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Kerala Forest Research Institute

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From the Director's Desk

Natural capital and the ecosystem services that flow from these natural ecosystems are steadily being acknowledged as essential to human well-being. Sound management of natural capital provides stability and sustainability to ecosystems. Today it is realized that it also provides stability and sustainability to economic growth. Nations typically measure economic growth as gross domestic product (GDP) which is the broadest quantitative measure of a nation's total economic activity. Conventionally, GDP does not overtly and wholly account for the non-marketed goods and services provided by natural capital resources. Natural capital fortify the economy and provide direct and indirect values to business and humanity in general. According to FAO, food, livelihood and management of natural capital resources cannot be looked upon separately. Sustainable management of both forests and agriculture, and their incorporation into land use plans, is essential for achieving the Sustainable Development Goals, ensuring food security and tackling climate change. With the collaboration of forest and agricultural sector, the 2030 Agenda's historic commitment to rid the world of the twin scourges of poverty and hunger can be easily achieved.

Worldwide there is a call for a new system of natural capital accounting to measure the value of healthy habitats to a country's true wealth. Combining the concept within economic and environmental management systems is attained best by considering the natural environment correspondingly to other types of valued capital and espousing the ecosystem approach which is compatible with a wide range of frameworks. This would facilitate the development of sound and effective environmental policies. Action through effective legal and institutional framework are significant in meeting the commitments made by various countries in the Paris Agreement on climate change. Adequate funding through public sector investment like payments for environmental services mechanisms, the sale of products from publicly owned forests, royalties, license fees, taxes on forest products, export levies, official development assistance and, potentially, REDD+ in the agriculture sector, the forest sector and rural development programmes will improve the conservation activities in these sectors.

The Kerala Forest Research Institute by means of multi-disciplinary research is incessantly endeavouring to develop strategies for effective and sustainable utilization of natural capital for transforming lives.

Dr.Bransdon S Corrie, IFS
Director

THE INSTITUTE

In 1975, Government of Kerala established the Kerala Forest Research Institute (KFRI) as an autonomous organization under the Travancore-Cochin Literary, Scientific and Charitable Societies Act -1955. KFRI is a premier forestry research institute dedicated to research in tropical forestry and biodiversity and undertakes research and consultancy programmes for national and international agencies on various aspects/issues related to biological conservation and management of natural resources. In 2003, Science and Technology Department, Government of Kerala had formed Kerala State Council for Science Technology and Environment (KSCSTE), an autonomous body and KFRI becomes a part of that along with other Science and Technology institutions of the State.

The Institute is envisioned to become a centre of excellence in tropical forestry to offer scientific backbone for effective decision making on forestry, with particular emphasis on conservation, sustainable utilization and scientific management of natural resources ensuring benefits to the society. KFRI has been instrumental in evolving strategies for conservation and sustainable use of forest resources of the State. The Mission being to provide technical support to facilitate scientific management and utilization of forests for social benefits, thus, envisages to:

a. Conduct inter/multidisciplinary research on priority areas of tropical forestry including wildlife management, socioeconomics, indigenous knowledge, value addition of forest products, participatory forest management and livelihood improvement of forest dwellers/dependents by scientific management of forest resources,
b. Provide technical advice and solutions to practical problems related to forest conservation and sustainable utilization of forest resources, and
c. Disseminate knowledge and information on forest-related matters to end-users, farmers, general public and transfer of technology to stakeholders for social benefits.

The Campus

Main campus, Peechi

The main campus of KFRI is located in central Kerala at Peechi, about 20 kms east of Thrissur city in a 28 hectares Reserve Forest area adjacent to Peechi-Vazhani Wildlife Sanctuary. The main campus is an assemblage of offices of many International and National Networks, highly sophisticated laboratory facilities, live collections and plant propagation facilities. The Institute has a Sub-centre at Nilambur in Malappuram District and a Field Research Centre at Velupadam in Thrissur District.

KFRI houses a number of highly sophisticated experimental research facilities. These include Laboratories, Collections, Plant propagation facilities, Networks and Helpline; Monitoring and Centralized facilities. Laboratories include tissue culture, clonal multiplication, physiology, wildlife biology, soil science, molecular biology, wood science and technology, biochemistry, forest pathology, entomology, silviculture and Geographic Information System and remote sensing. These research laboratories are designed to serve staff scientists and research scholars as well as researchers from universities, industries, foreign institutions, and other government laboratories. Collections include, arboretum, bambusetum, palmetum, herbarium, medicinal plants garden, orchidarium, xylarium, wildlife museum, soil science museum, teak museum, butterfly garden and insect collections. For plant propagation, there are nurseries, green house, mist chamber and the Kerala Forest Seed Centre. Networks and Helpline housed in KFRI are Asia-Pacific Forest Invasive Species Network (APFISN), TeakNet, Bamboo Technical Support Group (BTSG) (south zone) of the National Bamboo Mission and the Tree Health Helpline. The monitoring facilities are the established permanent plots and weather stations. Library, Central Instrumentation Unit, Local Area Network (LAN), training facilities, stores, seminar and conference facilities, fieldwork support (vehicles), staff accommodation, guesthouse and research scholars' hostel are the centralized facilities of KFRI. A Seismic Observatory operated and maintained by the National Centre for Earth Sciences (NCESS) is in KFRI main campus.

Sub-centre, Nilambur

The Sub-centre campus at Nilambur with facilities for laboratory work and field trials in a 43.36-hectare area is about 140 kms away from the main campus. A bambusetum with 21 species of bamboos and trial plots of several tree species are maintained at the Sub-centre. The sub-centre also houses a Teak Museum, a Bio-Resources Nature Park, medicinal plant garden and a model butterfly garden.

Field Research Centre, Velupadam

The Field Research Centre (FRC) at Velupadam in Thrissur District is spread over an area of 47.43 hectare. It is 36 kms away from the main campus at Peechi. Mainly nursery and field trials are conducted at the FRC campus. A bambusetum, one of India's largest live collections of bamboos, is the special attraction of Velupadam campus.

Organization

KFRI is organized under nine programme divisions, which is a cluster of several departments for effective implementation of multidisciplinary research in forestry. Programme Coordinators and Departments head divisions by Heads. The Programme Divisions are: Sustainable Forest Management, Forest Genetics and Biotechnology, Forest Management Information System, Forest Ecology and Biodiversity Conservation, Wood Science and Technology, Forestry and Human Dimensions, Forest Health, Extension and Training, and Library and Information. A Central Instrumentation Unit in the institute functions as a common facility. A Research Monitoring and Evaluation (RME) Unit is also functioning to facilitate and monitor research activities in the Institute. The Research Council (RC) is the vital body responsible for overseeing and guiding the formulation and implementation of various research programmes in KFRI. The RC comprises of eminent scientists in the field of forestry research in the country. The RC also monitors the quality and content of research undertaken by the Institute and provides guidance for improvement. A Management Committee (MC) chaired by the Institute's Director oversees the administration and management of KFRI. The Committee approves and manages both administrative and financial matters. The routine administration of the Institute is looked after by the Director in accordance with the decisions of the MC. Administrative and Accounts Sections of the Institute, coordinated by the Registrar assist the Director in managing the day-to-day functioning of the Institute. An Internal Auditor scrutinizes the financial and expenditure matters of the Institute. The total staff strength of the Institute is 98 which include 31 scientists, 59 administrative staff and 8 technical staff. In addition, more than 100 project personnel attached to various research projects provide the necessary research support.

The institute is accredited as a research Centre of the Forest Research Institute University, Dehradun; Cochin University of Science and Technology, and University of Calicut for enrolling students for research programmes leading to the award of doctoral degree. Secretariat of two international Networks funded by the Food and Agriculture Organization of the United Nations, namely, the Asia-Pacific Forest Invasive Species Network (APFISN) and TEAKNET (International Teak Information Network) are housed in KFRI.

Programme Divisions

Sustainable Forest Management

The Programme Division comprises of Tree Physiology, Silviculture and Soil Science Departments. The key research areas of the Division are: improved nursery and silvicultural practices, seed technology, sustainable forest management and production of better clones and quality planting stock of plantation species. In addition, studies have also been undertaken on afforestation and eco-restoration of degraded sites, raising green belts in coastal areas, control of riverbank erosion by planting, evaluation of factors affecting plantation productivity, soil nutrient management for important forestry species, composting technology for soil amelioration and environmental physiology, especially water use, photosynthesis and microclimate. Division also undertakes weather parameters monitoring. Some of the cuurrent activities of the division include assessment of medicinal plant resources of Northern Kerala; population analysis, seed biology and restoration of *Hopea erosa* and *H. racophloea* of Western Ghats; introducing biochar for enhancing the quality of degraded soils of plantation forestry sector in Kerala; popularisation of weed composting technology for soil carbon sequestration and livelihood improvement of rural poor and pedogenic influences on vegetation dynamics in major forested wetlands of Kerala Western Ghats.

Forest Genetics and Biotechnology

The Programme Division includes Forest Genetics and Tree Breeding as well as Biotechnology Departments with plant propagation, plant tissue culture and molecular biology facilities. The major research areas of the Division are genetic improvement of teak, clonal propagation of forest trees and medicinal plants through vegetative and micropropagation, field testing of superior clones, DNA fingerprinting, DNA barcoding, population genetics, molecular phylogeny, genomics and transcriptomics. Major achievements of the Division are the development of efficient mass clonal propagation methods for important forestry crops through macro and micropropagation, cost reduction in micropropagation, genetic improvement, plus tree selection and establishment of clonal seed orchards in teak, population genetic structure of teak and sandal provenances in India, DNA fingerprinting and genetic diversity studies of eucalyptus, acacia and teak clones, genetic diversity of captive elephants, molecular phylogeny and biogeography of paleotropical woody bamboos and dipterocarps and development of institutional capability for DNA barcoding of life forms, among others. DNA barcoding facility caters to the DNA barcoding requirements of various academicians and researchers in the field and undertakes consultancy services for various State Forest Departments and other agencies. The current research activities of the Division include development of clonal propagation protocols through micro and macro propagation for important forest tree species and medicinal plants, population demography, genetic structure and adaptive genetics for sustainable conservation and management of teak genetic resources, conservation genetics of selected RET species in the Western Ghats as well as DNA barcoding for biosystematics, authentication of Ayurvedic raw drugs and timber forensics.

Forest Management Information System

The Programme Division uses modern tools of remote sensing, GIS and statistics to advance the science of forest measurements, cater to the needs of co-researchers and partners, and manage a comprehensive database that supports the decision making process. The Division is well equipped with the state-of-the-art facilities to meet the expectations of post-doctorals, doctoral students, project fellows and master students. The Division has been actively engaged in various research activities including stand modeling, biodiversity mapping, ecosystem analysis, resource mapping, and population analysis. Currently, the core activities are more centered towards the different aspects of climate change research including the physical basis, mitigation and adaptation. The Division also works on the greenhouse gas inventorying, carbon stock assessments, and carbon sequestration estimations. The Division uses high spatial, spectral and temporal remote sensing data for characterizing the compositional and functional attributes of forest and trees outside the forest. The Division partner with various national and international organizations, and provides training on Remote Sensing, GPS and GIS.

Forest Ecology and Biodiversity Conservation

Programme Division comprises of Forest Ecology, Botany, Wildlife and Non-Wood Forest Products (NWFPs) Departments. The main research areas of the Division are biodiversity evaluation and conservation of fragile ecosystems, rehabilitation and restoration, ecosystem and landscape analysis, population ecology, traditional knowledge system analysis and biodiversity-informatics. Documentation and inventorisation of biodiversity of diverse forest types and protected areas, evaluation of below-ground biodiversity, taxonomic studies and conservation of RET species of flora are some of the research areas of the Division. In addition, Wildlife Department attempts various aspects on inventorisation of fauna, endangered animals, man-wildlife interaction and wildlife census. A wildlife museum with an exhaustive collection of species is attached to the Wildlife Department. Phytochemical analysis of medicinal plants, nursery and plantation technology of selected indigenous timber species, ethno-biological studies and cultivation of medicinal plants and other NWFPs, such as, bamboos and rattans, are other activities of the Division. The NWFP Department also works on isolation, characterization and bioactivity studies of molecules from medicinal plants of Western Ghats. Besides this, environmental impact of pesticide application on the ecosystem is also being studied. Some of the current activities of the division include, assessment of ecosystem services for conservation and management of sacred groves in Kerala part of Western Ghats; structure, composition, dyanamics and management of vayal ecosystem system in Periyar Tiger Reserve, ex-situ conservation of wild orchids of Western Ghats; systematics, phylogeny and biogeography of dipterocorps in the Western Ghats; development of biomarkers as a predictive tool for organophosphate toxicity in terrestrial ecosystem; long-term monitoring of forest

ecosystem dynamics of permanent plot in tropical wet evergreen forest of Kerala and bioactivity guided fractionation and mechanistic elucidation of biomolecules from *Cocculus laurifolius* DC. of Southern Western Ghats.

