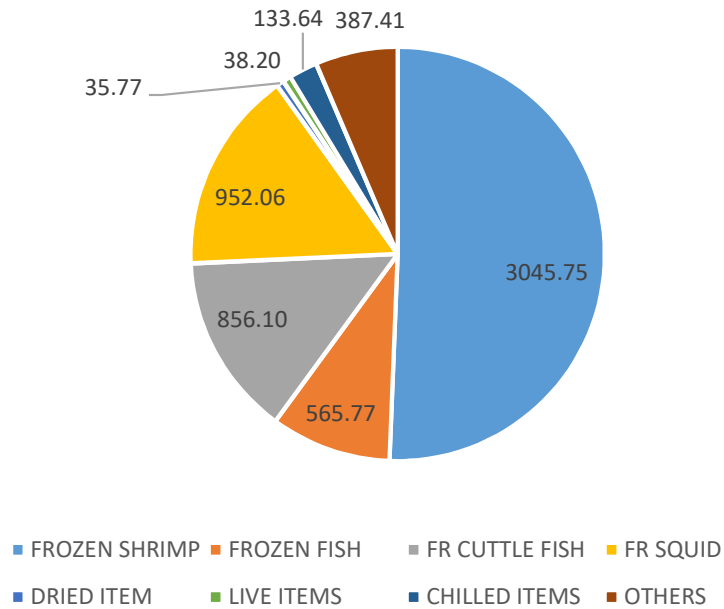
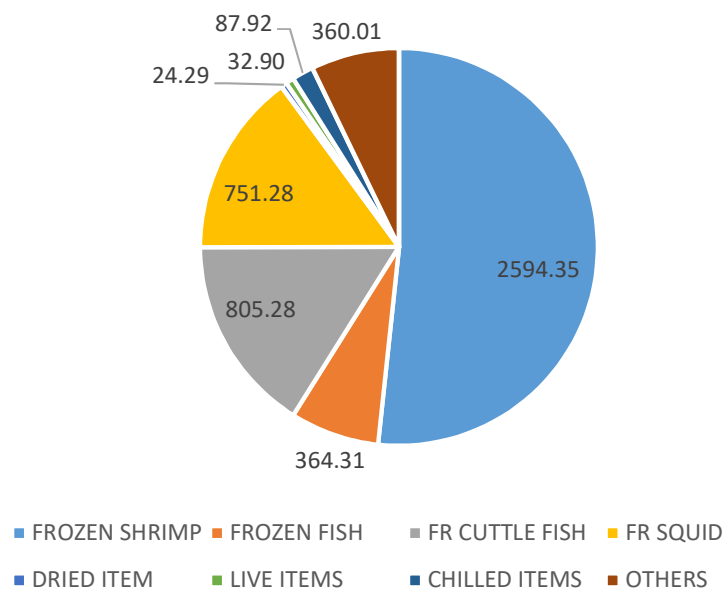


Figure 12.10j Item wise export of marine products from Kerala port during 2019-20; Value Rs Crores



(b) Market wise Export of Marine Products from Kerala

- Table 2.1 shows Kerala's export share of marine products to major markets like Japan, USA, European Union (EU), China, South East Asia and Middle East during 2010-2020.
- The EU is the main destination of marine products from Kerala ports with 36.14% quantity and 39.45% total value of marine products exported when compared to other destinations.
- One among the major markets, South East Asia (28.78% in quantity; 21.61% in total value), is second in Kerala's marine products export market after EU (36.14% in quantity; 39.45% in total value). Over the last decade the marine product's export quantity (20.61% in 2010 to 23.96% in 2020) and the total value (10.75% in 2010 to 17.56% in 2020) from Kerala to South East Asia increased.
- A decline in both quantity value of marine export from Kerala to EU (45.74% in 2010 to 31.15% in 2020 by quantity; 52% in 2010 to 33.14% in 2020 by total value) and Middle East (5.24% in 2010 to 4.57% in 2020 by quantity; 4.03% in 2010 to 3.27% in 2020 by total value) is reported during the last decade.
- In the case of Japan, no significant variation is reported in export quantity (5.16% in 2010 to 5.67% in 2020) and value (8.88% in 2010 to 8.74% in 2020), and showed a similar trend in export of marine products over the last decade.
- Interestingly, Kerala's share in marine exports to China (known for aquaculture and all*) increased significantly in quantity (9.15% in 2010 to 16.40% in 2020). However, it contributes only 5.28% share in export of marine products from Kerala to different markets/destinations. In case of total value, China accounts 5.25% share in export of marine products from Kerala to different markets. And, the export of marine products from Kerala to China increased in terms of total value with 8.16% in 2010 to 14.24% in 2020.
- Similarly, the export trend of marine products to USA from Kerala is increasing in both quantity (6.05% in 2010 to 9.54% in 2020) and total value (8.01% in 2010 to 17.03% in 2020) over the last decade. The USA shares 7.25% in quantity and 12.25 % in total value among all markets of Kerala's marine product export.

The following Table and the figures provides more details on the marke wise export of marine products from Kerala.



Table 12.13
Market wise export of marine products from Kerala ports (Quantity)

Sl. No.	MARKET	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		Total		Cumulative Average	
		MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%
1	JAPAN	6425.12884	5.16	8026.624	5.15	11787.51	7.08	8505.737	5.13	9256.282	5.55	8065.384	5.41	6539.927	11	8597.459	4.81	6632.123	3.62	8399.388	5.67	82235.56	5.15	8223.56	5.15
2	USA	7541.51314	6.05	11155.92	7.16	12535.66	7.53	10040.35	6.06	10189	6.11	10103.21	6.77	10093.05	6.34	14354.05	8.03	15580.38	8.57	14134.82	9.54	115837	7.25	11583.70	7.25
3	EUROPEAN UNION	57000.58264	45.74	53958.99	34.65	53168.59	31.95	60725.07	36.65	68344.87	40.99	6992.27	44.92	62088.75	39.01	60749.13	34.01	48063.93	26.26	46178.14	31.15	577268.3	36.14	57726.83	36.14
4	CHINA	11404.49165	9.15	7625.225	4.90	4552.447	2.74	4341.902	2.62	5382.972	3.23	3049.424	2.04	2411.52	1.52	4204.501	2.35	17104.68	9.34	24302.4	16.40	84379.57	5.28	8437.96	5.28
5	SOUTH EAST ASIA	25690.55143	20.62	51989.05	33.39	38947.32	23.41	42189.32	25.46	39397.8	23.63	34340.39	23.03	54971.18	34.54	66159.38	37.03	70489.45	38.51	35513.08	23.96	459687.5	28.78	45968.75	28.78
6	MIDDLE EAST	6529.28772	5.24	9075.042	5.83	12053.78	7.24	21169.85	12.78	19034.92	11.41	15234.41	10.21	10662.28	6.70	6307.34	3.53	9020.467	4.93	6767.395	4.57	115854.8	7.25	11585.48	7.25
7	OTHERS	10023.16163	8.04	13883.26	8.92	33353.85	20.04	18718.45	11.30	15147.78	9.08	11353.06	7.61	12374.42	7.78	18274.6	10.23	16072.78	8.78	12931.14	8.72	162132.5	10.15	16213.25	10.15
	TOTAL	124614.7171	100.00	155714.1	100.00	166399.2	100.00	165697.7	100.00	166753.6	100.00	149138.1	100.00	159141.1	100.00	178646.5	100.00	183063.8	100.00	148226.4	100.00	1597395	100.00	159739.52	100.00





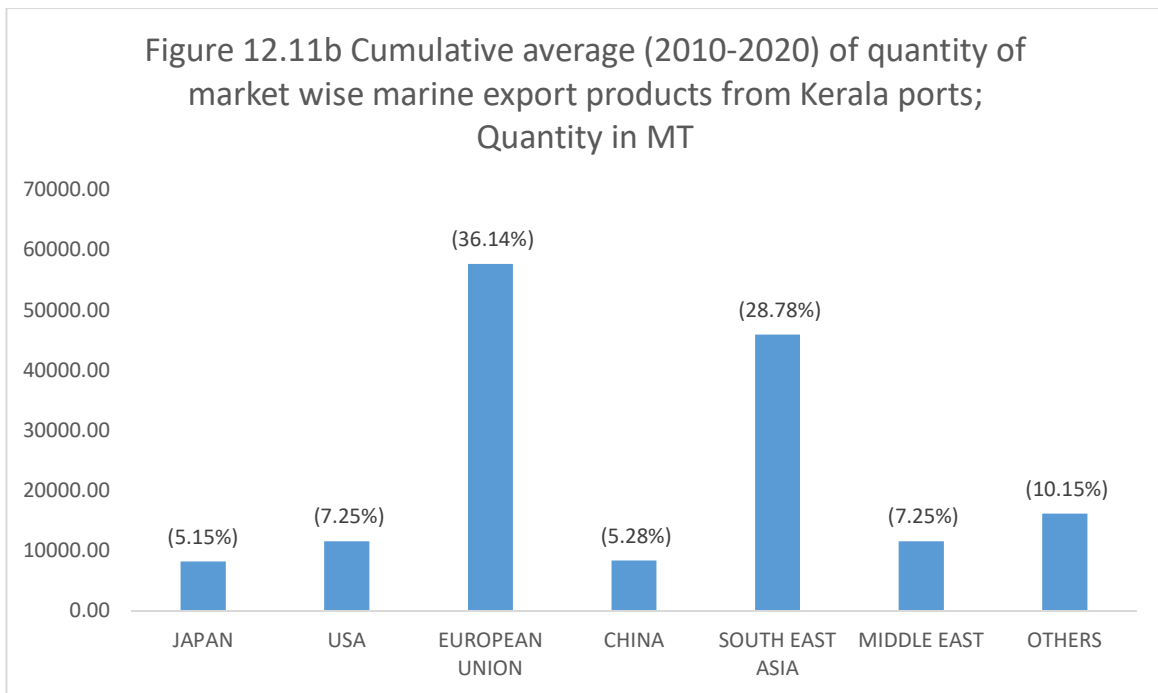
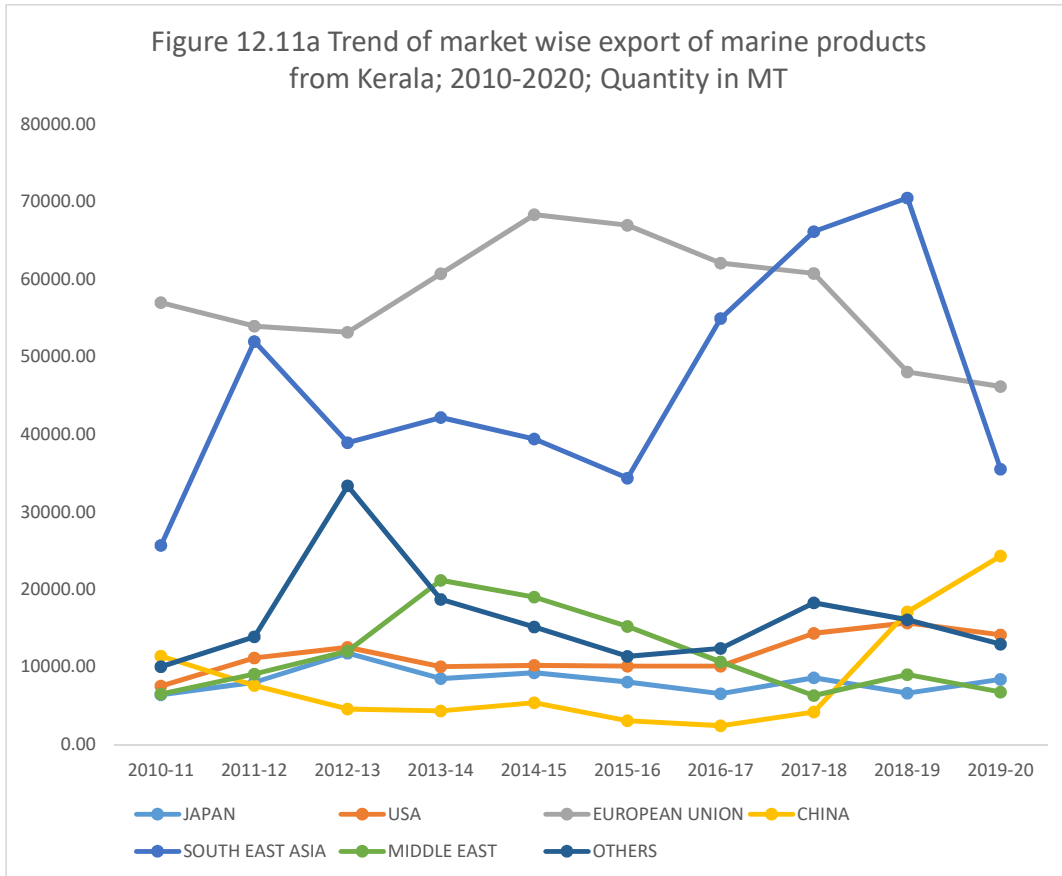


Figure 12.11c Market wise percentage share of marine export in quantity from Kerala ports

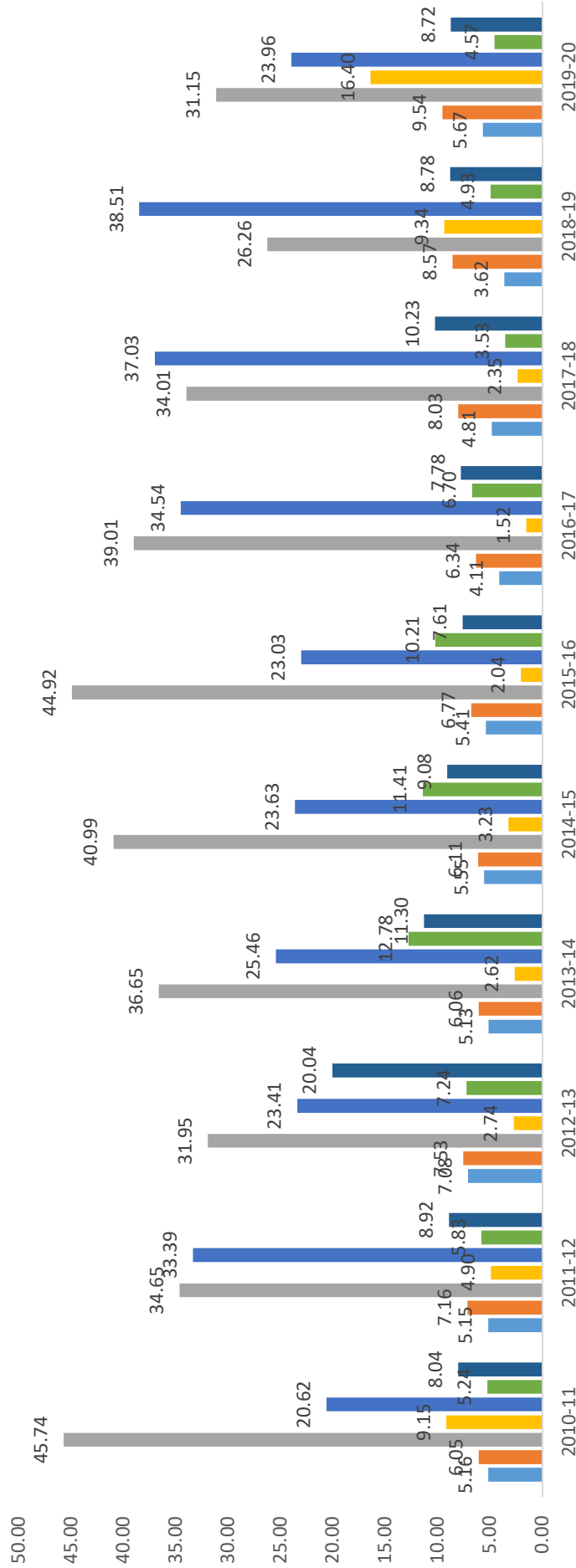


Figure 12.12a Market wise export of marine products from Kerala ports during 2010-11; (Quantity, MT)

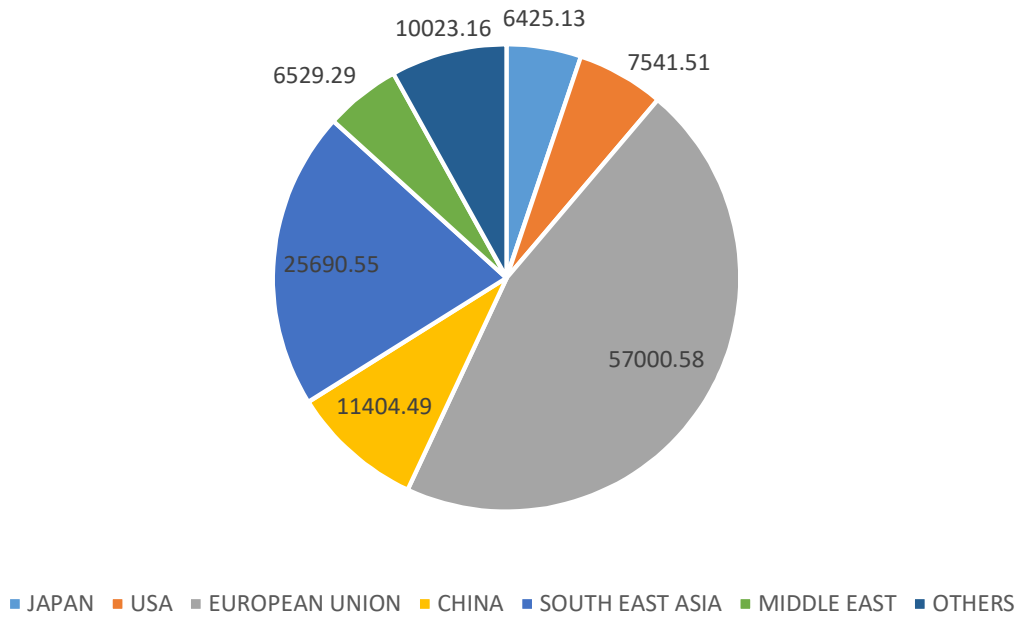


Figure 12.12b Market wise export of marine products from Kerala ports during 2011-12; (Quantity, MT)

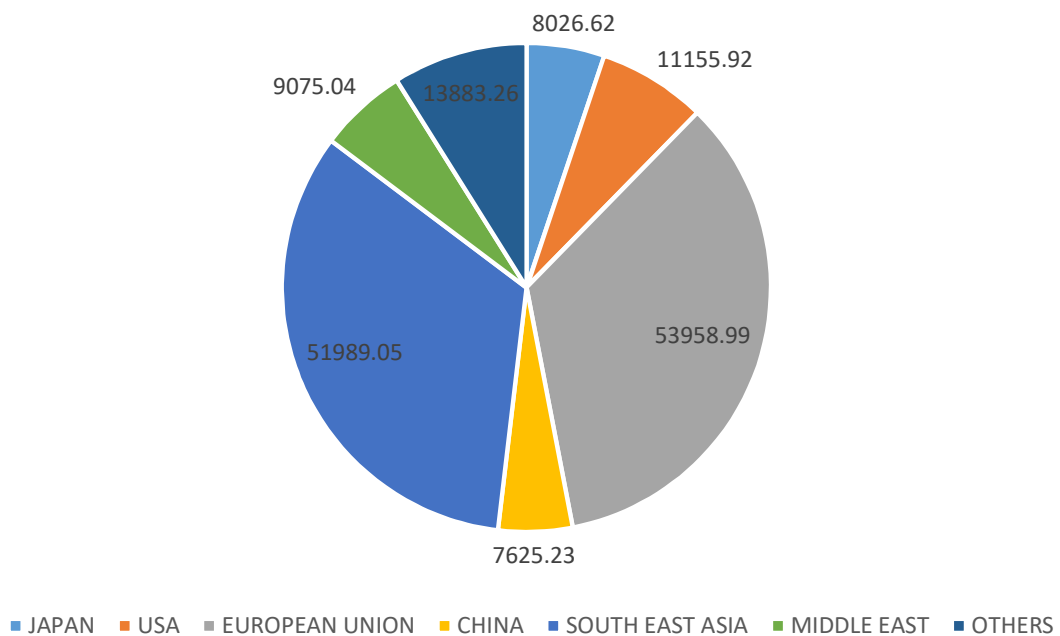


Figure 12.12c Market wise export of marine products from Kerala ports during 2012-13; (Quantity, MT)

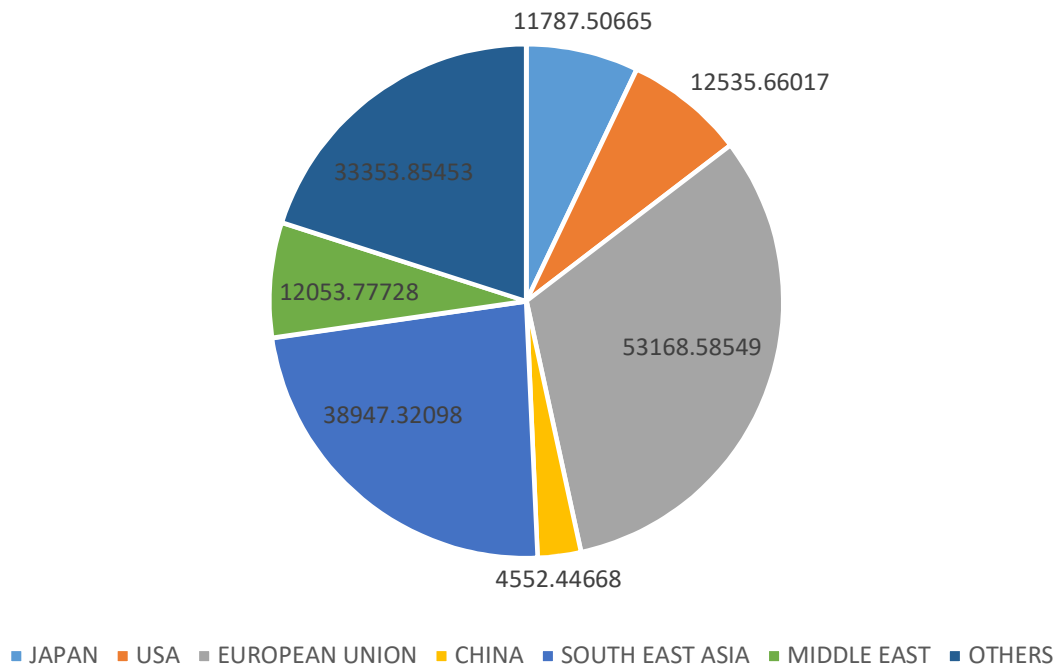


Figure 12.12d Market wise export of marine products from Kerala ports during 2013-14; (Quantity, MT)

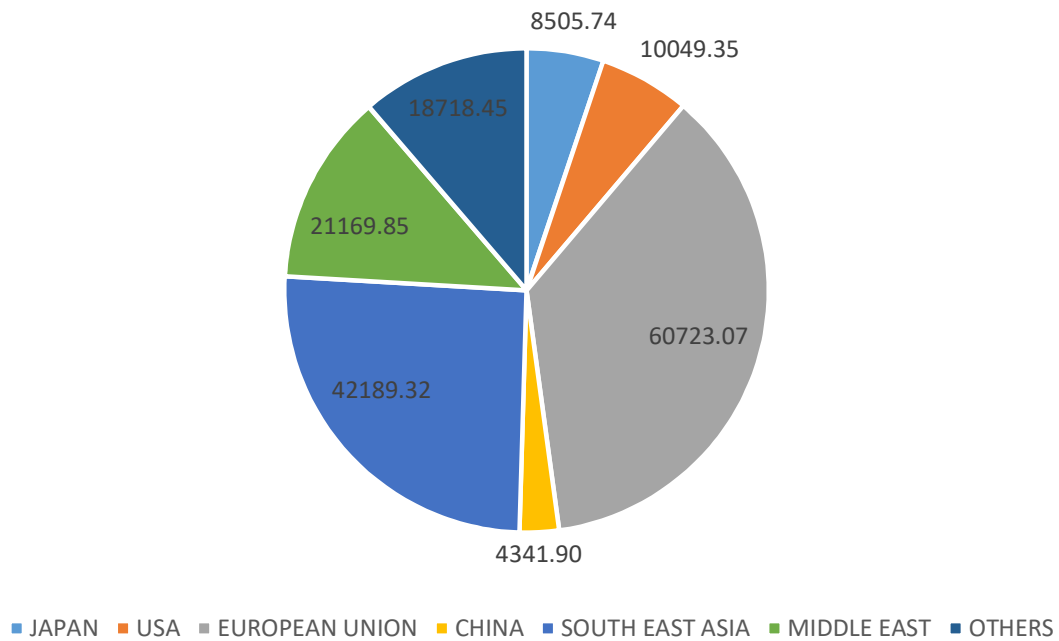


Figure 12.12e Market wise export of marine products from Kerala ports during 2014-15; (Quantity, MT)

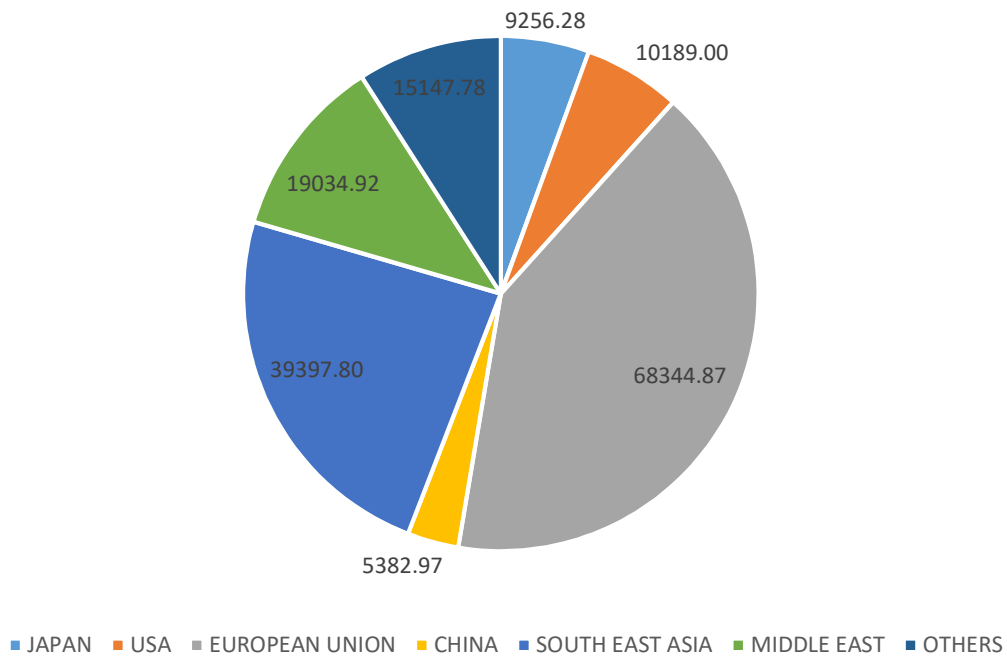


Figure 12.12f Market wise export of marine products from Kerala ports during 2015-16; (Quantity, MT)

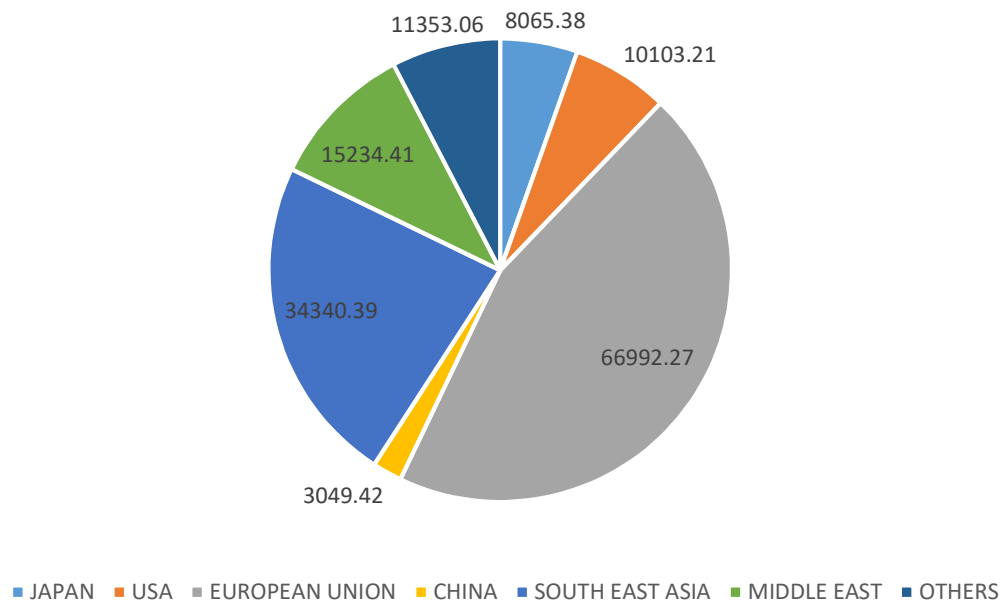


Figure 12.12g Market wise export of marine products from Kerala ports during 2016-17;(Quantity, MT)

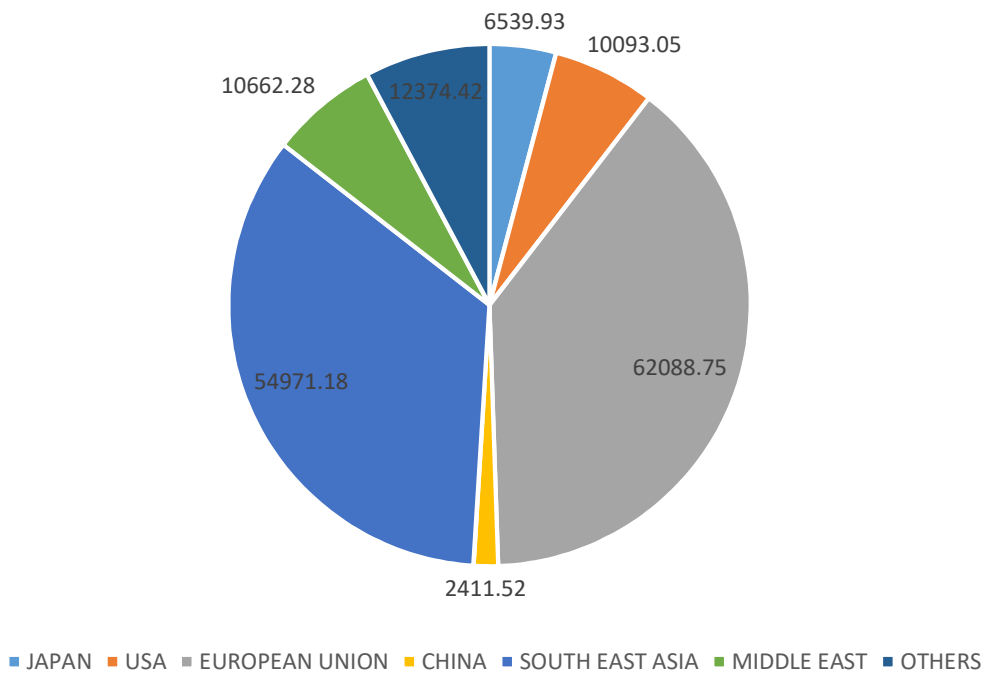


Figure 12.12h Market wise export of marine products from Kerala ports during 2017-18; (Quantity, MT)

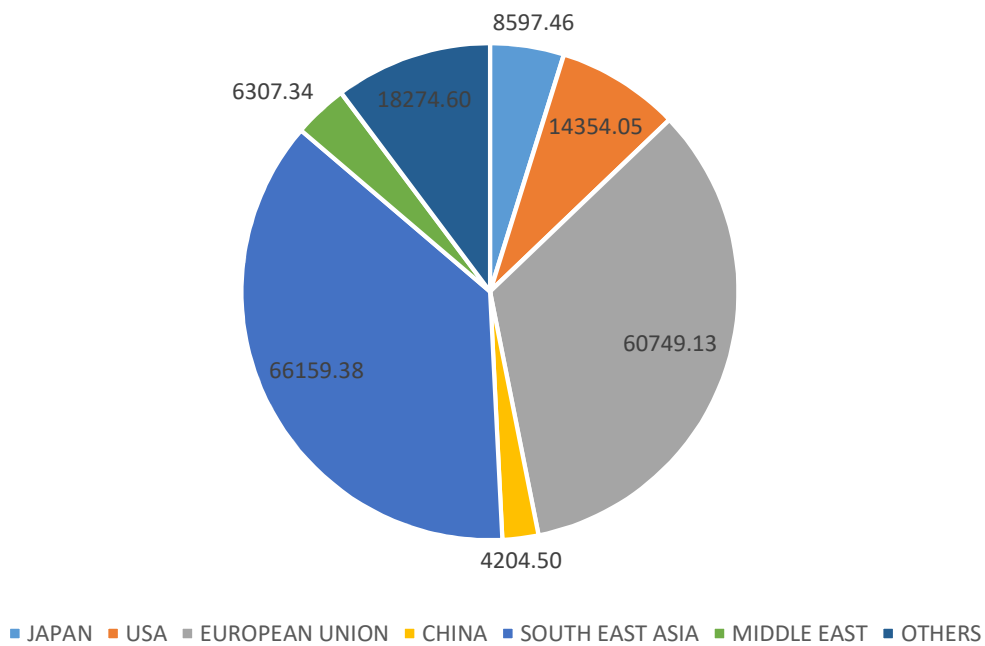


Figure 12.12i Market wise export of marine products from Kerala ports during 2018-19; (Quantity, MT)

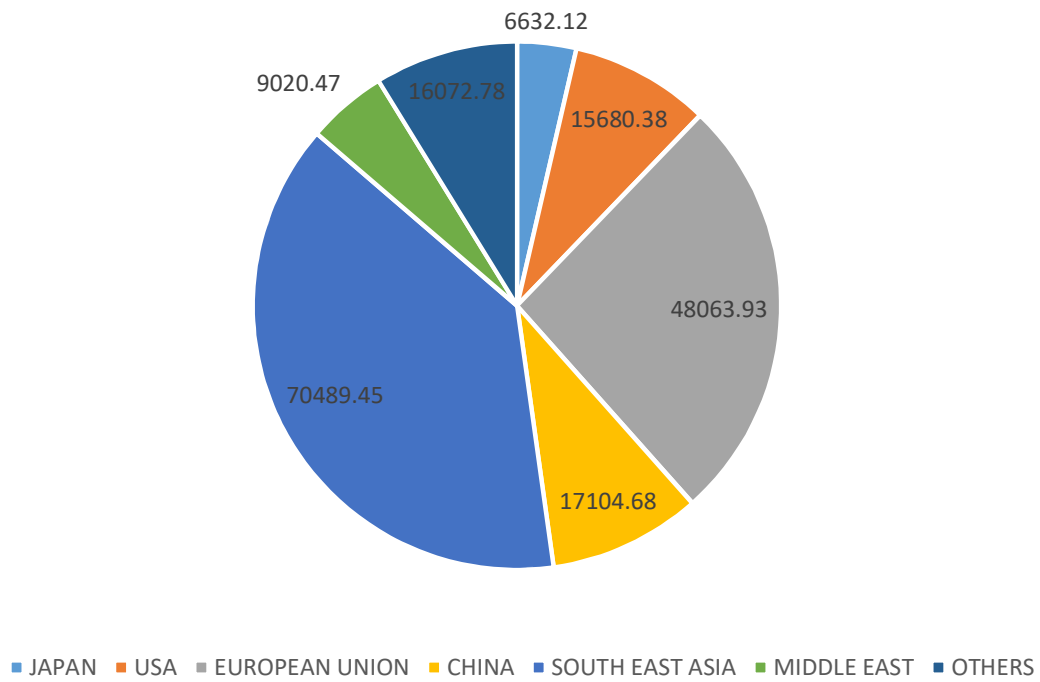


Figure 12.12j Market wise export of marine products from Kerala ports during 2019-20; (Quantity, MT)

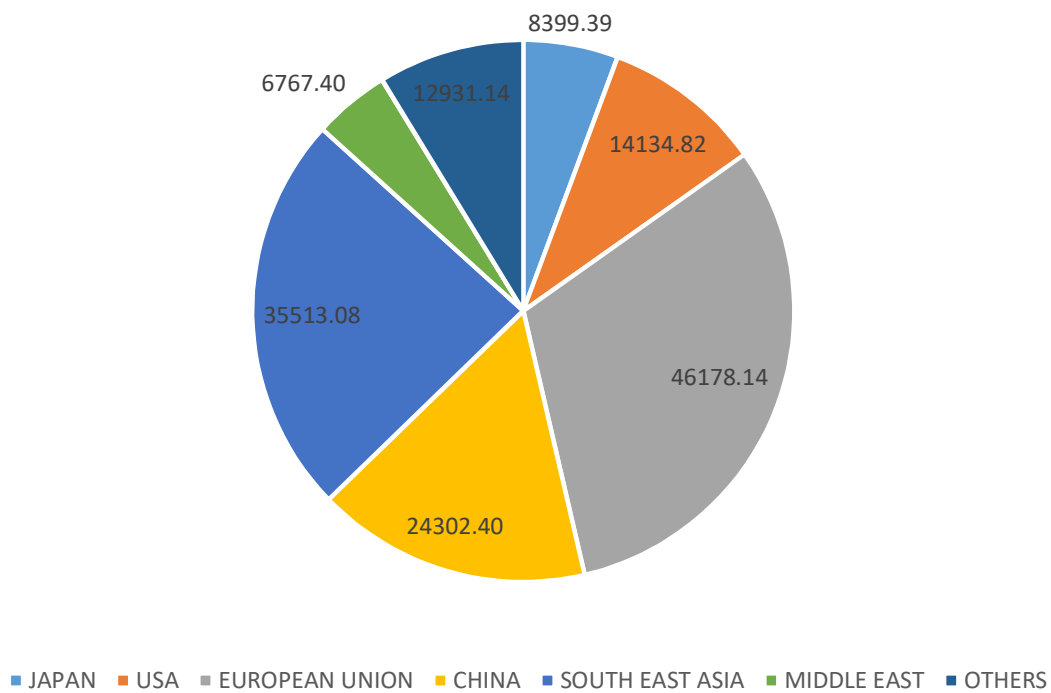


Table 12.14
Market wise export of marine products from Kerala ports (Value)