Wood Science and Technology

Programme Division focuses on research related to wood properties and utilization, wood structure, timber processing technology for increased durability, value addition, pulping characteristics of reed bamboos, among others. Division has facilities for Universal Testing Machine (UTM), image analyzer and NIR spectroscope. Many studies on wood structure, properties, quality assessment of teak, eucalypts and preservative treatments for species like rubber wood and coconut wood were undertaken by the Division. The ongoing research programmes of the Division include the genetic conservation of natural teak resources of India with emphasis on wood quality variation of natural teak provenances and the impact of climate change on the growth dynamics of tropical species like teak. Under the later, the Division procured and established the latest state-of the-art, Tree-Ring measuring station imported from Germany (photo). The major extension activities of the Division include, wood identification of tropical/temperate and exotic timbers for public sectors and judicial purposes. The well curated Xylarium serves this purpose to the scientific community (Xylarium photo). The Division was also involved in the consultancy services for the Archaeology Department, Government of Kerala in the renovation of Punalur Suspension bridge with regard to selection and quality assessment of Thambagam wood (*Hopea parviflora*) laid on the bridge (photo). In addition, anatomical studies, utilization and value

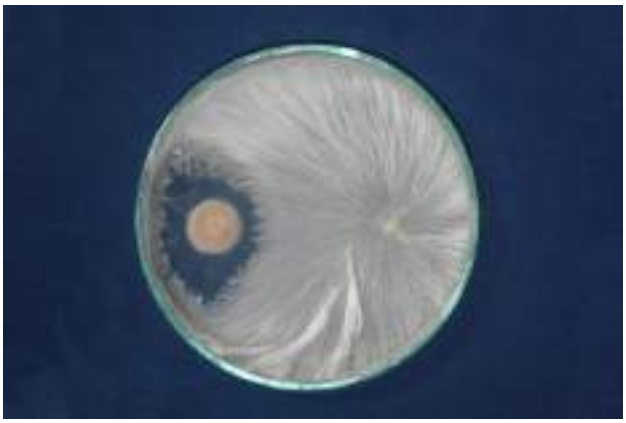
addition of products on bamboos and canes have been undertaken. Some of the current activities of the Division include evaluation of *Ochlandra* germplasm, mass propagation and field trials of elites for selection of low lignin plant material with desirable pulping properties that less pollute the environment. KFRI has established a 0.5 hectare multi-locational field trial plot at the factory site of HNL, Velloor, Kottayam (photo). At FRC, Palappilly a Common Facility Centre for Bamboo Enterprises with Department of Science and Technology Government of India support was established to impart training and technology transfer. Also Initiated was the establishment of replicable bamboo/cane based model business units for entrepreneurs via training, demonstration and transfer of the innovations/technologies developed or available.

Forestry and Human Dimensions

The Programme Division comprised of Forest Economics and Sociology Departments mandates to study, review and evaluate *Policy and management*, *People and forests* and *Production, sustainability and conservation*. The broad thematic areas in social sciences research in KFRI to date covered forest management systems; forest land use; institutional analysis; industry studies; natural forests; plantation economics; productivity of forest plantations; management of natural forests; econometric analysis; demand and supply of wood in Kerala; forestry sector analysis; trees outside forests; bamboo; price fixation of pulpwood; history and human dimensions of Forest management, tribal communities, socioeconomics including farm forestry; Ecotourism-visitor mangement in Protected areas; Non-Timber Forests Products collection, marketing and utilisation, the bamboo sector – livelihood and institutional framework, environmental and social impact assessments, economics of invasive alien sepcies, economic valuation and natural resource accounting inlcuding ecotourism development and policy studies. The current research areas include assessment of supply-demand position of wood for the State, economic valuation of ecosystem services; market economics covering medicinal plants market in south India; policy issues and strategic planning for a healthy forest and contented forest people; sustainable management of Non-Timber Forest Products; development experiences of selected tribal groups in Western Ghats, enriching, updating and maintenance of the existing database and repositories; and building capacity of decision makers, natural resource managers, local communities and other stakeholders to sustainably manage natural capital; create awareness amongst all relevant stakeholders about advances in forestry research.

Forest Health

Programme Division has Forest Entomology and Forest Pathology Departments. The thrust areas of research are different aspects of insects, microbes and weeds in the forest ecosystem. Authentic collections of microbes and insects of Kerala forests and also of microbial pathogens of forest insects are maintained in the Division. One of the focal point is development of eco-friendly biological technologies for management of pests, diseases and weeds in forest plantations. In addition, management of nursery and plantation diseases, diversity of plant pathogenic fungi in different forest ecosystems, Vescicular-Arbuscular and ectomycorrhizal fungal diversity and biological control of Invasive alien species are the thrust areas of research in Pathology Department. The Entomology Department is involved in monitoring of forest insect diversity, control of termites in plantations, wood damaging insects and teak defoliator, and traditional methods of post-harvest protection of bamboo from insect borers. The mass production technology of the biopesticide *Hyblaea puera* Nucleo Polyhedrosis Virus (HpNPV) has been standardized, and the application technology has been transferred to stakeholders. The concept of butterfly garden has been popularized and technical advice is being provided to various agencies for the establishment of butterfly parks. Some of the cuurrent activities of the Division include, studies on plant growth promoting *Rhizosphere* and *Rhizoplane* fungi of grasses and their ability to control important fungal diseases of forest nurseries and management of the invasive Alien Giant African Snail (*Achatina fulica*) in Kerala.



Extension and Training

Programme Division effectively transfers the expertise & technologies developed in KFRI to different stakeholders. The Division liaises with various users/stakeholders, facilitates transfer of technology and conducts training programmes in different aspects of tropical forestry like forest management, forest seed management, medicinal plant cultivation, environmental impact assessment, biodiversity monitoring and evaluation, remote sensing

and GIS, root-trainer technology, clonal propagation, tree improvement and statistical application in forestry. The Division has excellent facilities for conducting training programmes including lecture halls, trainees' hostel and vehicles for field trips. The Division also liaisons and coordinates technical support to the various stakeholders and departments, researchers, student community and general public.

Library and Information

KFRI Library functions as a full-fledged resource centre on tropical forestry and as a special repository of literature on teak, bamboo and rattan. It also functions as the national level Bamboo Information Centre. KFRI library with a core collection of more than 17,000 books and 10,000 back volumes of journals on forestry and allied subjects caters to the information requirements of scientists and research scholars of the Institute and others who are committed to forestry. Online access to many of the core journals in forestry and allied subjects is made available which include both national and international journals. Additionally, it has access to CAB's bibliographic database which covers the major subjects like agriculture, environment, and forestry, among others and also archives from1939. CAB Abstracts now comes with CABI Full Text and provides access to more than 220,000 journal articles, conference papers and reports. Online access to complete EBSCO database of Environment is possible, which contains more than 2.4 million records from more than 2,200 national and international titles dating back to 1888 as well as more than 190 monographs. The library collections include many of the valuable reference books, doctoral theses, publications of national and international bodies like Forest Research Institute (FRI), APAFRI, IRGWP, IUCN and IUFRO and databases in CDs and DVDs.

Access is made available to online catalogue of books and back volume collections of the library developed by using the software KOHA, open source Integrated Library Management software. Digital collections of the library include research reports, scientific papers and other documents published by KFRI scientists, which is possible to access through the library portal developed for the purpose. Digital resources of the library include KFRI Information Bulletins, Ph.D. theses, Annual Reports and all the published issues of the Evergreen-KFRI Newsletter. Collections of Ebooks, Eprints, Indian Forest Records and Bulletins (publications of FRI) and the collections of bamboo, teak and cane literature are also possible to search and download. Digital resources of the library are organized by using the software Dspace, an open source repository software. This can be accessed by the scientists and research scholars from their desktops in the institute. A total of 42 foreign journals and 57 Indian journals are subscribed during the period. Also a total of 91 books and 99 back volumes of journals have been added to the collection. The two websites, Indian Forestry Abstracts (IFA) and Bamboo Information Centre – India (BIC – India) are maintained by the library. The current projects are: an information system for forests of Kerala and Compilation of Indian Forestry Abstracts (IFA) – Phase III.

Support Sections

The research activities in KFRI are well supported by its Administration, Accounts and Engineering Sections. The Administrative Section looks after the day to day administrative activities of the Institute. Administrative Section headed by Registrar, helps Director in the smooth management of the Institute. All administrative sanctions related to project implementations are handled at Administrative Section. The transporation requirements for project implementation, trainings and other logistics are taken care by administrative section. KFRI has a fleet of 17 vehicles including buses, jeeps for off-road high altitude transport, cars and two wheelers. The financial and accounting management of the Institute is taken care by Accounts Section. All financial transactions related to projects implemented by the Institute are handled at the Accounts Section. The Accounts Section is responsible for all payments, including payroll. It is also responsible for maintenance of relevant records and accounts and for ensuring effective financial management practice in place. The Engineering Section handles civil and electrical works separately. The civil section looks after the implementation of new constructions and maintenance of existing infrastructure. The electrical section is responsible for the installation and maintenance of electrical infrastructure and uninterrupted power supply.

INTERNATIONAL AND NATIONAL NETWORKS

Asia-Pacific Forest Invasive Species Network

Asia – Pacific Forest Invasive Species Network (APFISN) is a cooperative alliance of 33 member countries of the Asia – Pacific region. The Network operates under the umbrella of Asia – Pacific Forestry Commission (APFC), which is a statutory body of the Food and Agricultural Organization (FAO) of United Nations. APFISN was established in 2004 during the 20th Session of the Asia – Pacific Forestry Commission (APFC) held in Fiji as response to the immense costs and dangers posed by invasive species to the substantial management of forest in the Asia – Pacific region. APFISN focuses on inter country cooperation that help to detect, prevent, monitor, eradicate and /or control forest invasive species in the Asia – Pacific region.

Species and habitat-specific protocols for the management of FIS, dissemination of these protocols among researchers and forest managers, promote data exchange and collaboration between member countries and discuss new strategies for APFISN were the key focal points of the Workshop on *'Habitat and species specific protocols for management of Forest Invasive Species (FIS) in the Asia-Pacific region' held* at Bandaranaike Memorial International Conference Hall, Colombo, Sri Lanka (23 - 27 October 2017). The successful conduct of the same by APFISN was highlighted by the presence of Mr. Kenichi Shono (FAO RAP, Thailand), Dr.Shiroma Sathyapala (FAO RAP, Italy), Dr.Weerawardana NDR (Forest Dept., Sri Lanka), Dr.Sajeev TV (Coordinator, APFISN), and national representatives. Prominent delegates from Asia-Pacific region have shared their experiences, views and suggestions on the topic. The entire Workshop had five

scientific sessions where the final session exclusively addressed the FIS related issues of Sri Lanka.

'**INVASIVES**' a bimonthly newsletter of the APFISN is intended to share information among countries in the Asia – Pacific region on Forest Invasive Species (FIS). The Newsletter comprises of a short description of APFISN, a short description of new invasive threat, recent news on invasive species, new publications, new books and future events. **Fact sheets** on *Mikania micrantha, Parthenium hysterophorus, Lantana camara,* Coconut leaf beetle, *Mimosa diplotricha,* Papaya mealy bug, *Eucalyptus* rust, *Achatina fulica* and Blue gum chalcid have been produced and disseminated. A fact sheet gives information about the taxonomic position of a species, its distribution, biology, description, infesting habitats, threats and damage, spread, uses and management. APFISN has secured a third prize for the best stall in the National Biodiversity Congress 2017 held at Thiruvananthapuram (22–26 February 2017), organized by Kerala State Biodiversity Board, Government of Kerala.

TEAKNET (International Teak Information Network) FAO

TEAKNET is an International Network established by FAO to address the issues of the global teak sector including institutions and individuals interested in teak. The Network aims to transform the global teak sector from its current suboptimal state to that of a dynamic entity for the benefit of all stakeholders of the sector and also to address the issues of the global teak sector. TEAKNET is basically manned by an International Steering Committee and its headquarters is currently located at the Kerala Forest Research Institute (KFRI), Peechi, India which acts as the host institution for the functioning of Teaknet since 2008.

Continuance of regular TEAKNET activities includes website updation, releases of quarterly TEAKNET Bulletin, Enrollment of new Teaknet Members and answering to the queries regarding various aspects of teak in a global level. As part of a study sponsored by the International Tropical Timber Organization (ITTO), a group of experts from the International Union of Forest Research Organizations (IUFRO), the United Nations Food and Agriculture Organization (FAO) and TEAKNET met in Vienna, Austria during 5-7 December, 2016 to

finalise a Technical Report on "Global Evaluation of Teak Management" and to draft policy recommendations and guidance for future work of governments and international organisations to promote the sustainable management of natural and planted teak forests. Besides, an evaluation mission on an ITTO-supported project "Ex-situ and In-situ Conservation of Teak (*Tectona grandis*) to support Sustainable Forest Management" was undertaken. The Technical Report on global evaluation of teak management is expected to address the best practices and lessons learnt on the conservation of teak genetic resources and the sustainable management of teak forests in different country contexts in Africa, Asia and Latin America. The same aims at presenting topics of far-reaching importance to the international forest and forest-related professional community. A Global Teak Support Program was proposed by the study team that would contribute to the preservation of the still existing native teak resources before they decline further. It would strengthen the understanding and knowledge of teak genetic resources, promote their sustainable use and management, and contribute to the development and promotion of in-situ and ex-situ conservation programs through international assistance and research collaboration. The group meeting organised by IUFRO Headquarters based on financial support provided by FAO was attended by 12 experts from 11 countries.

National Bamboo Mission - Bamboo Technical Support Group (BTSG- South zone)

The Bamboo Technical Support Group (BTSG-KFRI) consisting of a team of scientists form different disciplines set up at KFRI and supported by the National Bamboo Mission (NBM), Ministry of Agriculture and Cooperation, Government of India since 2006, offers technical support for different stakeholders in the bamboo sector. Training programmes for field functionaries and farmers on propagation, cultivation and utilization of bamboo has been a major activity of the BTSG for several years. Other activities have been to conduct specific R&D, offer technical support on bamboo to the National Bamboo Mission and to farmers and artisans. KFRI has set up a bamboo nursery to provide quality planting material of the important commercial bamboo species to farmers. A Bamboo Information Centre (www.bicindia.org) has been set up and is a valuable source of published literature on bamboo.

Bamboo Processing Centre: Velupadam, Thrissur, under the Bamboo Technical Support Group – KFRI with the support of the National Bamboo Mission. The Bamboo Processing Centre is currently working as Common Facility Centre for bamboo based Entrepreneurs, giving them technical support in the various stages of bamboo processing from raw materials to end products. The Centre was extended to two more buildings and couple of

new machines were added to facilitate the Centre. They include one each of Bamboo Seasoning Plant, Matt Weaving Machine, Bamboo Incense Stick making machine, Bamboo round stick making machine, stick sizing machine and stick polishing machine. Training programmes were conducted for 98 different stakeholders including Bamboo/Cane entrepreneurs, artisans, students, women groups and common people in bamboo processing methods, preservative treatment methods, traditional production processes, manufacturing various bamboo products like bamboo star, crib, bamboo pen, penholder, wastepaper basket, bamboo tray, among others. Bamboo based rehabilitation programme was conducted for mentally challenged students in the Centre. Outreach training programmes were conducted for about 116 stakeholders in various districts of Malappuram, Kozhikode and Kollam districts using the portable machine tools of the Centre. KFRI also provided Entrepreneurship Development Programmes for emerging Bamboo Entrepreneurs projecting Bamboo Processing Centre as a model business unit. The machines and facilities of the Bamboo Processing Centre were demonstrated to NGOs, research students, entrepreneurs and architects working on bamboo and allied fields. The products of the Centre were demonstrated and exhibited in SARAS Mela, Kollam 2016 and Bamboo Fest 2016.

FACILITIES

Arboretum

Arboreta are special places for the cultivation and display of a wide variety of evergreen and moist deciduous trees. It is a living laboratory, which functions as an outreach, teaching, and research facility dedicated to preserving the beauty and ecological functions of our biodiversity hotspot. KFRI Arboretum established in the Peechi campus in 2003 in an area of about 5 hectares currently has 3200 accessions belonging to 178 species under 50 families and 128 genera, with more than 50 taxa endemic to southern Peninsular India.

Arboretum is maintained with grid maps with markings of the location details of each of the live collection. Among the 178 taxa in the arboretum, there are two gymnosperms and 176 angiosperms. Among the angiosperms, 162 taxa are dicotyledons belonging to 118 genera and 47 families and monocotyledons are represented by 14 species of 3 genera and 2 families. A collection of wild nutmegs, key components of '*Myristica swamps*', characterized by evergreen, water-tolerant trees considered as the most primitive of the flowering plants or "*living fossils*" are special attraction in KFRI Arboretum. *Myristica fatua* (Kotthapanu) *Myristica beddomei* (Pathiripoovu), *Myristica malabarica* (Ponnampayin), *Gymnacranthera farquhariana* (Undappayin) are few among them. It is also recognized internationally by Index Seminum with ID No. 1518 and is also enlisted in the National Network of Botanical Gardens in India.

Bambusetum

The KFRI bambusetum at Field Research Centre, Velupadam in Thrissur District of Kerala (10° 26' 07.95" N; 76° 21' 32.92" E) was established during 1988-95 for the *ex situ* conservation of

Indian bamboo species and to create awareness and promote the cultivation of bamboo and its products. Moreover, it acts as a living laboratory which can be effectively utilized for taxonomical, molecular, silvicultural, ecological and synecological studies apart from its educative and aesthetic values. The Bambusetum also serves as a genetic resource for future crop improvement programmes for forest managers and farmers. Offsets, rhizomes and seedlings from different parts of the country (Andhra Pradesh, Arunachal Pradesh, Assam, Himachal Pradesh, Karnataka, Kerala, Meghalaya, Mizoram, Orissa, Tripura and West Bengal) were used as planting materials for establishing bambusetum. It has different types of bamboos like climber bamboos (*Dinochloa andamanica*), monopodial *or* runner bamboos (*Melocanna baccifera)* and clump form bamboos (*Bambusa bambos*). Fourteen genera with 56 species were the established bamboo species till 2016: *Bambusa* (20 spp.), *Cephalostachyum* (2 spp.), *Dendrocalamus* (9 spp.), *Dinochloa* (2 spp.), *Gigantochloa* (6 spp.), *Guadua angustifolia*, *Melocanna baccifera, Ochlandra* (6 spp.), *Oxytenanthera abyssinica*, *Phyllostachys sulphurea*, *Pseudoxytenanthera* (3 spp.), *Schizostachyum dullooa*, *Sinoarundinaria edulis* and *Thyrsostachys* (2 spp.). During

2016-17 the bambusetum was enriched with 10 new species from North-Eastern States: *Bambusa bambos* var *giganteus, Bambusa cacharensis, Bambusa dampiana, Bambusa japonica, Bambusa manoharani, Bambusa vulgaris* var *wamini, Dendrocalamus hookeri, Melocanna clarkia, Oxytenanthira parviflora, Teinostachyum griffithi.* The following new accessions were also added to the bambusetum during 2016-17: *Bambusa balcooa, Bambusa jaintiana, Bambusa polymorpha, Bambusa tulda, Cephalostachyum pergracile, Dendrocalamus asper, Dendrocalamus brandisii, Dendrocalamus hamiltonii, Dendrocalamus longispathus, Oclandra scriptoria, Oxytenanthera parviflora* and *Sinoarundinaria edulis*. Flowering in three species of bamboo viz. *Dendrocalamus asper, D. giganteus* and *D. stocksii* was observed in the bambusetum during the year. Currently, the bambusetum with 66 species of bamboos is one of the biggest in the country.

Bioresources Nature Park

Bioresource Nature Park is located at KFRI Sub-centre Nilambur, and was established with the financial support from Department of Biotechnology, Ministry of Environment and Forest, Government of India and Department of Planning and Economic Affairs, Government of Kerala. The Bioresources Nature Park has different conservation themes, for groups, viz.; algae, bryophytes, pteridophytes and plants found in specialized ecological niche, i.e. xerophytes (cacti and succulents) and hydrophytes (aquatic plants). Besides these beneficial plants (medicinal plants), ornamental and aesthetic plants (orchids), with special reference to endemic and rare, endangered and threatened (RET) species are also featured in the park. Propagules of over 1500 species of plants have been collected and introduced in the thematic areas of the nature trail. In the orchid house of the park, one can familiarise with some of the rare orchids, south Indian endemic species, medicinal orchids and commercially important orchids including some of the prettiest orchids in south India. The Fern House features around 80 species of ferns, including endemic, rare, endangered and ornamental ferns. The Aquatic plants include different forms, such as, floating hydrophytes, submerged and rooted hydrophytes, emergent rooted hydrophytes, and floating leaved and rooted hydrophytes. The Xerophyte and Succulent garden has both outdoor landscaped rock garden and a green house to display medicinal and ornamental species. A collection of bio-fence and bio-fuel species among other attractions too are displayed. Thallpohyte and Bryophyte specimens are displayed in a specially designed shade house with mist and drip irrigation facilities. In the Palm Garden, besides the 40 ornamental palm species many palms which have economic, ecological and cultural significance are grown. A Taxonomic Garden, where plants of over 100 angiosperm families are assembled is part of the Bioresources Park. The butterfly garden in the Park has been developed by planting larval and adult host plants and subtle modification of the habitat whereby one gets to see the entire life cycle of variety of butterflies. The Nature Park also has a model bamboo house established by the State Bamboo Mission.

Butterfly Garden

The half a hectare area in KFRI Peechi main campus designated as butterfly garden is an effort at in-situ conservation of butterflies. Butterfly gardens are considered as an important tool in the field of nature education. Butterflies are attracted into semi-natural garden space where food plants of butterflies and their caterpillars are carefully selected and grown. KFRI developed this concept and created varieties of micro-habitats in the garden for attracting butterflies belonging to various groups. Large number of butterflies including the rare, endemic and endangered butterflies frequent the garden and captivates the eyes of the visitors in the background of which they receive elucidative lessons on life history of the butterflies besides their co-evolution, intricate ecological linkages, diversity, food requirements and other details. KFRI has two butterfly gardens, one in its main campus at Peechi and another in the Sub-centre at Nilambur. Some of the butterflies that can generally be seen in the garden include Common Rose (*Pachliopta aristolochiae*), Malabar Rose (*Pachliopta pandiyana*), Common Mormon (*Papilio polytes*), Southern / Sahyadri Birdwing (*Troides minos*), Asian Cabbage White (*Pieris canidia),* Common Grass Yellow (*Eurema hecabe*)*,* Red Pierrot (*Talicada nyseus*), Common Castor (*Ariadne merione*)*,* Common Crow (*Euploea core*)*,*

Dark Blue Tiger (*Tirumala septentrionis*), Glassy Tiger (*Parantica aglea*), Blue Tiger (*Tirumala limniace*), Chocolate Pansy (*Junonia iphita*), Great Eggfly (*Hypolimnas bolina*), Water Snow Flat (*Tagiades litigiosa*), Chestnut Bob (*Iambrix salsala*) among others. The garden has 58 host plants of butterflies, among which 47 are larval host plants and the other 11 nectar plants. Some butterflies breed here, some are regular visitors with definite times for their visit and some visit the garden occasionally. The regular monitoring of the butterflies reported the presence of 12011 individuals belonging to 61 species. The aggregation among tiger butterflies (Blue tiger, Dark Blue tiger, plain tiger, striped tiger and common crow) at alkaloid sources such as, *Crotalaria retusa* was observed in the garden.