Sl. No.	Market	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		Total		Cumulative Average	
		Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%	Rs (Crores)	%
1	JAPAN	177.80	8.88	238.45	7.98	340.44	9.91	390.35	8.29	473.92	9.17	440.14	9.48	315.56	6.30	330.99	5.59	350.49	5.83	438.85	8.74	3496.984	7.79	349.70	7.79
2	USA	160.29	8.01	336.86	11.27	473.52	13.78	498.24	10.59	525.34	10.17	452.24	9.74	553.77	11.06	790.79	13.36	856.03	14.23	854.97	17.03	5502.04	12.25	550.20	12.25
3	EUROPEAN UNION	1055.50	52.1	1251.02	41.86	1367.24	39.79	1783.26	37.89	2191.39	42.42	2119.46	45.63	2145.61	42.84	2258.30	38.15	1878.65	31.23	1663.79	33.14	17714.22	39.45	1771.42	39.45
4	CHINA	163.39	8.16	142.08	4.75	124.97	3.64	160.08	3.40	129.77	2.51	133.25	2.87	89.90	1.79	140.17	2.37	559.92	9.31	714.93	14.24	2358.458	5.25	235.85	5.25
5	SOUTH EAST ASIA	215.28	10.75	610.95	20.44	500.57	14.57	981.74	20.86	890.53	17.24	758.16	16.32	1312.64	26.21	1838.31	31.06	1714.10	28.50	881.33	17.56	9703.612	21.61	970.36	21.61
6	MIDDLE EAST	80.74	4.03	182.16	6.10	251.08	7.31	436.26	9.27	465.49	9.01	370.68	7.98	293.37	5.86	208.17	3.52	316.79	5.27	164.13	3.27	2768.882	6.17	276.89	6.17
7	OTHERS	149.11	7.45	226.80	7.59	378.02	11.00	456.43	9.70	489.64	9.48	370.50	7.98	297.68	5.94	352.31	5.95	338.72	5.63	302.34	6.02	3361.553	7.49	336.16	7.49
	TOTAL	2002.10	100.00	2988.33	100.00	3435.85	100.00	4706.36	100.00	5166.08	100.00	4644.42	100.00	5008.54	100.00	5919.03	100.00	6014.70	100.00	5020.33	100.00	44905.74	100.00	4490.57	100.00



9	2			
	TOTAL	OTHERS	MIDDLE	EAST
	2002.10	149.11	80.74	
	100.00	7.45	4.03	
	2988.33	226.80	182.16	
	100.00	7.59	6.10	
	3435.85	378.02	251.08	
	100.00	11.00	7.31	
	4706.36	456.43	436.26	
	100.00	9.70	9.27	
	5166.08	489.64	465.49	
	100.00	9.48	9.01	
	4644.42	370.50	370.68	
	100.00	7.98	7.98	
	5008.54	297.68	293.37	
	100.00	5.94	5.86	
	5919.03	352.31	208.17	
	100.00	5.95	3.52	
	6014.70	338.72	316.79	
	100.00	5.63	5.27	
	5020.33	302.34	164.13	
	100.00	6.02	3.27	
	44905.74	3361.553	2768.882	
	100.00	7.49	6.17	
	4490.57	336.16	276.89	
	100.00	7.49	6.17	
	100.00	7.49	6.17	



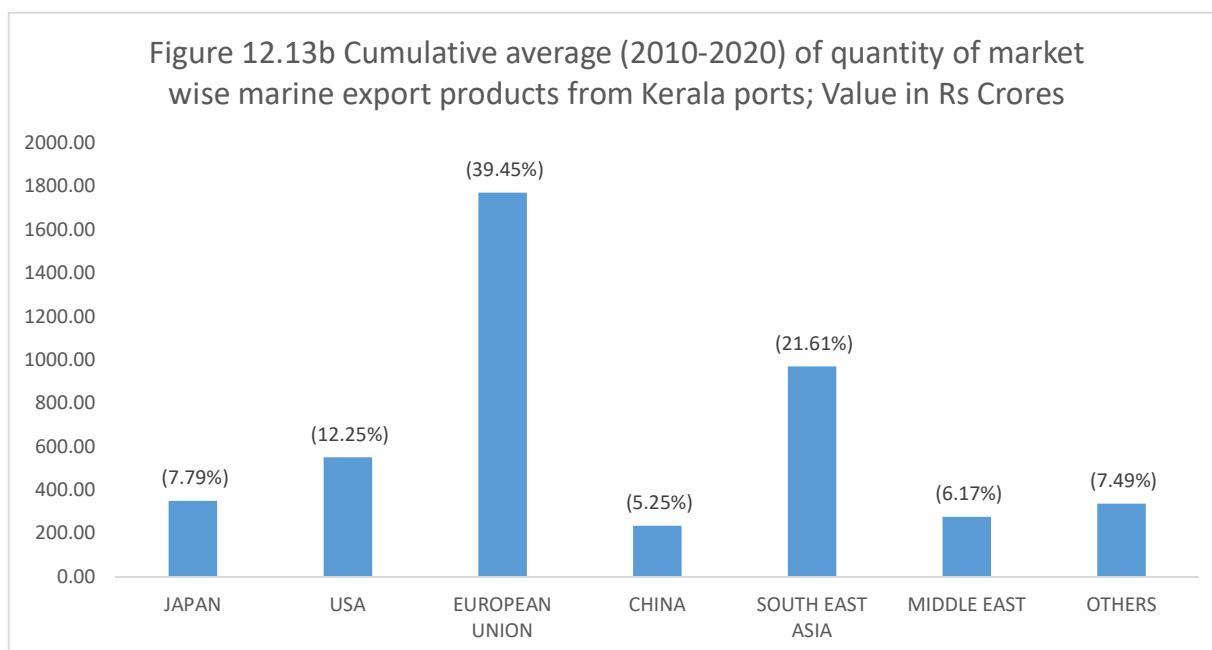
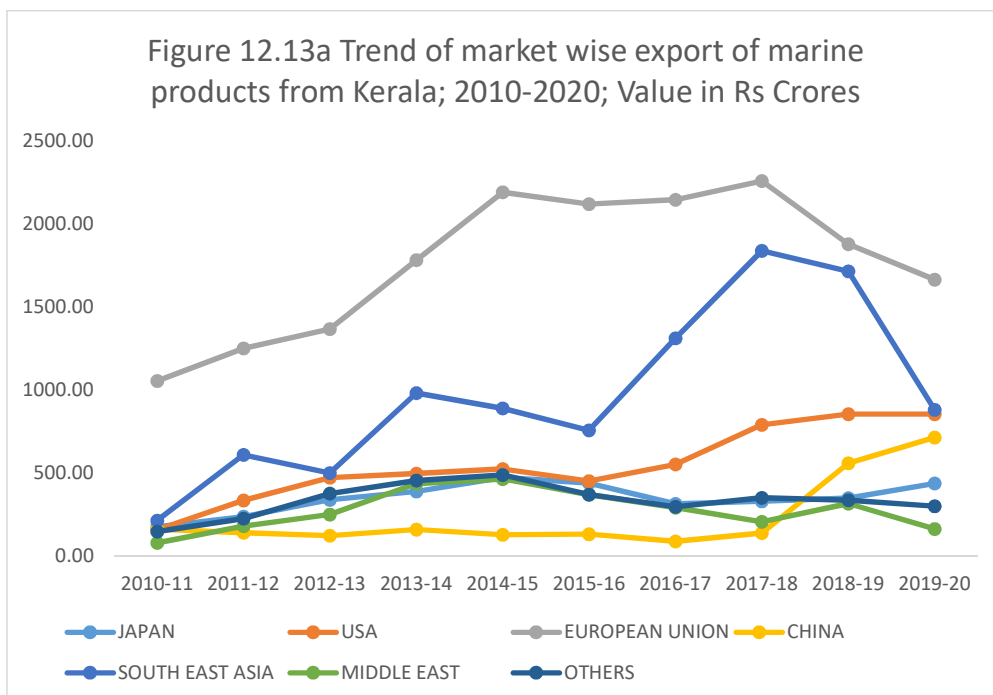


Figure 12.13c Market wise percentage share of marine export in value (Rs) from Kerala ports

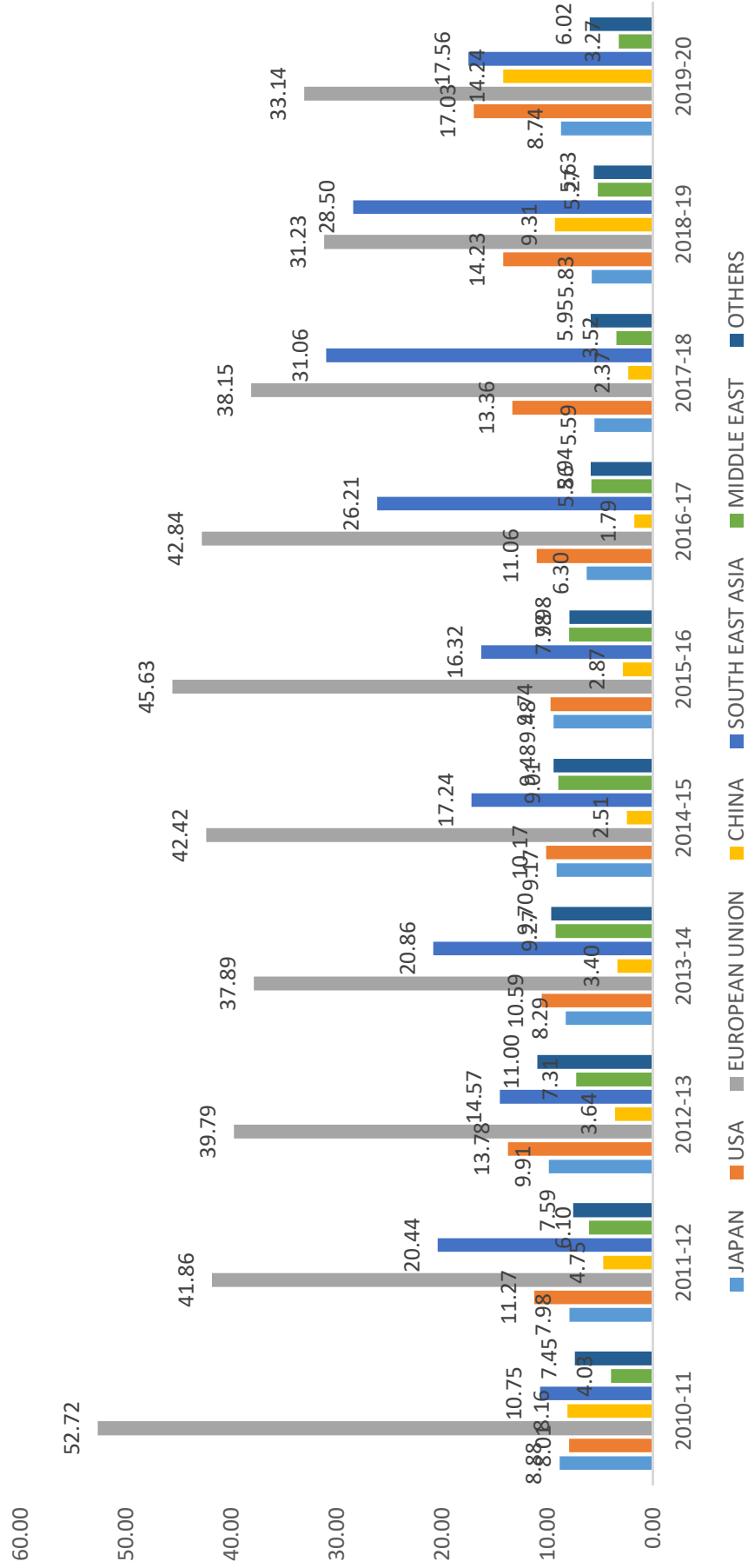


Figure 12.14d Market wise export of marine products from Kerala ports during 2010-11; (Value, Rs Crores)

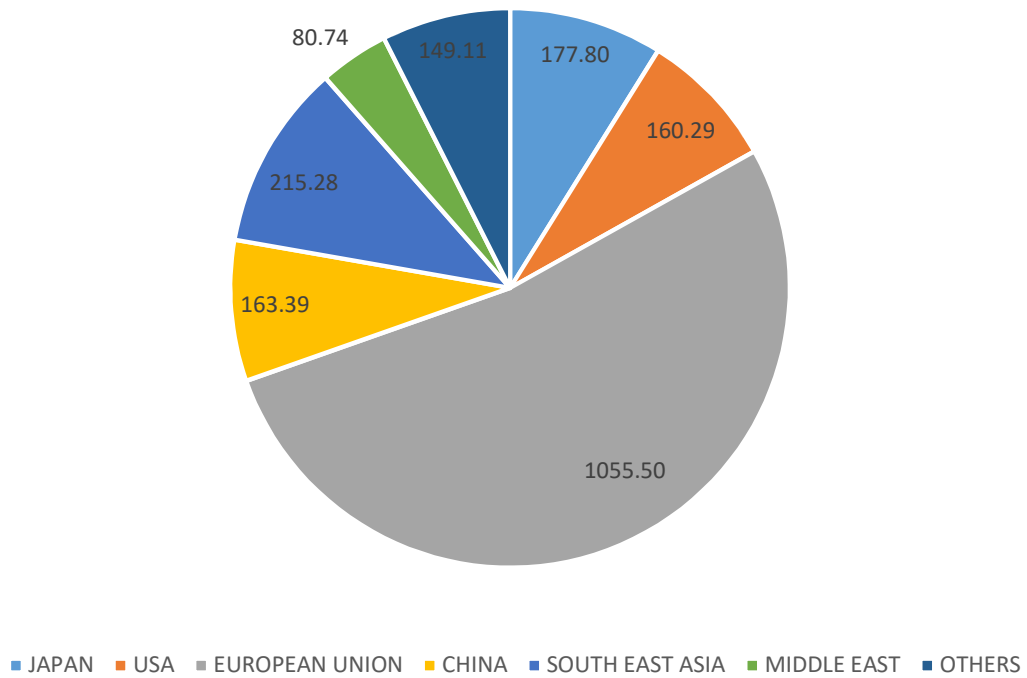


Figure 12.14e Market wise export of marine products from Kerala ports during 2011-12; (Value, Rs Crores)

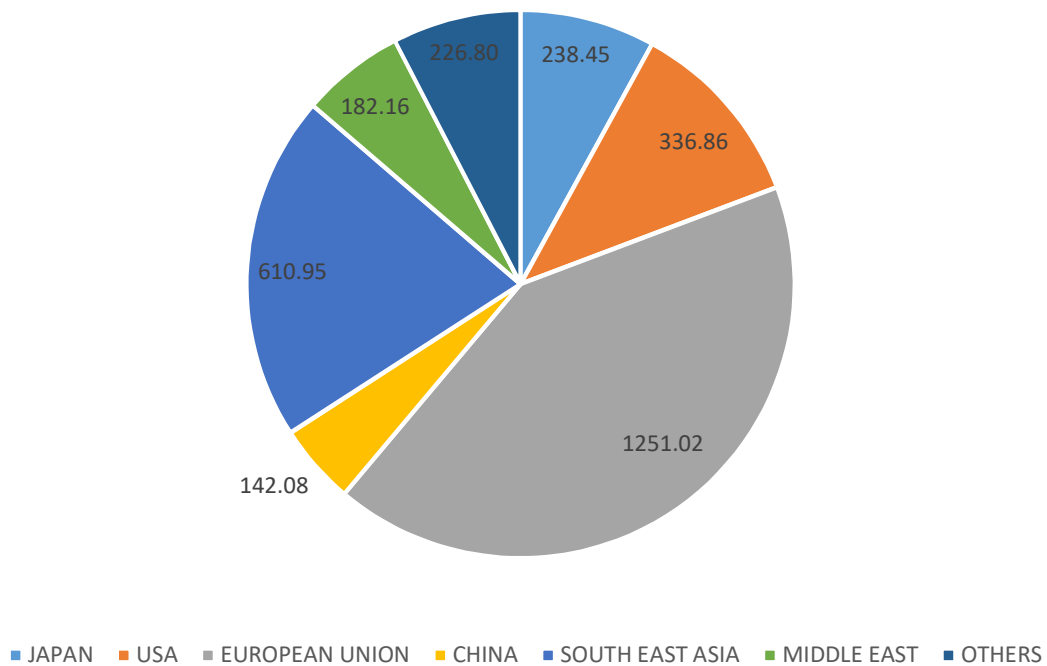


Figure 12.14f Market wise export of marine products from Kerala ports during 2012-13; (Value, Rs Crores)

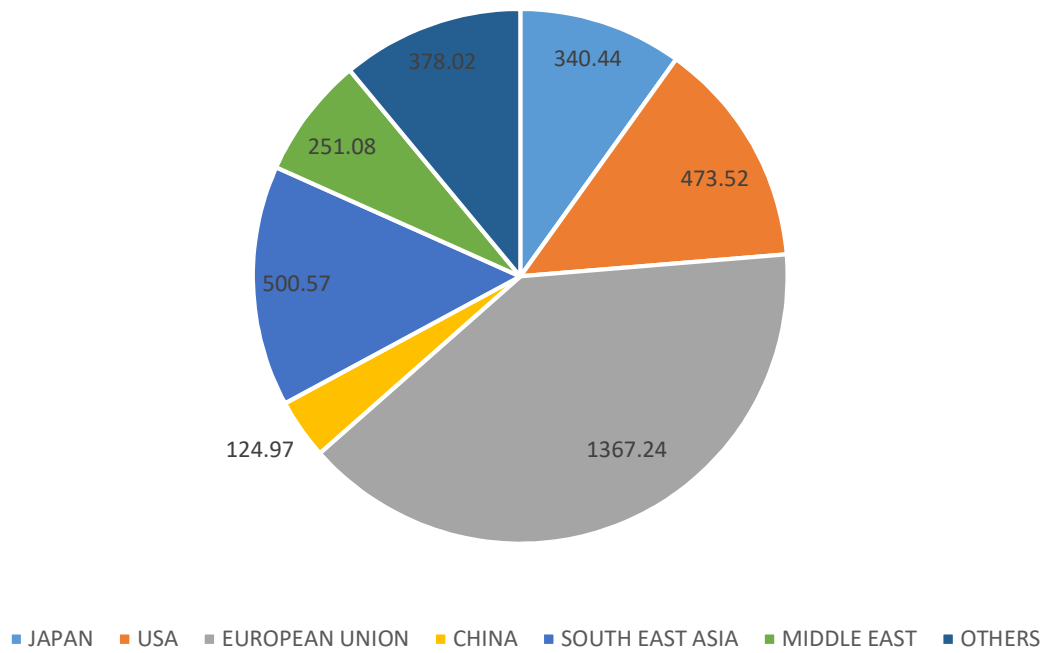


Figure 12.14g Market wise export of marine products from Kerala ports during 2013-14; (Value, Rs Crores)

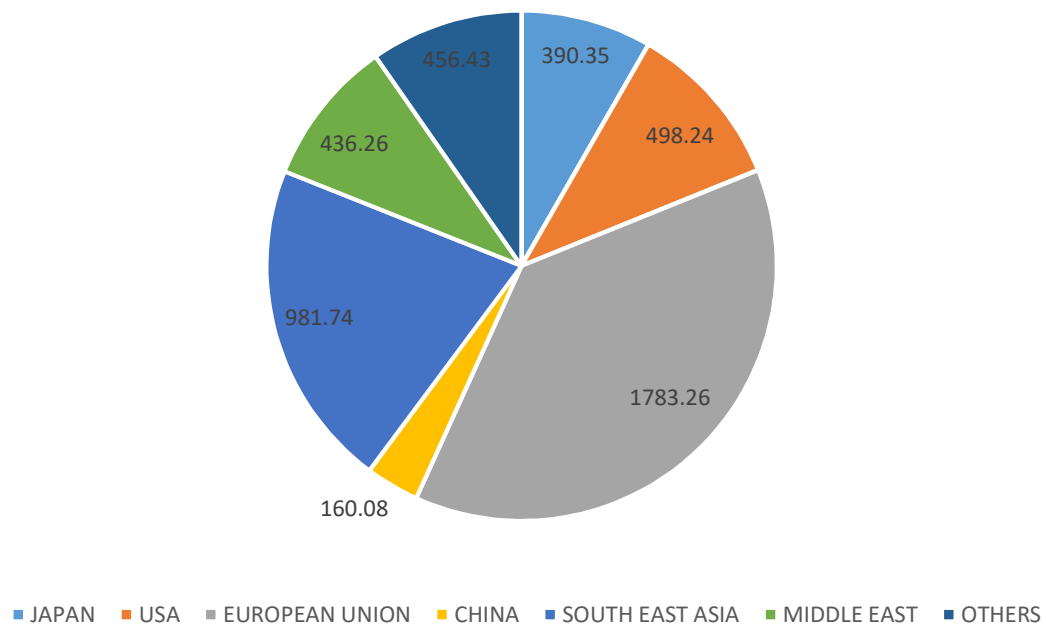


Figure 12.14h Market wise export of marine products from Kerala ports during 2014-15; (Value, Rs Crores)

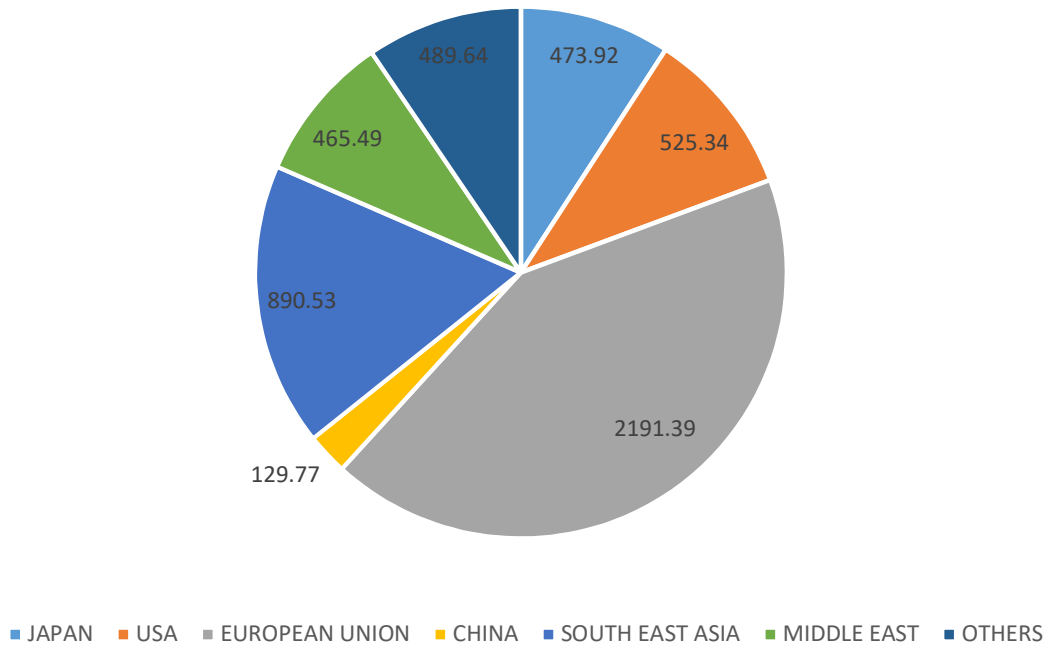


Figure 12.14i Market wise export of marine products from Kerala ports during 2015-16; (Value, Rs Crores)

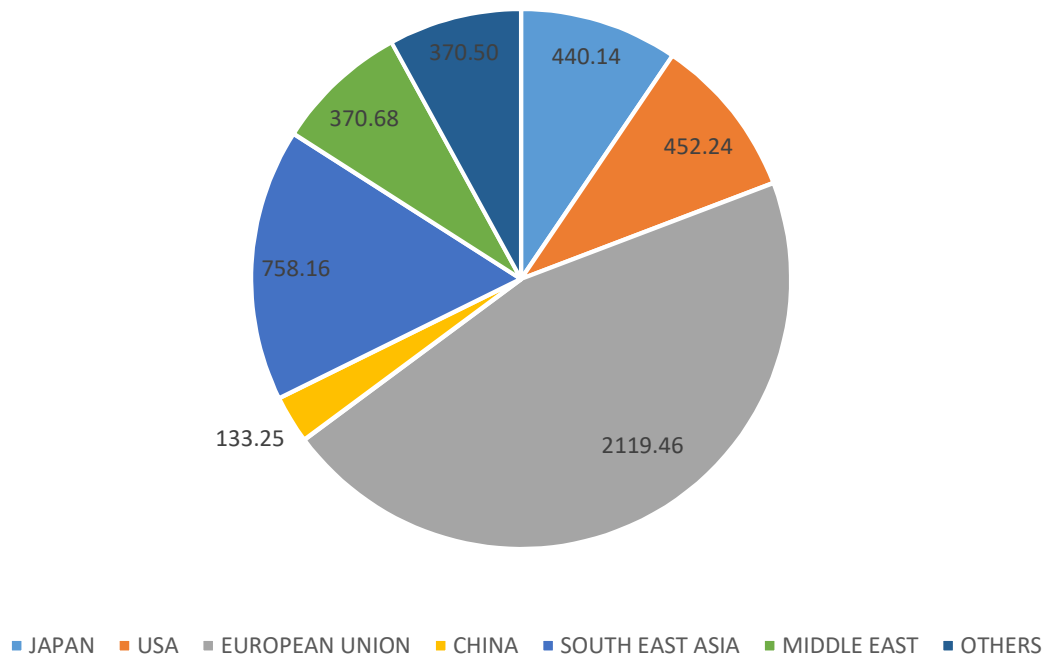


Figure 12.14j Market wise export of marine products from Kerala ports during 2016-17; (Value, Rs Crores)

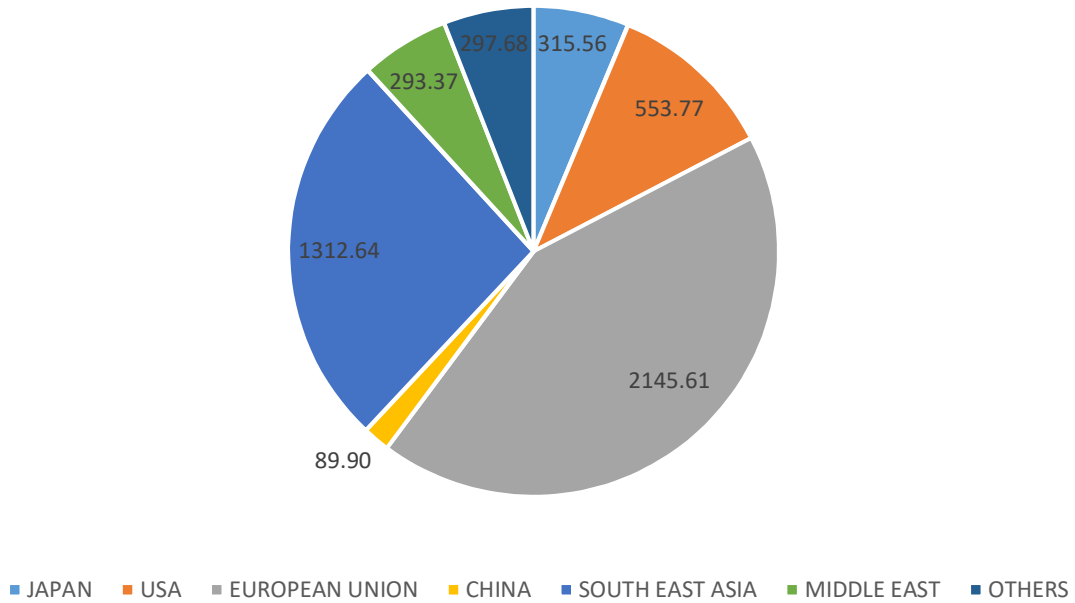


Figure 12.14j Market wise export of marine products from Kerala ports during 2017-18; (Value, Rs Crores)

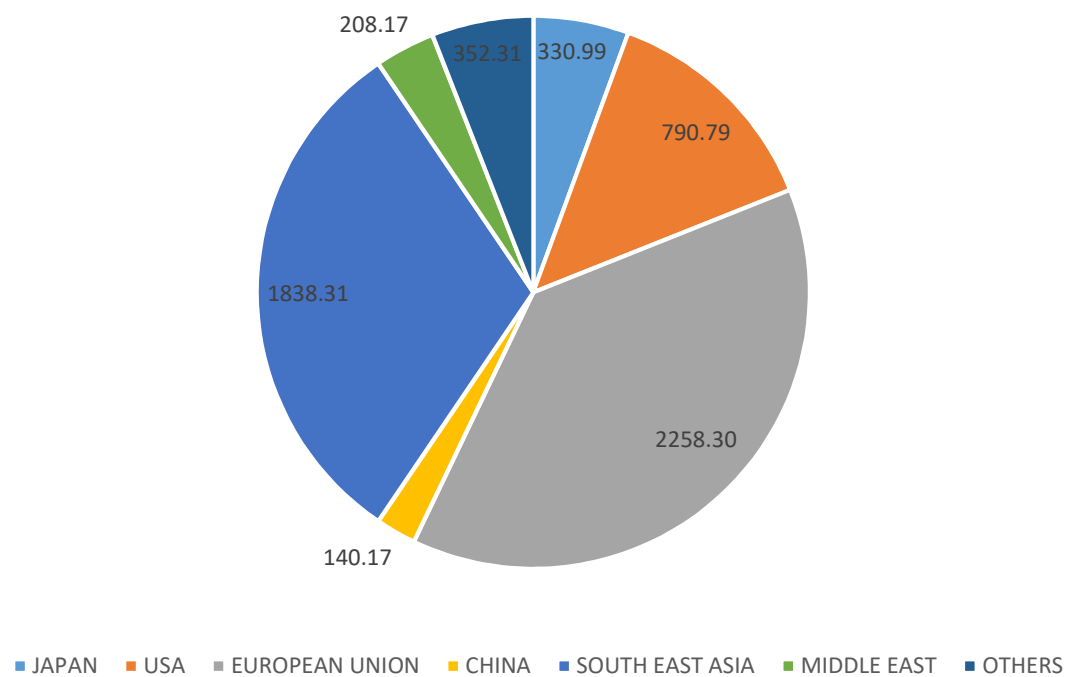


Figure 12.14k Market wise export of marine products from Kerala ports during 2018-19; (Value, Rs Crores)

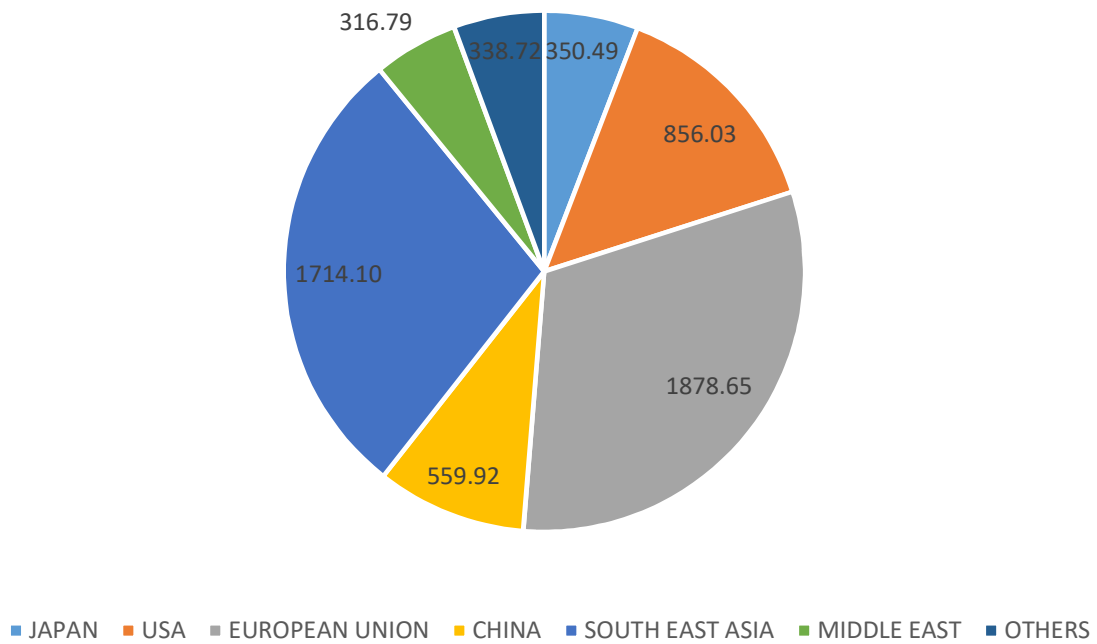
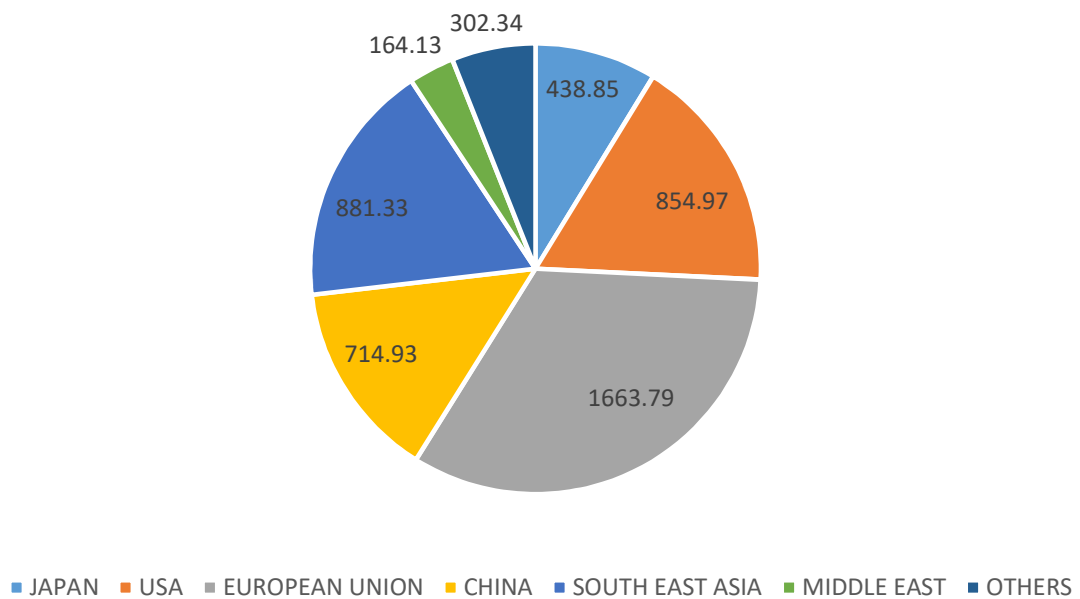


Figure 12.14l Market wise export of marine products from Kerala ports during 2019-20; (Value, Rs Crores)



(c) Port Wise Export of Marine Products from Kerala

- ❖ In Kerala, the principal channel through which export of marine products occurs is Kochi port.
- ❖ The Kochi port accounts the export of marine products by 97.88% in quantity; 96.6% in total value, when compared to Trivandrum (1.81% in quantity; 3.08% in total value) and Calicut ports (0.31% in quantity; 0.33% in total value).
- ❖ The export of marine products through Kochi port have increased both in quantity and total value (97.54% in 2010 to 98.52% in 2020 and 94.51% in 2010 to 97.69% in 2020 respectively) over the last decade.
- ❖ However, Trivandrum (2.35% in 2010 to 1.46% in 2020 in quantity; 5.27% in 2010 to 2.30% in total value) and Calicut (0.11% in 2010 to 0.01% in 2020 in quantity; 0.22% in 2010 to 0.01% in 2020 in total value) clearly marked a decline in export of marine products from Kerala during 2010 to 2020, implicating the fact that Kochi predominates in marine product's export both in quantity and total value among the three ports of Kerala.