Central Instrumentation Unit

The Central Instrumentation Unit a centralized facility established in 2006, is an assemblage of sophisticated analytical instruments used by scientists and researchers of different

departments of the Institute. Since inception, various instruments have been added to the facility and now it caters to the demand of researchers within and outside the institute at a larger scale. The major instruments in the CIU are high performance liquid chromatography, gas chromatography, GC-mass spectrometer, CHNS elemental analyzer, autoanalyzer, real time PCR machine, spectrophotometer and soil CO_2 exchange system, among others. The CIU also has a sample preparation lab and other minor instruments like, muffle furnace, precision water bath, analytical balance, rotary shaker and ultrapure water system. The CIU also offers the facilities to researchers from other organizations on payment. Even though, the KFRI - CIU was in existence since 2006, the unit was opened to external users only in April 2015. Since then the unit is actively involved in internal as well as external sample analysis. KFRI-CIU received approximately 1000 queries for the analysis during the year 2016 and could analyse 859 samples.

Central Nursery

The Central Nursery, situated at the KFRI main campus has a collection of about 120 species high in demand under timber yielding, fruit bearing and medicinal categories of plants. The nursery ensures the timely availability of planting material to the farmers, general public and other departments. Besides the above species and aspects, the nursery is engaged in handling a number of rare and threatened species from Western Ghats, related with various research programmes conducted by the Institute.

Standardization of nursery techniques of various species in collaboration with KFRI Seed Centre is the other major responsibility of the Central nursery. The data generated in the nursery is used in the ongoing research programs and is useful in future research programmes too.

Herbarium

The herbarium at KFRI, established in 1982, is recognized by the International Association of Plant Taxonomists, and is known by the acronym KFRI by Index Herbarium (Taxon 37: 503. 1988). The herbarium has over 11000 specimens demonstrating more than 2140 species from 203 families and is one of the major reference herbarium of forest plants. It has extensive specimen collection of flowering plants of Kerala, especially medicinal plants and a pan Indian collection of rattans, palms and bamboos of India including Andaman and

Nicobar Islands. The species in the herbaria are indexed in alphabetical order with collection numbers under respective plant families and Bentham and Hooker's system of classification (1867-1883) has been followed for the systematic arrangements. The predominant plant families in the collection are Poaceae (171 spp.), Orchidaceae (151 spp.), Arecaceae (109 spp.), Fabaceae (81 spp.), Euphorbiaceae (96 spp.) and Rubiaceae (90 spp.). The herbarium is also represented with more than 90 species of pteridophytes. For instant access of specimens from any part of the world, all specimens are digitized and that can be accessed by botanists and other researchers free of charge through the data portal at http://kfriherbarium.org/. The website provides basic and advanced search capabilities. Default search can be conducted in all fields of the herbarium database, while advanced search allows searches in specific fields.

Kerala Forest Seed Centre (KFSC)

Kerala Forest Seed Centre (KFSC) established under World Bank assisted Kerala Forestry Project in 2003 as a collaborative programme of Kerala Forest Research Institute (KFRI) and Kerala Forest & Wildlife Department (KFD). It is located in the main campus of the Institute (10.52668^{o} N; 76.35095^{o} E). It is under direct administrative control of the Director, KFRI. Functioning of the Centre is monitored by an Advisory Committee comprising officials from both the establishments. KFSC is led by a Senior Scientist of KFRI having professional experience in the field of Seed Technology. A Range Forest Officer and a Section Forest Officer on working arrangement is deputed from KFD to the KFSC. The Centre caters the requirement of certified seeds of forestry species to the KFD, other Government Departments, NGOs and farmers in and outside State. Main objective is to collect seeds from superior trees/ stands, process, grade, store and cater to the requirement of stakeholders. Its service is being extensively utilized by research institutions, students, entrepreneurs and farmers. Teak seeds from Seed Production Areas (SPAs) in Kerala are brought to KFSC during March – April. The seeds are subjected for grading, and routine tests

like rapid viability test and germination test as per ISTA rules. Depending on the storage physiology, healthy and viable seeds are stored at optimum storage conditions in plastic bins/gunny bags/plastic bags. The seeds in stock are being tested at frequent intervals for viability. In addition to supply of seeds, the facility is utilized for research in Seed Science and Technology on tropical forestry species of Western Ghats and provide training to forestry professionals, researchers, students and others interested in seeds. During 2016-17 about 53 tonne seeds of 55 forestry species including teak (48 t) other miscellaneous species (5 t) like Mahogany, Sandal, Asokam, Malaveppu, Kanjiram, etc. have been collected and supplied to the stakeholders through KFSC.

Medicinal Plants Garden

The Medicinal plant garden at Peechi campus spreads over 0.5 hectares, consisting of 350 species of medicinal plants including of herbs, shrubs, climbers and trees. It is maintained as a reference collection of authentic medicinal plants of Kerala forests. The collection in the garden is enriched by bringing new plants collected from the wild or through exchange with other Botanic gardens. In 2016-17, 79 plant accessions were made through various plant collections of which 41 are new introductions to the garden. The medicinal plants such as *Nothapodytes nimmoniana*, *Ophiorrhiza mungos*, *Salacia brunoniana*, *Ancistrocladus heyneanus* etc. are a few among the introductions. As part of labeling the plants during this period, 165 metal boards were displayed for both field and potted plants including for special groups. A potential medicinal plant, *Salacia fruticosa*

has been studied for floral biology as the species had low fruit set. During the period, 35 groups covering school/college students, researchers and general public were visited the garden.

Orchidarium and Fernery

The Orchidarium and Fernery are meant to provide artificial conditions similar to their habitats and helps in the *ex situ* conservation and their multiplication, besides providing materials for study purposes. Orchids and ferns are peculiar group of plants with wide range of economic and conservation importance. Orchidaceae, one of the largest families of flowering plants, consists of about 700 genera and 30,000 species and with untold number of hybrids. Though about 265 species have been recorded from Kerala, some species are known only by their type collections and few are presumed to be extinct. Among the orchids of Kerala, thirteen species are used medicinally. At present the Orchidarium/Fernery of KFRI have 240 species including rare, threatened, terrestrial, epiphytic species of Orchids and Ferns, also maintaining some rare ornamental orchids and Ferns.

Palmetum

Palmetum is the live collection of indigenous and exotic palms. KFRI Palmetum was established in the year 2000. We have a collection of 135 species of palms under 52 genera. Of these, 75 are indigenous palms and 60 are exotic species with 8 species critically endangered, 9 endangered, 8 vulnerable and 23 near threatened categories as per IUCN standards. The exotic species include those which are commonly found in Indian parks, gardens and along avenues. Rare species like *Bentinckia condapanna, B. nicobarica, Rhopaloblaste augusta, Calamus nagbettai, C. brandisii, C. vattayila, Wallichia disticha, W. nana, Korthalsia laciniosa, K. rogersii, Licuala spinosa* and mangrove species *like Phoenix paludosa and Nypa fruticans* are also present in the collection. Palmetum serves as a facility for educating the public about taxonomy, economical importance and conservation of palm resources.

Seismic Observatory

A Broadband (BB) seismic observatory operated by National Centre for Earth Science Studies in the campus of KFRI is one of the 10 permanent stations set up by Department of Science and Technology in 1999 for strengthening and monitoring Indian shield seismicity with 10 BBS to understand seismotectonics of the region using Vsat connectivity-(MoES-12) funded by the Ministry of Earth Sciences. A total of 1421 local, regional and teleseismic events were recorded during February 2016- January 2017. The 7.8 magnitude Sumatra earthquake, 6.9 and 6.8 magnitude Burma earthquakes, 7.8 magnitude Equador earthquake, 7.7 magnitude Mariana Island earthquake, 6.2 magnitude Italy earthquake, 7.1 and 7.8 magnitude New Zealand earthquakes, 7.0 magnitude El Salvador earthquake, 7.8 magnitude Solomon earthquake, two 7.9 magnitude Papua New Guinea earthquakes, 7.6 magnitude Chili earthquake and 7.3 Philippines earthquakes were the other major teleseismic earthquakes recorded during the reporting period. There were 35 tremors from Kerala, 13 events from nearby states, 18 events from other parts of India, 21 from Andaman-Nicobar region and 1334 teleseismic earthquakes recorded during the reporting period. The nearby state events were from Andhra Pradesh, Karnataka, and Tamil Nadu. Ten earthquakes were recorded from Andhra Pradesh mainly from Nellore district and Eturunagaram. Karnataka tremors were from Kanakapura. Tamil Nadu events from Ooty and Cuddalore. Other parts of India earthquakes were mainly from Koyna Dam Region (9 events), Himachal Pradesh, Off coast of Goa, Kakching Manipur, Gujarat, Punjab-Pakistan Boarder, Mizoram, Haryana-Delhi Region, Dharchula and Dhalai. Seismic Observatory recorded 35 tremors from Kerala. These tremors mainly from Thrissur, Palakkad and Malappuram districts. No damage was reported due to earthquakes from Kerala during this reporting period. In Thrissur district, tremors were mainly from Peechi Dam area, Thalore-Mannav region, Varavur-Desamangalam Region, Ollur, Chimmini Dam Area, Idamalayar Reserve Forest, Attoor, Wadakkancheri, Thirumuttakode, Killanur and Off coast of Triprayar. Tremors from Palakkad mainly from Thirumuttakode, Karakkad and Parambikulam Tiger Reserve. Malappuram tremors mainly from Anakkayam, off-coast of Tirur and off-coast of Tanur. Magnitude range of these tremors was 0.5 to 2.9. Tremors from Varavur, Parambikulam Tiger Reserve and Karakkad tremors were felt by a few people. The observatory is generating high quality uninterrupted data that is being used for monitoring worldwide earthquakes and studies of local and regional earthquakes. The data recorded here are systematically archived on hard disks / DVDs for future use. The observatory also provides data to government agencies as well as other research institutes, which is used in disaster management planning and various research works. The observatory acts as an educational facility by playing host to a large number of visitors, including students. The continuous and compiled data recorded here are being sent to IMD every six months, in SEED and SEISAN formats - latest being data till December 2016. The continuous data are being transmitted online to INCOIS, Hyderabad through V-Sat connectivity.

Soil museum

The KFRI Soil Museum showcases the diversity of forest soil and mineral resources in the State and provides critical inputs for forest management. The facility inaugurated on 10th December 2015 as a part of the celebration of International Year of Soils. The main attraction is a collection of soil monoliths featuring the soils in different types of forests *viz.* shola, evergreen, semi-evergreen, moist and dry deciduous, bamboo, grasslands, teak plantations, degraded forests and agroforestry systems in Kerala. A monolith is essentially a profile representing the soil typical of a region, with all the basic characteristics preserved intact. It displays vertical sections of the soil from the surface to the bedrock below displaying the various horizontal layers or genetic horizons. Each monolith was dug from the ground and processed for more than a month before being mounted for display. The forest soil museum is the first of its kind in India and provides valuable information on soil genesis and transformation in the humid tropics. It provides signatures of the vegetation, climate, rainfall, topography, and rocks in a particular region. Any degradation of a forest ecosystem is reflected in the soil profile and can be a valuable tool in forest management and conservation.

Teak Museum

The teak museum was established in the sub-centre campus of KFRI in collaboration with the KFD in 1995 owing to the historical significance of the region. The world's first Teak (*Tectona grandis*) plantation was raised in Nilambur way back in the 1840s. This museum is the first of its kind in the world dedicated to a single species–Teak. The museum offers information on several aspects of teak, such as history, cultivation management, utilization and socio economics. The ground floor of the double-storied museum exhibits a translite of Kannimara Teak, the oldest naturally growing teak tree located at the Parambikulam Wildlife Sanctuary and the life-size replica of the trunk of the largest known teak tree growing in the Malayattoor Forest Division. Another translite of a giant tree present in the oldest teak plantation in the Conolly's Plot at Nilambur offers the visitors a glimpse into the teak plantation activities undertaken 160 years ago. Some of the other attractions here are the traditional granary and a miniature

model of sailing vessel called Uru made of teak wood. Teak poles of varying sizes and qualities obtained during the process of 'thinning' of teak plantations are also displayed along with the necessary details of standard classification of teak poles. The depiction of foliage, flowers, fruits and bark of the tree gives us a deeper insight into other characteristics of teak. Here, one can also find the large stump of a 480-year-old teak tree brought from Nagarampara forest range in Kottayam Division. A Teak Information System (touch screen facility) in the Museum helps the visitors to get information on various aspects of teak tree, such as, habit and distribution, history, morphology, cultivation, harvesting, timber and utilization. In addition, various educational, extension and programmes like orientation programmes, workshops, nature study programmes and summer training course are also organized for various stakeholders. Other activities like contests, field trips and exhibitions, and documentary fests are also conducted for the students and the general public. The Museum attracts large number of visitors including students, farmers and teak users.