Table 12.15
Kerala port-wise export of marine products (Quantity)

Sl. No.	Ports	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16		2016-17		2017-18		2018-19		2019-20		Total		Cumulative Average	
		MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%	MT	%
1	Kochi	121550.44	97.54	152444.60	97.90	162109.36	97.42	160797.94	97.04	162818.38	97.64	145193.27	155988.59	98.02	176090.49	98.57	180457.14	98.58	146037.61	98.52	1563487.82	97.88	1563487.8	97.88	
2	Trivandrum	2931.80	2.35	2866.73	1.84	3130.97	1.88	3179.81	1.92	2955.20	1.77	3664.99	2946.73	1.85	2506.18	1.40	2606.19	1.42	2167.50	1.46	28956.10	1.81	2895.61	1.81	
3	Calicut	132.48	0.11	402.78	0.26	1158.82	0.70	1719.94	1.04	980.05	0.59	279.88	205.79	0.13	49.78	0.03	0.49	0.00	21.26	0.01	4951.26	0.31	495.13	0.31	
	Total	124614.72	100.00	155714.10	100.00	166399.15	100.00	165697.69	100.00	166753.62	100.00	149138.14	159141.12	100.00	178646.45	100.00	183063.82	100.00	148226.36	100.00	1597395.18	100.00	1597395.2	100.00	



Figure 12.15a Trend of port wise export of marine products from Kerala; 2010-2020; Quantity in MT

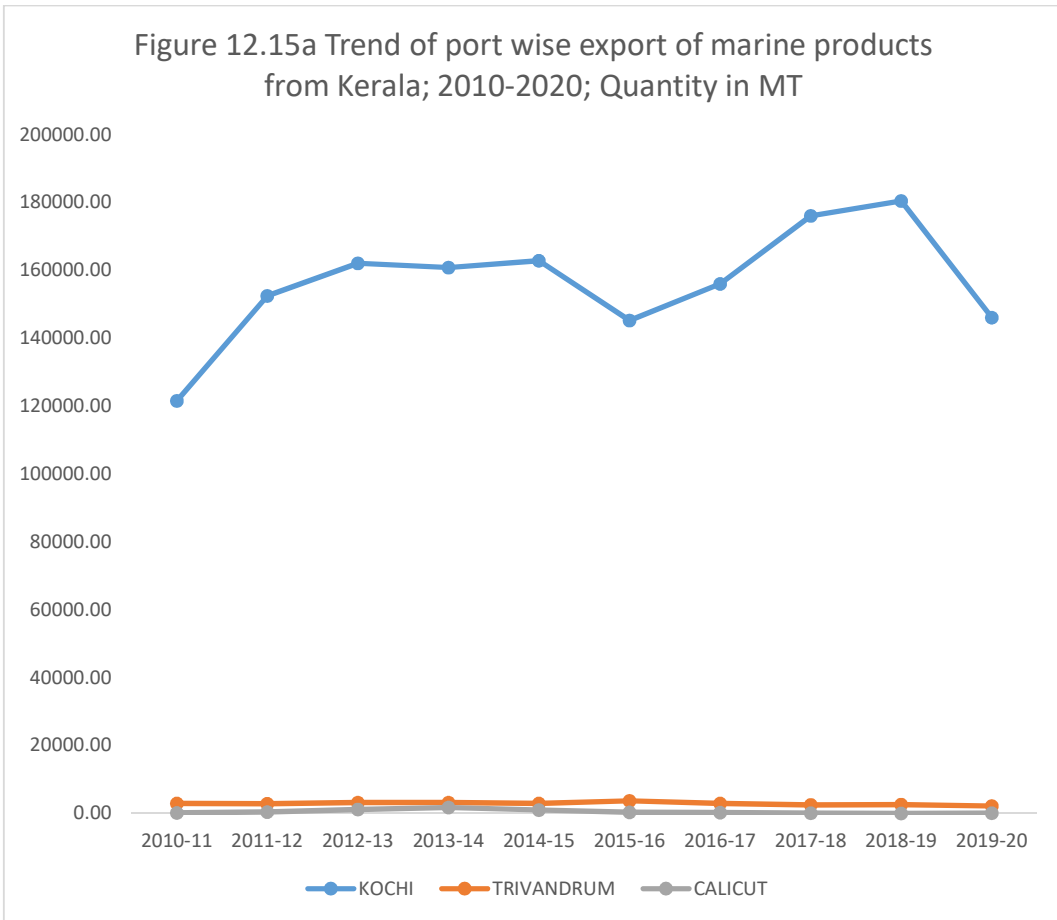


Figure 12.15b Cumulative average (2010-2020) of quantity of port wise marine export products from Kerala ports; Quantity in MT

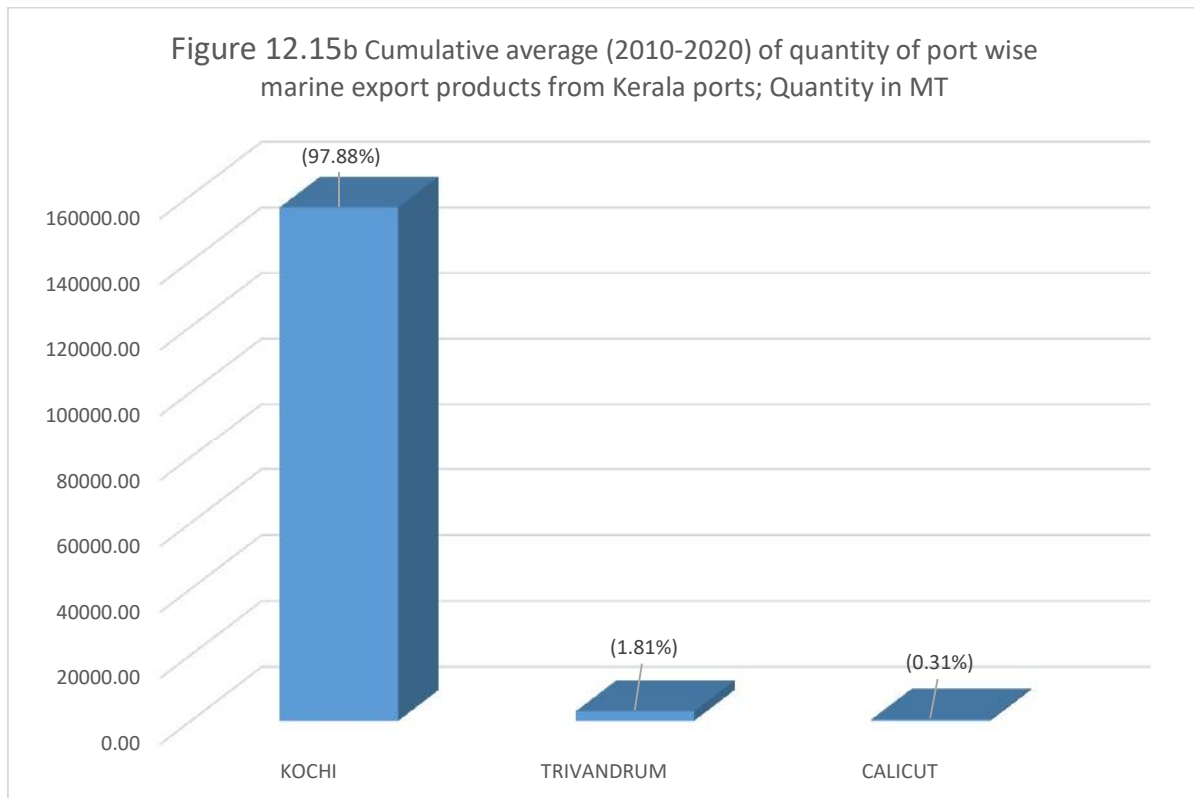


Figure 12.15c Port wise percentage share of marine export in quantity from Kerala

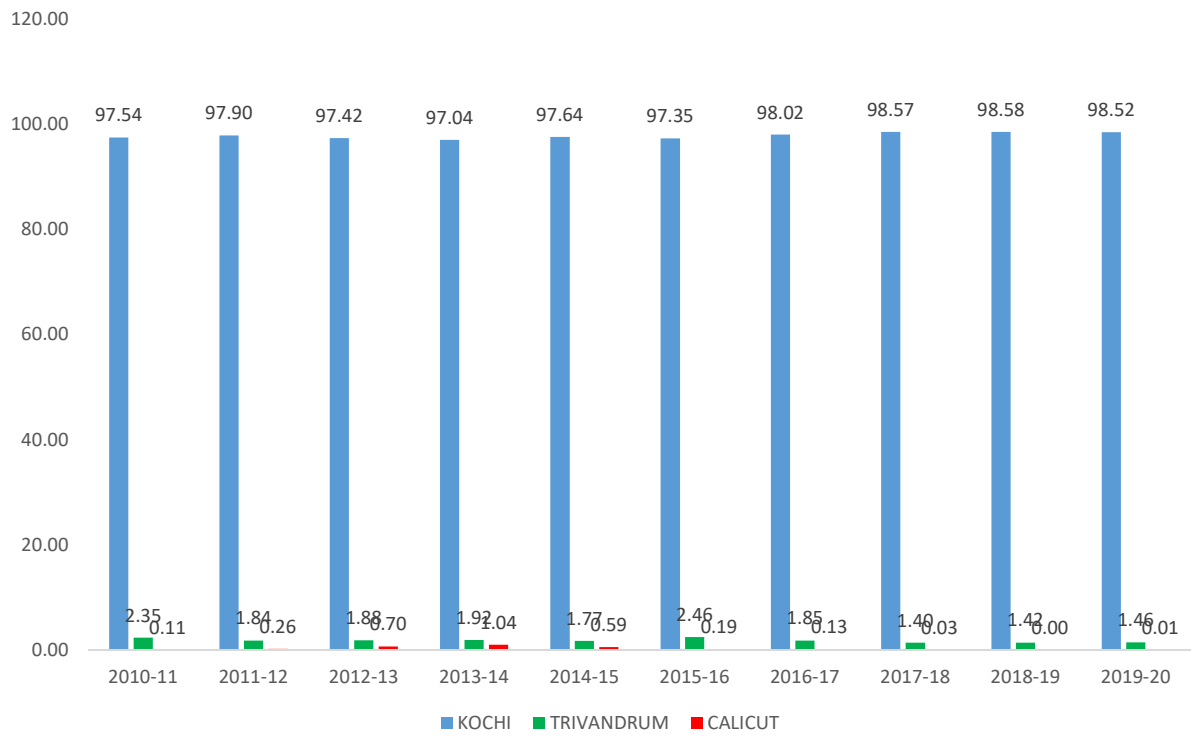


Figure 12.16a Trend of port wise export of marine products from Kerala; 2010-2020; Value in Rs Crores

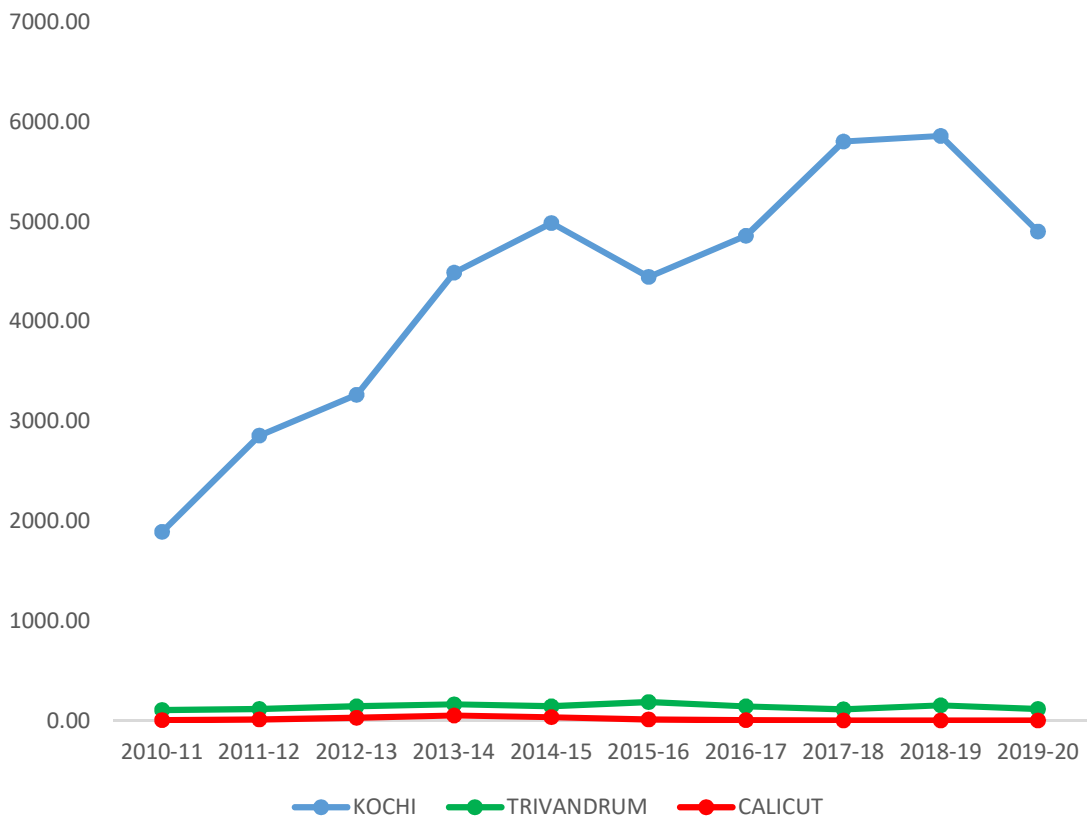


Figure 12.16b Cumulative average (2010-2020) of value of port wise marine export products from Kerala; Value in Rs. Crores

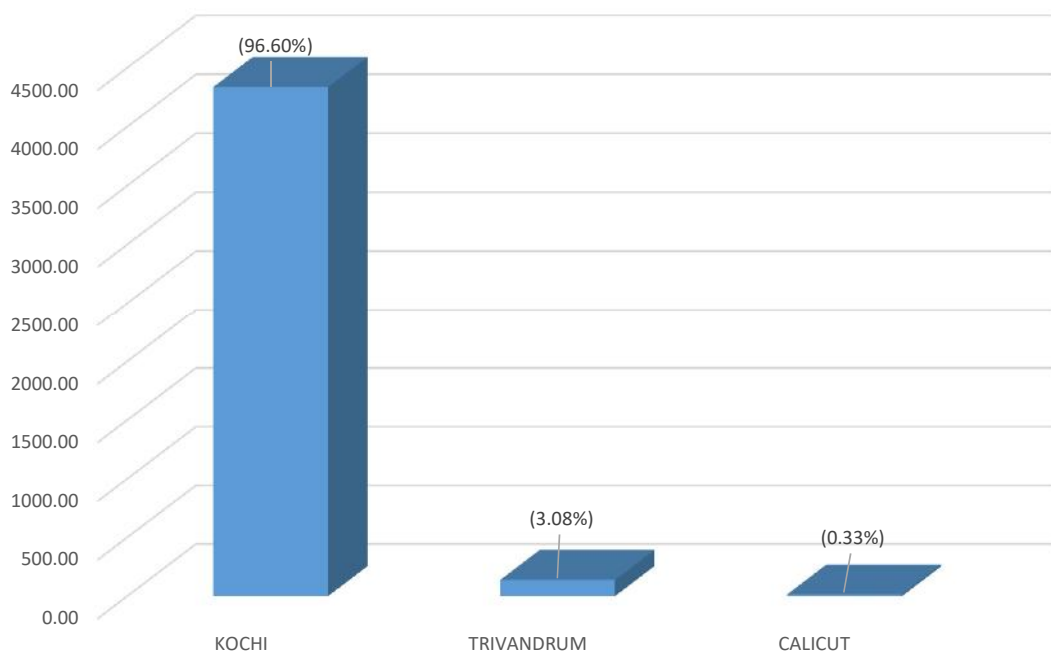
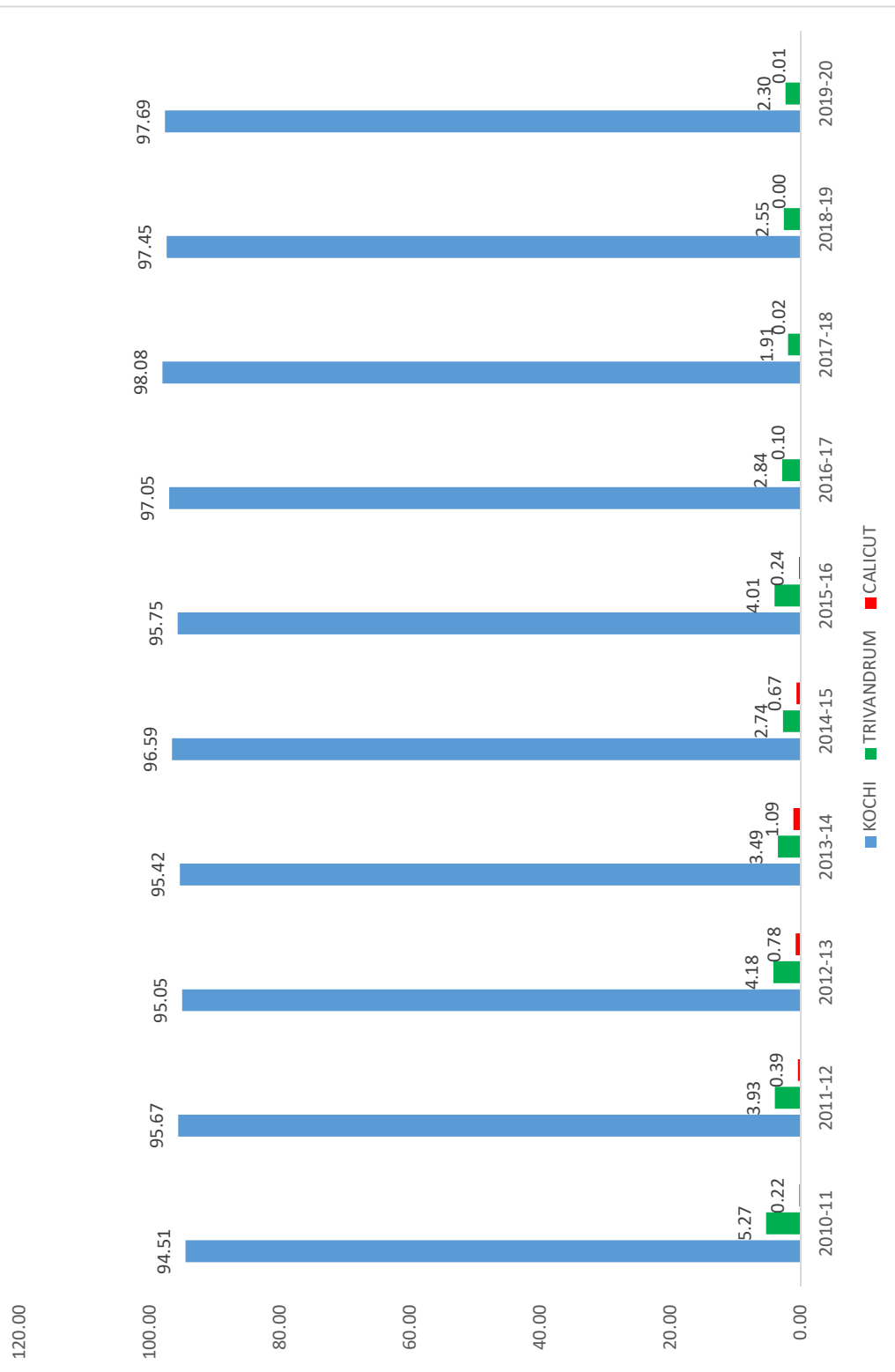


Figure 12.16c Port wise percentage share of marine export in value from Kerala



PART II

Marine Product's Export Trend in Kerala (Analysis of 25 Years Data)

For understanding the marine product's export trend from Kerala, it has significantly increased over the last 25 years (1995- 2020) in both quantity (14.39% during 1995-2000 to 27.81% during 2015-2020) and total value (7.54% during 1995-2000 to 42.66% during 2015 to 2020).

Table 12.17

Trend of export from Kerala; 1995-2020;Quantity in MT

Year	Ports			
	Kochi	Trivandrum	Calicut	Total
1995-96	78681.79	213.58	0.00	78895.36
1996-07	91616.15	672.40	0.00	92288.54
1997-98	88707.83	657.73	0.00	89365.56
1998-99	69990.61	650.72	0.00	70641.33
1999-00	91543.16	604.53	0.00	92147.69
Total	420539.54	2798.95	0.00	423338.49
2000-01	88355.00	497.00	0.00	88852.00
2001-02	72035.00	721.00	0.00	72756.00
2002-03	80373.00	1019.93	0.00	81392.93
2003-04	75761.00	866.00	4.00	76631.00
2004-05	86291.09	1039.89	46.72	87377.70
Total	402815.09	4143.83	50.72	407009.64
2005-06	95736.80	1500.74	73.24	97310.79
2006-07	106454.01	2123.27	39.65	108616.93
2007-08	98519.77	1784.12	14.11	100318.00
2008-09	98536.86	2209.28	33.42	100779.56
2009-10	104280.59	2984.54	28.01	107293.14
Total	503528.04	10601.95	188.43	514318.42
2010-11	121550.44	2931.80	132.48	124614.72
2011-12	152444.60	2866.73	402.78	155714.10
2012-13	162109.36	3130.97	1158.82	166399.15
2013-14	160797.94	3179.81	1719.94	165697.69
2014-15	162818.38	2955.20	980.05	166753.62
Total	759720.71	15064.50	4394.07	779179.28
2015-16	145193.27	3664.99	279.88	149138.14
2016-17	155988.59	2946.73	205.79	159141.12
2017-18	176090.49	2506.18	49.78	178646.45
2018-19	180457.14	2606.19	0.49	183063.82
2019-20	146037.61	2167.50	21.26	148226.36
Total	803767.10	13891.60	557.19	818215.90



Figure 12.17a Trend of export from Kerala; 1995-2020; Quantity in

MT

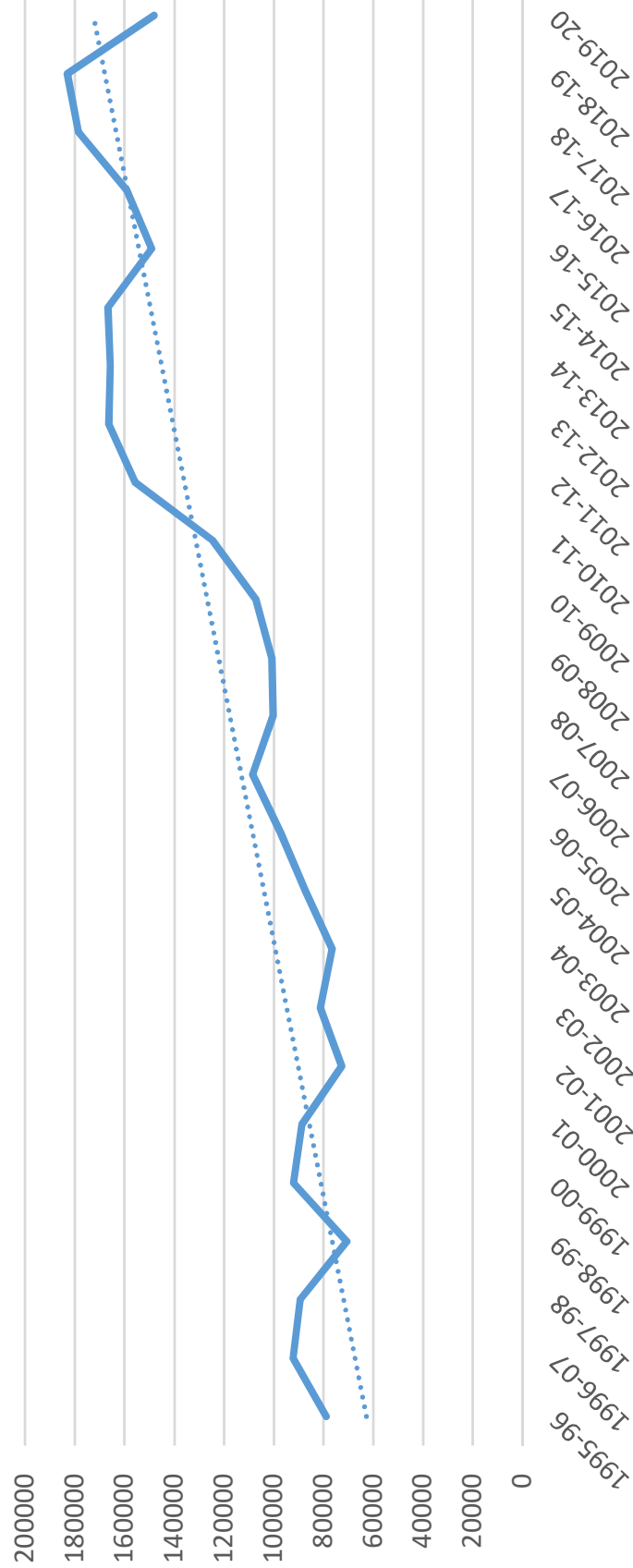
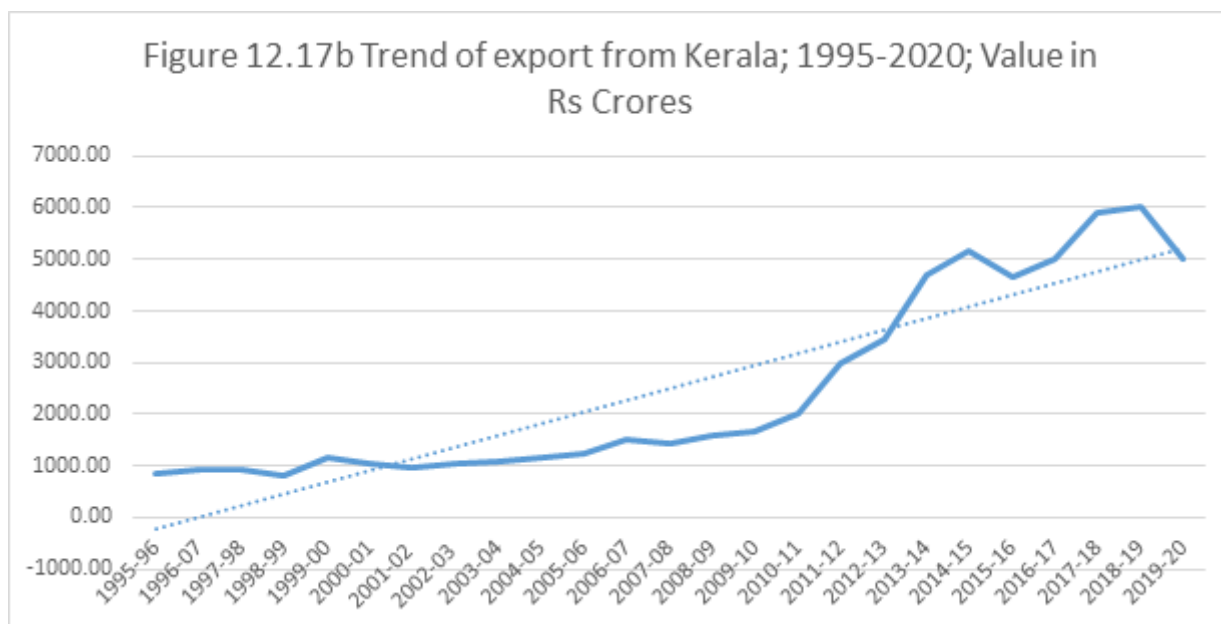


Table 12.18
Trend of export from Kerala; 1995-2020; Value in Rs Crores

Year	Ports			Total
	Kochi	Trivandrum	Calicut	
1995-96	853.76	3.14	0.00	856.90
1996-07	925.71	10.51	0.00	936.22
1997-98	937.96	10.07	0.00	948.03
1998-99	807.99	8.56	0.00	816.55
1999-00	1137.08	9.88	0.00	1146.96
Total	4662.51	42.16	0.00	4704.67
2000-01	1033.65	12.82	0.00	1046.47
2001-02	930.87	19.68	0.00	950.55
2002-03	1022.22	23.60	0.00	1045.82
2003-04	1077.11	22.02	0.02	1099.15
2004-05	1135.70	21.70	0.67	1158.07
Total	5199.55	99.82	0.69	5300.06
2005-06	1218.97	37.58	1.10	1257.65
2006-07	1476.51	47.04	0.56	1524.12
2007-08	1383.74	46.73	0.47	1430.94
2008-09	1504.98	66.16	1.03	1572.18
2009-10	1576.19	92.66	1.16	1670.02
Total	7160.39	290.17	4.33	7454.90
2010-11	1892.14	105.61	4.36	2002.10
2011-12	2859.02	117.54	11.77	2988.33
2012-13	3265.64	143.56	26.65	3435.85
2013-14	4491.03	164.19	51.14	4706.36
2014-15	4989.86	141.56	34.66	5166.08
Total	17497.70	672.45	128.57	18298.72
2015-16	4447.05	186.02	11.35	4644.42
2016-17	4860.98	142.41	5.15	5008.54
2017-18	5805.11	112.76	1.15	5919.03
2018-19	5861.55	153.14	0.01	6014.70
2019-20	4904.49	115.50	0.35	5020.33
Total	25879.18	709.83	18.01	26607.02





PART III

Export of Marine Products from Kerala: A Comprehensive Assessment

Broadly, a large number of marine item are exporting from Kerala. For obtaining a comprehensive picture the item wise distribution of export during 2019-20 to 2020-21 was collected (Annuxure

Table 12.19
ITEM WISE EXPORT OF MARINE PRODUCTS FROM KERALA

SI No	Item Name	2019-20			2020-21		
		Qty. Tons	Value Rs.Crore	U S \$ (Mln)	Qty. Tons	Value Rs.Crore	U S \$ (Mln)
	LIVE LOBSTER	122	23.45	3.35	17	3.36	0.46
	CHILLED FISH	939	34.54	4.97	32	1.35	0.19
	FR. TUNA (YELLOW FIN)	1,900	29.14	4.18	838	9.12	1.25
	FR. TUNA (SKIP JACK)	4,318	36.26	5.23	1,889	16.36	2.24
	FR. TUNA (LOINS)	1,090	32.81	4.68	497	9.55	1.31
	FROZEN YELLOW FIN TUNA WHOLE ROUND IQF	2,468	32.67	4.59	2,702	31.12	4.20
	FR.TUNA WHOLE ROUND(SKIPJACK)	5,869	48.84	6.88	14,821	121.20	16.48
	FR RIBBONFISH WHOLE	1,415	28.16	4.00	249	4.17	0.58
	FR MACKEREL WHOLE	2,999	40.54	5.75	5,498	87.63	12.02
	DRIED SHRIMP/PRAWN	88	22.97	3.32	46	8.66	1.19
	FR BAIGAI WHOLE	3,299	51.11	7.41	1,813	27.21	3.70

	IQF PUD SHRIMP	725	27.87	3.98	647	27.29	3.74
	IQF PD TAIL ON SHRIMP	671	38.34	5.51	358	20.23	2.77
	IQF COOKED SALAD SHRIMP	354	29.02	4.15	12	0.87	0.11
	IQF BLANCHED PUD SHRIMP	2,300	79.60	11.38	2,085	74.97	10.26
	IQF COOKED PD TAIL ON SHRIMP	4,166	265.89	37.85	5,524	396.76	54.07
	IQF COOKED PUD SHRIMP	1,558	57.41	8.20	1,327	53.76	7.36
	IQF PD T OFF VANNAMEI SHRIMP	667	33.08	4.70	1,137	61.88	8.50
	IQF COOKED PD T OFF VANNAMEI SHRIMP	2,764	153.88	22.00	4,249	252.20	34.42
	FR. SHRIMP (HEADON, TAILON BODY PEELED)	1,333	34.14	4.92	912	21.74	2.94
	FR PV PD SHRIMP	350	19.93	2.84	288	17.40	2.39
	FR HL SO VANNAMEI SHRIMP	11,555	428.83	61.41	11,658	470.13	63.58
	FR PUD BROWN SHRIMP - TRAY PACK	969	41.85	5.97	878	41.10	5.59
	FR PD PV VANNAMEI SHRIMP	722	41.23	5.86	876	56.14	7.57
	FR PUD VANNAMEI SHRIMP	2,322	98.36	14.05	3,000	131.08	17.94
	AFD SHRIMP (FROZEN DRIED SHRIMP) WILD	881	233.48	33.30	158	57.92	7.84
	IQF COOKED PD VANNAMEI	319	20.87	2.97	624	43.03	5.85
	FROZEN SEA WATER PD SHRIMPS	1,423	71.93	10.32	1,217	64.21	8.70
	FR. PUD SEA CAUGHT SHRIMP	2,344	97.70	13.82	1,862	88.40	12.00
	FR. RAW PUD KARIKADI/POOVALAN SHRIMP	1,834	75.83	10.87	1,806	81.68	11.11
	FR PUD SEA WATER SHRIMP	5,676	246.76	35.49	3,469	154.87	21.11
	FR PUD DEEP SEA SHRIMP	2,341	82.98	11.85	2,889	104.61	14.34
	FR. CUTTLEFISH WHOLE	7,344	212.47	30.15	5,063	126.52	17.28
	FR. CUTTLEFISH WHOLE CLEANED	5,262	192.76	27.53	5,677	204.10	27.81
	FR. CUTTLEFISH (WHOLE ROUND)	1,719	45.57	6.47	1,167	28.17	3.87
	IQF CUTTLEFISH (WHOLE CLEANED)	2,530	89.52	12.82	1,811	69.34	9.50
	IF CUTTLEFISH WHOLE CLEANED	6,505	227.89	32.42	3,090	100.72	13.69
	FR. SQUID WHOLE	13,821	402.52	57.27	11,234	428.52	58.65
	FR. SQUID (WHOLE CLEANED)	2,601	75.60	10.78	3,134	110.93	15.15
	FROZEN SQUID WHOLE ROUND	1,715	48.35	6.86	1,052	38.43	5.26
	IQF SQUID RINGS (BLANCHED)	1,168	31.77	4.54	975	29.15	3.98
	IF SQUID WHOLE CLEANED	1,018	26.14	3.72	1,596	52.29	7.12



FROZEN OCTOPUS	5,806	120.45	17.18	3,767	82.86	11.33
FROZEN OCTOPUS (WHOLE CLEANED)	1,203	29.75	4.26	1,699	41.70	5.70
FR. BABY OCTOPUS WHOLE CLEANED	837	22.36	3.19	777	20.61	2.83
FR OCTOPUS (WHOLE ROUND)	1,439	29.35	4.19	831	18.59	2.53
AGAR AGAR	121	13.80	1.96	94	11.49	1.56

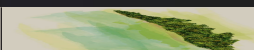
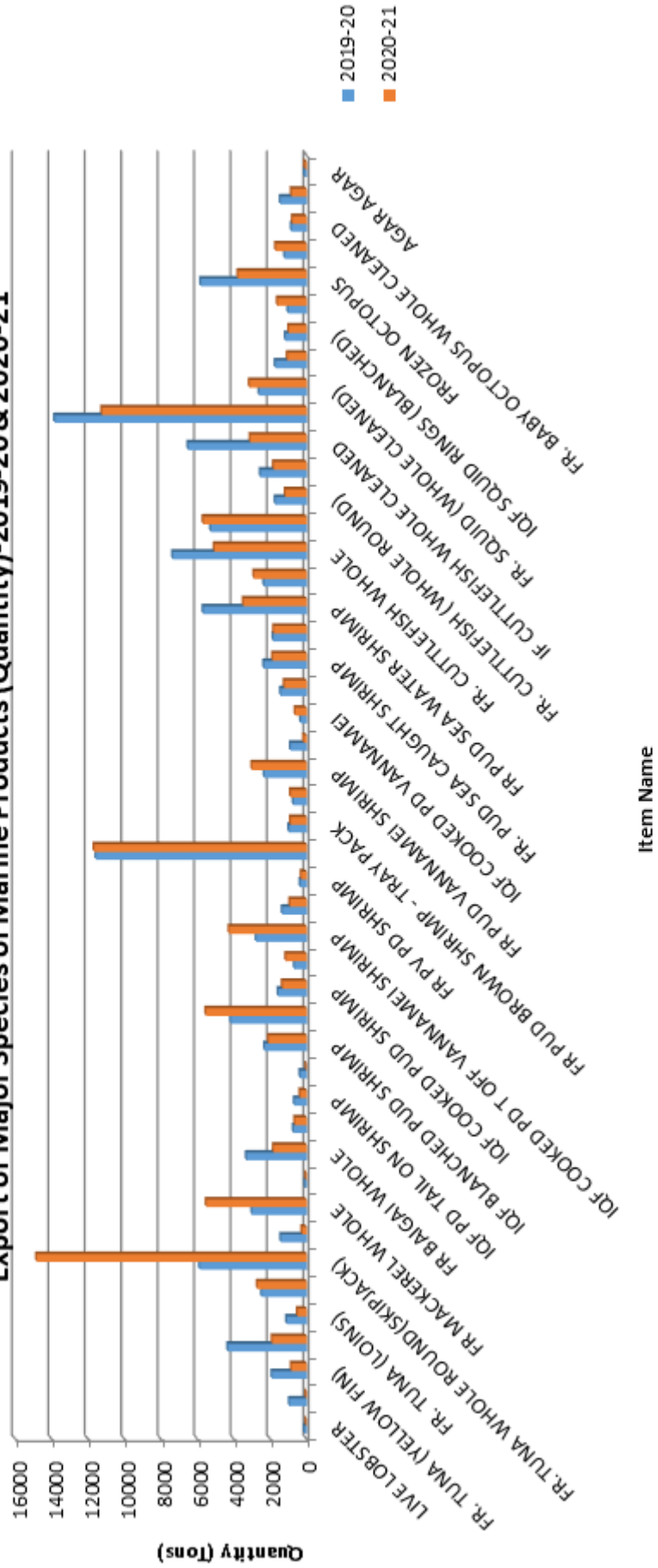


Figure 12.18
Export of Major Species of Marine Products (Quantity)-2019-20 & 2020-21