Tree Health Helpline

The Tree Health Helpline at KFRI is an outreach initiative mechanism tapping the accumulated expertise of the scientific community in KFRI. Problems faced at single tree level to those at nurseries and plantations are attended through the helpline. Tree growers of both private and public sectors are expected to be the beneficiaries of this initiative. The helpline attends largely to the queries received from the State Forest Department on pests and diseases associated with teak and eucalypts. The queries received were mostly related to pest attack, fungal problems, species – site matching, species identification, species information, fertilizer application, harvesting time, planting techniques, wood quality, physiological problems, micronutrient deficiency, parasitic issues, suitable intercrops, seeds, seedling availability, etc. A brochure for tree health helpline was prepared and distributed to various schools and public programmes. A health card was prepared for assessing the health of avenue trees. The various social issues undertaken involve the health assessment of various avenue trees in highways and cities in Kerala.

Wildlife Museum

The wildlife museum has a comprehensive collection of well preserved specimens belonging to various taxa from different locations across Western Ghats, a collection from different projects undertaken by KFRI since 1978. It has variety of preserved specimens including

many mammals, invertebrates, amphibians, fishes, birds and reptiles. More than 1000 specimens were collected as study materials, for awareness creation and reference materails for research students. Majority of the collection are identified and labeled. The collection has 76 amphibians including rare and endangered living fossil *Nasikabatrachus sahyadrensis*, 90 reptiles including rare coral snakes, kraits and many more reptiles, 49 mammals include rare little Indian porpoise, flying squirrel, spiny dormouse and 8 aves. Other than vertebrates there are a number of preserved invertebrate species including molluscs, meretrix species and spiders from various regions of the State are also preserved. The specimen collection at the museum is used for graduate and undergraduate training, species identification workshops and educational programs by State and local agencies. The major objective is to support and encourage morphology based taxonomy and research and education which will establish KFRI as a key reference facility in Kerala addressing environmental issues, such as, wildlife conservation, endangered species recovery, native fish decline, landscape ecology, systematics and biodiversity studies.

Xylarium

Xylarium is a collection of authenticated wood samples that is well-curated and accessible to the scientific community for research, teaching, environmental education and other programmes. KFRI xylarium was established in the year 1979, and has a collection of 587 specimens, 133 samples representing 68 genera and 114 species from Kerala / India and the rest are from 13 foreign countries. It has been indexed in Kew Royal Botanic Garden, UK in its Index Xylarium 4 - a directory of Institutional Wood Collections from around the world. The dimension of the KFRI xylarium sample is: 10 x 6 x 1 cm for small specimens and 16 x 10 x 2 cm for large specimens following international standard. The xylarium database has detailed records, covering, family name of the tree from which the wood was collected, species name, original wood specimen No., date of collection, collector(s) name, herbarium No. of the voucher specimen, country, altitude, latitude, longitude, habit, habitat, and note on collection or accession. For each wood specimen, there will be a corresponding voucher herbarium specimen deposited in the KFRI Herbarium with the same accession number. KFRI offers few Indian species for mutual exchange of xylarium samples.

RESEARCH AND EXTENSION ACTIVITIES

Completed Research Projects

KFRI Research Report No. 515

Seed regeneration and ecological studies on keystone tree species of the evergreen and moist deciduous forest ecosystems

Chandrasekhara Pillai PK, Sreekumar VB, Sreejith KA and Mallikarjunaswami GE.

Population structure, seed ecology and regeneration of dominant keystone tree species were assessed in seven plots established by KFRI in evergreen, moist deciduous and Shola forest types of Kerala. The species in the present study are *Culleniae xarillata*, *Mesua ferrea*, *Palaquium ellipticum* (Muthikulam & Pothumala), *Cynometra travancorica, Diospyros paniculata, Reinwardtiodendron anamalaiense* (Vellanipacha), *Dysoxylum malabaricum*, *Knema attenuate* (Vazhachal) from evergreen forests, *Cassia fistula*, *Catuna regamspinosa*, *Grewia tiliifolia* from moist deciduous forests in Parambikulam and *Gomphandra coriacea*, *Hydnocarpu salpina*, *Neolitsea scrobiculata*, *Syzygium densiflorum* from Shola forests (Mannavanshola & Vaguarrai). The dominant species observed were *P. ellipticum* in Muthikkuluam and Pothumala, *R. anamalaiense* in Vellanipacha, *K. attenuata* in Vazhachal, *C. fistula* in Parambikkulum, *G. coriacea* in Vaguarrai and *H. alpine* in Mannavan shola. Flowering and fruiting period varied with species i.e., *C. exarillata* (Jan-Nov), *P. ellipticum* and *K. attenuate* (Dec-July), *M. ferrea* (April- Dec), *C. travancorica* (Sept-April), *D. paniculata* (Feb-April), *R. anamalaiense* (Mar-Nov), *D. malabaricum* and *G. tilifolia* (Feb-June), *C. spinosa* (April-Oct), *S. densiflorum* (April-June), *G. coriacea* (Dec-March), *H. alpine* (Feb-July) and *N. scrobiculata* (May-Aug). Peak flowering of *C. fistula* was observed in March-April and fruits ripening in December. Mode of seed dispersal of all the species' was identified as zoochory. Storage physiology of most species is recalcitrant except *C. fistula* (orthodox), *C. spinosa*, *G. coriacea* and *G. tilifolia* (intermediate). Good seed regeneration was obtained for *C. exarillata* and *P. ellipticum* from Muthikkulum, *C. exarillata* from Pothumala, *Reinwardtiodendron anamalaiense* from Vellanipacha. whereas regeneration was poor for *M. ferrea* at Muthikkulum, *M. ferrea* and *P. ellipticum* from Pothumala, *D. malabaricum* and *K. attenuate* from Vazhachal, *C. travancorica* and *D. paniculata* from Vellanipacha, *C. spinosa*, *C. fistula* and *G. tiliifolia* from Parambikkulam, *H. alpine* and *N. scrobiculata* from Mannavanshola as well as in *G. coriacea* and *S. densiflorum* from Vaguarrai. The species with poor regeneration may create possible gaps across different stages (seedlings-saplings-poles-adults) and the population may decline in due course. The study suggests the need for augmenting the existing natural resources of these dwindling keystone species' to sustain the respective ecosystems.

KFRI Research Report No. 516

Conservation through restoration of wild nutmeg tree populations of Western Ghats of Kerala

Jose PA and Chandrasekhara Pillai PK.

A study on five wild nutmegs *viz. Myristica malabarica, M. beddomei, M. fatua* var. *magnifica,* G*ymnacranthera farquhariana, Knema attenuata* belonging to the family Myristicaceae was carried

out as part of conservation and management of existing populations towards sustainable utilization of these endemic, threatened tree resources. The major populations of wild nutmegs in the Kerala part of Western Ghats were identified and mapped out. As part of the study, clonal propagation methods with the aid of auxins and ideal seed storage practices for recalcitrant seeds were developed. A fair quantity of planting stock was established in the nursery and 11,500 seedlings of five species were planted at 14 forest locations where the depleting natural stocks of these species' exist. The planting sites were demarcated by signboards. The average seedling survival success of 70-90 per cent was recorded after six months of planting. A training programme was organised for capacity building on *Nursery practices, plant production and field planting* was imparted to 183 field staff of Thiruvananthapuram, Shendurney, Vazhachal and North Wayanad Forest Divisions where the restoration of species was carried out.

KFRI Research Report No. 517

Improving and maintaining productivity of eucalypt plantations in India and Australia
Sankaran KV.

The impact of site management practices *viz*. harvest residue retention, weeding, fertilizer application, legume intercropping, thinning and trenching on tree growth was evaluated in *Eucalyptus tereticornis* and *E. grandis* plantations in Kerala for a full rotation during 1998-2005. Biomass and nutrient content of the tree crop, forest floor and understory of the previous stands were determined before establishing the experiments. Quantities of carbon and nutrients in the soil were much higher than those found in the above ground biomass of plantations. The highland sites had higher organic C and double the amount of cumulative N than the lowland sites. Soil cations were significantly lower at the least fertile sites compared to the fertile sites. Removal of harvest residues (leaf, bark and branches) and understory from the sites was found to cause significant loss of N, P and cations from the site. Burning of residues, which is the normal practice in Kerala, will also result in volatilization and loss of major nutrients. Of the various treatments, retention of residues did not significantly improve eucalypt productivity at the sites probably due to the low amount of residues. Results indicate that the mean standing volume in harvest residue treatments was significantly higher than the previous rotation at all sites. The productivity increase at the end of the rotation was in the range 47-119 per cent at *E. tereticornis* sites and 77-224 per cent at the *E. grandis* sites which shows that use of good quality planting stock and periodic weeding alone can improve eucalypt productivity in Kerala. Intercropping of legumes in eucalypt plantations may be advantageous since *Pueraria* and *Stylosanthes* improved productivity at one of the *E. tereticontis* sites. However, choice of climbers like *Mucuna* and *Pueraria* may be avoided since they can smother trees if not managed periodically. The thinning experiments at the *E. grandis* sites showed that it would be ideal to keep 2300 stems ha-1 to get higher productivity in intensively managed eucalypt plantations. Trenching will have an impact in sites where water becomes a limiting factor for growth. Also, conservation of top soil by trenching may have an impact on productivity at steep sites which are prone to erosion. Periodic weeding significantly improved the eucalypt productivity of *E. tereticornis*. Responses to fertilizers were quite variable across sites with one each of the *E. tereticornis* (Punnala) and *E. grandis* (Surianelli) sites showing good responses to N and P fertilizer

which reflect the inherent difference in the nutrient supply characteristics of soils. The current annual increment (CAI) and mean annual increment (MAI) values of the standing crop show that 5-6 years may be an appropriate time to harvest intensively managed *E. tereticornis* and *E. grandis* plantations in Kerala. The influence of harvest residue retention on soil N, P and C was relatively minor in the short term period of this study with only a few detectable changes to the soil characteristics explored. Retention of harvest residues at the sites did increase the N mineralization and microbial biomass and it is evident that the residues contain large quantities of these critical nutrients. The incubation experiment with legume and eucalypt residues proved that the degree of N mineralization and immobilization was directly related to the N concentration of the residues. N mineralization rates quantified from plots applied with N fertilizer have shown that the best indicator of response to fertilizer across sites was the net N released during aerobic incubation.

KFRI Research Report No. 518

Impact of industrial activities on soil and water qualities in Koratty panchayat area
Sandeep S, Thomas P. Thomas and Jayson EA.

Human activities, in course of their development ventures may inflict irreparable damage to soil and water entities. Koratty panchayat in Thrissur District with a long history of industrial and agricultural activities is prone to soil and water contamination. Hence, the present project was envisaged with the objective of assessing the land use pattern, generate baseline information and evaluate soil and water qualities in Koratty panchayat area. Land capability classification shows that 98 per cent of the land in the region belongs to Class II and III, indicating moderate limitations for crop growth**.** Rice, coconut, banana, pepper, arecanut, nutmeg, rubber and vegetables are the main crops cultivated in the panchayat. Mixed cropping is the major cropping pattern in the region. Heavy metals in the surface soils and in water bodies of this area were analyzed to assess the impact of different land uses on soil and water quality. Total heavy metal contents in soil showed that cadmium in industrial sites and Cd (cadmium) and Ni (nickel) in most of the agricultural lands in Koratty were beyond the permissible limits. To increase the information capacity (mobility/ bioavailability) of generated results a speciation analysis suggested by EU Standards, measurement and testing programme called BCR process of the heavy metals in soil was conducted. Though Fe (iron) was the most mobile among the different heavy metals, more than 90 per cent of this metal was observed in the immobile residual fraction. Cd was the least mobile among the studied heavy metals in Koratty panchayat, but > 50 per cent of this metal existed in the easily available fractions (fractions 1 and 2) thus making it a contaminant of high bioaccumulation risk by way of plant absorption. Contamination factors for Cd, Ni and Pb (lead) were very high in the soils of Koratty. Enrichment factor values showed that accumulation of these metals in soils occurred mainly due to anthropogenic - industrial as well as agricultural activities. Water quality of the region was assessed by collecting samples from ponds, wells and prominent water courses draining the area. The pH values were found to vary between 4.85 - 6.85, 4.95 - 6.35 and 5.25 - 5.76 in ponds, wells and water courses respectively. The values were lower than the prescribed BIS and ICMR standards. Among the anions, sulphide content was found to exceed the limits in all the water bodies of the region (ponds, wells and streams). Oil, grease and phenolic compounds were found to

be other major pollutants of water in the region and present in levels above the prescribed standards in all water samples during the sampling period. All the analyzed water samples from wells indicated high pollution levels by coliforms and 32 per cent of them by *E. coli*. Water quality was thus found to be impaired to various levels in Koratty panchayat.