ITEM WISE EXPORT OF MARINE PRODUCTS FROM KERALA

SI No	Item Name	2019-20			2020-21		
		Qty. Tons	Value Rs.Crore	U S \$ (Mln)	Qty. Tons	Value Rs.Crore	U S \$ (Mln)
1	LIVE FISH	93	4.20	0.60	2	0.22	0.03
2	LIVE LOBSTER	122	23.45	3.35	17	3.36	0.46
3	LIVE AQUARIUM FISH	9	2.26	0.33	5	1.70	0.23
4	LIVE MUD CRAB	24	2.95	0.42	0	0.00	0.00
5	LIVE AQUATIC PLANT	0	0.04	0.01	0	0.00	0.00
6	CHILLED LOBSTER	7	0.14	0.02	1	0.10	0.01
7	CHILLED POMFRET	1	0.07	0.01	1	0.07	0.01
8	CHILLED FISH	939	34.54	4.97	32	1.35	0.19
9	CHILLED FRESHWATER FISH	0	0.00	0.00	0	0.01	0.00
10	CHILLED SHRIMP/PRAWN	9	0.21	0.03	19	0.96	0.13
11	CHILLED TUNA	21	1.14	0.16	0	0.02	0.00
12	CHILLED CLAM MEAT/ELEPHANT MULLI MEAT/BLOOD RED CL	1	0.01	0.00	5	0.12	0.02
13	CHILLED GROUPER	155	5.42	0.77	190	5.76	0.79
14	CHILLED GHOLE FISH	0	0.00	0.00	0	0.00	0.00
15	CHILLED RIBBON FISH	1	0.01	0.00	0	0.02	0.00
16	CHILLED POMFRET (SILVER/WHITE)	4	0.22	0.03	18	1.23	0.17
17	CHILLED POMFRET (BLACK)	1	0.04	0.01	4	0.15	0.02
18	CHILLED POMFRET (CHINESE)	0	0.02	0.00	2	0.11	0.01
19	CHILLED CROAKER (SILVER)	0	0.00	0.00	0	0.00	0.00
20	CHILLED CROAKER (YELLOW)	0	0.00	0.00	0	0.00	0.00
21	CHILLED CUTTLEFISH	1	0.03	0.00	0	0.01	0.00
22	CHILLED OCTOPUS	7	0.21	0.03	4	0.14	0.02
23	CHILLED SQUID	35	0.93	0.13	51	1.61	0.22
24	CHILLED SHRIMP (WHITE/NARAN)	31	1.32	0.19	45	2.23	0.31
25	CHILLED SHRIMP (SCAMPI)	25	2.06	0.29	13	0.72	0.10
26	CHILLED SHRIMP (TIGER)	3	0.24	0.03	21	1.61	0.22
27	CHILLED SHRIMP (BROWN)	1	0.03	0.00	9	0.56	0.08
28	CHILLED KING FISH	6	0.31	0.04	7	0.29	0.04
29	CHILLED REEF COD	4	0.24	0.03	2	0.05	0.01
30	CHILLED BAIGAI	1	0.03	0.00	2	0.07	0.01
31	CHILLED BOMBAY DUCK	2	0.02	0.00	1	0.01	0.00
32	CHILLED SNAPPER (RED)	9	0.35	0.05	33	1.17	0.16
33	CHILLED CRAB	22	0.83	0.12	19	0.70	0.10
34	CHILLED GROUPER (BROWN)	19	0.71	0.10	9	0.27	0.04
35	CHILLED FISH FILLET	5	0.25	0.04	1	0.03	0.00
36	CHILLED THREADFIN	5	0.17	0.02	24	0.70	0.10
37	CHILLED BARACUDA	6	0.16	0.02	6	0.21	0.03



38	CHILLED MULLET	1	0.04	0.01	2	0.06	0.01
39	CHILLED MULLET (RED)	4	0.16	0.02	9	0.34	0.05
40	CHILLED PARROT FISH	65	3.03	0.43	107	5.07	0.70
41	CHILLED TREVALLY (MALABAR)	9	0.25	0.04	21	0.71	0.10
42	CHILLED MACKEREL	13	0.25	0.04	18	0.50	0.07
43	CHILLED SEER FISH	3	0.11	0.02	10	0.45	0.06
44	CHILLED EEL FISH	0	0.00	0.00	0	0.00	0.00
45	CHILLED BUTTER FISH	0	0.01	0.00	1	0.01	0.00
46	CHILLED MUSSEL MEAT	0	0.00	0.00	1	0.05	0.01
47	CHILLED JEW FISH	0	0.00	0.00	0	0.00	0.00
48	CHILLED FLOWER PRAWN	1	0.08	0.01	1	0.02	0.00
49	CHILLED CRAB MEAT	7	1.40	0.20	6	0.69	0.10
50	CHILLED REEF COD FILLET	0	0.00	0.00	0	0.00	0.00
51	CHILLED YELLOW FIN TUNA	1	0.05	0.01	5	0.16	0.02
52	CHILLED MARLIN	1	0.04	0.01	1	0.03	0.00
53	CHILLED SWORDFISH	25	1.17	0.17	59	2.46	0.34
54	CHILLED YELLOWFIN TUNA LOINS	34	1.80	0.25	4	0.16	0.02
55	CHILLED TUNA(GUTTED)	1	0.02	0.00	0	0.00	0.00
56	CHILLED PEARL SPOT	3	0.08	0.01	13	0.52	0.07
57	CHILLED SARDINE	43	0.66	0.09	13	0.31	0.04
58	CHILLED SOLE FISH	8	0.15	0.02	6	0.16	0.02
59	CHILLED PONY FISH	4	0.08	0.01	6	0.20	0.03
60	CHILLED RANI FISH	1	0.02	0.00	0	0.01	0.00
61	CHILLED SCAD (VATTA)	7	0.14	0.02	24	0.58	0.08
62	CHILLED HALIBUT	0	0.00	0.00	0	0.00	0.00
63	CHILLED TILAPIA	0	0.00	0.00	0	0.00	0.00
64	CHILLED HILSA FISH	0	0.00	0.00	0	0.00	0.00
65	CHILLED SALMON FISH	0	0.00	0.00	0	0.00	0.00
66	CHILLED SILVER BIDDY	0	0.01	0.00	1	0.05	0.01
67	CHILLED SILVER SILAGO	0	0.02	0.00	1	0.03	0.00
68	CHILLED WHITE SNAPPER	0	0.00	0.00	0	0.00	0.00
69	CHILLED CATLA	1	0.01	0.00	3	0.08	0.01
70	CHILLED FISH MAWS	1	0.03	0.00	0	0.00	0.00
71	CHILLED ANCHOVY	120	3.04	0.44	98	2.31	0.31
72	CHILLED LEATHER JACKET FISH	0	0.00	0.00	0	0.00	0.00
73	CHILLED RED SEA BREAM	0	0.00	0.00	0	0.00	0.00
74	CHILLED EMPEROR	87	2.15	0.30	57	1.82	0.25
75	CHILLED RABBIT FISH	2	0.05	0.01	11	0.26	0.04
76	CHILLED RED SNAPPER FILLET	1	0.04	0.01	5	0.17	0.02
77	CHILLED DOCTOR FISH	0	0.00	0.00	0	0.00	0.00
78	CHILLED BARRAMUNDI	0	0.00	0.00	0	0.01	0.00
79	CHILLED SHARK	0	0.01	0.00	0	0.00	0.00



80	CHILLED MURREL/SNAKEHEAD(F W)	0	0.00	0.00	0	0.00	0.00
81	CHILLED NEEDLEFISH	1	0.02	0.00	1	0.04	0.00
82	CHILLED ROHU (F W)	4	0.05	0.01	2	0.05	0.01
83	CHILLED HAMOUR	0	0.00	0.00	0	0.00	0.00
84	CHILLED SEA BREAM FISH	0	0.01	0.00	2	0.06	0.01
85	CHILLED CAT FISH	0	0.01	0.00	1	0.02	0.00
86	CHILLED MUD SKIPPER	0	0.00	0.00	0	0.00	0.00
87	CHILLED SEABASS	0	0.01	0.00	2	0.10	0.01
88	CHILLED WOLF HERRING	1	0.02	0.00	1	0.02	0.00
89	CHILLED YELLOW FIN TUNA FILLET	78	4.37	0.63	9	0.55	0.08
90	CHILLED RAY FISH	2	0.05	0.01	3	0.10	0.01
91	CHILLED MULLET RED FILLETS	6	0.33	0.05	3	0.18	0.02
92	CHILLED COBIA	0	0.01	0.00	0	0.00	0.00
93	CHILLED GROUPER FILLET	12	1.05	0.15	2	0.08	0.01
94	CHILLED BARRACUDA FILLET	0	0.00	0.00	0	0.01	0.00
95	CHILLED MAHI MAHI FILLET	1	0.03	0.00	1	0.03	0.00
96	CHILLED SURGEON FISH	1	0.04	0.01	3	0.13	0.02
97	CHILLED WHITE FISH	0	0.00	0.00	0	0.01	0.00
98	CHILLED SWORD FISH LOINS	208	10.55	1.49	89	3.53	0.48
99	CHILLED SWORD FISH FILLETS	104	5.14	0.73	29	1.07	0.15
100	CHILLED YELLOWFIN TUNA H/L GUTTED	0	0.00	0.00	0	0.02	0.00
101	CHILLED YELLOW TUNA G/G	0	0.00	0.00	3	0.12	0.02
102	CHILLED YELLOWFIN TUNA H/L	11	0.47	0.07	0	0.01	0.00
103	CHILLED SAIL FISH	1	0.04	0.01	6	0.14	0.02
104	YELLOWFIN TUNA (WOUNDED)	0	0.02	0.00	4	0.22	0.03
105	CHILLED BOAL FISH	0	0.00	0.00	0	0.00	0.00
106	CHILLED LADY FISH	0	0.01	0.00	0	0.01	0.00
107	CHILLED SILVER BELLY FISH	1	0.02	0.00	0	0.01	0.00
108	CHILLED RED REEF COD	0	0.00	0.00	0	0.01	0.00
109	CHILLED SNAPPER (WHITE)	1	0.03	0.00	2	0.07	0.01
110	CHILLED CROAKER	1	0.01	0.00	1	0.02	0.00
111	CHILLED SEA TIGER	1	0.09	0.01	0	0.00	0.00
112	CHILLED BLACK TIGER	1	0.05	0.01	1	0.09	0.01
113	CHILLED RED GROUPER FISH	11	0.54	0.08	7	0.26	0.04
114	CHILLED CORAL TROUT FISH	7	0.17	0.02	0	0.01	0.00
115	CHILLED SAND LOBSTER	0	0.01	0.00	0	0.00	0.00
116	CHILLED OYSTER	0	0.00	0.00	0	0.00	0.00
117	CHILLED MOON TAIL FISH	0	0.01	0.00	0	0.00	0.00
118	CHILLED TOMATO GROUPER FISH	0	0.00	0.00	0	0.00	0.00
119	CHILLED SNAPPER	3	0.10	0.01	5	0.19	0.03
120	CHILLED PERCH FISH	0	0.00	0.00	0	0.00	0.00
121	CHILLED GREEN MUSSEL	0	0.00	0.00	0	0.00	0.00



122	CHILLED JOB FISH	0	0.00	0.00	0	0.00	0.00
123	CHILLED GOAT FISH	0	0.00	0.00	0	0.00	0.00
124	CHILLED LIZARD FISH	0	0.00	0.00	1	0.02	0.00
125	CHILLED ORA FISH	0	0.00	0.00	0	0.00	0.00
126	CHILLED TIGER PERCH FISH	0	0.00	0.00	0	0.00	0.00
127	FR. POMFRET (WHITE)	7	0.46	0.06	5	0.28	0.04
128	FR. POMFRET (BLACK)	1	0.06	0.01	6	0.23	0.03
129	FR. SNAPPER	22	0.86	0.12	32	0.98	0.13
130	FR. RIBBON FISH/WHOLE	61	1.24	0.18	67	1.39	0.19
131	FR. REEF COD WHOLE	21	0.81	0.11	0	0.00	0.00
132	FR. TUNA (YELLOW FIN)	1,900	29.14	4.18	838	9.12	1.25
133	FR. TUNA (SKIP JACK)	4,318	36.26	5.23	1,889	16.36	2.24
134	FR. TUNA (BIG EYE)	15	0.29	0.04	0	0.00	0.00
135	FR. MACKEREL	276	3.86	0.55	541	8.97	1.23
136	FR. SARDINE/WHOLE	9	0.10	0.01	21	0.25	0.03
137	FR. SEER FISH/SPANISH MACKEREL	0	0.00	0.00	23	1.79	0.24
138	FR. FISH FILLET	492	12.12	1.74	61	2.04	0.28
139	FR. FISH (OTHERS)	6	0.18	0.03	12	0.31	0.04
140	FR. FISH STEAKS/LOINS	2	0.05	0.01	10	0.42	0.06
141	FR. CROAKER	0	0.00	0.00	180	4.06	0.56
142	FR. RAY WINGS	9	0.21	0.03	0	0.00	0.00
143	FR. BARACUDA	0	0.01	0.00	0	0.00	0.00
144	FR. FISH ROE/FISH	0	0.00	0.00	0	0.03	0.00
145	FR. FISH FILLET (SNAPPER)	0	0.00	0.00	9	0.47	0.07
146	FR. REEF COD (HEADON GUTTED)	62	2.14	0.31	36	0.97	0.13
147	FR. KING FISH (HEAD ON GUTTED)	3	0.07	0.01	0	0.00	0.00
148	FR. LEATHER JACKET / LEATHER SKIN	410	8.77	1.25	1,951	41.88	5.74
149	FR. SOLE FISH	2	0.06	0.01	0	0.01	0.00
150	FR. THREADFIN	33	0.65	0.09	4	0.13	0.02
151	IQF MACKEREL	86	1.24	0.18	93	1.44	0.20
152	FR. GROUPER	92	2.32	0.33	193	6.22	0.85
153	FR. POMFRET (IQF)	0	0.00	0.00	0	0.00	0.00
154	FR. POMFRET (SILVER)	0	0.00	0.00	6	0.31	0.04
155	FR. TUNA (WHOLE)	181	1.52	0.21	127	1.86	0.25
156	FR. FISH FILLET (TUNA)	10	0.22	0.03	73	1.72	0.23
157	FR. SCAD	46	0.38	0.05	111	1.02	0.14
158	FR. PONY FISH (MULLAN/KATTI/KARAL)	0	0.01	0.00	7	0.10	0.01
159	FR. (F.W.) FISH (BOAL)	2	0.02	0.00	0	0.00	0.00
160	FR. (F.W.) FISH (ROHU)	0	0.00	0.00	0	0.00	0.00
161	FR. (F.W.) FISH (OTHERS)	0	0.01	0.00	4	0.05	0.01
162	FR. PEARL SPOT	4	0.23	0.03	4	0.32	0.04
163	FR. MULLET (RED)	1	0.02	0.00	23	0.67	0.09



164	FR. ANCHOVY	78	1.13	0.16	36	1.21	0.16
165	FR. TUNA (LOINS)	1,090	32.81	4.68	497	9.55	1.31
166	FR. GROUPER (GUTTED)	42	1.82	0.26	45	1.59	0.22
167	FR. SNAPPER (GUTTED)	7	0.36	0.05	3	0.06	0.01
168	FR. EMPEROR FISH (GUTTED)	0	0.00	0.00	33	0.80	0.11
169	FR. PARROT FISH (GUTTED)	1	0.05	0.01	0	0.00	0.00
170	FR. JOB FISH (GUTTED)	15	0.46	0.06	4	0.14	0.02
171	FR. FISH FILLET (MARLIN)	0	0.00	0.00	1	0.02	0.00
172	IQF FISH FILLET	0	0.00	0.00	9	0.44	0.06
173	FR. EMPEROR FISH STEAKS	3	0.07	0.01	7	0.19	0.03
174	FR. LADY FISH	5	0.14	0.02	1	0.02	0.00
175	FROZEN YELLOW FIN TUNA WHOLE ROUND IQF	2,468	32.67	4.59	2,702	31.12	4.20
176	IQF RED MULLET	10	0.28	0.04	0	0.00	0.00
177	IQF FISH STEAK (TUNA)	0	0.00	0.00	0	0.01	0.00
178	IQF SARDINE	21	0.21	0.03	3	0.03	0.00
179	IQF ANCHOVY	6	0.16	0.02	5	0.13	0.02
180	FR. SWORD FISH (HL GUTTED)	207	7.39	1.07	52	1.31	0.18
181	FR. TUNA (CUBES)	41	0.87	0.12	4	0.11	0.01
182	FR (F.W) TILAPIA WHOLE	0	0.00	0.00	0	0.00	0.00
183	FR. KING FISH STEAKS	4	0.31	0.04	21	1.43	0.19
184	FR RED SNAPPER STEAKS	1	0.01	0.00	1	0.06	0.01
185	FR RAYFISH STEAKS	13	0.34	0.05	0	0.00	0.00
186	FR RABBIT FISH WHOLE CLEANED/OTTI	0	0.00	0.00	1	0.02	0.00
187	SILVER BIDDY(GUTTED, SCALED)	0	0.00	0.00	0	0.00	0.00
188	FR.YELLOW TREVALLY/ CHOOPARAI(WHOLE CLEANED)	2	0.01	0.00	0	0.00	0.00
189	FR. TREVALLY STEAKS	30	0.28	0.04	8	0.19	0.03
190	FR PARROT FISH HEADLESS	0	0.03	0.00	0	0.00	0.00
191	IQF REEF COD (GUTTED)	0	0.00	0.00	22	0.62	0.08
192	IQF RED MULLET (GUTTED)	1	0.01	0.00	0	0.00	0.00
193	FR GROUPER/RED GROUPER FILLET	33	1.92	0.27	130	8.85	1.22
194	FR NEEDLE FISH	6	0.16	0.02	6	0.15	0.02
195	IQF OORA	1	0.02	0.00	0	0.00	0.00
196	FR. MARLIN FISH	39	0.93	0.13	23	0.45	0.06
197	FR LIZARD FISH FILLET	23	0.40	0.06	0	0.00	0.00
198	IQF (F W) FISH (TENGARA)	0	0.00	0.00	0	0.00	0.00
199	FR GHOL FISH	0	0.00	0.00	0	0.00	0.00
200	FR. ANCHOVY HEADLESS	12	0.29	0.04	27	0.73	0.10
201	IQF GROUPER FILLETS	17	1.31	0.18	0	0.00	0.00
202	IQF GROUPER	0	0.00	0.00	5	0.36	0.05
203	IQF TUNA (SKIPJACK)	50	1.25	0.18	0	0.00	0.00



204	FR. SILVER SILLAGO (KATHIRAN)	0	0.00	0.00	0	0.01	0.00
205	FR. ANCHOVY DRESSED	19	0.39	0.06	15	0.40	0.06
206	FR. MACKEREL (HEADLESS)	0	0.00	0.00	2	0.07	0.01
207	IQF YELLOW FIN TUNA	27	0.87	0.12	23	0.45	0.06
208	FR TUNA BELLY FLAPS	35	1.16	0.16	0	0.00	0.00
209	FR SARDINE DRESSED	8	0.19	0.03	8	0.19	0.03
210	FR SARDINE HEADLESS, GUTLESS	0	0.00	0.00	3	0.07	0.01
211	FROZEN TUNA(GUTTED)	71	1.23	0.17	156	2.19	0.30
212	FR RED MULLET WHOLE ROUND	52	1.35	0.19	51	1.40	0.19
213	FROZEN TUNA(STEAK)	29	0.69	0.10	12	0.32	0.04
214	IQF SNAPPER STEAKS	0	0.00	0.00	0	0.01	0.00
215	YELLOWFIN TUNA LOINS(IQF)	0	0.00	0.00	75	2.48	0.33
216	YELLOWFIN TUNA CUBES(IQF)	24	0.49	0.07	2	0.07	0.01
217	OTTI(WHOLE ROUND)	4	0.06	0.01	21	0.24	0.03
218	CHOPPARAI(WHOLE ROUND)IQF	0	0.00	0.00	2	0.03	0.00
219	OORA GUTTED IQF	3	0.08	0.01	1	0.03	0.00
220	OORA STEAKS IQF	4	0.10	0.01	0	0.00	0.00
221	ANCHOVY GUTTED (IQF)	11	0.26	0.04	0	0.00	0.00
222	PONY FISH IQF	0	0.00	0.00	0	0.00	0.00
223	FR YELLOW FIN TUNA ROE	118	2.03	0.30	0	0.00	0.00
224	FROZEN CATLA	0	0.00	0.00	0	0.00	0.00
225	FR.TUNA WHOLE ROUND(SKIPJACK)	5,869	48.84	6.88	14,821	121.20	16.48
226	FR.SKIPJACK TUNA CHUNKS IN BRINE (POUCHES)	34	0.87	0.12	45	0.76	0.10
227	FR.YELLOWFIN TUNA CHUNKS IN BRINE (POUCHES)	174	3.32	0.47	32	0.41	0.06
228	FR.YELLOW EEL	0	0.00	0.00	133	1.30	0.18
229	FR.YELLOW FIN TUNA CHUNK	42	0.67	0.10	0	0.00	0.00
230	FR. LIZARD FISH	367	2.17	0.31	76	0.45	0.06
231	FR. WHITE FISH WHOLE	16	0.39	0.06	0	0.00	0.00
232	FR.TUNA MEAT (RED)/FR. DARK MEAT/ FR. TUNA DARKBONE	55	1.17	0.17	37	0.35	0.05
233	FR SAIL FISH	142	2.25	0.32	93	1.47	0.20
234	FR GROUPER (GILLED GUTTED)	6	0.21	0.03	21	1.06	0.15
235	FR TUNA CHUNK MEAT/CHOPPED MEAT	76	1.95	0.28	0	0.00	0.00
236	FR TUNA BELLY SKINLESS	10	0.20	0.03	0	0.00	0.00
237	FR YELLOWFIN TUNA GILLED & GUTTED	27	0.48	0.07	111	1.76	0.25
238	FR RED SNAPPER FILLET	0	0.00	0.00	20	1.24	0.17
239	IQF INDIAN MACKEREL WHOLE ROUND	42	0.66	0.09	0	0.00	0.00
240	FR MACKEREL (TRAY PACK)	16	0.19	0.03	49	0.76	0.10
241	FR GROUPER ROE	0	0.00	0.00	0	0.02	0.00
242	FR LITTLE TUNA	23	0.18	0.03	0	0.00	0.00
243	FR YELLOWFIN TUNA STRIPS	28	0.25	0.04	5	0.15	0.02



244	IQF YELLOW STRIPPED TREVALLY	2	0.03	0.00	0	0.00	0.00
245	TUNA IN RETORT POUCH	0	0.00	0.00	15	0.37	0.05
246	FR GROUPER HEAD GILLED	8	0.32	0.05	0	0.01	0.00
247	FR GROUPER STEAK	1	0.04	0.01	13	0.54	0.07
248	FR FISH STEAK	4	0.11	0.02	6	0.16	0.02
249	FR CAT FISH WHOLE	0	0.02	0.00	0	0.01	0.00
250	FR SWORD FISH	162	5.24	0.74	137	4.33	0.59
251	IQF FISH STEAK (KING FISH)	0	0.00	0.00	4	0.30	0.04
252	FR LEATHER JACKET GUTTED	152	3.40	0.49	91	2.88	0.39
253	FR SILVER BREAM	1	0.02	0.00	0	0.00	0.00
254	FR REEF COD FILLET	0	0.00	0.00	3	0.11	0.02
255	FR BACHA WHOLE (F W)	0	0.00	0.00	0	0.00	0.00
256	IF CORAL TROUT	0	0.00	0.00	1	0.03	0.00
257	IF SWORD FISH HL	0	0.00	0.00	2	0.06	0.01
258	FR RED GROUPER HEAD	4	0.17	0.03	3	0.14	0.02
259	IF ANCHOVY PAN READY	97	2.46	0.35	64	1.90	0.26
260	IF RABBIT FISH PAN READY	4	0.08	0.01	13	0.22	0.03
261	IF LADY FISH WHOLE	14	0.46	0.07	0	0.00	0.00
262	IF PEARL SPOT WHOLE CLEANED	15	0.78	0.11	6	0.38	0.05
263	IF JAPANESE THREAD FIN BREAM	7	0.19	0.03	3	0.11	0.02
264	IF TREVALLY WHOLE CLEANED	5	0.13	0.02	1	0.03	0.00
265	IF EMPEROR STEAKS	5	0.34	0.05	1	0.05	0.01
266	IF LEATHER JACKET STEAKS	1	0.04	0.01	1	0.06	0.01
267	IF YELLOWFIN TREVALLY STEAKS	2	0.04	0.01	2	0.04	0.01
268	IF MALABAR TREVALLY STEAKS	0	0.00	0.00	4	0.10	0.01
269	IF RAY FISH STEAKS	0	0.00	0.00	2	0.06	0.01
270	IF ORA STEAKS	6	0.23	0.03	1	0.04	0.00
271	IF GROUPER STEAKS	0	0.00	0.00	5	0.30	0.04
272	IF NEEDLE FISH STEAKS	3	0.07	0.01	0	0.00	0.00
273	FR GROUPER HEAD ON GUTTED	18	0.71	0.10	54	2.73	0.37
274	FR REEF COD GUTTED, SCALE OFF, TAIL ON	239	8.52	1.22	121	3.85	0.53
275	IF RED SNAPPER GUTTED GILLES	0	0.00	0.00	17	0.49	0.07
276	FR SEABASS	0	0.00	0.00	1	0.07	0.01
277	IF SARDINE PAN READY	16	0.34	0.05	14	0.39	0.05
278	IF WHITEFISH WHOLE	2	0.07	0.01	2	0.05	0.01
279	IF RABBIT FISH WHOLE CLEANED	2	0.05	0.01	8	0.20	0.03
280	IF LEATHER JACKET HL/TAIL LESS/SKIN OFF	1	0.04	0.01	0	0.02	0.00
281	FR SEA BASS	0	0.01	0.00	0	0.00	0.00
282	FR TUNA BAIT	28	0.24	0.03	0	0.00	0.00
283	IF BARACUDA STEAKS	1	0.03	0.00	0	0.01	0.00



284	IF INDIAN MACKEREL WHOLE	248	3.28	0.47	3	0.05	0.01
285	IF RED SNAPPER WHOLE	0	0.00	0.00	0	0.01	0.00
286	IF MACKEREL PAN READY	2	0.06	0.01	5	0.18	0.02
287	IF PONY FISH WHOLE CLEANED	0	0.00	0.00	1	0.01	0.00
288	IF ANCHOVY HEADLESS	1	0.01	0.00	0	0.00	0.00
289	IF SARDINE CLEANED	7	0.11	0.01	9	0.12	0.02
290	IF SARDINE HEADLESS CLEANED	3	0.05	0.01	4	0.05	0.01
291	IF ANCHOVY WHOLE	2	0.02	0.00	0	0.00	0.00
292	IF REEF COD WHOLE GUTTED SCALELESS	22	0.74	0.11	0	0.00	0.00
293	IF GROUPER FILLET SKINLESS	0	0.00	0.00	2	0.09	0.01
294	IF RED SNAPPER WHOLE GUTTED	0	0.00	0.00	2	0.06	0.01
295	IF RED SNAPPER FILLET SKIN ON	19	0.91	0.13	0	0.00	0.00
296	IF YELLOW FIN TUNA LOINS	1	0.01	0.00	27	0.79	0.11
297	FR GROUPER PIECES	2	0.05	0.01	10	0.31	0.04
298	IF LEATHER JACKET WHOLE	1	0.03	0.00	257	7.04	0.97
299	IF ORA/RABBITFISH HEAD ON GUTTED, SCALELESS	20	0.52	0.07	0	0.00	0.00
300	FR RIBBONFISH WHOLE	1,415	28.16	4.00	249	4.17	0.58
301	FR SARDINE WHOLE	86	0.89	0.13	126	1.60	0.22
302	FR MACKEREL WHOLE	2,999	40.54	5.75	5,498	87.63	12.02
303	IF RIBBON FISH STEAKS	0	0.00	0.00	5	0.06	0.01
304	IF ANCHOVY CLEANED	8	0.14	0.02	0	0.00	0.00
305	IF RABBIT FISH HL CLEANED	1	0.03	0.00	0	0.00	0.00
306	IF BLACK POMFRET STEAK	0	0.00	0.00	15	0.59	0.08
307	IF SWORD FISH STEAK	1	0.04	0.01	3	0.10	0.01
308	IF SWORD FISH FILLET	0	0.00	0.00	5	0.16	0.02
309	IF MAHI MAHI FILLET	6	0.18	0.03	6	0.21	0.03
310	IF TRAVELLY WHOLE	2	0.05	0.01	2	0.11	0.01
311	IF MACKEREL HEADLESS CLEANED	1	0.01	0.00	37	0.48	0.07
312	IF FROZEN KING FISH	22	1.39	0.20	5	0.38	0.05
313	IF MOON FISH	2	0.04	0.01	2	0.03	0.00
314	IF SILVER BELLY	9	0.15	0.02	1	0.02	0.00
315	IF CROCKER	0	0.00	0.00	228	5.12	0.71
316	IF SKINLESS BONELESS SWORDFISH CUBES	0	0.00	0.00	4	0.15	0.02
317	SHRIMP/PRAWN PICKLES	10	0.67	0.10	18	0.83	0.11
318	FISH PICKLES	12	0.74	0.11	24	0.99	0.13
319	SUCHI SHRIMP PICKLES	0	0.00	0.00	0	0.01	0.00
320	CANNED TUNA	102	3.27	0.46	86	2.54	0.35
321	CANNED SARDINE	560	10.48	1.50	139	2.79	0.37
322	CANNED FISH	20	0.42	0.06	0	0.00	0.00
323	CANNED SARDINE IN OIL	0	0.00	0.00	360	5.69	0.78



324	DRIED SHRIMP/PRAWN	88	22.97	3.32	46	8.66	1.19
325	DRIED FISH	25	0.53	0.08	7	0.45	0.06
326	DRIED BOMBAY DUCK	2	0.04	0.01	6	0.21	0.03
327	DRIED SHRIMP POWDER/MEAT	1	0.29	0.04	0	0.00	0.00
328	DRIED FISH MEAL	0	0.00	0.00	2,960	27.65	3.82
329	DRIED SHARK	0	0.00	0.00	1	0.05	0.01
330	DRIED FISH FILLET	0	0.00	0.00	0	0.00	0.00
331	DRIED MALDIVE FISH	0	0.00	0.00	0	0.00	0.00
332	DRIED SALTED FISH	2	0.03	0.00	0	0.00	0.00
333	DRIED SPRATTS	7	0.14	0.02	11	0.24	0.03
334	DRIED SILVER BELLY	6	0.10	0.01	5	0.19	0.03
335	DRIED SOLE FISH	3	0.06	0.01	5	0.16	0.02
336	DRIED RIBBON FISH	0	0.00	0.00	1	0.01	0.00
337	DRIED ANCHOVIES	8	0.11	0.02	2	0.08	0.01
338	DRIED SARDINE	0	0.00	0.00	1	0.02	0.00
339	DRIED MACKEREL	0	0.00	0.00	1	0.02	0.00
340	STEAM DRIED FEEDING FISH FLOUR	0	0.00	0.00	200	1.73	0.24
341	DRIED CROAKER	0	0.00	0.00	0	0.02	0.00
342	DRIED LIZARD FISH	0	0.00	0.00	0	0.03	0.00
343	FISH SOLUBLE PASTE	1	0.01	0.00	391	1.55	0.21
344	DRIED STING RAY	0	0.00	0.00	0	0.00	0.00
345	DRIED SHRIMP/PRAWN (CULTURED)	0	0.00	0.00	1	0.18	0.03
346	CRAB (CRAB SHELLS)	0	0.00	0.00	0	0.01	0.00
347	FR BAIGAI WHOLE	3,299	51.11	7.41	1,813	27.21	3.70
348	FR TOP SHELL (BAIGAI)	237	3.23	0.47	16	0.12	0.02
349	IQF SEAFOOD MIX BLANCHED	85	2.63	0.38	104	3.36	0.46
350	FR. ROCK LOBSTER TAIL	4	0.70	0.10	0	0.00	0.00
351	FR.SAND/SLIPPER LOBSTER TAIL	1	0.16	0.02	6	1.18	0.16
352	FR. DEEP SEA LOBSTER TAILS	10	0.66	0.09	0	0.00	0.00
353	FR. LOBSTER MEAT	1	0.09	0.01	1	0.07	0.01
354	FR. ROCK LOBSTER WHOLE	2	0.19	0.03	0	0.00	0.00
355	FR. SAND LOBSTER WHOLE	1	0.12	0.02	0	0.00	0.00
356	FR. HEADON LOBSTER	17	2.72	0.39	0	0.01	0.00
357	IQF LOBSTER HEADON	0	0.05	0.01	0	0.00	0.00
358	IQF LOBSTER WHOLE ROUND	0	0.00	0.00	9	0.77	0.10
359	FR. LOBSTER WHOLE ROUND	44	4.26	0.61	16	0.84	0.12
360	SLIPPER LOBSTER WHOLE	7	0.54	0.08	0	0.00	0.00
361	IQF SAND LOBSTER WHOLE	13	1.07	0.15	3	0.31	0.04
362	FR SAND LOBSTER MEAT	0	0.00	0.00	8	0.49	0.07
363	IF LOBSTER WHOLE	0	0.00	0.00	1	0.10	0.01
364	IF SAND LOBSTER WHOLE	4	0.40	0.06	4	0.38	0.05
365	IQF H ON WHITE SHRIMP	0	0.00	0.00	0	0.00	0.00



366	IQF H ON TIGER SHRIMP	4	0.23	0.03	5	0.33	0.04
367	IQF H ON SEA TIGER SHRIMP	2	0.11	0.01	0	0.00	0.00
368	IQF H ON FLOWER SHRIMP	0	0.00	0.00	27	2.56	0.35
369	IQF H ON SCAMPI	0	0.00	0.00	13	1.02	0.14
370	IQF H ON DEEP SEA SHRIMP	1	0.11	0.02	0	0.00	0.00
371	IQF HL WHITE SHRIMP	0	0.01	0.00	0	0.00	0.00
372	IQF HL BROWN/PINK SHRIMP	23	1.32	0.19	56	2.46	0.34
373	IQF HL DEEP SEA SHRIMP	2	0.12	0.02	6	0.25	0.03
374	IQF PUD SHRIMP	725	27.87	3.98	647	27.29	3.74
375	IQF PUD TAIL ON/FAN TAIL ROUND SHRIMP	20	1.13	0.16	0	0.00	0.00
376	IQF COOKED PEELED SHRIMP	316	18.11	2.59	28	1.75	0.24
377	IQF PD COOKED (PDC) SHRIMP	25	1.54	0.22	25	2.48	0.34
378	IQF PD SHRIMP/PD PINK BROWN SHRIMP	143	6.08	0.87	41	1.96	0.26
379	IQF PD TAIL ON SHRIMP	671	38.34	5.51	358	20.23	2.77
380	IQF PUD COOKED SHRIMP	42	2.11	0.31	11	0.78	0.11
381	IQF WHOLE COOKED SHRIMP	5	0.32	0.04	0	0.00	0.00
382	IQF PULLED VEIN - TAIL ON	0	0.00	0.00	6	0.38	0.05
383	IQF BUTTERFLY SHRIMP	12	0.82	0.12	2	0.13	0.02
384	IQF COOKED SALAD SHRIMP	354	29.02	4.15	12	0.87	0.11
385	IQF BLANCHED PUD SHRIMP	2,300	79.60	11.38	2,085	74.97	10.26
386	IQF BLANCHED PD SHRIMP	143	5.80	0.82	239	10.86	1.48
387	IQF PD (DEEP CUT) SHRIMP	14	0.65	0.10	40	1.35	0.18
388	IQF COOKED PD TAIL ON SHRIMP	4,166	265.89	37.85	5,524	396.76	54.07
389	IQF COOKED PUD SHRIMP	1,558	57.41	8.20	1,327	53.76	7.36
390	IQF PEELED COOKED SHRIMP	55	3.16	0.46	0	0.00	0.00
391	IQF SCAMPI (DEEP CUT)	0	0.03	0.00	0	0.00	0.00
392	IQF HL BLANCHED PINK SHRIMP	0	0.00	0.00	61	2.52	0.35
393	IQF COOKED PD TAIL ON BLACK TIGER	15	0.84	0.12	20	1.23	0.16
394	IQF BUTTERFLY GARLIC HERB SHRIMP	0	0.00	0.00	45	3.23	0.44
395	IQF PUD COOKED DEEP SEA SHRIMP	26	1.15	0.17	73	3.47	0.48
396	IQF PVPD SHRIMP	6	0.41	0.06	84	6.08	0.83
397	IQF PD VANNAMEI SHRIMP	35	1.96	0.28	109	5.44	0.73
398	IQF BLANCHED PD VANNAMEI SHRIMP	168	12.02	1.72	266	12.19	1.65
399	IQF RAW VANNAMEI SHRIMP	47	2.31	0.32	222	13.08	1.81
400	IQF PD TO VANNAMEI SHRIMP	45	2.65	0.38	99	7.68	1.06
401	IQF VENNAMEI EZ PEEL SHRIMP	158	8.73	1.25	244	14.40	1.94
402	IQF CRISPY SHRIMP WRAPS	11	0.77	0.11	0	0.00	0.00
403	IQF HEAD ON SHELL ON BLACK TIGER SHRIMP	18	1.04	0.15	27	2.20	0.30
404	IQF HL EASY PEEL WHITE SHRIP	0	0.00	0.00	3	0.18	0.02