KFRI Research Report No. 519

Vetiver system technology for river bank stabilization

Sandeep S, Jayaraj R, Hrideek TK and Raghu AV.

Stream bank erosion is a major problem in Kerala. Physical and vegetative methods are effectively used for stream bank stabilization. In vegetative methods, *Vetiveria zizanioides* is a widely accepted plant. The present project was undertaken to identify and characterize different ecotypes of vetiver, evaluate their efficiency in river bank stabilization and to impart training for the benefit of end users. A total of 15 vetiver accessions were collected from different research centres and private individuals. Correlation analysis and character associations of 12 morphometric characters of the collected vetiver accessions were done and their relationship derived. Plant height showed the highest factor loading followed by leaf breadth, root length, leaves per tiller and fresh root weight showing their higher contribution towards the variability of the population and their usability in breeding programmes as lead characters. In the collected accessions, phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) in all cases indicating polygenic background of characters and additive gene action. Field experiments conducted at the Field Research Centre of KFRI at Velupadam in Thrissur district showed that Periavura (vetiver accession) and ODV – 23 were the most promising in terms of growth parameters. Soil modifying parameters, such as, soil reaction, organic carbon content and mean weight diameter (MWD) did not differ between accessions. However, organic carbon (%) and water stable aggregates expressed as mean weight diameter were higher vetiver cropping. Periavura accession had the lowest oil content in roots and ODV – 23 the highest. Thus, ODV – 23 though acceptable by growth standards its high oil content may tempt the planting community to harvest the crop thereby defeating the purpose of soil stabilization. Hence among the tested vetiver accessions, Periavura could be preferred for river bank stabilization.

KFRI Research Report No. 520

Digital Library in Forestry

Sarojam N.

The vast amount of information being generated in an exponential manner makes it difficult to collect and organize. Adding to the complexity are images and multimedia content which present even more challenges for retrieval. Recent developments in information and communication technologies help in organizing the vast amount of information. Digitization of documents offers many advantages to manage a large collection of documents of any format. It is possible to preserve the documents for long term and store systematically. It is easy to locate information stored in the library. Space of the library can also be saved. It facilitates easy access to the materials at any time from remote places. KFRI Library had initiated the work of building up a digital archive of the publications of KFRI and later other collections of the library were added. An overview of the

collections brought into digital archives and how it is implemented and the benefits to the users are discussed in this report.

KFRI Research Report No. 521

Development of a prophylactic control strategy for managing the mahogany shoot borer *Hypsipyla robusta* in trial plantations

Mohanadas K

Mahogany is one of the valuable timbers of the tropics. In spite of excellent growth potential and adaptability to a wide range of conditions including degraded sites, the tree is susceptible to shoot borer attack by *Hypsipyla* species. A package of practice is suggested in this study to manage new mahogany plantations from the shoot borer, *Hypsipyla robusta.* This study was done at a six year old mahogany trial plots (*S. macrophylla* and *S. mahagoni)* established at the Field Research Centre (FRC), at Veluppadam in 2003. A three-way approach including the physical, biological and chemical tree-injection control methods was attempted. In the physical control, the leading tender shoot of mahogany plants was covered with a hood made of bamboo frame and covered with fine nylon mosquito net. This covering protected the tender shoot from *H. robusta* infestation and further damage. In the biocontrol method, weaver ants (*Oecophylla smaragdina*) along with their nest were collected from the neighbourhood forest trees, released on the mahogany plants and allowed to establish their new nests. These weaver ant nested plants were connected to other mahogany plants in the study plots using some thick threads to ensure the surveillance of these ants. Significant differences with respect to the infestation percentage were observed between the plants in the control plots and weaver ants established (treated) plots. In the chemical tree-injection control method using systemic insecticide (Dimethoate 30% EC), 100 per cent protection could be observed in all the three concentrations applied (0.1, 0.2 and 0.5 %), and no infestations were occurred upto 100 days. Further experiments are needed to recommend the frequency of treatments with regard to the long term protection of the plants. All these control methods can be applied as a package of practice during the establishment of new mahogany plantations.

KFRI Research Report No. 522

Wild animal kills and its causative factors in selected forest roads in Kerala

Easa PS.

A study was conducted on wild animal kills along the road connecting Vazhachal - Malakkapara and Chinnar - Marayur in Udumalpet – Munnar road. The 16 kms long stretch of the road passes through the dry deciduous forests and scrub jungle in Chinnar Wildlife Sanctuary. The 50 kms distance in Vazhachal- Malakkapara road is through the tropical wet evergreen and moist deciduous forests and reed patches. The observations during 2013-14 were made by covering the distance on a bike at a slow pace. During the trip, the kills were recorded along with the details including the species name, GPS reading and the surrounding habitat. A total of seventy five wild animal kills were recorded from the road passing through Chinnar Wildlife Sanctuary. These included a number of animals included in Schedule IV of Wildlife Protection Act, mostly reptiles and birds. Indian garden lizard and the three striped palm squirrel were the highest in term of number of kills. Gray slender loris, black

naped hare and lesser bandicoot rat were the mammals recorded as vehicle hit in Chinnar. The birds included the rare yellow throated bulbul. The observations in Vazhachal-Malakkapara road recorded about 315 road kills, which included almost uniformly the reptiles, amphibians and mammals. A number of Western Ghats endemics included under Schedule I and Schedule IV were seen hit by vehicles. These included Nilgiri langur, Indian crested porcupine and small Indian civet. The highest number of kills was that of bi-coloured frog with about 197 numbers followed by 52 numbers of Indian bullfrog. Indian rock python (under schedule I), checkered keelback and spectacled cobra (both Schedule II) were also observed to be killed. The observations indicate the vulnerability of wildlife to vehicular traffic in both the areas. It is suggested to establish speed breakers in most of the areas in Chinnar to regulate the speed of the vehicles thereby helping the drivers stop the vehicles in case of sighting animals on the road. The canopy connectivity could be maintained by planting suitable tree species in identified areas and go for artificial canopy bridges as a temporary relief. Highway patrolling as suggested by National Tiger Conservation Authority could be arranged in Vazhachal road. Awareness among the drivers is considered crucial in both the areas.

Ongoing Research Projects

1. Assessment of ecosystem services for conservation and management of sacred groves in Kerala part of Western Ghats (*Dr. UM. Chandrashekara)
2. Structure, composition, dynamics and management of vayal ecosystem system in Periyar Tiger Reserve (*Dr. KA. Sreejith)
3. Assessment of medicinal plant resources of Northern Kerala (*Dr. P. Sujanapal)
4. An information system for forests of Kerala (*Smt. N. Sarojam)
5. Genetic improvement of teak- phase II : establishment of clonal hedge gardens and seed orchards (*Dr.TK. Hrideek)
6. Population analysis, seed biology and restoration of *Hopea erosa* and *H. racophloea,* two critically endangered trees of Western Ghats (*Dr. PKC. Pillai)
7. Clonal forestry programme for KFD in teak bamboo and other important forestry species (*Dr. EM. Muralidharan)
8. Ex-situ conservation of wild orchids in the Western Ghats, India (*Dr. VB. Sreekumar)
9. Development and management of research and office information system - facility development (*Dr. EA. Jayson)
10. Introducing biochar for enhancing the quality of degraded soils of plantation forestry sector in Kerala (*Dr. MP. Sujatha)
11. Popularisation of weed composting technology for soil carbon sequestration and livelihood improvement of rural poor (*Dr.MP. Sujatha)
12. Evaluation of *Ochlandra* germplasm, mass propagation and field trials of elites - phase 2 (*Dr. PK. Thulasidas)
13. Digitization of selected books in KFRI Libraray-Phase2 (*Dr. KF. George)
14. Information system on medicinal plant of Kerala (*Dr. KF. George)
15. Compilation of Indian Forestry Abstracts Phase 2 (*Smt. N. Sarojam)
16. Systematics, phylogeny and biogeography of dipterocorps in the Western Ghats (*Dr. VB. Sreekumar)
17. Large scale restoration of *Dysoxylum malabaricum* Bedd ex Hietn and *Coscinium fenestratum* Colebr, two endangered and important medicinal plants of Western Ghats (*Dr. P. Sujanapal)

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*Principal Investigator

18. Genetic improvement of Teak phase – I: Locating plus trees and establishment of clonal hedge garden and clonal seed orchards (*Dr. TK. Hrideek)
19. Impact of climate change on growth dynamics of tropical tree species in the Western Ghats region as evidenced from dendroecological studies (*Dr. PK. Thulasidas)
20. Development of a farming system based cyber extension model for the state of Kerala (*Dr. P. Sujanapal)
21. DNA barcoding as a valuable, molecular tool for certification of bamboo plantation material (*Dr. Suma Arun Dev)
22. Kerala Forest and Environment Index (KF & E-Index)(*Dr. M. Amruth)
23. Plant metabolic studies in the genus *Embelia* found in Kerala (*Dr. AV. Raghu)
24. Ecology and restoration of *Cynometra beddomei* and *Kingiodendron pinnatum,* two endemic and endangered tree legumes of Western Ghats of Kerala (*Dr. P A. Jose)
25. Foraging ecology of selected birds in the kole wetlands of Kerala, India (*Dr. EA. Jayson)
26. Network project on conservation of lac insect genetic resources (*Dr. TV. Sajeev)
27. Fire as a management tool: a case study from selected forest ecosystems in Kerala. (*Dr. K A. Sreejith)
28. Ecology and patch dynamics of the endangered grizzled giant squirrel, *Ratuyamacroura dandolena* habitats in south India with special reference to its conservation (*Dr. Sugantha Sakthivel)
29. Risk assessment and development of management protocols for alien invasive ants of Kerala (*Dr. Presty John)
30. Evaluation of bioactive principles from entomo fungi for insect pest management (*Dr. Majesh Thomson)
31. Development of biomarkers as a predictive tool for organophosphate toxicity in terrestrial ecosystem (*Dr. R. Jayaraj)

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*Principal Investigator

32. Long-term monitoring of forest ecosystem dynamics: Phase I: Establishment of 10 ha. permanent plot in tropical wet evergreen forest of Kerala (*Dr. KA. Sreejith)
33. Plant growth promoting *Rhizosphere* and *Rhizoplane* Fungi of grasses and their ability to control important fungal diseases of forest nurseries (*Dr. G E. Mallikarjuna Swamy)
34. Ecology and conservation genetics of *Atuna indica* and *Hydnocarpus longipedunculatus* –two rare and endemic trees in the Kerala part of the Western Ghats (*Dr. P A. Jose)
35. Exploring the potential for hybridization in bamboo species in flower in the KFRI Bambusetum (*Dr. EM. Muralidharan)
36. Study on reproductive constrains and seed characteristics of *Terminalia paniculata* (*Dr. P K. Chandrasekhara Pillai)
37. Developing a digital library for the Teak museum (*Smt. N. Sarojam)
38. Quantification of antibiotic gene expression levels in *Bacillus subtilis* during co-inhibition of rubber wood sapstain fungus using real-time PCR (*Dr. Suma Arun Dev)
39. Bioactivity guided fractionation and mechanistic elucidation of biomolecules from *Cocculus laurifolius* DC. of Southern Western Ghats (*Dr. R. Jayaraj)
40. Genetic improvement of selected tree species - Phase I: Establishment of germplasm collection at KFRI (*Dr. TK. Hrideek)
41. Bamboo Technical support Group – KFRI (*Dr. EM. Muralidharan)
42. BTSG – Training (*Mr. VP. Raveendran)
43. BTSG - Publicity and Extension (*Dr. AV. Raghu)
44. BTSG - Base line survey for assessing potential for improvement of productivity (*Dr. UM.Chandrashekhara)
45. BTSG - National level Seminar (*Dr. V. Anitha)
46. BIC India (Database generation and management)(*Smt. N. Sarojam)
47. BTSG - Tools for management and harvesting operations in bamboo (*Dr. EM. Muralidharan)
48. BTSG - Strengthening of bamboo processing centre (CFC) (*Dr. TK. Dhamodharan)
49. BTSG - Institutional mechanisms and policy provisions towards community empowerment (*Dr. V. Anitha)