405	IQF COOKED PD TAIL OFF BLACK TIGER SHRIMP	86	6.30	0.91	20	0.94	0.13
406	IQF BLANCHED PD T OFF PINK SHRIMP	23	1.02	0.14	0	0.00	0.00
407	IQF PD T OFF VANNAMEI SHRIMP	667	33.08	4.70	1,137	61.88	8.50
408	IQF BLANCHED PD T OFF BROWN SHRIMP	0	0.00	0.00	20	1.25	0.17
409	IQF BLANCHED PINK SHRIMP	20	0.64	0.09	0	0.00	0.00
410	IQF HL BUTTERFLY SCAMPI (MARINATED)	38	2.67	0.38	0	0.00	0.00
411	IQF HL EASY PEEL BLACK TIGER SHRIMP	4	0.23	0.03	0	0.00	0.00
412	IQF COOKED PEELED TAIL ON VANNAMEI SHRIMP	180	10.10	1.46	237	16.70	2.28
413	IQF HL VANNAMEI SHRIMP	0	0.00	0.00	19	1.06	0.14
414	IQF BREADED BATTERED PRAWN (PRAWNS TOFFEE BAGS)	0	0.00	0.00	6	0.36	0.05
415	IQF BREADED BATTERED PRAWN (PRAWN SAMOSA)	0	0.00	0.00	15	0.92	0.13
416	IQF BREADED BATTERED PRAWN (PRAWNS LOLLIPOP)	0	0.00	0.00	15	0.92	0.13
417	IQF COOKED PD T OFF VANNAMEI SHRIMP	2,764	153.88	22.00	4,249	252.20	34.42
418	IQF BT LIME CHILLI MARINATED SHRIMP	0	0.00	0.00	5	0.29	0.04
419	IQF HL VANNAMEI SHRIMP EASY PEEL	36	1.55	0.22	41	2.39	0.32
420	IQF RAW BREADED BATTERED BLACK TIGER SHRIMP	0	0.00	0.00	14	1.02	0.14
421	IQF RAW PD TO COOKED BT SHRIMP	5	0.33	0.05	0	0.00	0.00
422	IQF SHRIMP	95	4.96	0.71	22	1.19	0.16
423	BL. FR. H ON SCAMPI	2	0.16	0.02	0	0.00	0.00
424	BL. FR. H ON BLANCHED SHRIMP	0	0.00	0.00	20	0.70	0.10
425	BL. FR. HL BROWN/PINK/BAMBOO SHRIMP	0	0.00	0.00	21	0.90	0.12
426	BL. FR. PUD SHRIMP/MEAT	22	0.84	0.12	82	3.46	0.48
427	BL. FR. COOKED & PEELED SHRIMP	0	0.00	0.00	48	2.52	0.35
428	BL. FR. PD SHRIMP	0	0.01	0.00	11	0.57	0.08
429	BL. FR. PD TAIL ON SHRIMP	0	0.00	0.00	5	0.21	0.03
430	BL. FR. H ON SHELLON THELLY SHRIMP (ISSA)	0	0.00	0.00	19	0.32	0.04
431	FR. PUD BLANCHED SHRIMP	10	0.25	0.04	0	0.00	0.00
432	BL. FR. P D (CUT DEVINED) SHRIMP	0	0.00	0.00	15	0.66	0.09
433	BL. FR. PUD DEEP SEA SHRIMP/RED RING	42	1.59	0.23	10	0.35	0.05
434	FR. BREADED COCONUT SHRIMP	0	0.00	0.00	35	2.04	0.28
435	FR. MARINATED SHRIMP	0	0.00	0.00	55	3.45	0.47
436	BREADED SHRIMP	16	0.83	0.12	89	3.18	0.43



437	FR. SHRIMP (HEADON, TAILON BODY PEELED)	1,333	34.14	4.92	912	21.74	2.94
438	IQF PUD BLANCHED DEEP SEA SHRIMP	20	0.64	0.09	122	4.36	0.60
439	FR SHRIMP (BREADED TAIL ON)	19	1.26	0.18	6	0.27	0.04
440	FR PV PD SHRIMP	350	19.93	2.84	288	17.40	2.39
441	FR PV PD BLACK TIGER SHRIMP	3	0.45	0.06	0	0.00	0.00
442	FR PD BLANCHED SHRIMP	3	0.24	0.04	0	0.00	0.00
443	BREADED BATTERED PRAWN	0	0.00	0.00	32	1.69	0.23
444	FR. PRAWN SPRING ROLL	0	0.00	0.00	0	0.00	0.00
445	FR.HEADON KARIKADI SHRIMP	91	1.83	0.26	42	0.96	0.13
446	IQF HEAD ON BLACK TIGER	0	0.00	0.00	5	0.16	0.02
447	FR PD BUTTERFLY PRAWN	0	0.01	0.00	0	0.00	0.00
448	FR PUD RED RING SHRIMP	63	3.25	0.47	131	7.83	1.07
449	FR PPV BT SHRIMP	19	0.99	0.14	29	2.09	0.28
450	BL FR PD VANNAMEI SHRIMP	0	0.02	0.00	180	6.16	0.84
451	FR VANNAMEI SHRIMP	205	6.72	0.98	163	10.53	1.45
452	FR HLSD VANNAMEI SHRIMP	11,555	428.83	61.41	11,658	470.13	63.58
453	FR PEELED TAIL ON VANNAMEI SHRIMP	114	6.14	0.88	90	4.97	0.68
454	FR HLSD RAW BLACK TIGER SHRIMP	72	2.43	0.35	39	3.36	0.47
455	FR EZP WHITE SHRIMP (WILD)	0	0.00	0.00	4	0.16	0.02
456	FR BLACK TIGER (WILD)	7	0.39	0.06	30	1.87	0.26
457	FR PD WHITE SHRIMP	113	6.00	0.87	155	8.01	1.10
458	FR RAW HEAD ON SHELL ON VANNAMEI SHRIMP	13	0.59	0.08	393	16.15	2.19
459	FR PD TO WHITE SHRIMP	18	1.05	0.15	14	0.95	0.13
460	FR PD PINK BROWN SHRIMP	203	9.58	1.35	321	16.44	2.26
461	FR HEAD ON BLACK TIGER SHRIMP (EASY PEEL)	12	2.02	0.29	4	0.26	0.04
462	FR HEAD ON SHELL ON BLACK TIGER SHRIMP (TRAY PACK)	69	2.50	0.36	8	0.71	0.10
463	FR HEAD ON SHELL ON BLACK TIGER SHRIMP	136	7.44	1.09	25	1.45	0.20
464	FR PUD FLOWER SHRIMP	251	12.23	1.78	202	8.49	1.17
465	FR PD TAILON BUTTERFLY SHRIMP	1	0.05	0.01	0	0.00	0.00
466	FR HEAD ON VANNAMEI SHRIMP (TRAY PACK)	99	3.45	0.49	41	1.27	0.17
467	FR EZ PEEL PINK SHRIMP	22	1.12	0.16	4	0.17	0.02
468	FR PUD BLANCHED BROWN SHRIMP - TRAY PACK	12	0.35	0.05	0	0.00	0.00
469	FR PUD BROWN SHRIMP - TRAY PACK	969	41.85	5.97	878	41.10	5.59
470	FR HL SHELL ON BROWN SHRIMP - TRAY PACK	222	8.05	1.15	173	6.03	0.82
471	FR PD BLANCHED SHRIMPS - TRAY PACK	21	1.05	0.15	0	0.00	0.00



472	FR HEAD ON SHELL ON SEA TIGER SHRIMP	98	3.75	0.55	3	0.22	0.03
473	FR VANNAMEI SHRIMP EASY PEEL	83	3.86	0.56	24	1.02	0.14
474	HO SO SEA TIGER (TRAY PACK)	40	2.01	0.29	5	0.25	0.03
475	FR HL SO SEA TIGER (TRAY PACK)	105	4.54	0.65	42	2.76	0.38
476	FR PD TAIL OFF VANNAMEI SHRIMP	205	10.60	1.52	267	14.70	2.02
477	FR HEAD ON WHITE SHRIMP (TRAY PACK)	151	7.28	1.04	37	1.58	0.21
478	FR PD PV VANNAMEI SHRIMP	722	41.23	5.86	876	56.14	7.57
479	FR PUD VANNAMEI SHRIMP	2,322	98.36	14.05	3,000	131.08	17.94
480	FR PUD VANNAMEI SHRIMP (TRAY PACK)	12	0.60	0.09	0	0.00	0.00
481	FR HL SO VANNAMEI SHRIMP EASY PEEL (TRAY PACK)	120	4.39	0.62	122	5.10	0.69
482	BL. FR. SHRIMP	0	0.00	0.00	1	0.03	0.00
483	AFD SHRIMP (FROZEN DRIED SHRIMP) WILD	881	233.48	33.30	158	57.92	7.84
484	AFD SHRIMP POWDER	0	0.00	0.00	0	0.01	0.00
485	FD SQUID PIECES	79	2.57	0.37	300	11.51	1.58
486	AFD CLAM MEAT	0	0.00	0.00	0	0.00	0.00
487	AFD SHRIMP (FROZEN DRIED SHRIMP) CULTURED	0	0.00	0.00	478	131.34	17.93
488	IQF HL FRESH WATER EZ PEEL SHRIMP	16	0.99	0.15	0	0.00	0.00
489	IF HLSO PINK/BROWN SHRIMP	10	0.42	0.06	1	0.05	0.01
490	IF HEAD ON FLOWER SHRIMP	2	0.10	0.01	0	0.00	0.00
491	IF PUD RED RING SHRIMP	11	0.02	0.00	0	0.00	0.00
492	IQF PUD VANNAMEI SHRIMP	39	1.96	0.28	150	8.46	1.17
493	IQF PD TO SKEWER VANNAMEI SHRIMP	3	0.24	0.03	8	0.63	0.08
494	IQF HL SO VANNAMEI SHRIMP (TRAY PACK)	13	0.85	0.12	76	2.84	0.39
495	IQF HO SO VANNAMEI SHRIMP (TRAY PACK)	20	0.82	0.12	0	0.00	0.00
496	IQF BLANCHED PUD VANNAMEI SHRIMP (TRAY PACK)	0	0.00	0.00	39	1.14	0.15
497	IF HO SO VANNAMEI SHRIMP	4	0.11	0.02	13	0.75	0.10
498	IQF HL SO BROWN SHRIMP	13	0.61	0.09	49	2.08	0.28
499	IQF HL SO EASY PEEL SEA TIGER	0	0.00	0.00	20	0.82	0.11
500	IF PD TAIL ON VANAMEI SHRIMPS	46	1.76	0.25	56	2.38	0.33
501	IQF BLANCHED PUD VANNAMEI SHRIMPS (TRAY PACK)	0	0.00	0.00	1	0.07	0.01
502	IQF BLANCHED PD TO VANAMEI SHRIMP	90	4.69	0.67	231	9.64	1.32
503	FR.PUD TAIL ON VANNAMEI	0	0.00	0.00	14	0.55	0.08
504	FR.PUD TAIL-OFF VANNAMEI	0	0.00	0.00	93	4.29	0.58
505	FR.HEADLESS SEA WHITE	25	0.95	0.14	0	0.00	0.00
506	HL SO TAIL ON WHITE	0	0.00	0.00	9	0.58	0.08



507	IQF COOKED HL SO EASY PEELED VANNAMEI	13	0.79	0.11	134	8.62	1.16
508	IQF COOKED PD VANNAMEI	319	20.87	2.97	624	43.03	5.85
509	IQF PD PV TO VANNAMEI SHRIMP	106	6.54	0.91	260	16.64	2.23
510	IQF PD SEA WATER SHRIMP	69	3.50	0.51	57	2.71	0.36
511	IQF PUD SEA WATER SHRIMP	61	2.82	0.41	22	1.01	0.14
512	IQF RAW HL SO EASY PEEL VANNAMEI SHRIMP	29	1.78	0.25	70	3.78	0.52
513	IQF BLANCHED HEADLESS SHELLON VANNAMEI SHRIMP	136	5.97	0.84	106	4.63	0.63
514	IQF HEADLESS SHELLON VANNAMEI SHRIMP	86	5.21	0.75	116	5.69	0.78
515	FR PD TAILON VANNAMEI SHRIMP (TRAY PACK)	149	6.89	0.99	327	17.44	2.38
516	FR HEADON BROWN SHRIMPS (TRAY PACK)	129	3.40	0.49	77	1.76	0.24
517	FR PD FLOWER SHRIMP	34	1.84	0.26	103	4.59	0.63
518	FR.HL SO VANNAMEI (TRAY PACK)	43	1.40	0.20	0	0.00	0.00
519	FROZEN SEA WATER PD SHRIMPS	1,423	71.93	10.32	1,217	64.21	8.70
520	FR. VANNAMEI PD SHRIMPS	702	38.14	5.46	1,225	70.55	9.61
521	FR.HEAD ON SHELL ON SCAMPI	198	12.87	1.83	101	8.13	1.10
522	FR.HEADLES SHELL ON SEA WHITE	20	0.78	0.12	46	2.64	0.36
523	FR.HEADLESS SHELL ON PINK SHRIMP	0	0.00	0.00	9	0.29	0.04
524	FR. PUD SEA CAUGHT SHRIMP	2,344	97.70	13.82	1,862	88.40	12.00
525	FR HO SEA WHITE SHRIMP	88	2.21	0.32	75	3.89	0.54
526	FR.RAW PUD KARIKADI/POVALAN SHRIMP	1,834	75.83	10.87	1,806	81.68	11.11
527	FR RAW PD SEA WATER SHRIMP	179	9.03	1.31	266	14.28	1.95
528	FR PUD SEA WATER SHRIMP	5,676	246.76	35.49	3,469	154.87	21.11
529	FR HL SO SEA WATER SHRIMP	158	7.33	1.05	23	1.16	0.15
530	FR HO SO VANNAMEI SHRIMP	621	19.14	2.73	403	12.95	1.74
531	FR RAW PD TO SEA WHITE SHRIMP	1	0.03	0.00	22	1.47	0.20
532	FR PUD CAT TIGER SHRIMP	66	2.81	0.40	25	0.78	0.11
533	FR PUD DEEP SEA SHRIMP	2,341	82.98	11.85	2,889	104.61	14.34
534	FR PEELED CUT DEVEINED T - OFF BLACK TIGER	64	3.88	0.56	33	1.71	0.23
535	CUL. HL SCAMPI (DEEP CUT)	0	0.00	0.00	0	0.00	0.00
536	NOBASHI EBI VACCUME (CUL. HL BLACK TIGER)	0	0.00	0.00	4	0.28	0.04
537	IQF CUL. H ON SCAMPI	0	0.00	0.00	0	0.00	0.00
538	IQF CUL. HL SCAMPI	0	0.00	0.00	0	0.00	0.00
539	IQF CUL. P COOKED SCAMPI (FW SHRIMP)	0	0.00	0.00	0	0.00	0.00
540	IQF CUL. BLACK TIGER (TRAY PACKED)	0	0.00	0.00	16	1.06	0.15



541	IQF CUL. HL BLACK TIGER (EASY PEEL)	0	0.00	0.00	0	0.02	0.00
542	IQF PD TAIL-ON RAW BLACK TIGER SHRIMP	12	0.63	0.09	0	0.00	0.00
543	IQF PUD DEEP SEA SHRIMP/RED RING	73	2.96	0.43	89	3.42	0.47
544	IQF PD DEEP SEA SHRIMP	104	5.49	0.79	59	2.44	0.33
545	IQF DEEP SEA SHRIMP	37	1.96	0.28	15	0.79	0.11
546	IQF PUD BLACK TIGER(BLANCHED)	3	0.20	0.03	7	0.36	0.05
547	IQF PD TAIL OFF WHITE SHRIMPS	53	2.66	0.39	0	0.00	0.00
548	FR HL BLANCHED PINK/BROWN SHRIMP	20	0.66	0.10	0	0.00	0.00
549	IQF HL SHELL ON BLANCHED BROWN/PINK SHRIMP	0	0.00	0.00	31	1.41	0.19
550	IQF BLANCHED EASY PEELED HL BROWN SHRIMP	0	0.00	0.00	20	0.83	0.11
551	IQF BLANCHED PD TAILON SHRIMPS	277	13.67	1.94	121	5.64	0.77
552	IQF HEAD ON SHELL ON VANNAMEI SHRIMP	10	0.60	0.09	0	0.00	0.00
553	IQF COCKTAIL SHRIMP	165	13.69	1.95	22	0.83	0.11
554	IQF COOKED HL SHELL ON BROWN/PINK SHRIMP	2	0.15	0.02	0	0.00	0.00
555	IQF HEAD ON SHRIMP	0	0.00	0.00	0	0.00	0.00
556	IQF HL SHRIMP	0	0.01	0.00	1	0.04	0.01
557	IQF PD FLOWER SHRIMP	20	0.96	0.14	0	0.00	0.00
558	IF PD TAIL ON BLACK TIGER SHRIMP	0	0.00	0.00	6	0.32	0.04
559	IQF COOKED PUD SHRIMP VANNAMEI	0	0.00	0.00	30	1.73	0.23
560	IQF COCKTAIL SHRIMP (CULTURED)	0	0.00	0.00	99	8.54	1.14
561	FR. CUTTLEFISH FILLETS	57	2.08	0.30	34	1.27	0.17
562	FR. CUTTLEFISH WHOLE	7,344	212.47	30.15	5,063	126.52	17.28
563	FR. CUTTLEFISH WHOLE CLEANED	5,262	192.76	27.53	5,677	204.10	27.81
564	FR. CUTTLEFISH TENTACLE	20	0.23	0.03	28	0.36	0.05
565	FR. CUTTLEFISH RINGS	3	0.20	0.03	0	0.00	0.00
566	FR. CUTTLEFISH ROE	122	4.59	0.65	50	2.18	0.30
567	IQF CUTTLEFISH	19	0.56	0.08	9	0.20	0.03
568	FR. CUTTLEFISH INK	70	1.49	0.21	59	1.34	0.18
569	FR. CUTTLEFISH WINGS	1	0.02	0.00	11	0.29	0.04
570	FR. CUTTLEFISH W.C. (TRAY PACKED)	30	1.18	0.17	0	0.00	0.00
571	FR. CUTTLEFISH (BABY)	13	0.36	0.05	13	0.40	0.05
572	FR. CUTTLEFISH BLANCHED	0	0.00	0.00	1	0.01	0.00
573	FR. CUTTLEFISH HEAD	3	0.07	0.01	0	0.00	0.00
574	FR. CUTTLEFISH MEAT (TRIMMED)	0	0.01	0.00	0	0.00	0.00
575	FR. CUTTLEFISH (WHOLE ROUND)	1,719	45.57	6.47	1,167	28.17	3.87
576	FR. CUTTLEFISH STRIPS	124	7.04	0.99	275	15.85	2.14
577	IQF CUTTLEFISH STRIPS	245	13.47	1.92	103	5.70	0.78
578	IQF CUTTLEFISH TENTACLES	0	0.00	0.00	7	0.14	0.02



579	AFD CUTTLEFISH WHOLE	15	0.25	0.04	22	0.92	0.13
580	IQF CUTTLEFISH (WHOLE CLEANED)	2,530	89.52	12.82	1,811	69.34	9.50
581	IQF WHOLE ROUND CUTTLE FISH	3	0.07	0.01	0	0.00	0.00
582	FR CUTTLE FISH SKIN	46	0.34	0.05	29	0.22	0.03
583	IQF CUTTLEFISH CUBES	0	0.00	0.00	0	0.01	0.00
584	IQF CUTTLE FISH TENTACLES(BLANCHED)	0	0.00	0.00	31	0.62	0.09
585	IQF CUTTLEFISH SKEWERS	2	0.04	0.01	0	0.00	0.00
586	IQF CUTTLEFISH FILLET	0	0.00	0.00	1	0.03	0.00
587	IQF CUTTLE FISH ROE	7	0.29	0.04	1	0.04	0.01
588	IF CUTTLEFISH STRIPS BLANCHED	0	0.00	0.00	5	0.31	0.04
589	IF CUTTLEFISH WHOLE CLEANED	6,505	227.89	32.42	3,090	100.72	13.69
590	FR CUTTLEFISH SPOTTED	14	0.45	0.06	0	0.00	0.00
591	FR BROKEN CUTTLEFISH MEAT CLEANED	0	0.00	0.00	1	0.03	0.00
592	IF SOFT CUTTLEFISH WHOLE	0	0.00	0.00	19	0.71	0.09
593	IF SOFT CUTTLEFISH WHOLE CLEANED	12	0.39	0.06	0	0.00	0.00
594	IQF BLANCHED CUTTLEFISH STRIPS	11	0.23	0.03	76	1.83	0.25
595	IQF CUTTLEFISH WHOLE CLEANED BLANCHED CUTTLE CUBE	103	3.70	0.53	11	0.35	0.05
596	FR. SQUID WHOLE	13,821	402.52	57.27	11,234	428.52	58.65
597	FR. SQUID (WHOLE CLEANED)	2,601	75.60	10.78	3,134	110.93	15.15
598	FR. SQUID TUBE	400	15.76	2.24	139	6.14	0.84
599	FROZEN SQUID RINGS	279	13.31	1.91	236	10.44	1.41
600	FROZEN SQUID TENTACLES	300	6.45	0.92	121	3.64	0.50
601	FROZEN SQUID (STUFFED)	0	0.00	0.00	17	0.56	0.08
602	FR. SQUID/TUBES/RINGS/TENTACLE	423	16.90	2.40	517	21.20	2.88
603	FROZEN SQUID WINGS/TUBES	0	0.01	0.00	0	0.00	0.00
604	FROZEN SQUID RINGS BLANCHED	93	2.55	0.37	0	0.00	0.00
605	FR. SQUID STRIPS	16	0.39	0.05	23	1.25	0.17
606	IQF SQUID RINGS	635	21.35	3.04	258	9.24	1.25
607	IQF SQUID TENTACLES	38	1.49	0.21	22	0.66	0.09
608	IQF SQUID STUFFED	12	0.32	0.04	14	0.36	0.05
609	IQF SQUID WHOLE CLEANED	364	9.59	1.36	308	10.27	1.40
610	FROZEN SQUID WHOLE ROUND	1,715	48.35	6.86	1,052	38.43	5.26
611	FROZEN BABY SQUID WHOLE ROUND	45	0.38	0.05	24	0.26	0.03
612	FROZEN SQUID TENTACLES BLANCHED	28	0.66	0.09	0	0.00	0.00
613	IQF SQUID TENTACLES (BLANCHED)	630	14.44	2.07	282	7.23	0.98
614	IQF SQUID RINGS (BLANCHED)	1,168	31.77	4.54	975	29.15	3.98
615	FROZEN SQUID WHOLE (BABY SQUID)	19	0.13	0.02	0	0.00	0.00
616	IQF SQUID WHOLE	352	11.38	1.61	183	6.06	0.83
617	IQF SQUID TUBES	30	0.85	0.12	36	1.12	0.15
618	FROZEN SQUID RINGS (BOILED)	0	0.00	0.00	11	0.58	0.08
619	FROZEN SQUID (FLOUR CUT IQF)	6	0.14	0.02	0	0.00	0.00



620	FROZEN SQUID (AFD)	19	0.42	0.06	0	0.00	0.00
621	IQF SQUID TUBES (BLANCHED)	48	1.57	0.23	16	0.54	0.07
622	FR. SQUID RINGS (BREADED)	51	2.30	0.33	14	0.70	0.09
623	FR. SQUID WHOLE CLEANED SKIN TRAY PACK	70	2.53	0.37	0	0.00	0.00
624	IQF SQUID SLICED	10	0.24	0.03	39	1.05	0.14
625	FR. NEEDLE SQUID WHOLE	119	3.10	0.44	148	2.75	0.38
626	IQF BLANCHED SQUID	40	0.85	0.12	23	0.50	0.07
627	FR DUSTED SQUID AND TENTACLES	91	4.40	0.64	21	1.21	0.17
628	FR SQUID SEMI NEEDLE/FILLETS	69	1.94	0.28	254	7.54	1.04
629	IQF SQUID STRIPS BLANCHED	0	0.01	0.00	5	0.19	0.03
630	FR SQUID TUBE NEEDLE	20	0.61	0.09	0	0.00	0.00
631	FR SQUID WHOLE ROUND (POUCH PACK/ TRAY PACK)	209	6.45	0.93	59	2.60	0.35
632	IQF SQUID WHOLE ROUND	80	2.10	0.31	110	3.72	0.51
633	IF SQUID TENTACLE BLANCHED	38	0.87	0.12	70	1.84	0.25
634	IF SQUID RINGS BLANCHED	43	0.89	0.13	57	1.85	0.25
635	IQF SQUID TUBES COOKED	5	0.18	0.03	3	0.10	0.01
636	FR SQUID WHOLE CLEANED (POUCH PACK)	139	4.60	0.66	0	0.00	0.00
637	IQF BOILED SQUID RING	12	0.31	0.04	18	0.44	0.06
638	IF SQUID WHOLE CLEANED	1,018	26.14	3.72	1,596	52.29	7.12
639	IF SQUID RING	13	0.43	0.06	45	0.99	0.13
640	IF SQUID TENTACLE	20	0.60	0.09	2	0.05	0.01
641	IQF COOKED SQUID RINGS	290	10.54	1.50	292	11.27	1.53
642	IQF COOKED SQUID TENTACLES	6	0.14	0.02	0	0.00	0.00
643	IQF BLANCHED SQUID RINGS & TENTACLES	115	3.16	0.46	172	4.89	0.67
644	FROZEN OCTOPUS	5,806	120.45	17.18	3,767	82.86	11.33
645	FROZEN OCTOPUS (BABY)	8	0.21	0.03	325	6.80	0.94
646	IQF BABY OCTOPUS	37	1.10	0.16	20	0.54	0.07
647	FROZEN OCTOPUS TENTACLES	3	0.02	0.00	0	0.00	0.00
648	FROZEN OCTOPUS (WHOLE CLEANED)	1,203	29.75	4.26	1,699	41.70	5.70
649	IQF OCTOPUS (WHOLE CLEANED)	56	1.43	0.21	76	2.00	0.27
650	FROZEN OCTOPUS (GUTTED & COOKED)	21	0.47	0.07	0	0.00	0.00
651	FR. BABY OCTOPUS WHOLE CLEANED	837	22.36	3.19	777	20.61	2.83
652	IQF OCTOPUS (GUTTED)	113	3.04	0.44	53	1.37	0.19
653	FR. OCTOPUS(GUTTED)	52	1.41	0.20	42	1.03	0.14
654	FR OCTOPUS (WHOLE ROUND)	1,439	29.35	4.19	831	18.59	2.53
655	FR OCTOPUS LONG ARM	39	0.89	0.13	162	3.37	0.46
656	FR OCTOPUS (BABY CUT OPEN)	59	1.82	0.26	0	0.00	0.00
657	IQF OCTOPUS(BLANCHED)	3	0.05	0.01	20	0.44	0.06
658	IQF BABY OCTOPUS (WHOLE CLEANED)	72	1.96	0.28	72	1.81	0.25



659	IQF CLEANED BIG OCTOPUS	15	0.44	0.06	21	0.69	0.10
660	FR BABY OCTOPUS WHOLE GUTTED	157	3.84	0.54	97	2.35	0.33
661	FR WHOLE GUTTED OCTOPUS	602	13.99	1.98	130	3.54	0.49
662	IF OCTOPUS WHOLE CLEANED	83	2.05	0.30	111	2.78	0.38
663	IF BABY OCTOPUS WHOLE GUTTED	32	0.79	0.11	28	0.62	0.09
664	CLAM (FR. BOILED CLAM/WHELK/ COCKLE MEAT)	8	0.20	0.03	42	0.70	0.10
665	FR. MUSSEL MEAT	1	0.07	0.01	0	0.01	0.00
666	FROZEN SNAIL MEAT	150	1.98	0.29	34	0.48	0.07
667	CRAB (FR. CRAB MEAT)	8	0.65	0.09	0	0.00	0.00
668	FR. BAIGAI MEAT	183	3.09	0.45	0	0.00	0.00
669	CRAB (FR. MUD CRAB)	0	0.01	0.00	0	0.00	0.00
670	CRAB (FR. CUT SWIMMING CRAB)	0	0.00	0.00	3	0.10	0.01
671	CRAB (FR. DRESSED CRAB)	0	0.00	0.00	0	0.00	0.00
672	CRAB (IQF WHOLE CRAB)	0	0.00	0.00	0	0.00	0.00
673	CRAB (FR. WHOLE CRAB)	2	0.15	0.02	1	0.02	0.00
674	CRAB (FR. CUT CRAB WITH CLAWS)	0	0.00	0.00	0	0.00	0.00
675	CRAB (FR. CUT CRAB)	10	0.66	0.09	0	0.00	0.00
676	CRAB (FR. CRAB MEAT WITH SHELL/ CRAB CHUNKS)	0	0.00	0.00	0	0.01	0.00
677	FROZEN OYSTER MEAT	1	0.03	0.00	0	0.01	0.00
678	CLAM (FR. BOILED CLAM MEAT)	167	3.16	0.45	114	2.44	0.33
679	CLAM (FR. CLAM MEAT- RAW IQF)	2	0.10	0.02	1	0.10	0.01
680	CRAB (CRAB FLAKES)	0	0.00	0.00	0	0.00	0.00
681	FR THREE SPOT CRAB	0	0.00	0.00	0	0.01	0.00
682	FR. MUSSEL (COOKED)	20	0.39	0.06	0	0.01	0.00
683	FR. MUSSEL (BLANCHED)	4	0.11	0.02	0	0.01	0.00
684	CLAM (CLAM MEAT YELLOW)	0	0.01	0.00	13	0.11	0.02
685	IQF CUT CRAB (3 SPOT)	8	0.28	0.04	2	0.07	0.01
686	FR.CLAM MEAT(BABY)	0	0.01	0.00	46	0.55	0.08
687	IQF BLUE SWIMMING CUT CRAB	2	0.12	0.02	0	0.00	0.00
688	FR.BLUE SWIMMING CUT CRAB	0	0.00	0.00	2	0.07	0.01
689	HALF SHELL GREEN MUSSEL	0	0.00	0.00	0	0.00	0.00
690	FR.IMITATION CRAB STICK	0	0.00	0.00	0	0.01	0.00
691	FR IMITATION CRAB CLAWS	0	0.00	0.00	0	0.01	0.00
692	FR IMITATION CRAB SHREDS	0	0.00	0.00	1	0.04	0.01
693	IQF WHOLE ROUND BAIGAI	211	3.48	0.51	0	0.00	0.00
694	FR THREE SPOT HALF CUT CRAB	0	0.00	0.00	0	0.00	0.00
695	FR THREE SPOT CUT CRAB WITH CLAW	0	0.00	0.00	0	0.00	0.00
696	FR BLUE SWIMMING CUT CRAB WITH CLAW	16	0.66	0.09	13	0.66	0.09
697	FR BLUE SWIMMING CUT CRAB WITHOUT CLAW	15	0.51	0.07	6	0.21	0.03



698	IF CUT CRAB	1	0.04	0.01	0	0.00	0.00
699	IF CRAB WHOLE	0	0.00	0.00	0	0.00	0.00
700	FROZEN STONE CRAB	0	0.00	0.00	0	0.01	0.00
701	IQF COOKED SEAFOOD MIX	0	0.00	0.00	1	0.02	0.00
702	FISH SOLUBLE POWDER	0	0.00	0.00	2	0.03	0.00
703	FISH CUTLETS	1	0.02	0.00	2	0.05	0.01
704	AGAR AGAR	121	13.80	1.96	94	11.49	1.56
705	PRAWN CUTLETS	18	0.70	0.10	1	0.07	0.01
706	SEAFOOD MIX	8	0.26	0.04	7	0.19	0.03
707	BREADED SHRIMP	0	0.00	0.00	2	0.17	0.02
708	FISH FINGERS	0	0.00	0.00	0	0.00	0.00
709	BREADED SQUID RINGS	0	0.00	0.00	7	0.29	0.04
710	FISH CURRY	8	0.26	0.04	17	0.66	0.09
711	FR.CRAB CUTLETS	6	0.22	0.03	0	0.00	0.00
712	CHEMMEEN CHUTNEY-COCONUT	0	0.01	0.00	0	0.00	0.00
713	PRAWN CHUTNEY (WITHOUT COCONUT)	1	0.09	0.01	3	0.18	0.02
714	SPICED AND FRIED SHRIMP	0	0.01	0.00	37	1.06	0.15
715	FRIED FISH	0	0.00	0.00	0	0.00	0.00
716	FISH CHUTNEY	1	0.05	0.01	0	0.01	0.00
717	FISH POWDER (READY TO EAT)	0	0.00	0.00	40	0.72	0.10
718	FR. SEAFOOD COCKTAIL	0	0.00	0.00	133	10.96	1.51
719	IQF MEAL KIT	0	0.00	0.00	22	0.19	0.03
720	FISH CURRY (GOA)	0	0.00	0.00	0	0.00	0.00
721	FISH CURRY (KERALA)	2	0.13	0.02	0	0.03	0.00
722	SHRIMP (READY TO COOK)	0	0.00	0.00	1	0.07	0.01
723	PRAWN ROAST	0	0.03	0.00	7	0.43	0.06
724	FR. MAHI MAHI	74	0.81	0.12	57	0.55	0.08
725	FR. MAHI MAHI FISH FILLET	15	0.16	0.02	2	0.07	0.01
726	MEEN PEERA KOZHUVA(ANCHOVY)	1	0.07	0.01	1	0.06	0.01
727	FISH BIRIYANI	1	0.08	0.01	1	0.07	0.01
728	SARDINE PEERA	0	0.01	0.00	2	0.10	0.01
729	FR SEAFOOD MIX (TRAY PACK)	4	0.12	0.02	60	1.77	0.24
730	SHRIMP/ PRAWN MASALA	2	0.12	0.02	0	0.00	0.00
731	IF SEAFOOD COCKTAIL	0	0.00	0.00	99	8.31	1.13
732	FISH OIL	8	0.16	0.02	9	2.89	0.40
733	SQUALENE (SHARK OIL)	0	0.00	0.00	1	0.16	0.02
734	IQF SEAFOOD MIX	136	4.02	0.57	137	4.07	0.55
735	IQF BAIGAI (SHELL ON)	334	5.20	0.76	165	2.63	0.36
736	FR MARINATED CRAB CURRY	0	0.00	0.00	0	0.00	0.00
	** Grand Total **	1,48,226	5,020.33	716.81	1,44,700	5,039.89	687.23



Conclusion

The marine bio-resources exports as a separate category of exports are handled by MPEDA. The secondary data from MPEDA was analysed to estimate this important bio-resource export to various countries across the globe. As a part of this study, the item-wise, market wise and port wise marine bio-resource export from Kerala, the trend of marine products exports based on past 25 years data (1995 -2020) and the different items of marine products export during 2019-20 to 2020-21 have been analysed.

Frozen shrimp (29.61% by quantity and 47.75% by total value), frozen fish (23.94% by quantity and 10.07% by total value), frozen squid (18.98% by quantity and 15.69% by total value) and frozen cuttle fish (15.28% by quantity and 16.50% by total value) were the major export items from Kerala during 2010-2020. Shrimp is the most important item in the export of marine products from Kerala. Over the last decade, the export of shrimp from Kerala significantly increased both in quantity (20.30% in 2010 to 36.32% in 2020) and total value 32.73% in 2010 to 51.68% in 2020).

The cuttle fish occupies second position after shrimp in terms of total value of exported items from Kerala and even though the total value of the cuttle fish exported declined (24.06% in 2010 to 16.04% in 2020), its quantity exported remained the same over years (16.55% in 2010 to 16.38% in 2020).

The total value of frozen squid (15.69%) among the exported items during 2010 to 2020 showed that it is the third most important item in export items of Kerala. Both export quantity (25.66% in 2010 to 17.26% in 2020) and total value (19.95% in 2010 to 14.96% in 2020) of squid declined over years. Similarly, both export quantity (28.60% in 2010 to 17.13% in 2020) and total value (13.15% in 2010 to 7.26% in 2020) of frozen fish declined over years.

The main destination of marine products from Kerala ports with 36.14% quantity and 39.45% total value of marine products exported when compared to other destinations was the European Union (EU). South East Asia (28.78% in quantity; 21.61% in total value) being was second in Kerala's marine products export market after EU. The marine product's export quantity (20.61% in 2010 to 23.96% in 2020) and the total value (10.75% in 2010 to 17.56% in 2020) from Kerala to South East Asia increased over the last decade. The export trend of marine products to USA from Kerala is increasing in both quantity (6.05% in 2010 to 9.54% in 2020) and total value (8.01% in 2010 to 17.03% in 2020) over the last decade. The USA shares 7.25% in quantity and 12.25 % in total value among all markets of Kerala's marine product export.

The principal channel through which export of marine products occurs is Kochi port in Kerala. The Kochi port accounts the export of marine products by 97.88% in quantity; 96.6% in total value, when compared to Trivandrum (1.81% in quantity; 3.08% in total value) and Calicut ports (0.31% in quantity; 0.33% in total value). The export of marine products through Kochi port have increased both in quantity and total value (97.54% in 2010 to 98.52% in 2020 and 94.51% in 2010 to 97.69% in 2020 respectively) over the last decade. This shows the significance of Kochi port which is a major port of India in the marine products export. It may be noted that marine products catch from other states may also be exported through the Kochi port due to its proximity with other state borders (Karnataka and Tamil Nadu), as well as the high activity of trade.

The analysis of marine products export trend from Kerala's ports showed that it has significantly increased over the last 25 years (1995- 2020) in both quantity (14.39% during 1995-2000 to 27.81% during 2015-2020) and total value (7.54% during 1995-2000 to 42.66% during 2015 to 2020).



A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer. This network includes different activities, people, entities, information, and resources. The supply chain also represents the steps it takes to get the product or service from its original state to the customer. Broadly, the functions in a supply chain include product development, marketing, operations, distribution, finance, and customer service. However, in the ABS context, our concern is the movement of bio-resources from the providers (local communities) to the end user (industry) for commercial utilization or product development (see Figure 1). Generally, the ABS amount will be fixed based on the ex-factory sale value by the enforcement agencies (NBA and SBBs). Hence, the product movement from the industry to the customer is insignificant in the ABS based supply chain.