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*Principal Investigator

50. BTSG - Plant growth promoting and biocontrol microbes for high quality bamboo planting stock production (R & D Project) (*Dr. GE. Mallikarjuna Swamy)
51. BTSG – Coordination (*Dr. EM. Muralidharan)
52. Factors affecting roosting ecology of birds in Kerala (*Dr. EA Jayson)
53. Pedogenic influences on vegetation dynamics in major forested wetlands of Kerala Western Ghats (*Dr. S. Sandeep)
54. Developing a sampling methodology for the snail, *Achatina fulica* and to estimate the population size in infested sites of Kerala (*Ms. T.K. Maneetha)
55. Exploration of medicinal plant resources of Lakshadweep island with special reference to indigenous knowledge (*Dr. P. Sujanapal)
56. Wood balance study in Kerala (*Director, KFRI)
57. Documentation of population demography and genetic structure of teak for developing sustainable conservation strategies and resource management(*Dr. Suma Arun Dev)
58. Genetic Improvement of selected tree species- Phase I: Plus tree selection, standardization of the propagation techniques, establishment of seed orchard and clonal hedge garden (*Dr. TK. Hrideek)
59. Management of the invasive alien giant african snail (*Achatina fulica* Bowdich) in Kerala (*Dr. TV. Sajeev)
60. Economic valuation of ecosystem services in the moist deciduous forests of Kerala (*Dr. V. Anitha)
61. Authentication of major commercially traded raw drugs in the Ayurvedic systems of medicine in India (*Dr. Suma Arun Dev)
62. The medicinal plants market in south India: Economic value and tribal rights (*Dr. V. Anitha)
63. Development of management protocols for already established invasive alien species in the protected and other forests of Kerala (*Dr. TK. Hrideek)
64. Establishment of a herbal garden as a peri-urban green space of Nilambur, Malappuram District, Kerala (*Dr. UM. Chandrashekhara)
65. Bird hazard to aircrafts in the Cochin Naval Air Station (INS Garuda)(*Dr. EA. Jayson)

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*Principal Investigator

66. Facilitating the establishment of bamboo and cane Enterprises through training and technology transfer (*Dr. TK. Dhamodaran)
67. Exploration of medicinal plant resources of Panju islands of Maharashtra (*Dr. P. Sujanapal)
68. Collection, Identification, documentation, exploration and conservation of biodiversity of parasitic *foliicolous hyphomycetous* fungi from Tarai forests flora of Uttar Pradesh (*Dr. Shambu Kumar)
69. Tracking the binvasion of *Achatina fulica* and its role in spreading the rat lung worm *Angiostrongylus cantonensis* (*Ms. Keerthy Vijayan)
70. DNA barcoding a promising molecular tool for timber forensics (*Dr. Suma Arun Dev)
71. Compilation of Indian Forestry Abstracts (IFA) Phase III (*Dr. KF. George)

*Principal Investigator

Ongoing Extension Projects

1. Maintenance of permanent plots establishment by KFRI in natural forests of Kerala - Phase I (*Dr. KA. Sreejith)
2. Enriching of live collections of orchids and ferns (*Dr. P. Sujanapal)
3. Monitoring of teak experimental plots, clonal multiplication area (CMA) and production of superior clonal plants (*Dr. TK. Hrideek)
4. CAT (Conservation Awareness Team) at school for environment education and conservation (*Dr. AV. Raghu)
5. Organising educational programs at Teak Museum, KFRI Subcentre (*Smt. Sani Lookose)
6. Maintenance of bio-resources nature park in the KFRI Sub Centre, Nilambur (*Dr. UM. Chandrasekhara)
7. Competence building on analytical instrumentation and maintenance of central instrumentation unit (*Dr. R. Jayaraj)
8. Enrichment of microbial culture collection at KFRI (*Dr. GE. Mallikarjuna Swamy)
9. Maintenance, documentation and preparation of the wildlife museum of KFRI (*Dr. EA. Jayson)
10. Habitat enrichment in the butterfly garden at KFRI campus, Peechi (*Dr.TV.Sajeev)
11. Enrichment of the insect collection of KFRI (*Dr. TV. Sajeev)
12. Maintenance and enrichment of medicinal plants garden at Peechi campus- Phase II (*Dr. PA. Jose)
13. Strengthening and enriching of KFRI Herbarium (*Dr. VB. Sreekumar)
14. Strengthening and enriching of KFRI Palmetum (*Dr. VB. Sreekumar)
15. Issues, challenges and strategies for sustaining soil health in the humid tropics (*Dr. MP Sujatha)
16. Upgradation of soil museum at KFRI (*Dr. MP. Sujatha)
17. Tree health helpline (*Dr. TV. Sajeev)
18. Management and monitoring bambusetum at FRC, Velupadam (*Dr. PKC. Pillai)

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*Principal Investigator

19. Maintenance and monitoring arboretum at FRC, Velupadam (*Dr. PKC. Pillai)
20. Management of experimental plots at Devikulam (*Dr. PKC. Pillai)
21. Bamboo innovations to enterprises: Maintaining and strengthening business model facilitating CFC activities (*Dr. TK. Dhamodharan)
22. KFRI facility maintanance collection, processing, quality assessment, storage and distribution of seeds of forestry species through KFSC (*Dr. PKC. Pillai)
23. Avenue tree health assessment in Thiruvananthapuram corporation (*Dr. TV. Sajeev)
24. Production of planting stock in KFRI bamboo Nurseries (*Dr. E.M Muralidharan)
25. 29th Kerala Science Congress(*Director)
26. KSCSTE Curtain Raiser Programme of 29th KSC (*Dr. VB. Sreekumar)
27. Maintenance of digital archives and research project records in RME (Research Coordinator - *Dr. E A Jayson)
28. Developing protocols for professional forest management practices (*Dr. EM. Muralidharan)

*Principal Investigator

PUBLICATIONS

Research Papers in Journals

1. Chandrashekara UM. 2016. Growth and physiological responses to an elevation gradient by co-occurring tree species in a Shola forest of Kerala, India. Current Science 110 (10): 1900-1901.
2. Chandrashekara UM and Thasini VM. 2016. Non-crop edible plants and medicinal plants in homegarden agroforestry system of Palakkad District, Kerala. Int J. and Environmental Sci. 42 (2): 183-191.
3. Hrideek TK, Ginu J, Raghu AV and Jijeesh CM. 2016. Phytochemical profiling of bark and leaf volatile oil of two wild *Cinnamomum* species from evergreen forests of Western Ghats. Plant Archives 16 (1): 266-274.
4. Jayaraj R, Sasidharan N, Beenu Tom and Muhammad Anaz K. 2016. Comparative phytochemical profiling and quantification of mangiferin content in species of *Salacia* from southern Western Ghats of India. Journal of Biologically Active Products from Nature 6 (3): 209-222.
5. Jose Mathew, Hrideek TK, Sreekumar VB and Madhusudhanan K. 2016. *Seidenfadeniella salimii* (Orchidaceae): a new plant species from south Western Ghats, India. Webbia: Journal of Plant Taxonomy and Geography 70 (1): 69-71.
6. Jose PA, Siju Tom Kuruvila and Binoy NM. 2016. New record of seed pest, *Alcidodes* sp. Indet. (Coleoptera: Curculionidae) in *Cynometra beddomei* Prain. Indian Journal of Forestry 39 (2): 97-100.
7. Joshi Y, Sreekumar VB and Sequeira S. 2016. First report of teleomorphic stage of *Normandina pulchella* from India. Kavaka 47: 155 - 157.
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11. Raghu AV, Deepa K, Daisy MJ and Chandrasekhara Pillai PK. 2016. Effect of pre-germination treatments and storage conditions on germination of *Embelia ribes* Burm f. (bidanga) with special reference to Vrikshayurveda. J. Traditional and Folk Practices 2/3/4(1): 160-163.
12. Sandeep S and Manjaiah KM. 2016. Impact of tillage and nutrient management practices on soil aggregate carbon pools of rice-wheat cropping systems in semiarid India. Indian Journal of Geomarine Sciences 45(2): 207 -214.
13. Sajitha KL and Suma Arun Dev. 2016. Quantification of antifungal lipopeptide gene expression levels in *Bacillus subtilis* B1 during antagonism against sapstain fungus on rubberwood. Biological Control 96: 78-85.

14. Sajitha KL, Suma Arun Dev and Maria Florence EJ. 2016. Identification and characterization of lipopeptides from *Bacillus subtilis* B1 against sapstain fungus of rubberwood through MALDI-TOF-MS and RT-PCR. 2016. Current Microbiology 73: 46-53.
15. Sarojam N and Raman Nair R. 2017. Design and development of bamboo information system. Informatics Studies (Jan-Mar): 19-28.
16. Sasidharan N, Sujanapal P, Dantas KJ and Robi AJ. 2016. Enigmatic new species, *Strobilanthes agasthyamalana* (Acanthaceae), from Agasthyamala Biosphere Reserve of southern Western Ghats, India. 2016. Kew Bulletin 71(4): 1-6.
17. Sivaram M, Ramachandran KK, Jayson EA and Vijayakumaran Nair P. 2016. Evaluation of line transects sampling technique in estimating elephant abundance in Kerala forests using dung survey. Indian Forester 142 (10): 959-964.
18. Sreejith KA, Chandrashekara UM, Nirmesh TK and Sreekumar VB. 2016. Tree species composition and distribution pattern in a *Myristica* Swamp of Northern Kerala, India. Current World Environment 11 (3): 743-750.
19. Sreejith KA, Sreekumar VB, Nirmesh TK and Sugantha Sakthivel R. 2016. New population of *Santalum album* L. (sandalwood) from Agali Forest Range, Kerala, India. Current Science 110 (2): 148-150.
20. Sreejith KA, Prashob P, Sreekumar VB, Manjunatha HP and Prejith MP. 2016. Microhabitat diversity in a lateritic hillock of northern Kerala, India. Vegetos 29:3. doi:10.4172/2229-4473.1000145.
21. Sreekumar VB, Sugantha Sakthivel R and Sreejith KA. 2016. Distribution mapping and conservation of *Rhopaloblaste augusta* (Kurz) H. E. Moore in Nicobar Islands, India. Tropical Ecology 57 (2): 271-277.
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23. Sreekumar VB, Hussain KH and Renuka C. 2017. Virtual herbarium of Kerala Forest Research Institute, Peechi, Kerala, India. Current Science 112(3): 466-470.

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1. Anoop EV, Jiljith KP, Sakti C, Nicodemus A, Hrideek TK. and Swagatika Sahoo. 2016. Genetic variation in wood basic density and modulus of elasticity in Teak (*Tectona grandis*) grown in seed orchards of Kerala. National conference on 'Tree improvement research in India : Current trends and future prospects'. 2nd-3rd February 2017 at Indian institute of Wood Science and technology, Bengaluru, pp83
2. Chandrashekara UM and Reshma PK. 2016. Hidden Harvests. LEISA-INDIA, 18 (2): 28-30.
3. Chandrashekara UM. 2016. Benefits of using newspaper to cover teak nursery beds. Teaknet Bulletin 9(2): 4-6.
4. Corrie BS and Sreekumar VB. 2016. A strategic vision for natural capital management in the Kerala part of Western Ghats. Proceedings of National Conference on 'Western Ghats Revisited' November, at Maharashtra Forest Department.