Figure – 13.1
Supply Chain: A broader Picture



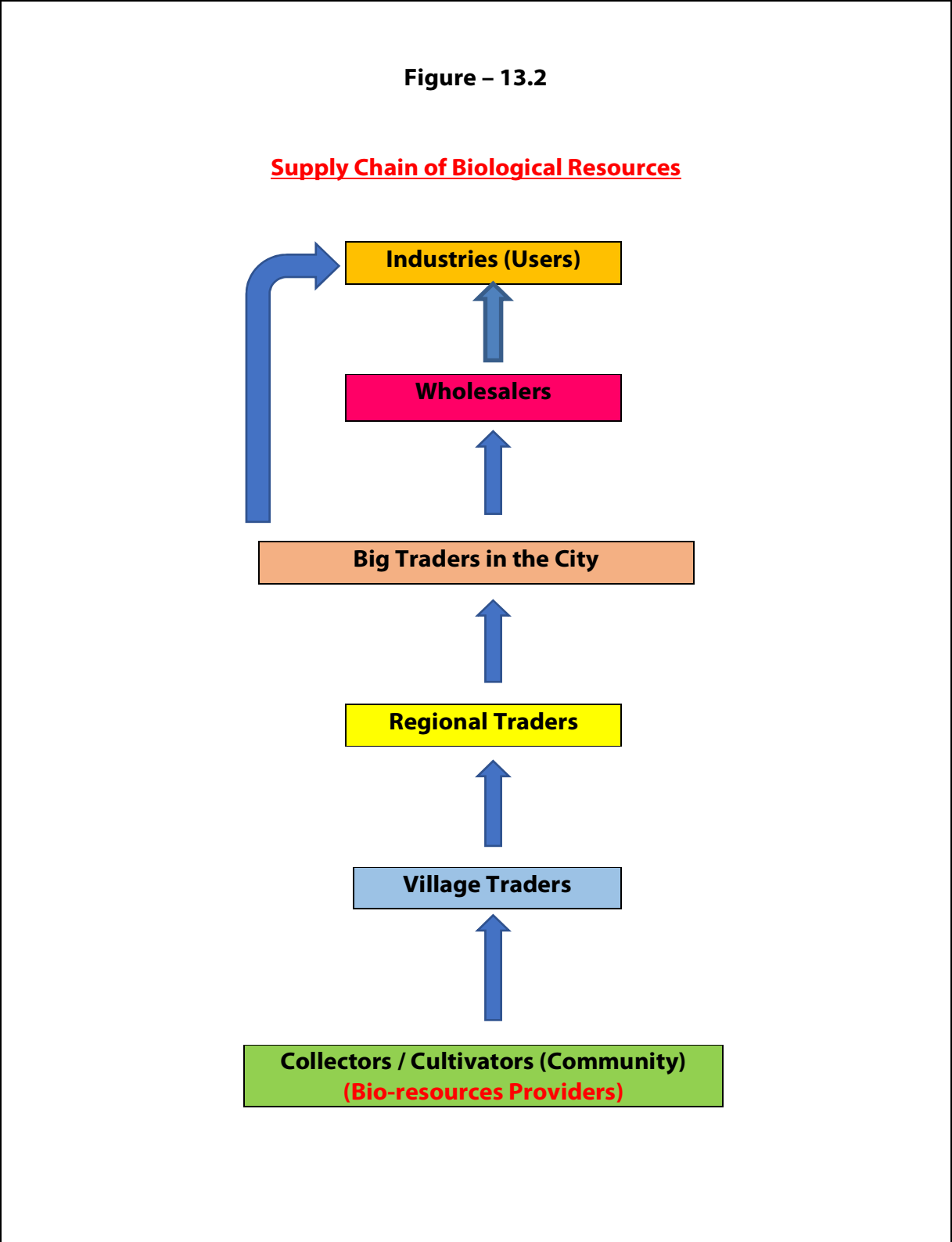
Generally, value addition for bioresources (raw) and bio-resources based products occurs either through transaction costs or / and processing or manufacturing costs. Transaction costs are the costs of particular bio-resources' movement from their collection point to the company gate, and occur through transportation charges and brokers or dealers' profits. Normally, the bio-resources transaction may take place through different agencies such as federations, wholesalers, and retailers at different locations before reaching to the final consumer and the price spread for the resources will occur. The ABS concern is whether the price spread is reasonable or not, and if not, what are the abnormalities, and how will it bounce back to the communities or providers of the resources.

Further, certain bioresources are basic raw-materials for manufacturing final consumer products. Besides, many other products (inputs) and knowledge / skill (research and development) also contribute to an output production. Hence, the processing or manufacturing costs at different stages are significant. Through an amortised (remunerated) pricing technique, one can estimate the real price of the bio-resources. The same approach is applicable in the case of bio-prospecting based research and development.

Considering the present condition of the bioresources market; tracing the bioresources from its origin to the end user is a challenge. Along this trade channel, the bioresources could be exchanged several times (figure 13.2), which should be captured.

The transaction cost of the bioresources should be estimated through the hands it is transferred. Hence, the need to bring traders and collect information is important to unravel the entire supply chain. In the supply chain analysis of bioresources, estimating the value addition in the production stage is also important, but complicated, task. The cost escalation is mainly under: research and development, manufacturing, and marketing. Under each head different cost distribution criteria should be considered.

In brief, the supply chain analysis of an ABS potential bioresource gives a comprehensive picture about its origin to the end product. It can explain the complete history of the bioresources' movement, production process and steps, various stakeholders involved in the process, and value additions at each stage. Through the supply chain analysis one can successfully find out the real / true value of the bioresources, which is not captured by the imperfect market, generally existing for the bio-resources which are collected from the common property ecosystems. In this context, a supply chain analysis is an ideal valuation method / approach for bioresources' valuation.



A systematic tracking mechanism of the bioresources' origin to the end user and exploring the value additions at each stage of exchange and production was planned in the RKI project. However, due to pandemic related closedowns and other Government protocols our staff have not succeeded in visiting the industrial units and studying the production process or interviewing the managers for gathering the required information (which are unique) for successfully completing the supply chain analysis. Further, visiting or contacting other stakeholders of the supply chain (bioresources' collectors or cultivators, traders, wholesalers, exporters etc., who are located in different parts of the State / Nation) has also not succeeded as we anticipated. Hence, we lost the momentum in capturing the complete chain and exploring the value additions at each stage of production. However, out of the attempts we targeted on different bioresources, one case (honey or cheruthen) is presented here.

In this context we strongly propose a separate study / project to explore the complete supply chain (with value addition) of key bio-resources of the State, which ensure a lot of inferences for the KSBB in taking many curtail policy decisions related to the ABS. Further, the methodology for assessing the supply chain derived from this exercise will help other SBBs in India as well as the NBA to carry out similar studies in their States considering the Biological Diversity Act and the ABS.



Wild Forest Honey (Cheruthen) and its Supply Chain: Vanasree Unit:

Honey is a supersaturated sugar solution with approximately 17 percent water. Besides carbohydrates, honey contains small amounts of protein, vitamins and minerals. Apart from its high calorific value, honey is known for its medicinal properties too. Honey is produced by honey bees belonging to the genus *Apis*. *Apis dorsata*, the giant honey bee is very common in the forests of southern and south-eastern Asia. The comb is approximately 1 metre across. Nests are mainly built in exposed places far off the ground, on tree limbs and under cliff overhangs. *Apis dorsata* is an aggressive bee and has never been domesticated as it does not use enclosed cavities for nesting. These bees are good honey gatherers with an average yield of 50-80 kg per colony.

Apis cerana indica, are small honey bees found in the forests of southern and south-eastern Asia. Their honey yield is lesser, because they form smaller colonies. They construct multiple parallel combs with an average honey yield of 6-8 kg per colony. *Apis florea*, the dwarf honey bee is another wild honey



bee of southern and south-eastern Asia. These bees make exposed single combs built on branches of shrubs and small trees. They are poor honey yielders and yield about 200-900 gm of honey per colony. *Trigona iridipennis* are sting-less honey bees found in the forests of the tropics which make nests in hollow tree trunks and wall cavities. They yield 300-400 g of honey. All the above mentioned four types of honey bees are seen in the forests of Kerala.

Honey harvesting is a major means of livelihood of the tribals in the forests of Kerala. Under the Vana Samrakshana Samithies (VSS) and Eco-Development Committees (EDC), the honey collectors have been trained in the last four years in the non-destructive collection of honey and value addition by a process called ultra filtration. It is marketed through Forest Development Agencies (FDA) in attractive bottles.

The cheruthen's value addition is examined in 2 stages. At the first stage, the Cheruthen collection is by the tribal community and supplied to Vanasree and the second stage is the processing by vanasree and preparing the honey to be supplied in the market. The value



addition in both the stages is examined in detail with the help of a structured interview schedule (tribal community) and an interview with vanasree officials. (Copy of the interview schedule is in Annexure 1). The inference from the data / information is summarized below.

- Small groups (4 to 8 members) of tribals go and halt inside the forest for a minimum of 4 to 7 days and collect the honey (cheruthen) along with other non wood forest items.
- Honey is collected by a tribal from the honey hive in between rocks
- After the collection of the honey hive, the collectors squeeze and transfer the honey to plastic vessels to be handed over to Vanasree.
- Each group may collect around 40 kg of honey (cheruthen) in one trip of collection (4 to 7 days)
- They sell this cheruthen to the Vanasree unit through VSS (Vana Samrakhaka Samithi) at a rate of Rs 900/1kg.
- For each kg of honey (cheruthen) transfer, the VSS take Rs. 50 as commission. So the collectors get Rs.850/Kg of cheruthaen.



Value addition process of honey (cheruthen) at Vanasree processing unit:

The value addition process of honey occurs primarily by the ultra filtration method. Initially, 50 kg of raw-honey is transferred to the preheating vessel for heating. The preheating process takes 45 minutes followed by 10 minutes to remove the foam. The cooled honey is then transferred to another chamber called the processing chamber. In the processing chamber, it is heated up to 55 to 75o C for 45 minutes. During this process, the water content is removed in the form of steam. There is about 5 to 8 % weight loss in the form of water vapour. Finally, the filtered, highly processed and purified honey is packed in containers.



Honey Processing Plant at Thiruvananthauram - vanasree unit

The cost of machinery of the honey processing unit is Rs.14 lakhs. (In this unit, it was installed by the Anpharma Equipments,Perambra, Thrissur). At a time 50Kg of raw honey (50 x Rs 900=45,000) can be processed and can yield 44 - 46 Kg of purified honey. The selling price of Cheruthen is Rs. 1350/kg. Therefore, from 50kg of raw-honey 45 kg of purified honey will be obtained -- worth Rs 60,750 (45 Kg x Rs.1350).



Supply Chain (with Value Addition) of 1 kg. *Cheruthen* with market price of Rs. 1,350/

Stage 1: Tribal to Vanasree Unit (1kg – Rs. 900): Value Addition Steps			
S No	Cost Component	Cost (Expenditure) in Rs.	Total (cumulative) Cost in Rs.
1	Travelling Expenditure	40.00	40
2	Food Expenditure	100.00	140
3	Work Knowledge	100.00	240
4	Manpower (Physical effort)	180.00	420
5	Transportation of Honey to Vanasree Unit	15.00	435
	Total collection cost	435.00	
6	Amount given to VSS	50.00	485
	Total Cost	485.00	
	Total price of 1 Kg honey (vss)	900.00	
	Net Benefit (Value of nature in honey)	(900-485) 415 .00	
Stage 2: Processing Cost of Cheruthen (in Vanasree)			
1	Transportation cost	2.00	2
2	Cost of bottle	32.00	34
3	Cost of Bottle cap	7.50	41.50
4	Cost of label	3.50	45
5	Labour charge	12.00	57
6	Machine rate	4.00	61
7	Electricity Charge	30.00	91
8	Cost of Management	30.00	121
9	Rent	20.00	141
10	Tax	40.00	181
	Total processing cost	181.00	
	Cheruthen from tribal (Charge)	900.00	
	Processing charge + Cost of Cheruthen	(181+900)=1081.00	
	Market Price	1350.00	
	Profit	(1350.00-1081) = 269.00	

In brief, the cheruthen's case clearly reveals a natural resources' (which is derived from the forest ecosystem) value addition at its collection point, transfer, and further processing by examining the different cost components involved in it. Cheruthen is a free gift from nature and traditional knowledge plays a significant role, particularly in its collection. In every value addition stage, many stakeholders are involved; creating employment opportunities and the end result is a product having medicinal and nutritional value contributing to human welfare.



Annexure -13.1

Interview Schedule: for Honey Collectors

S. No.	Particulars	
1	Name of the VSS member/ Honey collector / Tribal	
2	Phone Number of VSS member	
3	Name the VSS of your membership	
4	How many members in your VSS	
5	The location (area) of your VSS	
6	In which forest Division / Range does it come?	
7	Do you have any collection rights for honey or other NWFP	
8	What are the other NWFP collecting from the forest	
9	Do you have any specific technique / method to collect honey from forest?	
10	From a single hive, how much quantity of honey is getting? Quantity/week	
11	Quantity of honey collecting per Year	
12	Is there any specific season for honey collection?	
13	Is there any specific tree for honey collection?	
14	Do you face any problem on honey collection?	
15	Rate of honey <ul style="list-style-type: none"> ❖ Direct collection from tribal / Kg ❖ Rate of honey from honey collector to VSS / Kg ❖ Rate of honey from VSS to Vanasree / Kg 	
16	Do you have any trade centers other than VSS / Vanasree	
17	Any other additional information	-



14.1 ACCESS AND BENEFIT SHARING (ABS)

The Biological Diversity Act, 2002 proposes the ABS provisions, when users access biological resources and associated traditional knowledge with commercial intent. Section 3 of the BD Act insists that 'certain persons do not undertake biodiversity related activities without the approval of the NBA'. Section 4 mentioned that the 'results of research should not be transferred to certain persons without the approval of the NBA'. Section 6 pointed out that 'applications of IPR not be made without the approvals of the NBA'.

Similarly, as per Section 7, 'prior intimation of SBBs for obtaining biological resources for certain purposes' is required. ABS Guidelines, 2014 specified the benefit sharing criteria when utilizing the biological resources and associated traditional knowledge for different purposes. However, the BD Act has not proposed steps for ABS potential estimation.

Industries which use genetic/biological resources for commercial purposes and manufacturing different consumer products will come under the purview of the BD Act. But, the majorities of the industries do not comply with the Act or share the benefits to the local community (through NBA / SBBs) for biodiversity conservation. Hence, a significant portion of finance (ABS amount) which is to be assigned for biodiversity conservation is being lost for the country. The estimation of the ABS potential in a bio-diverse rich country like India, especially a State like Kerala who possess substantial share of the bio-wealth of India, will enhance the scope of ABS as an effective financial solution for biodiversity conservation.

14.2 METHODOLOGY AND PROCESS FOR ASSESSING THE ABS POTENTIAL

The National Biodiversity Finance Plan - Working Document – of India has been developed based on national level assessments for current biodiversity expenditures and financial needs for implementation of the National Biodiversity Action Plan, following a customised methodological framework and with exemplary support and ownership of the Government of India. The Biodiversity Finance Plan has identified 12 potential finance solutions for bridging the funding gap for implementation of the National Biodiversity Action Plan. Out of these 12 finance solutions, Access and Benefit Sharing (ABS) also included (NBA, 2019). The objective of this finance solution is to develop a robust methodology for assessment of ABS potential at the National and State level. The Biodiversity Finance Plan, which outlines the potential of ABS as an innovative finance solution for biodiversity conservation.

For framing the 'ABS potential assessment methodology' at the state level a team of ABS specialists in the country have been working for a while and the Subject Expert of Economic Valuation of Bio-resources of the RKI Project is one among them. This experience as well as the insights gained during the methodology development process is an add-on advantage in initiating the estimation of the ABS potential for Kerala, based on the data collected during the RKI project. Further, the expert opinion of Dr. R.V. Varma, Chairman of the Expert Committee of RKI Project (who also serves as a Chairman of the Expert Committee of ABS at NBA) has also been taken in to account in the ABS potential estimation.

In the process of ABS potential estimation of Kerala, a thorough understanding of the various efforts taken by the Board (KSBB) particularly on: listing the biological resources-based industries in the state, notices issued to the industries which are supposed to comply with the Biological Diversity Act, negotiation and challenges with the industries, ABS agreements signed, biological resources' tracking

mechanism, future action plan on strengthening the ABS process in the state etc., were gathered. Discussion with the Kerala State Biodiversity Board Officials: After a detailed discussion with the Board officials following findings on key issues were derived, which are given below:

1. Listing the bio-resources based industries and documentation of the tradable bio-resources
Prior to the RKI project, the Board has collected available (limited) data from the industries' licensing authorities, such as Industrial Departments, Department of Drugs and Cosmetics, Pollution Control Board etc., and segregated the biological resources based units. The tradable bio-resources' documentation has not been done earlier. However, through the Rebuilding Kerala Initiative project a comprehensive documentation of commercially important tradable bio-resources progressed in the State. According to the officials, coming up with a comprehensive methodology for tradable bio-resources' documentation is a challenge. Recently, the Board directed the BMCs to maintain a register for recording the details of bio-resources going out from their jurisdiction such as: source of collection, destination of the resource move, users of the resources etc.

2. Notices issued to the industries

For identifying the units which come under ABS, initially the Board approached the industrial associations. In this regard, Ayurveda Drug Manufacturers, Spices Manufactures and Exporters, and Marine Resources (3 major bio-resources based commercial sectors in the state) were approached and many awareness generation programmes were conducted. The Board has also given advertisements in the news papers: and insisted on the bio-resources- based industries to comply with the provisions of the Biological Diversity Act. However, the responses from the industries were limited. Hence, the Board issued notices to more than 600 Ayurveda units. These units were identified with the support of the Industrial Departments and Ayurveda Industries Association.

According to the Board officials in Kerala, Ayurveda is one of the predominant bio-resources based sectors, which collect a major share of their required raw-materials (medicinal plants) from the wild. Generally, when resources are collected from the wild there are enough possibilities for their being over-exploited and posing a threat to species, but in the case of cultivated species these sorts of challenges are not emerging. The Board has come up with tentative lists of industries that come under the purview of the Biological Diversity Act. There are huge uncertainties regarding the type of industries that come under the purview of the Biological Diversity Act in the state.

3. Response from the industry to the notices and the follow up actions

The Board has issued notices two times (2016 and 2018) to 600 Ayurveda industries. Generally, the industry association is against its members complying with the Biological Diversity Act. Even if a few industries come forward for ABS agreements, their association becomes a hurdle. The Association generally argued that the Act is not for Indians who use biological resources, but only for foreigners. A Majority of the industries felt that the Act is a burden. For industries, profit is the only objective and they are not bothered about the resources' (raw materials) stock or their sustainability. However, the Board is engaging on continuous negotiations with the industries and trying to convince them about their responsibility related to the Biological Diversity Act and also trying to build models. So far six court cases against industries have been filed in the state

4. Industries' awareness about the Biological Diversity Act and the ABS

Around 50% of the industries are aware about the Biological Diversity Act. Now- a- days, the awareness level is increasing, as the Board is giving a series of advertisements related to the Biological Diversity Act and ABS in the news papers and publishing articles in the industrial magazines.



5. ABS agreements:

The Board signed 4 ABS agreements and all are with the Ayurveda companies. Industries come forward to sign the ABS agreement based on the notices. Medicinal plants are the key biological resources/raw materials used. Ex-factory sales value is the criterion followed for fixing the benefit sharing ratio and the total amount collected is Rs. 88,310/-. 328 industries submitted their application in Form 1 with details indicating their turnover. However, these industries are not coming forward for signing the ABS agreements. According to them, submission of the Form 1 application is the intimation of the bio-resources' access, and that is sufficient for them and there is no need for signing the ABS agreement. KSBB has come up with a Guideline (government order) for the constitution of the Kerala Biodiversity Fund and its utilization and administration and it has gone to the government for approval.

Even after the 190 companies furnished their turnover in their application, the Board did not estimate the ABS potential from the Ayurveda sector in the state. However, after discussion they showed their interest in estimation.

6. Future action plans for strengthening the ABS and the State Government's support

The Board is initiating the work for assessing the tradable as well as ABS potential bio-resources in the state with the financial support of the state government, and also planning to form a state level monitoring committee both for the governmental and non-governmental sectors. The Officials stated that, the State governments' support, especially for PBR preparation, BMC formation and their capacity building are satisfactory.

7. Biological resources' traders and tracking mechanism

At present, the Board is not having the data about the biological resources' traders. However, they are initiating the task for identifying the traders at district levels with the support of the District Coordinators and the BMCs. According to the officials "we need to track the resources movement and identify its origin for distribution of ABS money and initiate conservation measures. It is important to designate check points at different levels. Further, it is extremely important to develop a methodology for tracking the bio-resources movement".

8. Universe of commercially significant bio-resources and the ABS potential

As Kerala is rich in biodiversity, the commercial potential of bio-resources is very high. Medicinal plants, marine resources, coconut and spices based entrepreneurs have high commercial significance. According to the Board officials, "there is no doubt that Kerala is having high ABS potential and we are trying to identify it. We need to list the bio-resources based industries, traders, societies, and self help groups in the state". One can estimate the ABS share. However, a scientific approach and appropriate methodology should be followed in estimating the ABS potential. Besides, sample studies of industry specific documentation and upward and downward study on the value chain and supply chain will be highly useful. The Board officials accepted that: "ABS is an innovative financial mechanism and an effective financial solution for biodiversity conservation and management".



14.3 NEED FOR SCALING UP THE ABS IN KERALA

The rich biodiversity of Kerala provides number of ecosystem services as well as source of income/livelihood for millions of poor. The genetic/biological resources of Kerala are raw-materials for manufacturing different consumer products or the benefit/profits options for large number of bio-entrepreneurs. However, Kerala's biodiversity faces a number of threats, ranging from land use changes in natural habitats to overexploitation of natural resources, proliferation of invasive species and climate change. Arresting the further destruction of biodiversity and its conservation is an agenda in the environmental management policies of the government. Further, Kerala is initiating the ABS as an option for biodiversity conservation.

As an outcome of CBD initiatives, India enacted the Biological Diversity Act (2002) and Biological Diversity Rules (2004) and made decentralized institutional arrangements such as; National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs) and Biodiversity Management Committees (BMCs) at the national, state and regional/local levels respectively, for their effective implementation. Further the various notifications issued under the Act, and the 'Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulation (2014)' provide more clarity for implementing the ABS in the country.

At the state level, different states notified State Specific Biological Diversity Rules for the smooth implementation of ABS. In this regard, Kerala's initiatives and achievements are highly appreciable. The objectives of the Act are similar to the CBD objectives. The salient features of the Biological Diversity Act are: it

- Provide sovereign rights of the country over its biological resources
- Stops misappropriation of biological resources and associated TK (bio-piracy).
- Regulates access and use of biological resources and / associated knowledge
- Ensure sustainable utilisation of biological resources and / associated knowledge and equitable benefit sharing.
- Provide legal recognition and support to the biological resources and associated TK.

The Key provisions of the Biological Diversity Act and Rules are given in Table 14.1.

Table 14.1

Provisions of the Biological Diversity Act, 2002 and Rules, 2004

Section	Persons	Activity	Purpose
Section 3 (NBA)	Foreign citizens, Non-Resident Indians (NRIs), body corporates, associations or organisations not incorporated or registered in India or incorporated or registered in India which has any non-Indian participation in share capital or management.	Obtainment of any biological resource occurring in India or knowledge associated thereto.	Research, Commercial Utilization, Bio-survey and Bio-utilization.
Section 4 (NBA)	Indian citizens, foreign citizens, NRIs, body corporates, associations or organisations incorporated or registered in India with or without any non-Indian participation in share capital or management and body corporates, associations or organisations not incorporated or registered in India.	Transfer of results of any research relating to any biological resource occurring in, or obtained from India, to any person covered under Section 3.	Transfer of research results for monetary consideration or otherwise.
	Indian citizens, foreign citizens, NRIs, body corporates, associations or	Application of any IPR in or outside India for	Obtaining IPR, by whatever name



Section 6 (NBA)	organisations incorporated or registered in India with or without any non-Indian participation in share capital or management and body corporates, associations or organisations not incorporated or registered in India.	any invention based on any research or information on a biological resource obtained from India.	called, in or outside India.
Section 20 (NBA)	Any person who has been granted approval under Section 19.	Third party transfer of any biological resources or associated knowledge there to which is the subject matter of an approval granted by the NBA under section 19.	Transfer of biological resources or associated knowledge
Section 7 (SBB)	Indian citizens, body corporates, associations or organisations which are registered or incorporated in India and not covered under Section 3.	Obtaining any biological resource.	Commercial utilization, bio-survey and bio-utilization for commercial utilization.

Source: NBA (2010)

Exemption in ABS provision as per the Act include: (a) human genetic material, (b) value added products (products which may contain portions or extracts of plants and animals in unrecognizable and physically inseparable form), (c) 421 biological resources notified as 'normally traded as commodities', and (d) local people and communities, including growers and cultivators of biodiversity, and vaidas and hakims, who have been practicing indigenous medicine. Contravention or abetment of contravention of the provisions of Sections 3, 4, 6, 7, 20 or 24 of the Act amounts to a cognizable non-bailable offence.

Broadly, industries which use genetic/biological resources for commercial purposes and manufacturing different consumer products will come under the purview of the BD Act. But, the majorities of the industries do not comply with the Act or share the benefits to the local community (through NBA / SBBs) for biodiversity conservation. Hence, a significant portion of finance (ABS amount) which is to be assigned for biodiversity conservation is being lost for the country including Kerala.

The estimation of the ABS potential in a bio-diverse rich State like Kerala will enhance the scope of ABS as an effective financial solution for biodiversity conservation. As per Section 7, 'prior intimation of SBBs for obtaining biological resources for certain purposes' (commercial utilization, bio-survey and bio-utilization for commercial utilization) is required. It is applicable for Indian citizens, body corporates, associations or organisations which are registered or incorporated in India and not covered under Section 3.

14.4 TENTATIVE ABS POTENTIAL ESTIMATION

As per the "Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulation – 2014", Access and Benefit Sharing (ABS) can be availed of from the biological resources based industries either:

- (a) Based on the biological resources' purchased price by the industries, based on the raw-material cost, prescribed as 3% to 5 %.
- or
- (b) Based on the ex-factory sale value of the product minus government taxes, where biological resources are involved in production fully or partially (0.1% to 0.5%).



A. ABS POTENTIAL BASED ON ANNUAL TURNOVER OR OUTPUT VALUE OF BIO-RESOURCES BASED MANUFACTURING IN KERALA

The analysis of data on bio-resources based Micro, Small and Medium Enterprises (MSMEs) (MSMEs and Factories) in Kerala carried out in the previous sections derived the sector wise annual turnover. In the MSMEs' case the ABS potential is estimated to be 0.2% of turnover, as its overall investment is relatively small compared to the large industries or factories (Table 14.2).

Table 14.2
ABS potential of Bio-resources Based Enterprises (MSMEs)

Sl. No.	Category	Number of Enterprises		Annual Turnover (Rs. Lakh)	ABS Potential (0.2% of turnover)	
		Number	%		Amount (Rs. lakh)	%
1	Ayurveda and Herbal cosmetics	586	1.23	43648.74	87.29	1.90
2	Food Processing	15927	33.50	1287608.39	2575.22	53.62
3	Cashew products other than nuts	207	0.44	10554.00	21.11	0.44
4	Marine products and Sea foods	174	0.37	224992.61	449.98	9.24
5	Textiles and Handlooms	9964	20.96	125492.73	250.98	5.23
6	Coir products	1159	2.44	76682.40	153.36	3.19
7	Wood, Bamboo and Cane based industries	9629	20.25	238901.98	477.80	9.95
8	Herbal Wellness Centres	3245	6.83	20844.79	41.69	0.87
9	Paper based products and printing	3317	6.98	88400.70	176.80	3.68
10	Rubber based products (Tyres, Foot wares etc.)	2023	4.26	226636.84	453.27	9.44
11	Wax products	254	0.53	1220.08	2.44	0.10
12	Others	1056	2.22	56211.11	112.42	2.34
	TOTAL	47541	100.00	2401194.36	4802.39	100.00

As per the estimation, the ABS potential of all the bio-resources based enterprises (MSMEs) in the State is Rs. 4802.39 lacs. In this, the Food processing industries play a significant role with Rs. 2575.22 lakh (53.62%) followed by Wood, Bamboo and Cane based industries (Rs.477.80 lakh - 9.95%), Rubber based products - Tyres, Foot wares etc. - (Rs.453.27 lakh - 9.44%), Marine products and Sea foods (Rs.449.98 lakh - 9.24%), Textiles and Handlooms (Rs.250.98 lakh - 5.23%), and Paper based products and printing (Rs.176.80 lakh - 3.68%). Other industrial units' ABS potential is relatively small.

For the factories (major/large industries) the ABS potential is estimated to be 0.5% of the turnover, as its overall investment is high (Table 14.3).



Table 14.3
ABS potential of Bio-resources Based Factories in Kerala
(Major factory group at 2-digit NIC 2008)

NIC Code	Factory / Description	Factories		Total Output/Turnover		ABS Potential (0.5% of turnover)	
		Number	%	Value (Rs. Lakh)	%	Amount (Rs lakh)	%
A. Fully Bio-resources based							
10	Manufacture of food products	1624	45.88	3525681	80.38	17628.41	80.38
11	Manufacture of beverages	63	1.78	122299	2.79	611.495	2.79
12	Manufacture of tobacco products	500	14.12	16083	0.37	80.415	0.37
15	Manufacture of leather and related products	203	5.73	238422	5.44	1192.11	5.44
16	Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	857	24.21	153492	3.50	767.46	3.50
17	Manufacture of paper and paper products	134	3.79	77944	1.78	389.72	1.78
21	Manufacture of pharmaceuticals, medicinal chemical and botanical products	159	4.49	252214	5.75	1261.07	5.75
	Total	3540	100	4386135	100	21930.68	100
B. Partially Bio-resources based*							
13	Manufacture of textiles	423	32.36	426913	11.81	2134.56 (1067.28*)	11.81
14	Manufacture of wearing apparel	51	3.90	81120	2.25	405.6 (202.80*)	2.24
22	Manufacture of rubber and plastic products	629	48.13	1054283	29.17	5271.41 (2635.71*)	29.17



31	Manufacture of furniture	130	9.95	48089	1.33	240.44 (120.22*)	1.33
32	Other manufacturing	74	5.66	2003717	55.44	10018.59 (5009.29*)	55.44
	Total	1307	100	3614122	100	9035.305	100.00
	Grand Total (A+B)	4847		8000257		30965.98	

Source: Estimated based on Annual Survey of Industries 2017-18

Note: * Partially Bio-resources based industries, 50% of total output value only considered for ABS amount estimation

The estimation of the ABS potential of factories in the State focuses Fully on bio-resources based factories and Partial bio-resources based factories. In the fully Bio-resources based factories the estimated ABS potential is Rs. 21930.68 lakh. Out of this, the manufacture of food products plays a significant role with Rs. 17628.41lakh (80.38 %) followed by manufacture of pharmaceuticals, medicinal, chemical and botanical products (Rs. 1261.07 lakh - 5.75%) and manufacture of leather and related products (Rs. 1192.11lakh - 5.44%). Other factories' ABS potential is relatively small.

In the partial bio-resources based factories case, as per the 2-digit NIC classifications, along with biological resources, the non-biological resources based factories have also been taken in to account. Hence, only 50% of the total output value is considered for the ABS amount estimation. Accordingly, the partial bio-resources based factories total ABS potential is Rs. 9035.30 lakh.

The following table (Table 14.4) provides a comprehensive picture about the ABS potential of the State based on the manufacturing of products by industrial units, and the amount is around **Rs. 357 crore.**

Table 14.4
Consolidated ABS potential from bio-resource based Manufacturing or Industrial Units

S No	Bio-resource based Manufacturing	ABS Amount (Rs. Lakh)
1	MSME	4802.39
2	Large factories	30965.98
	Total	35768.37

B. BIOLOGICAL RESOURCES' PURCHASED PRICE BASED ABS ESTIMATION

Access and Benefit Sharing (ABS) can be also availed of, based on biological resources' purchased price by the industries or based on the raw-material cost. Unfortunately we are not in a position to get this information from each industry either through the secondary data or through the primary sources. Hence, an ecosystem based approach has been followed with certain specific assumptions which have been approved by the experts. The base for this analysis is the ecosystem wise tradable bio-resources database (quantity of the resources and their economic or market value) we generated as part of the RKI project.



1. FOREST ECOSYSTEM

High value bio-resources (sandalwood and other timbers)

Kerala's forest ecosystem is rich with timber (wood) and Non Timber Forest Products (NTFPs). The Marayoor sandalwood has a high demand even in international markets. In the case of NBA, out of the total ABS amount collected so far around 95% has been obtained from red sanders. The ABS potential of high value bio-resources will be estimated based on the norms prescribed in the ABS Guidelines as well as the Guidelines issued by the NBA for the red sanders' ABS estimation. The following table provide an overall picture about the timber sector (both in forest and outside forest) in Kerala. As per the estimation, the ABS Potential of Timber both from the forests and outside (Based on Auction Value) is **Rs 1319 Lakh per year (Table 14.5)**

Table 14.5

ABS Potential of Timber (Based on Auction Value)

Timber	Mode of Estimation	Quantity (M ³ /Kg)	Value (Rs. Lakh)		ABS potential Value (Rs. Lakh)	
			Value	%	Value	%
FOREST						
27 Timber Depots	Cumulative Annual Average (2015-2020)	26422.07 (M ³)	15395	73.45	76.97 (0.5% of total value)	23.42
KFDC	Cumulative Annual Average: (2015-16 to 2019-20)	9684.30(M ³)	590	2.81	2.95 (0.5% of total value)	0.90
Marayoor Sandalwood	Cumulative Annual Average (2015-2020)	72,991 (Kg)	4975	23.74	248.75 (5% of total value)	75.68
Forest (Total)			20,960	100.00	328.67	100
Timber outside Forest						
Outside Forest (Total)	Annual total (2014-15)	22,56,219 (M ³)	1,98,134		990.67 (0.5% of total value)	100
Grand Total			2,19,094		1319.34	



Non Timber Forest Products (NTFPs)

Some of the NTFPs, particularly the medicinal plants and aromatic plants from Kerala's forests have high ABS potential. Out of the cumulative annual average value of the NTFPs we have arrived at (Rs. 423.3 Lakh), we assumed that around 50% goes for domestic (non commercial) purposes and traditional practices. As per the Biological Diversity Act, the bio-resources used by the local people and communities, including growers and cultivators of biodiversity, and v aids and hakims, who have been practicing indigenous medicine, are exempted from the provisions of the Act. Hence, only Rs. 211.6 (50% of the total value) is considered for ABS projection. The benefit sharing ratio considered for ABS estimation is 3% of the value. Accordingly, the ABS potentials of the NTFPs of Kerala amount to Rs. 6.35 Lakh per year (see Table 14.6).

Table 14.6

ABS Potential of NWFPs in Kerala

Method / Year	Quantity (Kg)	Total Value (Rs. Lakh)	Value considered for ABS (50% total value)	ABS Potential (Rs. Lakh)
Cumulative Average (2015-19)	826573.9	423.3	211.6	6.35 (3% of the value)

2. FISHERIES SECTOR:

Both the marine and inland fisheries in Kerala can contribute substantially to ABS. Some of the fish species available in the State have high commercial potential and export value. Fish processing industries located in Kerala as well as in neighbouring states use the fish landed or cultured in Kerala as raw material. Since a large volume of fish in the State is used for domestic or local (non commercial) consumption, only 50% of the total value of fisheries sector is considered for ABS potential estimation. The benefit sharing ratio taken into account is 0.5% of the total value for both the marine and inland sectors. Accordingly, the total ABS potential of fisheries sector in the State is Rs.3039 Lakh per year, which includes Rs Rs.2079 Lakh from Marine and Rs.960 Lakh from inland sectors (see Table 14.7).

Table 14.7

ABS Potential of Fisheries

Method / Year	Quantity (MT)	Total Value (Rs. Lakh)	Value considered for ABS (50% total value)	ABS Potential (RS. Lakh)
Marine Fisheries				
Cumulative Average (2015-19)	518783	831666.47	415833.2	2079.17 (0.5% of the value)
Inland Fisheries				
Cumulative average (2015-19)	197086.2	384071.40	192035.7	960.18 (0.5% of the value)
Total	715869.2	1215737.87	607868.9	3039.35



3. AGRICULTURE SECTOR

For the agriculture sector 26 major crops items of Kerala were considered for estimating the net value which comes to Rs. 23,61,407 Lakh. Out of this, only 30% (Rs. 7,08,422 Lakh) is considered for ABS estimation as most of the crop items are used for household purposes or domestic consumption. Further, considerable volumes of agriculture produce are under NTC (Normally Traded as Commodities). The benefit sharing ratio considered for estimating the ABS is 0.5% of the value. In brief, the ABS potential of Kerala's agriculture sector is Rs. 3542 Lakh per year (see Table 14.8).

Table 14.8

ABS Potential of Agriculture

Year	Production (MT)	Value (Rs. Lakh)	Value (Rs. Lakh) (30% of the value)	Potential ABS value (Rs. Lakh)
2018-19	5213126.3	23,61,407	7,08,422	3542.11 (0.5% of the total value)

4. LIVESTOCK SECTOR

The total value generated from the livestock sector of Kerala is Rs. 28,91,650 Lakh. As most of the livestock products are used in domestic sectors, we considered a limited percentage of the value for ABS estimation (30% for milk, 10% for egg and meat). The benefit sharing ratio considered in the livestock sector is 0.5%. The projected ABS in the livestock sector in Kerala is Rs. 2693 Lakh per year, which includes Rs. 1872 Lakh from milk; Rs. 65 Lakh from egg and **Rs. 756 Lakh from meat (see Table 14.9).**

Table 14.9

ABS Potential of Livestock

Livestock Product	Production	Value (Rs. in Lakh)	Reduced Value (Rs. in Lakh)	Potential ABS value (Rs. Lakh)	%
Milk	24560.38 (Lakh Ltrs)	1247905.42	374371.6 (30%)	1871.86 (0.5% of 30% of total value)	69.49
Egg	218.00 Crore Numbers	130950.00	13095 (10%)	65.47 (0.5% of 10% of total value)	2.43
Meat	4690 (Lakh Kg.)	1512816.90	151281.7 (10%)	756.41 (0.5% of 10% of total value)	28.08
Total		28,91,650	538748.3	2693.74	100.00

In Brief, the bio-resources based ABS potential of Kerala would be Rs. 10599 Lakh (Table 14.10)



Table 14.10

Bio-resources based ABS potential of Kerala

S No	Sectors	ABS potential (Rs. Lakh)
1	Forest	1325
	Timber	1319
	NTFPs	6
2	Fisheries	3039
	Marine	2079
	Inland	960
3	Agriculture	3542
4	Livestock	2693
	TOTAL	10599

C. TRADABLE AND ABS POTENTIAL BIO-RESOURCES KERALA

Table 14.11

Marine and Inland bioresources

Sl.No	Scientific name	Common name
	Crustaceans	
1	<i>Penaeus indicus</i> H. Milne Edwards, 1837	Indian prawn
2	<i>Penaeus monodon</i> Fabricius, 1798	Tiger prawn
3	<i>Penaeus semisulcatus</i> (de Haan, 1844)	Green Tiger Prawn
4	<i>Penaeus japonicus</i> (Bate, 1888)	Kuruma prawn
5	<i>Melicertus canaliculatus</i> (Olivier, 1811)	Local Witch prawn
6	<i>Metapenaeus dobsoni</i> (Miers, 1878)	Kadal shrimp
7	<i>Metapenaeus affinis</i> (Milne- Edwards, 1837)	Jinga Prawn
8	<i>Metapenaeus monoceros</i> (Fabricius, 1798)	Brown/Speckled Shrimp
9	<i>Parapenaeopsis stylifera</i> (Milne- Edwards, 1837)	Kiddi Prawn
10	<i>Litopenaeus vannamei</i> (Boone, 1931)	White leg prawn, Vannamei prawn
11	<i>Heterocarpus woodmasoni</i> Alcock, 1901	Indian Nylon Shrimp
12	<i>Heterocarpus gibbosus</i> (Spence Bate, 1888)	Tomato shrimp
13	<i>Parapandalus spinipes</i> (Bate, 1888)	
14	<i>Plesionika ensis</i> (Milne-Edwards, 1881)	Gladiator striped shrimp
15	<i>Aristeus alcocki</i> Ramadan, 1938	Arabian red shrimp
16	<i>Exhippolysmata ensirostris</i> (Kemp, 1914)	Hunter shrimp
17	<i>Solenocera hextii</i> (Wood-Mason & Alcock, 1891)	Deep-sea mud shrimp
18	<i>Solenocera crassicornis</i> (Milne-Edwards, 1837)	Coastal mud shrimp
19	<i>Solenocera choprai</i> Nataraj, 1945	Ridgeback shrimp



20	<i>Acetes indicus</i> Milne-Edwards, 1830	Jawla paste shrimp
21	<i>Acetes erythraeus</i> Nobili, 1905	Tsivakihini paste shrimp
22	<i>Acetes johni</i> Nataraj, 1947	Paste shrimp
23	<i>Macrobrachium idella</i> (Hilgendorf, 1898)	Slender river prawn
24	<i>Macrobrachium rosenbergii</i> (de Man, 1879)	Giant freshwater prawn
26	<i>Portunus pelagicus</i> (Linnaeus, 1758)	Flower crab
27	<i>Portunus sanguinolentus</i> (Herbst, 1783)	Three spot swimming crab
28	<i>Scylla serrata</i> (Forskål, 1775)	Mud crab
29	<i>Scylla tranquebarica</i> (Fabricius, 1798)	Mangrove crab
30	<i>Scylla olivacea</i> (Herbst, 1796)	Orange mud crab
31	<i>Charybdis feriata</i> (Linnaeus, 1758)	Crucifix crab
31	<i>Charybdis smithii</i> (Fabricius, 1798)	Indian ocean swimming crab
32	<i>Charybdis lucifera</i> (Fabricius, 1798)	Yellowish brown crab
33	<i>Charybdis natator</i> (Herbst, 1789)	Ridged swimming crab
34	<i>Thenus unimaculatus</i> Burton & Davie, 2007	
35	<i>Panulirus homarus</i> (Linnaeus, 1758)	Scalloped Spiny Lobster
36	<i>Panulirus ornatus</i> (Fabricius, 1798)	Ornate Rock Lobster
37	<i>Panulirus polyphagus</i> (Herbst, 1793)	Spiny Lobster
38	<i>Panulirus versicolor</i> (Latreille, 1804)	Painted Rock Lobster
39	<i>Puerulus sewelli</i> Ramadan, 1938	Arabian whip lobster
40	<i>Nephropsis stewarti</i> Wood-Mason, 1872	Indian Ocean lobsterette
	Molluscs	
41	<i>Lamellidens marginalis</i> (Lamark, 1819)	Freshwater mussel
42	<i>Saccostrea cucullata</i> (Born, 1778)	Hooded oyster
43	<i>Crassostrea madrasensis</i> (Preston, 1916)	Indian Backwater oyster
44	<i>Meretrix casta</i> (Gmelin, 1791)	Backwater hard clam
45	<i>Meretrix meretrix</i> (Linnaeus, 1758)	Asiatic hard clam
46	<i>Perna perna</i> (Linnaeus, 1758)	Brown mussel
47	<i>Perna viridis</i> (Linnaeus, 1758)	Asian Green Mussel
48	<i>Pinctada margaritifera</i> (Linnaeus 1758)	Black-lip pearl oyster
49	<i>Paphia malabarica</i> (Dillwyn, 1817)	Short neck clam
50	<i>Villorita cyprinoides</i> (Gray, 1825)	black clam
51	<i>Sepia aculeata</i> (Van Hasselt, 1835)	Needle Cuttle fish
52	<i>Sepia pharaonis</i> (Ehrenberg, 1831)	Pharaoh cuttlefish
53	<i>Sepilla inermis</i> (Van Hasselt, 1835)	Spineless cuttlefish
54	<i>Uroteuthis duvauceii</i> (d'orbigny, 1835)	Indian Squid
55	<i>Octopus vulgaris</i> (Cuvier, 1797)	Common octopus
56	<i>Cistopus incidus</i> (Raap, 1835)	Pouched Octopus
	Fishes	
57	<i>Chiloscyllium indicum</i> (Gmelin, 1789)	Slender Bamboo Shark
58	<i>Alopias pelagicus</i> (Nakamura, 1935)	Pelagic Thresher Shark (Whiptail Shark)
59	<i>Alopias vulpinus</i> (Bonnaterre, 1788)	Common Thresher (Thresher)
60	<i>Carcharhinus dussumieri</i> (Müller & Henle, 1839)	Whitecheek Shark
61	<i>Carcharhinus limbatus</i> (Müller & Henle, 1839)	Blacktip Shark
62	<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Shark
63	<i>Scoliodon laticaudus</i> (Müller & Henle, 1838)	Spadenose Shark
64	<i>Sphyrna zygaena</i> (Linnaeus, 1758)	Smooth hammer head
65	<i>Pristis microdon</i> (Latham, 1794)	Large-tooth Sawfish
66	<i>Himantura bleekeri</i> (Blyth, 1860)	Bleeker's Whip Ray



67	<i>Himantura uarnak</i> (Gmelin, 1789)	Honeycomb Stingray
68	<i>Hippocampus kuda</i> (Leach, 1814)	Spotted Seahorse (Yellow Seahorse)
69	<i>Hippocampus trimaculatus</i> (Hamilton, 1822)	Longnose Seahorse (Three-spot Seahorse)
70	<i>Rachycentron canadum</i> (Linnaeus, 1758)	Cobia (King Fish)
71	<i>Parastromateus niger</i> (Lacepède, 1801)	Black Pomfret
72	<i>Scomberoides commersonianus</i> (Forsskål, 1775)	Talang Queenfish
73	<i>Scomberoides lysan</i> (Cuvier, 1832)	Double-Spotted Queenfish
74	<i>Coryphaena hippurus</i> (Bloch & Schneider, 1801)	Common Dolphinfish
75	<i>Lutjanus malabaricus</i> (Bloch, 1790)	Malabar Blood Snapper
76	<i>Nemipterus japonicus</i> (Bleeker, 1853)	Japanese Threadfin Bream
77	<i>Johnius dussumieri</i> (Mohan, 1976)	Sin Croaker
78	<i>Mugil cephalus</i> (Bleeker, 1853)	Flathead Mullet
79	<i>Siganus javus</i> (Valenciennes, 1835)	Streaked Spinefoot
80	<i>Lepturacanthus savala</i> (Klunzinger, 1884)	Savalai Hairtail
81	<i>Trichiurus lepturus</i> (Cuvier, 1832)	Large head Hairtail
82	<i>Auxis rochei</i> (Lacepède, 1800)	Bullet Tuna
83	<i>Auxis thazard</i> (Cantor 1849)	Frigate Tuna (Frigate Tuna)
84	<i>Euthynnus affinis</i> (Rüppell 1836)	Kawakawa (Mackerel Tuna)
85	<i>Katsuwonus pelamis</i> (Cuvier, 1816)	Skipjack Tuna (Skiy Jack)
86	<i>Rastrelliger kanagurta</i> (Temminck & Schlegel, 1844)	Indian Mackerel
87	<i>Scomberomorus commerson</i> (Bloch & Schneider, 1801)	Narrow-Barred Spanish Mackerel (King Seer)
88	<i>Scomberomorus guttatus</i> (Kishinouye, 1915)	Indo-Pacific King Mackerel (Spotted Spanish Mackerel)
89	<i>Scomberomorus lineolatus</i> (Bonnaterre, 1788)	Streaked Seer
90	<i>Istiompax indica</i>	Black Marlin
91	<i>Thunnus albacares</i> Bleeker, 1851	Yellow Fin Tuna
92	<i>Thunnus tonggol</i> (Bleeker, 1851)	Longtail Tuna (Longtail Tuna)
93	<i>Pampus argenteus</i> (Euphrasen, 1788)	Silver Pomfret
94	<i>Pampus chinensis</i> (Günther, 1860)	Chinese Silver Pomfret
95	<i>Parastromateus niger</i> (Bloch, 1795)	
96	<i>Cynoglossus puncticeps</i> (Day, 1877)	Speckled Tonguesole
97	<i>Epinephelus malabaricus</i> (Bloch & Schneider, 1801)	Malabar Grouper
98	<i>Sardinella longiceps</i> (Valenciennes, 1847)	Indian Oil Sardine
99	<i>Chanos chanos</i> (Forsskal 1775)	Milk fish
100	<i>Lates calcarifer</i> (Bloch 1790)	Barramundi
101	<i>Epinephelus diacanthus</i> (Valenciennes 1828)	Spinycheek grouper
102	<i>Epinephelus areolatus</i> (Forsskål 1775)	Areolate grouper
103	<i>Lutjanus argentimaculatus</i> (Forsskål 1775)	Mangrove red snapper
104	<i>Carinotetraodon travancoricus</i> (Hora & Nair, 1941)	Dwarf pufferfish
105	<i>Dawkinsia arulius</i> (Jerdon, 1849)	Arulius barb
106	<i>Garra hughii</i> (Silas, 1955)	Cardamon garra
107	<i>Hypsobarbus kurali</i> (Menon & Rema Devi, 1995)	Kooral
108	<i>Sahyadria denisonii</i> (Day 1865)	Denison barb



109	<i>Sahyadria chalakkudiensis</i> (Menon, Rema Devi & Thobias, 1999)	Chalak barb
110	<i>Batasio travancoria</i> (Hora & Law, 1941)	Travancore batasio
111	<i>Glyptothorax housei</i> (Herre, 1942)	
112	<i>Mesonoemacheilus remadevii</i> (Shaji, 2002)	Devi's Loach
113	<i>Anguilla bengalensis</i> (Gray, 1831)	Indian mottled eel
114	<i>Barilius bakeri</i> (Day, 1865)	
115	<i>Barilius gatensis</i> (Valenciennes, 1844)	River-carp baril
116	<i>Channa striata</i> (Bloch, 1793)	Striped snakehead
117	<i>Danio rerio</i> (Hamilton, 1822)	Zebra fish
118	<i>Dawkinsia filamentosus</i> (Valenciennes, 1844)	filament barb
119	<i>Devario malabaricus</i> (Jerdon, 1849)	Malabar danio
120	<i>Pseudetroplus maculatus</i> (Bloch, 1795)	Orange chromidae
121	<i>Etroplus suratensis</i> (Bloch 1790)	Green chromidae
122	<i>Horabagrus nigricollaris</i> (Pethiyagoda & Kottelat, 1994)	Black collared catfish
123	<i>Horabagrus brachysoma</i> (Günther, 1864)	Sun cat fish
124	<i>Laubuca fasciata</i> (Silas, 1958)	Malabar Hatchet Chela
125	<i>Macrogathus aral</i> (Bloch & Schneider, 1801)	one-stripe spiny eel
126	<i>Mastacembelus armatus</i> (Lacepède, 1800)	zig-zag eel
127	<i>Nandus nandus</i> (Hamilton, 1822)	Gangetic leaf fish
128	<i>Nemacheilus guentheri</i> (Day, 1867)	Gunther's Loach
129	<i>Mesonemacheilus triangularis</i> (Day, 1865)	Stone loach
130	<i>Osteochilichthys nashi</i> (Day, 1869)	Nash's barb
131	<i>Parambassis thomassi</i> (Day, 1870)	Western Ghat glassy perchlet
132	<i>Pethia conchonius</i> (Hamilton, 1822)	Rosy barb
133	<i>Pethia ticto</i> (Hamilton, 1822)	Ticto barb
134	<i>Travancoria elongata</i> (Pethiyagoda & Kottelat, 1994)	Periyar loach
135	<i>Channa diplogramma</i> (Day, 1865)	Malabar snakehead
136	<i>Channa marulius</i> (Hamilton, 1822)	Great snakehead
137	<i>Channa striata</i> (Bloch, 1793)	Striped snakehead
138	<i>Heteropneustes fossilis</i> (Bloch, 1794)	Stinging catfish
139	<i>Wallago attu</i> (Bloch & Schneider, 1801)	Wallago
140	<i>Tor khudree</i> (Sykes, 1839)	Deccan mahseer
141	<i>Tor malabaricus</i> Jerdon, 1849	Malabar mahseer
142	<i>Amphiprion percula</i> (Lacepède, 1802)	Clown anemone fish
143	<i>Amphiprion ocellaris</i> Cuvier, 1830	False clown anemone fish
144	<i>Amphiprion sandaracino</i> Allen, 1972	Yellow sunk clown
145	<i>Amphiprion frenatus</i> Brevoort, 1856	Tomato clown
146	<i>Amphiprion clarkia</i> (J. W. Bennett, 1830)	Clark's Anemone fish
147	<i>Amphiprion nigripes</i> Regan, 1908	Maldives Anemone fish
148	<i>Premnas biaculeatus</i> (Bloch, 1790)	Maroon clown
149	<i>Pseudochromis dielectus</i> Lubbock, 1976	Redhead dottyback
150	<i>Dascyllus trimaculatus</i> (Rüppell, 1829)	Three spot damsel
151	<i>Dascyllus aruanus</i> (Linnaeus, 1758)	Stripped damsel
152	<i>Pomacentrus caeruleus</i> Quoy & Gaimard, 1825	Blue damsel
153	<i>Neopomacentrus nemurus</i> (Bleeker, 1857)	Yellow tail damsel
154	<i>Chrysiptera cyanae</i> Quoy & Gaimard, 1825	Sapphire devil
155	<i>Chrysiptera unimaculata</i> (Cuvier, 1830)	One spot damsel
156	<i>Chromis viridis</i> (Cuvier, 1830)	Green chromis



	SPONGES (shown here to give emphasis on bio-active compounds)	
157	<i>Spongia officinalis</i> Linnaeus, 1759	Bath sponge
158	<i>Xestospongia sp.</i>	
159	<i>Zezzya fuliginisa</i>	
160	<i>Euryspongia</i>	
161	<i>Dactylospongia elegans</i> (Thiele, 1899)	
162	<i>Tridemnum sps.</i>	
163	<i>Tethyacrypta</i>	
164	<i>Echinodactylum sps.</i>	
165	<i>Discodermia dissolute</i>	
166	<i>Lissodendorys sps.</i>	
167	<i>Verongia aerophoba</i>	
168	<i>Theonella sp.</i>	
	ASCIDIAN	
169	<i>Lissodinum bistratum</i>	
	SEA WEEDS	
170	<i>Gracilaria corticata</i>	Agar
171	<i>Gracilaria foliifera</i>	Agar
172	<i>Gelidiopsis variabilis</i>	Agar
173	<i>Gelidium pusillum</i>	Agar
174	<i>Sargassum wightii</i>	Algin
175	<i>Sargassum duplicatum</i>	Algin
176	<i>Sargassum tenerimum</i>	Algin
177	<i>Stoechospermum marginatum</i>	Algin
178	<i>Dictyota dichotoma</i> and <i>Padina</i>	Algin
179	<i>Padina sp.</i>	Algin
180	<i>Hypnea musciformis</i>	Carangineen
181	<i>Hypnea valentiae</i>	Carangineen
182	<i>Grateloupia filicina</i>	Carangineen
183	<i>Hypnea musciformis</i>	Carangineen
184	<i>Hypnea valentiae</i>	Carangineen
185	<i>Grateloupia filicina</i>	Carangineen
186	<i>Grateloupia lithophila</i>	Carangineen
187	<i>Gracilariopsis lemaneiformis</i>	Carangineen



Table 14.12
Floral Bioresources- Medicinal Plants

SL. No	Botanical Name	Local Name	Part Used	Threat Status
1.	<i>Nervilia crociformis</i>	Orilathamara	Rhizomes	NT *
2.	<i>Abies spectabilis</i>	Thalisapathram	Leaves	NT or LR **
3.	<i>Abrus precatorious</i>	Kunnikkuru	Seed	NT *
4.	<i>Acacia catechu</i>	Karingali	Wood	LC **
5.	<i>Acacia nilotica</i>	Karivelappatta	Bark	LC **
6.	<i>Achyranthes aspera</i>	Valiyakadaladi	Roots	
7.	<i>Aconitum ferox</i>	Valsanabhi	Tuberous root	EN *
8.	<i>Aconitum heterophyllum</i>	Athividayam	Tuberous root	CR *
9.	<i>Acorus calamus</i>	Vayambu	Rhizome	EN *
10.	<i>Actiniopteris dichotoma</i>	Nanmughapullu	Leaves	Rare ^
11.	<i>Justicia beddomei</i>	Cheriya Adalodakam	Roots, Leaves	CR *
12.	<i>Adiantum lunatum</i>	Kozhikkalin veru	Roots	NT **
13.	<i>Aegle marmelos</i>	Koovalam	Roots, Leaves, Fruits pulp	NT **
14.	<i>Aerva lanata</i>	Cheroola	Whole plant, Roots	
15.	<i>Ageratum conyzoides</i>	Kattappa veru	Roots	
16.	<i>Alangium salviifolium</i>	Ankolathin	Roots	LC **
17.	<i>Albizia lebbek</i>	Nenmenivaka	Bark, Roots	LC **
18.	<i>Aloe vera</i>	Kattarvazha	Leaves	
19.	<i>Alpinia officinarum</i>	Chuvannaratha	Roots	
20.	<i>Alstonia scholaris</i>	Ezhilampala	Bark	LC **
21.	<i>Amomum subulatum</i>	Perelam	Fruits	DD **
22.	<i>Amorphophallus paeoniifolius</i>	Kattuchena	Corm	LC **
23.	<i>Anacyclus pyrethrum</i>	Akkikkaruka	Roots	
24.	<i>Andrographis paniculata</i>	Kiriyath	Whole plant	VU *
25.	<i>Anethum graveolens</i>	Shathakuppa	Fruits	
26.	<i>Anisomeles malabarica</i>	Karinthumpa	Whole plant	
27.	<i>Aquilaria agallocha</i>	Karakil	Wood	EN *
28.	<i>Argemone mexicana</i>	Erumakkalli	Whole plant	
29.	<i>Aristolochia bracteolata</i>	Attukottappala	Roots	VU *
30.	<i>Aristolochia indica</i>	Garudakkodi	Roots	VU *
31.	<i>Asparagus racemosus</i>	Shathavari	Tuberous root	EN *
32.	<i>Azadirachta indica</i>	Aryavepp	Roots, Leaves,	LC **



			Fruits, Bark, Wood	
33.	<i>Azima tetraantha</i>	Eshankin	Roots	LC **
34.	<i>Bacopa monnieri</i>	Brahmi	Whole plant	VU *
35.	<i>Baliospermum montanum</i>	Nagadanthi	Roots	NT*
36.	<i>Bauhinia variegata</i>	Chuvanna mandaram	Bark	LC **
37.	<i>Biophytum sensitivum</i>	Mukkutti	Fruits	
38.	<i>Boerhavia diffusa</i>	Thazhuthama	Whole plant, Roots	
39.	<i>Borassus flabellifer</i>	Panavazha	Flowers	EN **
40.	<i>Brassica alba</i>	Velutha kaduk	Fruits	LC **
41.	<i>Brassica nigra</i>	Karuthakaduk	Fruits	LC **
42.	<i>Bridelia stipularis</i>	Kannikottam	Roots	LC **
43.	<i>Butea monosperma</i>	Plash	Bark	LC **
44.	<i>Caesalpinia sappan</i>	Pathimugham	Wood	LC **
45.	<i>Caesalpinia bonduc</i>	Kazhanchi	Roots, Seed	LC **
46.	<i>Callicarpa macrophylla</i>	Njazhal	Flowers	LC **
47.	<i>Calophyllum inophyllum</i>	Punna	Flowers	
48.	<i>Calotropis gigantea</i>	Erukk	Roots, Leaves	
49.	<i>Calycopteris floribunda</i>	Pullani	Leaves, Fruits	
50.	<i>Cardiospermum halicacabum</i>	Uzhinja	Whole plant	LC **
51.	<i>Caryota urens</i>	Panamkula	Inflorescence	LC **
52.	<i>Cassia fistula</i>	Kannikonna	Leaves, Bark	LC **
53.	<i>Cassia tora</i>	Ponnanthakara	Seed	
54.	<i>Cedrus deodara</i>	Devatharam	Wood	LC **
55.	<i>Celastrus paniculatus</i>	Cherupunnayari	Seed	EN *
56.	<i>Centella asiatica</i>	Muthil	Whole plant	LC **
57.	<i>Centratherum anthelminticum</i>	Kattujeerakam	Seed	
58.	<i>Chenopodium album</i>	Cherucheera	Whole plant	
59.	<i>Chonemorpha fragrans</i>	Perumkurumba	Roots	EN *
60.	<i>Chrysopogon zizanioides</i>	Ramacham	Roots	LC **
61.	<i>Cinnamomum malabattrum</i>	Sheema Elavankam	Bark	LC **
62.	<i>Cissus quadrangularis</i>	Changalamparanda	Whole plant	
63.	<i>Citrullus colocynthis</i>	Kattuvellari	Roots	VU *
64.	<i>Cleome gynandra</i>	Adunarivelaveru	Roots	
65.	<i>Clerodendrum serratum</i>	Cheruthekk	Roots	EN *
66.	<i>Clitoria ternatea</i>	Shankupushpam	Whole plant, Roots	
67.	<i>Coleus aromaticus</i>	Panikoorkka	Leaves	
68.	<i>Coptis teeta</i>	Peetharohini	Tuberous root	EN **
69.	<i>Coriandrum sativum</i>	Kothambalayari	Fruits	
70.	<i>Coscinium fenestratum</i>	Maramanjil	Bark	CR *
71.	<i>Costus speciosus</i>	Naruchanna	Tuberous root	VU *
72.	<i>Crateva magna</i>	Neermathalam	Roots, Bark	
73.	<i>Crocus sativus</i>	Kunkumapoovu	Stigma & Style	
74.	<i>Cullen corylifolium</i>	Karkokilari	Fruits	LC **



75.	<i>Cuminum cyminum</i>	Jeerakam	Seed	
76.	<i>Curculigo orchioides</i>	Nilappana	Tuberous root	
77.	<i>Curcuma aromatica</i>	Kasthurimanjal	Rhizomes	VU *
78.	<i>Curcuma longa</i>	Pachamanjal	Rhizomes	
79.	<i>Cyathula prostrata</i>	Cherukadaladi	Whole plant	
80.	<i>Cyclea peltata</i>	Padakizhang	Tuberous root	LC *
81.	<i>Cymbopogon citratus</i>	Chonapullu	Leaves	
82.	<i>Cymbopogon martini</i>	Poothunakkappullu	Leaves	
83.	<i>Cynodon dactylon</i>	Karuka	Leaves	
84.	<i>Cyperus rotundus</i>	Muthanga	Tuberous root	LC **
85.	<i>Datura metel</i>	NeelaUmmam	Whole plant, Fruits, Leaves	LC **
86.	<i>Desmodium gangeticum</i>	Orila	Roots	
87.	<i>Desmodium triflorum</i>	Nilamparanda	Whole plant	LC **
88.	<i>Desmostachya bipinnata</i>	Attudarbha	Roots	LC **
89.	<i>Dolichos biflorus</i>	Pazhyamuthira	Fruits	
90.	<i>Eclipta prostrata</i>	Kanjunni	Leaves	LC **
91.	<i>Elaeocarpus serratus</i>	Rudhraksham	Fruit	LC **
92.	<i>Elettaria cardamomum</i>	Elakka	Fruits	
93.	<i>Embelia ribes</i>	Vizhalari	Seed	VU **
94.	<i>Erythrina variegata</i>	Murikk	Bark, Leaves	
95.	<i>Euphorbia ligularia</i>	Kalli	Roots	
96.	<i>Euphorbia neriifolia</i>	Kalliyila	Leaves	LC **
97.	<i>Euphorbia trigona</i>	Kallikazhuth	Leaves	
98.	<i>Ficus benghalensis</i>	Peral	Roots, Flower bud, Bark	
99.	<i>Ficus hispida</i>	Kattathi veru	Roots	LC **
100.	<i>Ficus microcarpa</i>	Ithimottu	Flowerbud, Bark	LC **
101.	<i>Ficus racemosa</i>	Athi	Flowerbud, Bark	LC **
102.	<i>Ficus religiosa</i>	Arayal	Flowerbud, Bark	
103.	<i>Garcinia gummi-gutta</i>	Kudambuli	Leaves	LC **
104.	<i>Glycyrrhiza glabra</i>	Irattimadhuram	Roots	LC **
105.	<i>Gmelina arborea</i>	Kumizhin veru	Roots, Fruits	LC **
106.	<i>Gossypium herbaceum</i>	Paruthi	Fruits	
107.	<i>Gymnema sylvestre</i>	Chakkarakolli	Leaves	EN *
108.	<i>Hedyotis pruinosa</i>	Parppadakapullu	Whole plant	
109.	<i>Heliotropium indicum</i>	Thekkada	Roots	
110.	<i>Hemidesmus indicus</i>	Naruneendi	Tuberous root	
111.	<i>Holarrhena pubescens</i>	Kudakappala	Bark, Seed	LC **
112.	<i>Holoptelea integrifolia</i>	Avil patta	Bark	
113.	<i>Holostemma ada-kodien</i>	Adapathiyam kizhangu	Tuberous root	EN *



114.	<i>Homonoia riparia</i>	Attuvanchi	Roots	LC **
115.	<i>Hordeum vulgare</i>	Yavam	Seed	LC **
116.	<i>Hugonia mystax</i>	Karthotti	Roots	
117.	<i>Hygrophila auriculata</i>	Vayalchulli	Roots, Fruits	LC **
118.	<i>Hyoscyamus niger</i>	Kurashani	Fruits	EN *
119.	<i>Ichnocarpus frutescens</i>	Parvalli	Tuberous root	
120.	<i>Illicium verum</i>	Thakkolapottil	Flowers	
121.	<i>Imperata cylindrica</i>	Dharbha	Roots, Leaves	LC **
122.	<i>Indigofera tinctoria</i>	Neelayamari	Roots, Leaves	
123.	<i>Inula racemosa</i>	Pushkaram	Roots	
124.	<i>Ipomoea turbinata</i>	Vattapoonthaliyari	Fruits	
125.	<i>Ipomoea mauritiana</i>	Palmuthukk	Tuberous root	NT *
126.	<i>Ipomoea marginata</i>	Thiruthali	Twinnings	NT *
127.	<i>Ipomoea pes-tigridis</i>	Pulichuvadi	Whole plant	
128.	<i>Ixora coccinea</i>	Thechi	Roots, Flowers	
129.	<i>Jasminum grandiflorum</i>	Pichakam	Roots, Leaves, Flower bud	
130.	<i>Jasminum multiflorum</i>	Kurukkuthimulla	Roots	
131.	<i>Kaempferia galanga</i>	Kachooram	Rhizomes	DD *
132.	<i>Kaempferia rotunda</i>	Chengazhineer	Tuberous root	
133.	<i>Lagenaria siceraria</i>	Churayila	Leaves	
134.	<i>Lens culinaris</i>	Chanam payar	Seed	LC **
135.	<i>Lepidium sativum</i>	Ashali	Seed	
136.	<i>Leucas aspera</i>	Thumba	Flowers	
137.	<i>Limonia acidissima</i>	Blankay	Fruits	VU *
138.	<i>Linum usitatissimum</i>	Agashi	Fruits	
139.	<i>Lodoicea maldivica</i>	Aklari Thenga	Fruits	EN **
140.	<i>Madhuca longifolia</i>	Eruppa	Flowers, Wood matter	VU *
141.	<i>Magnolia champaca</i>	Champakam	Flower bud	LC **
142.	<i>Mallotus philippensis</i>	Kambipala	Bark	LC **
143.	<i>Merremia emarginata</i>	Elicheviyan	Whole plant	LC **
144.	<i>Merremia tridentata</i>	Prasarani	Whole plant	
145.	<i>Mesua ferrea</i>	Sheemanagapoovu	Flowers	EN **
146.	<i>Mimusops elengi</i>	Ilanji	Flowers	LC **
147.	<i>Momordica dioica</i>	Kaippakka	Fruits	
148.	<i>Monochoria vaginalis</i>	Karimkoovalam	Rhizomes	LC **
149.	<i>Mucuna pruriens</i>	Naykkaruna	Roots, Kernel	LC **
150.	<i>Mukia maderaspatana</i>	Mushumushukk	Whole plant	
151.	<i>Myristica fragrans</i>	Jathipathri	Flowers, Fruits	DD **
152.	<i>Myristica malabarica</i>	Pashupashi	Flowers	VU **
153.	<i>Myxopyrum smilacifolium</i>	Chathuramulla	Whole plant	
154.	<i>Nardostachys Jatamansi</i>	Jadamanji	Roots	CR **



155.	<i>Nelumbo nucifera</i>	Thamaravalayam	Twiners, Flowers, Rhizomes, Seed	DD **
156.	<i>Neolamarckia cadamba</i>	Kadambin	Roots	
157.	<i>Nerium oleander</i>	Karaveeram	Roots, Bark	LC **
158.	<i>Nigella sativa</i>	Karimjeerakam	Fruits	LC **
159.	<i>Nilgirianthus ciliatus</i>	Karimkuringi	Whole plant, Roots	VU **
160.	<i>Nymphaea nouchali</i>	Naithal	Rhizomes	EN **
161.	<i>Ocimum kilimandscharicum</i>	Karpoorathulasi	Roots	
162.	<i>Ocimum gratissimum</i>	Kattuthulasi	Roots	VU *
163.	<i>Ocimum tenuiflorum</i>	Thulasi	Flowers, Roots, Leaves	
164.	<i>Operculina turpethum</i>	Kuzhalkonna	Roots	EN **
165.	<i>Oroxylum indicum</i>	Palakapayyani	Roots	EN *
166.	<i>Orthosiphon glabratus</i>	Kuzhimundan	Whole plant	
167.	<i>Oxalis corniculata</i>	Puliyaral	Whole plant	
168.	<i>Pandanus odorifer</i>	Pookaitha	Roots	LC **
169.	<i>Papaver somniferum</i>	Vella kashakasha	seed	LC **
170.	<i>Paspalum scrobiculatum</i>	Varakinari	Seed	LC **
171.	<i>Phoenix dactylifera</i>	Enthappazham	Fruits	LC **
172.	<i>Phoenix pusilla</i>	Chittenthal	Roots	
173.	<i>Phyllanthus amarus</i>	Keezharnelli	Whole plant	
174.	<i>Phyllanthus emblica</i>	Nellikka	Fruit rind, Fruits	VU *
175.	<i>Physalis minima</i>	Njottanjodiyam	Whole plant	LC **
176.	<i>Picrorhiza kurroa</i>	Kadukurohini	Roots	EN **
177.	<i>Pinus roxburghii</i>	Charalam	Wood matter	EN **
178.	<i>Piper betle</i>	Vettila	Leaves	
179.	<i>Piper attenuatum</i>	Kattumulak	Roots	
180.	<i>Piper cubeba</i>	Valmulak	Fruits	
181.	<i>Piper longum</i>	Kattuthippali	Roots, Fruits	NT **
182.	<i>Piper betle</i>	Vellila	Twiners	
183.	<i>Pistacia chinensis</i>	Karkkidaka Shrinki	Fruits	LC **
184.	<i>Plectranthus hadiensis</i>	Sheema Iruveli	Roots	LC **
185.	<i>Plumbago zeylanica</i>	Koduveli	Tuberous root	VU **
186.	<i>Plantago ovata</i>	Thumboonalar	Seed	
187.	<i>Pogostemon cablin</i>	Sheemapachila	Leaves	LC *
188.	<i>Pongamia pinnata</i>	Ung	Roots, Kernel, Bark, Fruits	EN **
189.	<i>Portulaca oleracea</i>	Kozhuppa	Whole plant, Leaves	LC **
190.	<i>Pothos scandens</i>	Paruvakkodi	Twiners	
191.	<i>Premna serratifolia</i>	Munja	Roots	LC **
192.	<i>Prunus avium</i>	Elavalukam	Fruits	LC **
193.	<i>Prunus dulcis</i>	Badham	Kernel	LC **
194.	<i>Pseudarthria viscida</i>	Moovila	Roots	VU *



195.	<i>Pterocarpus marsupium</i>	Venga	Wood	NT **
196.	<i>Pterocarpus santalinus</i>	Rakthachandanam	Wood	EN **
197.	<i>Punica granatum</i>	Mathala Naranga	Fruits, Leaves	LC **
198.	<i>Quercus infectoria</i>	Mayakk	Fruits	LC **
199.	<i>Catunaregam spinosa</i>	Malankaram	Seed	
200.	<i>Raphanus sativus</i>	Mooleri	Tuberous root	
201.	<i>Rauwolfia serpentina</i>	Amalpori	Roots	EN *
202.	<i>Rhaphidophora pertusa</i>	Athithippali	Fruits	
203.	<i>Ricinus Communis</i>	Avanakk	Roots	
204.	<i>Rotula aquatica</i>	Kalloorvanchi	Roots	LC **
205.	<i>Rubia cordifolia</i>	Manchatti	Roots	LC **
206.	<i>Saccharem bengalens</i>	Amaveru	Roots	
207.	<i>Salacia oblonga</i>	Ekanayakam	Roots	VU **
208.	<i>Santalum album</i>	Chandanam I	Wood	VU **
209.	<i>Saraca asoca</i>	Ashokam	Bark	VU **
210.	<i>Sarcostemma brevistigma</i>	Somavalli	Twinners	EN *
211.	<i>Saussurea costus</i>	Sheemakottam	Roots	CR **
212.	<i>Semecarpus anacardium</i>	Cherkkuru	Seed	LC **
213.	<i>Senna occidentalis</i>	Ponnaveeram	Roots	LC **
214.	<i>Senna tora</i>	Vattathakara	Fruits	
215.	<i>Setaria italica</i>	Thina	Seed	
216.	<i>Sida cordifolia</i>	Kurunthotti	Roots	
217.	<i>Smilax china</i>	Cheenappavu	Tuberous root	
218.	<i>Solanum anguivi</i>	Putharichunda	Roots	LC **
219.	<i>Solanum virginianum</i>	Kandakari	Whole plant	
220.	<i>Solanum trilobatum</i>	Thoothavela	Roots	
221.	<i>Solena amplexicaulis</i>	Njerinjampuli	Rhizomes	
222.	<i>Soymida febrifuga</i>	Churutturohini	Tuberous root	
223.	<i>Spandlas pinnate</i>	Ambazhathila	Leaves	
224.	<i>Spermacoce hispida</i>	Tharthaval	Whole plant	
225.	<i>Sphaeranthus indicus</i>	Adakkamaniyan	Roots	LC **
226.	<i>Spondias pinnata</i>	Ambazhatholi	Bark	
227.	<i>Sterculia foetida</i>	Peenari	Wood matter	
228.	<i>Stereospermum chelonoides</i>	Pathiri	Roots	NT **
229.	<i>Strychnos nux-vomica</i>	Kanjiram	Leaves, Seed	
230.	<i>Strychnos potatorum</i>	Thettambaral	Seed	
231.	<i>Symplocos cochinchinensis</i>	Pachotti	Leaves, Bark	
232.	<i>Syzygium aromaticum</i>	Karayambu	Flowerbud	
233.	<i>Syzygium caryophyllatum</i>	Njara	Tender Leaves, Bark	EN **
234.	<i>Syzygium cumini</i>	Njaval	Kernel, Bark	LC **
235.	<i>Tectona grandis</i>	Thekk	Tender Leaves, Bark	EN **
236.	<i>Terminalia arjuna</i>	Neermaruth	Bark	LC **
237.	<i>Terminalia bellirica</i>	Thanniyila	Leaves, Bark, Roots,	LC **



			Kernel, Fruits rind	
238.	<i>Terminalia chebula</i>	Kadukka	Fruits	LC **
239.	<i>Tinospora cordifolia</i>	Chittamruth	Stem	
240.	<i>Trachyspermum roxburghianum</i>	Ayamodakam	Seed	
241.	<i>Tragia involucrata</i>	Koduthoova	Roots	LC **
242.	<i>Trapa natans</i>	Vankottakizhang	Fruits	LC **
243.	<i>Tribulus terrestris</i>	Njerinjil	Fruits	LC **
244.	<i>Trichosanthes lobata</i>	Kattupadavalam	Whole plant, Leaves	
245.	<i>Trichosanthes tricuspidata</i>	Kakkathondi	Roots	
246.	<i>Valeriana wallichii</i>	Thakaram	Roots	VU *
247.	<i>Vateria indica</i>	Velutha kunthirikkam	Wood	VU **
248.	<i>Ventilago maderaspatana</i>	Thakittuvembada	Bark	VU **
249.	<i>Vitex altissima</i>	Arenukam	Fruits	
250.	<i>Vitex negundo</i>	Karinochi	Roots, Leaves	
251.	<i>Withania somnifera</i>	Amukkuram	Roots	DD **
252.	<i>Woodfordia fruticosa</i>	Thathiri	Flowers	LC **
253.	<i>Wrightia tinctoria</i>	Dhandhappala	Leaves	LC **
254.	<i>Xylia xylocarpa</i>	Eravool	Wood	DD **
255.	<i>Zizyphus mauritiana</i>	Lanthakkuru	Seed	

*ENVIS

**IUCN

^India Biodiversity Portal

Figure 14.1 Convergence of threatened medicinal plant species with root, whole plant and rhizome usage

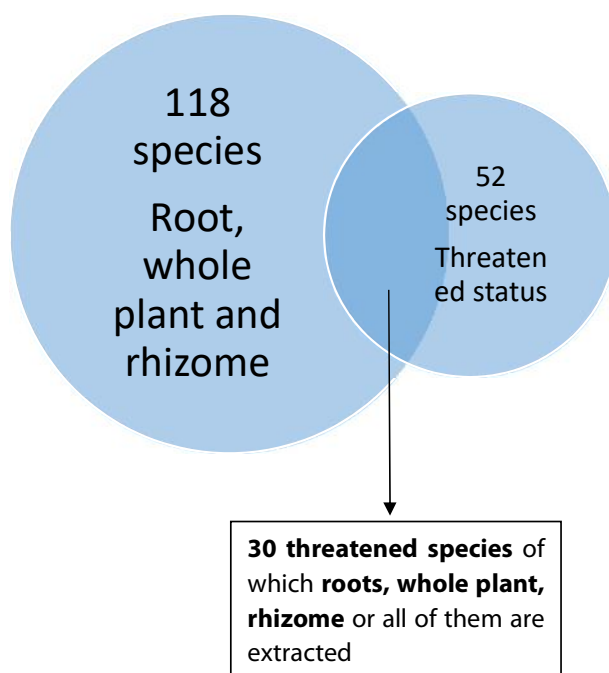


Table 14.13 Threatened species of which **roots, whole plant, rhizome** or all of them are extracted

Sl No.	Botanical Name	Common Name	Part used	Threat status
1.	<i>Aconitum ferox</i>	Valsanabhi	Tuberous root	EN *
2.	<i>Aconitum heterophyllum</i>	Athividayam	Tuberous root	CR *
3.	<i>Acorus calamus</i>	Vayambu	Rhizome	EN *
4.	<i>Justicia beddomei</i>	Cheriyadaalodakam	Roots, Leaves	CR *
5.	<i>Andrographis paniculata</i>	Kiriyath	Whole plant	VU *
6.	<i>Aristolochia bracteolata</i>	Attukottappala	Roots	VU *
7.	<i>Aristolochia indica</i>	Garudakkodi	Roots	VU *
8.	<i>Asparagus racemosus</i>	Shathavari	Tuberous root	EN *
9.	<i>Bacopa monnieri</i>	Brahmi	Whole plant	VU *
10.	<i>Chonemorpha fragrans</i>	Perumkurumba	Roots	EN *
11.	<i>Citrullus colocynthis</i>	Kattuvellari	Roots	VU *
12.	<i>Clerodendrum serratum</i>	Cheruthekk	Roots	EN *
13.	<i>Coptis teeta</i>	Peetharohini	Tuberous root	EN **
14.	<i>Costus speciosus</i>	Naruchanna	Tuberous root	VU *
15.	<i>Curcuma aromatica</i>	Kasthurimanjal	Rhizomes	VU *
16.	<i>Holostemma ada-kodien</i>	Adapathiyan kizhangu	Tuberous root	EN *
17.	<i>Nardostachys Jatamansi</i>	Jadamanji	Roots	CR **
18.	<i>Nilgirianthus ciliatus</i>	Karimkuringi	Whole plant, Roots	VU **
19.	<i>Nymphaea nouchali</i>	Naithal	Rhizomes	EN **
20.	<i>Ocimum gratissimum</i>	Kattuthulasi	Roots	VU *
21.	<i>Operculina turpethum</i>	Kuzhalkonna	Roots	EN **
22.	<i>Oroxylum indicum</i>	Palakapayyani	Roots	EN *
23.	<i>Picrorhiza kurroa</i>	Kadukurohini	Roots	EN **
24.	<i>Plumbago zeylanica</i>	Koduveli	Tuberous root	VU **
25.	<i>Pongamia pinnata</i>	Ung	Roots, Kernel, Bark, Fruits	EN **
26.	<i>Pseudarthria viscida</i>	Moovila	Roots	VU *
27.	<i>Rauwolfia serpentina</i>	Amalpori	Roots	EN *
28.	<i>Salacia oblonga</i>	Ekanayakam	Roots	VU **
29.	<i>Saussurea costus</i>	Sheemakottam	Roots	CR **
30.	<i>Valeriana wallichii</i>	Thakaram	Roots	VU *



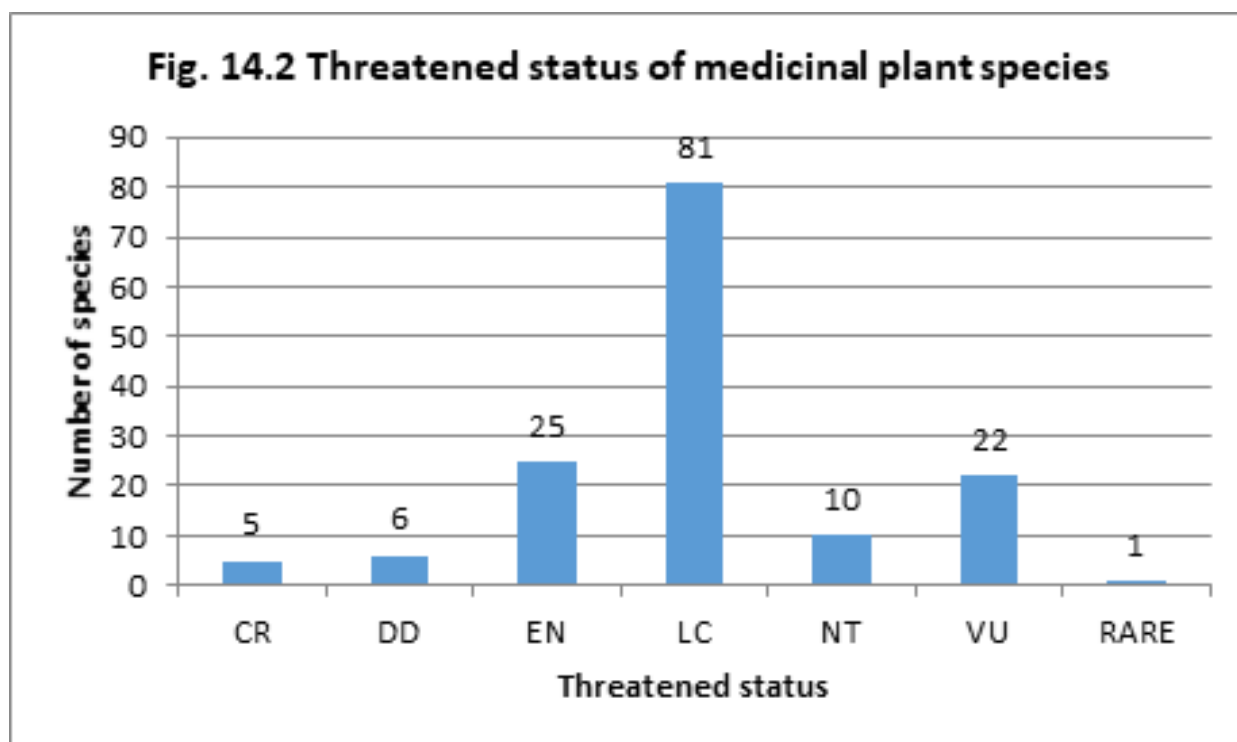


Table 14.13
Cultivated crops- Products from crops with GI registration

1. Navara Rice
2. Malabar Pepper
3. Malabar Arabica Coffee
4. Wayanaad Robusta Coffee
5. Alleppey Green Cardamom
6. Pokkali Rice
7. Vazhakulam Pineapple
8. Wayanad Jeerakasala Rice & Wayanad Gandhakasala Rice
9. Kaipad Rice
10. Chengalikodan Nendran Banana
11. Nilambur Teak
12. Marayur Sugarcane (Marayoor Jaggery)
13. Tirur Betel Leaf (Tirur Vettila) (Agricultural)
14. Onattukara sesame
15. Kuttiattoor mango
16. Edayur chilli

CHALLENGES AND WAY FORWARD:

For estimating the ABS potential and its operationalization in a vast country like India, sincere efforts from all the stakeholders are required. SBBs should identify the bio-resources based industries in their jurisdiction and issue notices and take stringent legal action against those who violate the rules. The major risk factor here is, in most cases, industries go to the court and get a stay, which leads to delay and the entire process becomes more complicated. Most of the SBBs case (including KSBB), they don't have any clarity on the biological resources based industrial units or traders in their respective states, which come under the ambit of the Biological Diversity Act and the ABS. Further they are facing huge challenges in handling the industries which are summarized below:



- There are many industries in the states, that are violating the Biological Diversity Act and operating their business and it is extremely difficult to make them comply with the ABS provisions.
- The basic problem is that there is no proper information about the bio-resources' users in the state.
- Majority of the industries are not aware about the Biological Diversity Act.
- Industries and their Association generally argued that the BD Act is not for Indians who use biological resources, but only for foreigners.
- A majority of the industries felt that the BD Act is a burden. For industries, profit is the only objective and they are not bothered about the resources' (raw materials) stock or their sustainability.
- Generally, industries are submitting their application in Form 1 with details indicating their turnover. However, these industries are not coming forward for signing the ABS agreements. According to them, submission of the Form 1 application is the intimation of the bio-resources' access, and that is sufficient for them and there is no need for signing the ABS agreement.
- Bio-resources traders (that also come under the ambit of ABS) and their businesses are highly unorganized.
- Bio-resources come under the NTC list and the associated ABS issues are a concern.
- At present, broadly the SBBs are focusing only on the wild bio-resources for ABS. However, bio-resources other than wild items' trading and manufacturing need to be captured.
- All states need a policy on handling the cultivated bio-resources and their ABS.
- A majority of the cultivated items are NTCs and its ABS scope is a challenge.
- Traditional practices, especially practicing indigenous medicines, are excepting from the BD Act. In this context, many village and household entrepreneurs are claiming their manufacturing belongs to indigenous practice.
- Similarly, value added products (products which may contain portions or extracts of plants and animals in unrecognizable and physically inseparable form) are also excepting from the AB Act. However, many manufactures are using secondary bio-resources including extracts as raw materials and manufacturing final products. According to them extracts are the value added products, hence required exemption from the Act, but it is controversial.

WAY FORWARD

As Kerala is rich in biodiversity, the commercial potential of bio-resources is very high. Forest resources including timber and medicinal plants, marine resources, agriculture/crops and livestock resources have high commercial significance. However, the State has not carried out an estimation of its ABS potential. In this context, the present attempt is a pioneering exercise. Further, none of the other States in India have attempted a comprehensive estimation of their ABS potential as we have.

This exercise has been attempted with the help of the available secondary data collected from various Government Departments of the State. Broadly, industries' cooperation, particularly in sharing the reliable primary information, was limited. Further, the methodology used for the estimations and the assumptions assigned must be critically evaluated. In this regard, the KSBB should come up with appropriate Guidelines for ABS projection estimation for the State. For more reliable ABS estimation the requirement of appropriate data from the commercial users of bio-resources and the support and participation of the key stakeholders is required.

For operationalizing the ABS, it is an extremely difficult task to convince the industries and traders about the ABS mechanism and its overall objectives. However, for the successful implementation of the Biological Diversity Act, convincing the industries and traders about the ABS process is significant. In the ABS process, what is needed is a workable solution, rather than a complicated and unacceptable one.



Biodiversity degradation is one of the major challenges faced at the global level. As biodiversity is a critical element for providing ecosystem services its conservation is important. Further biodiversity have significant commercial importance, as provide source materials for different industries, its sustainable use is a critical aspect. Biodiversity was seen as the common heritage for mankind to use and improve upon for millions of years. Much of the diversity, ranging from crop genetic diversity to livestock diversity and fish diversity, are all results of such an approach. However, during the past few decades, especially after the advent of CBD, we have seen a quick transition of looking at biodiversity as a common good of those countries where the biodiversity occurs (the sovereign rights principle). In this regard, appropriate management strategies have to be developed where ABS has good scope. ABS is an emerging innovative financial mechanism for resources mobilization from those who make substantial benefits from ecosystem/biodiversity.

As a party in CBD India initiated legal and institutional measures for the effective implementation of the ABS. various benefit sharing criteria has also fixed on differ use of bio-resources. ABS agreements signing at the national and the state level is progressing and large money is procured, which is distributing to the BMCs for the conservation of biodiversity/ecosystem. However, the ABS process in the country faces huge challenges. Different stakeholders, including the providers and users of the biological resources, are not well aware about the ABS principles and its operation. As ABS is a techno-legal issue, strict enforcement is always a big challenge. Researchers and industrialists, who access biological resources, are coming up with their arguments against the Biological Diversity Act.

But ABS is an effective mechanism for the conservation and sustainable use of biodiversity with more empowerment of local community, who are the custodian of the biological resources. As 196 nations are parties in CBD and many countries are ratifying the Nagoya Protocol, ABS is getting the universal acceptance. Hence, the effective implementation of the ABS is a pre-requisite. In this regard, the following pre conditions are required:

- The enforcement agencies of the Biological Diversity Act, especially the NBA and the SBBs need a clear understanding about the biological wealth (bioresources) in their jurisdiction (quantities of extraction or production and their economic values), which are for commercial utilization within the Nation/State. Otherwise they cannot execute the components envisaged in the Biological Diversity Act.
- More awareness about the need for protecting the biodiversity and healthy interactions between the stakeholders (NBA, SBBs, BMCs, academics and researcher agencies, industries, traders etc.) is required. Biodiversity and its management should be introduced in schools, colleges, and university curriculums.

The current project (Database of Tradable / Commercially Potential Bioresources and their Economic Valuation in Kerala) emphasizes on the first component.

BIO-WEALTH OF KERALA AND ITS ECONOMIC VALUE

The state of Kerala situated on the south-western coast of the Indian peninsula presents a unique biome that is sustained due to its geographical position between the tall Western Ghats on its east, and the Arabian Sea on its west. Confined in this narrow stretch of land rests a bountiful wealth of ecosystems that are inhabited by a plethora of flora and fauna. Forests, rivers, estuaries, coastal backwaters and agricultural landscapes, all exist as a mosaic creating a reservoir for the flourishing bio-wealth of the state.

The bio-wealth has been utilized by generations of indigenous tribal communities and subsequently by the native population over the centuries. Trading of bio-resources and bio-resource based products from the shores of Kerala has been a historical feature of the state which had become a popular destination for traders across the world, especially for the world renowned spice varieties. Since industrialization and colonialism started impacting Kerala along with the other parts of India, rapid land use change and exploitation of natural resources led to its large-scale depletion in the state. Even after independence, the industrial growth of India was fuelled by rapid loss of natural resources.

Against this backdrop, the various conservation measures which include the Biological Diversity Act, 2002 (BD act) have acquired paramount importance. The access and benefit sharing (ABS) provisions are still in a fledgling stage with only a minimum number of bio-resource based commercial enterprises under their ambit. To implement these mandates of the BD act and ensure sustainable utilization of the bio-resources, first an overall estimation of tradable bio-resources of the state was necessary. Therefore, this study has been conducted by taking into account the bio-resource value both at the ecosystem stage from which it is extracted and at the commercial stage where value addition and manufacturing is done.

Bioresources, such as timber and non-timber forest products, fishes, agriculture produce and livestock produce were considered for valuation. Tourism from natural ecosystems was also considered as a recreational use value. At the value addition stage, bio-resource based MSMEs and large factories (full and partial) were both considered for estimating their value. Hence, it is apparent that only the bio-resources which have a certain value for tradability have been included in the study. Additionally, the export and import of bio-resources and bio-resources -based products were also evaluated to understand the extent of importance of these resources in external trade. The report also emphasized the need of a value chain (with value addition) of bioresources and a tentative estimation of the ABS in the State. The methodology followed included primary data collection through questionnaire surveys as well as secondary data analysis from various institutional and academic sources. The following table (Table no 15.1) provides the summary of the bioresources value from different ecosystems.



Table 15.1
Total Quantity and Value of Different Bioresources of Kerala

Ecosystems / Sectors	Bioresources	Mode of Estimation	Quantity (M³/Kg)	Value (Rs. Crore)
Forest	Timber (27 Timber Depots)	Cumulative Annual Average (2015-2020)	26422.07 (M ³)	153.95
	Timber (KFDC)	Cumulative Annual Average: (2015-16 to 2019-20)	9684.30 (M ³)	5.90
	Timber (Marayoor Sandalwood)	Cumulative Annual Average (2015-2020)	72,991 (Kg)	49.75
	NTFP	Cumulative Average (2015-19)	826573.9 (Kg)	4.23
	Forest (Total)			
Land outside Forest	Timber (outside forest)	Annual total (2014-15)	22,56,219 (M ³)	1,981.34
Marine	Fish	Cumulative Average (2015-19)	518783 MT	8,316.66
Inland	Fish	Cumulative average (2015-19)	197086.2MT	3,840.71
Agriculture	crops	2018-19	5213126.3 MT	23,614.07
Livestock	Milk	Annual total (1919-20&2017-18)	24560.38 (Lakh Ltrs)	12,479.05
	Egg	Annual total (1919-20&2017-18)	218.00 (Crore Nos.)	1,309.50
	Meat	Annual total (1919-20&2017-18)	4690 (Lakh Kg.)	15,128.16
	Livestock (Total)			
GRAND TOTAL				66,883.11

The total annual value of the bioresources at their origin is **Rs. 66,883.11 Crore**, which indicates the magnitude of the contribution of biodiversity (in the form of bioresources) in the State. The bioresources coming from the forests, marine, and freshwater ecosystems (those are common properties) are purely the gift of nature. But the resources coming from the private lands are predominantly through cultivation (agriculture produces, tree garden, etc.) and culture (aquaculture and livestock - cattle and poultry). In these resources case, even if the cost of cultivation and culture come in to the picture,



nature plays a significant role. Broadly, bioresources are the basic raw-materials for manufacturing different consumer products having a huge demand in domestic and international markets.

Since, biodiversity has recreational value (which is considered as direct use value of the biodiversity like bioresources) the tourism related value - revenue of tourism –was also estimated (Table 15.2), which comes to **Rs. 39,197 Crores**.

Table 15.2

Total Value of Biodiversity/Ecosystem Attributed Tourism

S. No	Mode of Estimation	Source / Type	Value (Rs. Crore)
1	Annual total (1919)	Revenue from General Tourism (Direct and Indirect) (87% of total tourism value of Rs.45,01,100 Lakhs)	39,160
2	Annual total (1919)	Revenue from Ecotourism	37
Total			39,197

In brief, the contribution of Kerala’s biodiversity in the form of biological resources and tourism (direct use-values) is significant. Besides, the State’s biodiversity / ecosystems also provide a number of non-marketed services, but their valuation is not under the scope of the RKI project.

In the industrial sector of Kerala, bioresources based industries play a major role at the Micro, Small and Medium Enterprises (MSMEs) as well as the big factories (which are assessed fully and partially.). The following table (Table 15.3) provides the number and annual turnover of these manufacturing units. There are 52,388 bioresources based manufacturing (industrial) units in the State, which generate an annual turnover to the tune of Rs. 1,04,014 Crore. There is no doubt that a substantial share of the bioresources used by these industrial units, as raw-materials, originates from Kerala. Further our research / study clearly revealed that the bioresources originated from Kerala are used by the industrial units in other States as well as abroad.

Table 15.3

Bioresources Based Industries in Kerala

Type of Industries	No of Units	Annual Turnover (Rs. in Crore)
MSMEs	47541	24,011.94
Factories		
(a) Fully bioresource based	3540	43,861.35
(b) Partially bioresource based	1307	36,141.22
Total	52,388	1,04,014.51



We also estimated the export, import and balance of trade of bioresources as well as bioresources based products of Kerala through its major sea ports. Here, there is no guarantee that all the bioresources (bioresources based products) exported through Kerala's ports originated / were manufactured from Kerala, but from other parts of the country too (please remember that Kerala's bioresources are exported through other ports in India also). Similarly, the bioresources (bioresources based products) imported through Kerala ports are not used / consumed in Kerala. It is very clear that (Table -15.4) the annual export value of bioresources as well as bioresources based products from Kerala through its major sea ports is (Rs 21,760 Crore)-- far higher than the annual bioresources as well as bioresources based products import value (Rs. 4,414 Crore). The balance of trade of Rs. 17,347 Crore indicated the richness of Kerala's bio-wealth.

Table 15.4

**Bioresources or Bioresources Based Products Export and Import
(Annual Average: 2019-20 & 2020-21)**

Export Value	Import Value	Balance of Trade
Rs 21,760 Crore	Rs. 4,414 Crore	Rs. 17,347 Crore

In this context, a thorough investigation of key bioresources' (which originate from the different ecosystems of the State) supply chain analysis considers its value addition a lot. The current project made a preliminary attempt in this regard, but detailed investigation through a separate research is strongly proposed.

The tentative ABS potential of the State was carried out, based on the norms prescribed in the 'Guidelines on Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulations, 2014'. The Criteria were: (a) turnover / output value of the bioresources based manufacturing sectors in the State as well as (b) the value of bioresources use as input (raw-material) in manufacturing. The estimated ABS through the turnover / output value of the bioresources based manufacturing sectors in the State is Rs. 357.68 Crore (Table -15.5). However, bioresources value based estimate is relatively low as Rs. 105.99 Crores (Table -15.6).

Table 15.5

ABS potential from bio-resource based Manufacturing (Industrial Units)

S No	Bio-resource based Manufacturing	ABS Amount (Rs. Crore)
1	MSMEs	48.02
2	Large factories	309.66
	Total	357.68



Table 15.6
Bioresources Value based ABS potential of Kerala

S No	Bioresources	ABS potential (Rs. Crore)
1	Timber	13.19
2	NTFPs	0.06
3	Marine Fishery	20.79
4	Inland Fishery	9.60
5	Agriculture	35.42
6	Livestock	26.93
	Total	105.99

Biodiversity / ecosystem wise different categories of Tradable and ABS Potential bioresources list in Kerala also drafted (Table 15.7) based on the available secondary data. However, this list should be further revised on the light of Biological Diversity Act and the magnitude of bioresources commercialization with the help of an expert committee. Ultimately, KSBB may come up with an Ordinance of 'Tradable and ABS Potential bioresources' separately, which will really uplift the ABS process in Kerala as well as become a model to other States in India.

Table 15.7
Tradable and ABS Potential Bio-resources in Kerala

Ecosystem	Type of Species / Bioresources	No of Species / Bioresources
Marine and Inland (bioresources)	Crustaceans	40
	Molluscs	17
	Fishes	101
	SPONGES (Emphasis on Bio-Active Compounds)	12
	Ascidian	1
	Sea Weeds	18
	Total	189
Forest (Floral Bioresources)	Medicinal Plants	398
Agriculture (bioresources)	Cultivated crops- Products from crops with GI registration	16
	Grand Total	603

In brief, the analysis carried out in the report with respect to bioresources collection (quantity and value) at its origin, its commercial utilization (manufacturing) with supply chain / value addition, trade, and the overall ABS potential signifies the importance as well as the need for conservation of the biodiversity / bio-wealth of Kerala and its sustainable utilization. Hence, the state should take appropriate policy measures.



POLICY SUGGESTIONS

The above analysis clearly signifies the biological resources (bio-wealth) of Kerala, and their contribution to the production of multiple consumer products, employment and income generation and export earnings. The unique topography and climate along with rich water resources and soil health enriches the multiple biodiversity and ecosystems (forest, marine, coastal, agriculture and freshwater) of the state. The biodiversity or ecosystem spots of Kerala are the buffer stock of rich bioresources having high commercial importance and value not only in Kerala but in other states and overseas too. Hence, one can conclude that bioresources play a significant role in shaping Kerala's economy. In this context, the newly emerging concept of "Bio-economy" is extremely relevant for Kerala and it is proposed to designate a "State Mission on Bio-Economy". Further, through the strict enforcement of ABS, the State can mobilise a considerable amount for the conservation of its bio-wealth.

STATE MISSION ON BIO-ECONOMY

Economy is the large set of inter-related production and consumption activities that scarce resources generate. . In this context bio-economy consists of all economic activities (production, distribution / trade, consumption) of bio-resources based goods and services in a given geographical area. The components of bio-economy include: (a) technology approach, focusing on biotechnology applications in primary production, health, and industry; (b) status of biotechnologies and R&D expenditures; (c) the roles of R&D funding, human resources, intellectual property, and regulation in bio-economy, and (d) the possible developments that could influence emerging business models.

The Science Campus stated that "The concept of bio-economy covers the agricultural industry and all manufacturing sectors and their respective service areas, which develop, produce, process, reprocess or use them in any form biological resources such as plants, animals and microorganisms. Thus, it achieves a variety of industries such as agriculture, forestry, horticulture, fisheries and aquaculture, plant and animal breeding, food and beverage, wood, paper, leather, textile, chemical and pharmaceutical industries up to branches of energy industry." Bio-economy allows the use of available biological resources more effectively than previously, by innovative methods and to supplement their fields of application on the basis of new scientific knowledge and findings (Science Campus, 2021).

The European Union & OECD came up with their approach on Bio-economy, which might be a torch bearer for the mission on Bio-economy for Kerala. Europe is setting the course for a resource-efficient and sustainable economy, with the goal of: (a) more innovative and low-emissions economy, (b) reconciling demands for sustainable agriculture and fisheries, (c) food security, and (d) the sustainable use of renewable biological resources for industrial purposes, while ensuring biodiversity and environmental protection. To achieve this, the European Commission has set a "Bio-economy Strategy and Action Plan" which focuses on three key aspects: (1) developing new technologies and processes for bio-economy; (2) developing markets and competitiveness in the bio-economy sectors; and (3) pushing policy makers and stakeholders to work more closely together. Moreover, the Commission works on ensuring a coherent approach to bio-economy through different programmes and instruments including the Common Agricultural Policy, the Common Fisheries Policy, Horizon 2020, European environmental initiatives, the Blue Growth initiative for the marine sector and the European Innovation Partnership on Sustainable Agriculture (European Commission, 2020).

The intention of the European Union is "over the coming decades, Europe must ensure a safe, healthy and prosperous environment for current and future generations". Hence they believe that successfully addressing major environmental, social and economic challenges will change the way we live and work. Bio-economy will make this a change for the better if its potential for sustainable production and conversion of biological material is fully exploited. A mature, sustainable bio-economy will help deliver global food security, improve nutrition and health, create smart bio-based products and biofuels, and



help agriculture, forestry, aquaculture and other ecosystems to adapt to climate change. The ultimate aim of the European bio-economy is to help keep Europe competitive, innovative and prosperous by providing sustainable, smart and inclusive economic growth and jobs, and by meeting the needs of a growing population whilst protecting our environment and resources.

Further the OECD's "Bio-economy to 2030" designed a policy agenda, which stated that, the biological sciences are adding value to a host of products and services, producing, labelled bio-economy. From a broad economic perspective, bio-economy refers to the set of economic activities related to the invention, development, production and use of biological products and processes. If it continues on course, bio-economy could make major socio-economic contributions to OECD & Non-OECD countries (OECD, 2020).

Hence, in the light of the bio-economy concept developed and implemented by the European Union and the OECD, the Kerala Government needs to start the initiative considering the following issues and questions:

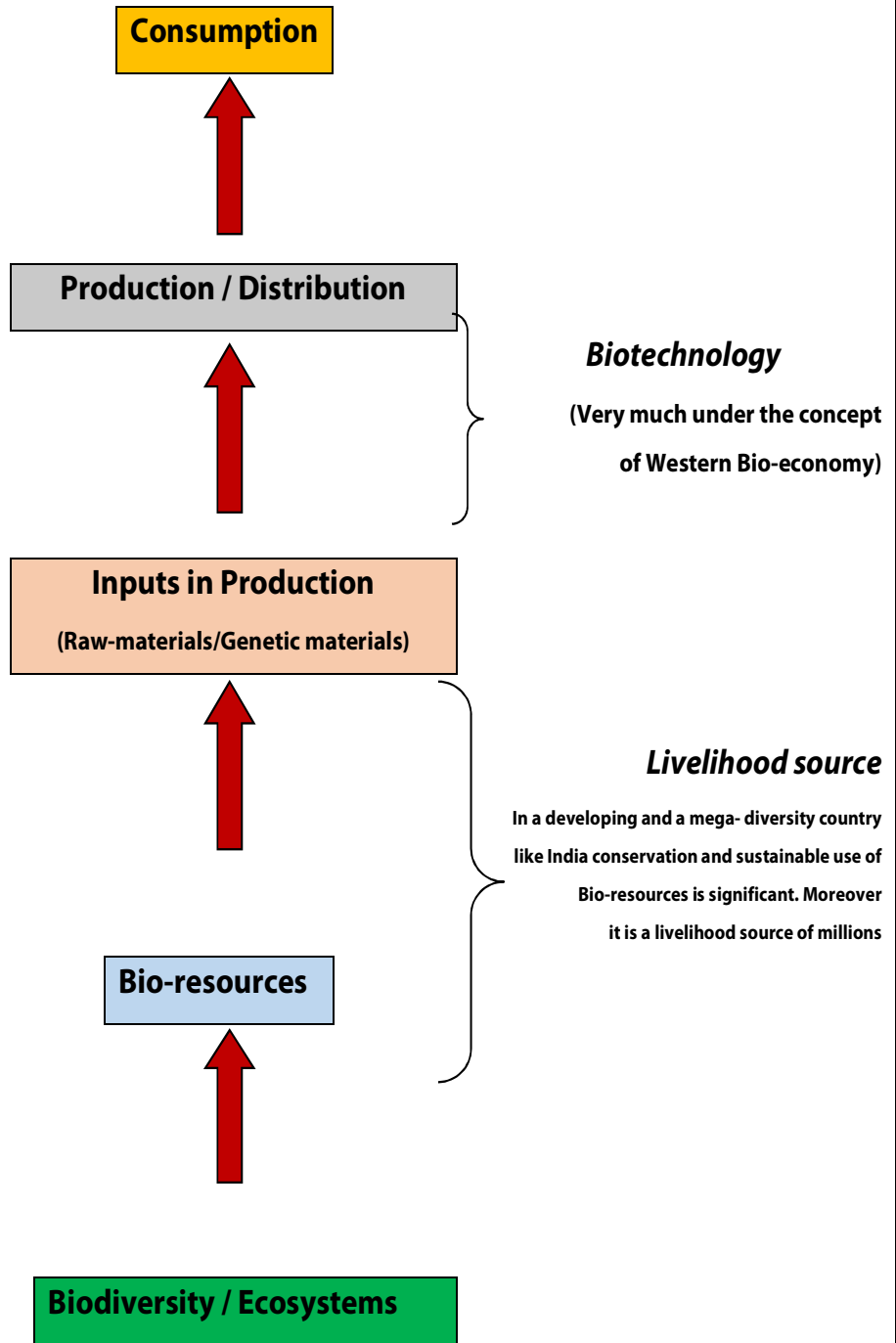
1. Bio-resources are renewable resources and exist in both public and private lands. Since the property rights of private lands is assigned with a person or entity, the management decisions related to the biodiversity and biological resources are purely individual. In this regard, what might be the conservation strategy?
2. However, most of the biological resources of the state may be in the public lands (ocean, forests, wetlands etc.), which face huge governance challenges. Even if the property rights of this land are with the government, public or local communities have user rights. When more demand arises for certain resources which are endemic and scarce, the possibilities for over-extraction of those resources may be high (free rider and the tragedy of the commons) and may lead to species' extinction. In this case what are the management and conservation measures to be taken?
3. Biological resources, particularly those available in the public land need to undergo periodical assessment and an understanding of their status such as: depletion rate, regeneration rate, stocks etc. needs to be made.
4. Through the above process, one can find out whether a particular bio-resource is scarce or plenty. This may generally depend on the demand for each bio-resource and the volume of its availability.
5. Appropriate policy actions may be required on Rare / Endangered / Threatened plants or animal conservation or its sustainable use.
6. If any species' over-extraction or extinction is noticed the appropriate Government agencies need to take strict action against it. Further special attention is also required for its conservation.
7. The Biological Diversity Act provides the power to BMCs to levy a fee from the users who collect biological resources from areas under their jurisdiction. If this is introduced the local bodies can mobilise adequate money for conserving the bio-resources.
8. Bio-resources' trade should be promoted through the supervision of BMCs.
9. ABS compliance in commercial sectors / industries in the state are also a pre-condition for bio-economy.

Broadly, compared to the developed countries, developing countries are biodiversity rich but technologically weak. In a developed country, bio-economy may primarily depend on the development of biotechnology. They are also involved in the production of the products from bio-resources and genetic materials, where biotechnology application is extensive. Developed countries normally transfer the technology to the developing countries, where bio-resources based mass production will take place. On the contrary a rich biodiversity country like India (Kerala) needs to focus more on the conservation and sustainable use of its biodiversity / biological resources (see Fig 15.1).



Fig - 15.1

Bio-economy Pyramid



In brief, in a developing State like Kerala, the fundamental objective of bio-economy would be the utilization of its bio-resources efficiently and preventing the loss of biodiversity or the ecosystem, which is the base for food and health security as well as options for many other economic developments. Further, biodiversity is the source for employment and livelihood for millions of poor people. It is important to consider these aspects on a priority basis and develop an appropriate management strategy with the stakeholders' participation. If this platform is stabilized, bio-economy will step-up towards sustainable development and a social system: harmony with nature.

ENFORCEMENT OF ACCESS AND BENEFIT SHARING (ABS)

As Kerala is rich in biodiversity, the commercial potential of bio-resources is very high. Forest resources and medicinal plants, marine resources, agriculture / crops based entrepreneurs have high commercial significance. There is no doubt that Kerala is having high ABS potential and the concerned authorities need to identify it. KSBB need to authenticate the draft Tradable / ABS bio-resources lists come up list.

For enforcing the ABS mechanism in Kerala, the following steps were proposed:

1. Identification of the industries and traders: The State Biodiversity Board has to collect data (details of ABS potential industries and traders) from the industries' licensing authorities such as: Industrial Departments, Department of Drugs and Cosmetics, Pollution Control Board etc., and segregated the biological resources based units in the state. For identifying the units which come under ABS compliance, the Board can also approach the industrial associations such as: Ayurveda Drug Manufacturers, Spices Manufactures and Exporters, and Marine Resources, Seed industries etc. Further Board can give a series of advertisements related to the Biological Diversity Act and ABS in the news papers and industrial magazines and encourage the bio-resources based manufactures and traders in comply the provisions of the Act.
2. Enforcement: After identifying the comprehensive sector specific bio-resources based industries and traders list in the state, the Board need to issue notices to the industries and traders. Further Boards' continuous engagement and negotiations with the industries and convincing them about their responsibility related to the Biological Diversity Act is needed. Board also need to organize a number of consultation meetings for bio-resources manufactures and traders at different locations.
3. As biological resources are predominant from forests, negotiations with the Forest Department is required for the benefit sharing from the amount mobilized through the NTFPs and economically significant forest resources such as sandalwood and industrial wood auctions, which might be a huge amount. Generally, through the sale of forest products, the Forest Department is mobilizing huge amount. The resources are transferred to the companies (users) through traders and or exports. The ABS possibility of these bio-resources is huge.
4. Criteria for Benefit Sharing: Based on the Guidelines on "Access to Biological Resources and Associated Knowledge and Benefit Sharing Regulation – 2014", the Access and Benefit Sharing (ABS) can be availed of from the biological resources based industries either: based on the biological resources' purchased price by the industries, based on the raw-material cost, prescribed as 3% – 5 % or based on the ex-factory sale value of the product minus government taxes, where biological resources are involved in production fully or partially (0.1% to 0.5%).
5. However, there is a huge difference in the ABS shares based on the above two criteria for different types of biological resources based industries. When the value addition is low, the turnover based ABS estimation prefers the companies. On the other hand, if the value addition is high the bio-resources' purchased price is the criterion they prefer. The fact is that the bio-resources based industries revealed different input-output ratios.
6. Mutually Agreed Benefit Sharing Approach: In the ABS amount fixation a mutually agreed



and negotiable approach is required from the users and providers of bio-resources. Hence a reliable amount (within the purview of the ABS guidelines) needs to be considered by the SBBs.

7. **Involvement of Line Departments:** Involvement of the services of the line departments in the ABS process is significant. As ABS is a complicated task, the involvement of line departments such as: forest, agriculture, fisheries etc. is important. For example; the Madhya Pradesh SBB established an ABS Cell in all the Divisional Forest Offices (DFOs) in the state and involved the Forest Officials in the ABS collection process.
8. **Tradable and ABS Bio-resources' Documentation:** The basic problem for the ABS regime is that there is no proper information about the ABS potential bio-resources of the states as well as its users. In this regard the documentation of the tradable bio-resources as well as ABS potential bio-resources carried out in Kerala (as part of this Project) is extremely important. KSBB should finalize this list further and an order to be issues for the references for ABS stakeholders.
9. **Bio-resources tracking Mechanism:** Most of the industries are claiming that they are not utilizing the bio-resources available in Kerala. Bio-resources are coming from different part of the country and or even from abroad. However, for the effective implementation of the ABS, especially the conservation of biodiversity, the origin of the bio-resources should be identified and the benefit sharing amount to be channelized there.



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