5. Divya Soman, Anitha V and Anju Arora. 2017. Bioremediation as an ecosystem service function in constructed wetland. In proceedings of the National Seminar on 'Dwindling wetlands-impacts onlivelihoods ad ecosystem service (DWILES)', January, Christ University, Bangalore.
6. George KF. 2016. Application of data mining in library and information services. In: Balachandran S and Ramesh Babu V (Eds.). Proceedings of two day national conference on 'Quality of library and information services for teaching, learning and research in the present era: challenges and opportunities'. on 5-6, August, Thiruvalluvar College, Papanasam, Vickramasingapuram, Tamil Nadu,: A7-A13.
7. Hrideek TK, Muraleekrishnan K, Jijeesh CM. and Surendran T. 2016. Evaluation of early growth performance of *Tectona grandis* clones in south and central Kerala. National conference on 'Tree improvement research in India : Current trends and future prospects'. 2nd-3rd February 2017 at Indian Institute of Wood Science and technology, Bengaluru, pp 83.
8. Hrideek TK. 2016. Management of tree invasion at APFW conference, Clark city, Philippians 22-26 Feb 2016
9. Jithin KV, Jose PA, Subin K and Suma Arun Dev. 2017. Population ecological studies of *Hydnocarpus longipedunculatus* Robi, Sasidh. & Jose- a newly described endemic taxon of the Western Ghats, Kerala. Proceedings of Extended Abstracts, 29th Kerala Science Congress, Marthoma College, Thiruvalla 28-30 January 2017. p.656.
10. Jose PA, Ranjith CV and Chandrasekhara Pillai PK. 2017. Clonal propagation and germplasm storage of wild nutmegs - a tool for conservation and resource enhancement. National Conference on 'Tree Improvement Research in India: Current Trends and Future Prospects'. 2-3 February, IWST, Bangaluru, p. 42.
11. Jose PA, Ranjith CV and Chandrasekhara Pillai PK. 2017. Developing seed propagation protocols for conservation of endemic and threatened trees of Western Ghats: A case study on wild nutmegs. Technical Notes of National Workshop on 'Seed Collection and Conservation'. Botany Dept., University of Kerala, Kariavattom, Thruvananthapuram, pp. 40-43.
12. Jose PA, Ranjith CV and Pillai PKC. 2017. Clonal propagation and germplasm storage of wild nutmegs – a tool for conservation and resource enhancement. Proceedings of the National Conference on 'Tree Improvement Research in India: Current Trends and Future Prospects'. 2-3rd February, Institute of Wood Science and Technology, Bengaluru, 42 pp.
13. Jose PA, Ranjith CV and Pillai PKC. 2017. Developing seed propagation protocols for conservation of endemic and threatened trees of Western Ghats: A case study on wild nutmegs.Proceedings of the national Workshop on 'Seed Collection and Conservation', 8-10 March, Department of Botany, University of Kerala, Thiruvanathapuram, pp. 40-43.
14. Pillai PKC. 2017. Seed handling of recalcitrant group: A case study on selected tropical tree species. Proceedings of the national Workshop on 'Seed Collection and Conservation', 8-10 March, ' Department of Botany, University of Kerala, Thiruvananthapuram ,' pp. 15-28
15. Pillai PKC, Mahendran R and Sarath MS. 2016. *Hopea erosa* (Bedd.) Van Sloot. a critically endangered endemic species in southern Western Ghats: need to conserve. In: Souvenir-cum-Abstracts of National Conference on "Forestry in India: Current

16. Challenges and Future Prospects". 15-18 November, Himalayan Forest Research Institute (HFRI) Shimla, Himachal Pradesh. Pillai PKC, Sanal C Viswanath and Jiji AH. 2017. Influence of pre-

sowing treatments on seed germination of mahogani (*Swietenia macrophylla* King). Proceedings of the 29th Kerala Science Congress, 28-30 January, Mar Thoma College, Thiruvalla, pp. 649-645.

17. Sajeev TV. 2016. Invasive insects in Kerala. Insect biodiversity Conference, Central University of Kerala, Kasargod
18. Sani Lookose and Anju Antony. 2017. Teak Museum at KFRI Sub centre, Nilambur as a destination for promoting science education and conservation awareness among the students and society. Proceedings of the 29th Kerala Science Congress, Marthoma College, Thiruvalla, Pathanamthitta, 28-31 January, 2017
19. Sreejith KA, Prejith MP, Sreekumar VB and Alex CJ. 2016. First Report of forested ecosystem from paddy fields of lateritic biotope, Northern Kerala, India. National Conference on 'Forestry in India: Current Challenges and Future Prospects', Himalayan Forest Research Institute, 15-18 November, Shimla, India
20. Sreekumar VB, Sreejith KA, Sanil MS and Sasi R. 2016. Geographical Modelling for the conservation and management of two endemic and threatened dipterocarps in the Western Ghats. National Conference on 'Forestry in India: Current Challenges and Future Prospects', Himalayan Forest Research Institute, 15-18 November, Shimla, India.

Chapters in Books

1. AnithaV, Santheep KV, and Jyotsna Krishnakumar. 2017. Social and economic Implications of *Mikania micrantha* in the Kerala Western Ghats. In Carol A Ellison, Sankaran KV and Sean T. Murphy (Eds.), Invasive Alien Plants -Impacts on Development and Options for Management, CAB International Bioscience, pp.
2. Hrideek TK, Nampoothiri KUK. 2016. Millets as an integral part of nutritional diet in India. In Benjamin S (Ed.), Examining the Development, Regulation and Consumption of Functional Foods, IGI Global, United States. pp. 83-108.
3. Rao KS, Saxena KG and Chandrashekara UM. 2015. Inventory, functions and management of soil biodiversity; An overview. In Saxena KG and Rao KS (Eds.), Soil Biodiversity. Bishen Singh Mahendra Pal Singh, Dehardun, India. pp. 403-442.
4. Sivaram M and Sandeep S. 2016. Error propagation in the estimation of greenhouse gas emissions due to forestry sector. In Ed Statistics and Informatics in Agricultural Research, IASRI, New Delhi, pp. 24 -33.
5. Sujanapal P and Kunhikannan C. 2017. The Genus *Syzygium* in Western Ghats. In Nair KKN (Ed.), The Genus *Syzygium: Syzygium cumini* and Other Underutilized Species , CRC Press, Taylor & Francis group, ISBN: 978-1-4822-4972-9., pp. 15-56.
6. Sureshkumar P and Sandeep S. 2016. Secondary Nutrients in Soils and their Management. In Ed Soil Science: An Introduction, Indian Society of Soil Science, New Delhi. pp 601 - 622.

Books

Amruth M, Raghu AVand Hrideek TK 2016. Sustainable harvest of medicinal plants Published by Kerala Forest Research institute (ISBN: 81-85041-86-5), 28p

Sujanapal P and Sankaran KV. 2016. Common plants of Maldives. Food and Agriculture Organization of the United Nations, Bangkok, ISBN 978-92-5-109295-8,

Raghu AV, Hrideek TK, Amruth M, Sabik S, Thulasidas PK and Corrie BS. 2016.Teak cultivation. Published by Kerala Forest Research institute (ISBN: 81-85041-85-7), 30 p.

Documentaries and other visuals

Teak Cultivation, 12 min documentary on 'Teak Cultivation' for the farmers of Kerala. Script and Direction: Dr. Raghu AV

Sustainable harvesting of Medicinal Plants, 45 min documentary on 'Sustainable harvesting of Medicinal Plants'. Script and Direction: Dr. Raghu AV

'Kadanu Kavalal" 6 min song illustrates the importance our forests. Lyric by Dr. Raghu AV

Popular Magazine

Sajeev TV. 2016. Before breaking the big news to Pinky, Pawstrails (Online) Magazine, pp-64-69

Sajeev TV. 2017. The Other People. Pawstrails (Online) Magazine, pp-58-63

Sajeev TV. 2017. The Invasive Aliens. Pawstrails (Online) Magazine, pp-70-75

Popular articles

അതെ, വാക്കൊരൗഷധമാണ്- Mangalam Daily (March 2016)

ശാസ്ത്രംഉത്പന്നമല്ല, പ്രക്രിയആണ്. - Mathrubhumi Weekly (May 2016)

മരംനടുന്നവരോട്. -Mangalam Daily(June 2016)

പാവങ്ങളുടെപേര്പറഞ്ഞുരക്ഷപ്പെടുന്നപണക്കാർ- Mangalam Daily (October 2016)

ഇവിടുത്തെകാറ്റാണ്കാറ്റ്. -Managalam Daily (October 2016)

ENDOWMENT AWARDS

Dr. C. Chandrasekharan Memorial Endowment

Vivek Philip Cyriac, School of Biology, Indian Institute of Science Education and Research, Thiruvananthapuram and Ms. Jis Sebastian, Research Scholar, Saraswathi Narayanan College, Perungudi, Madurai Kamraj University, Madurai are the joint recipients of the Dr. C. Chandrasekharan Memorial Endowment Award 2016. The Award instituted in the memory of KFRI's first Director, Dr. C. Chandrasekharan, an expert in tropical forestry, carries a purse of Rs.40,000/-, a gold medal and certificate. The Award was handed over by the Hon'ble Justice K. Sukumaran (Retd.) who also delivered Dr. Chandrasekhara memorial lecture on 17th November 2016 at KFRI.

EXTENSION AND TRAINING ACTIVITIES

TRAINING PROGRAMMES & WORKSHOPS CONDUCTED

1. Compulsory Training Programme for Wild Life Assistants – Trainees Grade II on Forest Ecology (Dr. K. Mohanadas, Dr. KV. Mohammed Kunhi, Dr. AV. Raghu, Mr. VP. Raveendran)
2. Training Programme On Conservation, Cultivation, Utilization and Value Addition of Medicinal Plants - Odisha (Mr VP. Raveendran, Dr. AV. Raghu)
3. Environment Management (Mr. VP. Raveendran, Dr. K. Mohanadas, Dr. KV. Mohammed Kunhi, Dr. AV. Raghu)
4. Training on Nursery techniques and Seedling Production for the Prisoners in Various Prisons of Kerala (Dr. AV Raghu, Dr. M. Amruth, Dr.TK. Hrideek, Dr. PK. Thulasidas)
5. Bamboo Cultivation and Value Addition (Mr. VP. Raveendran)
6. Issues Involved in Man-Animal Conflict Strategies for Mitigation (Dr. EA. Jayson, Mr. VP. Raveendran, Dr. K. Mohanadas)
7. Eco-Cadets in Nearest Schools (Dr. K. Mohanadas, Dr. TV. Sajeev, Dr. M. Amruth)
8. Indigenous Taxonomy, Conservation Sustainability and Ayurveda Pharmacology (Mr. VP. Raveendran, Dr. AV. Raghu)
9. Bamboo Based Enterprises and Livelihood Development for the Differently Abled and Physically/Mentally Challenged Persons (Dr. KV. Mohammed Kunhi, Dr. TK. Dhamodaran, Dr. K. Mohanadas, Mr. VP. Raveendran)

10. Two day Orientation Programme on Mangrove Restoration and Management for Conservation Volunteers (Dr. KV. Mohammed Kunhi, Dr. K. Mohanadas, Dr. AV. Raghu, Mr. VP. Raveendran)
11. One-Week Compulsory Training Course on Managing Green Spaces for Urban Biodiversity and Ecosystems Services for Indian Forest Service Officers (Dr. UM. Chandrashekara).

12. Conducted a 2-day Interaction Meeting of Practitioners of Traditional Systems of Medicine at KFRI Sub Centre, Nilambur (Dr. UM. Chandrashekara).
13. Conducted Three Workshops on Medicinal Plants to the Farmers and Staff of Karnataka Forest Department at KFRI Sub Centre, Nilambur (Dr. UM. Chandrashekara).
14. Conducted Summer Training Programme for Students Through Prior Registration, in Teak Museum at KFRI Sub centre, Nilambur (Ms. Sani Lookose).
15. Conducted Teak Study Training Programme for Teacher Trainees from Various Training Institutes in Teak Museum (Ms. Sani Lookose).
16. Asia-Pacific Forest Invasive Species Network (APFISN), organized a workshop on Transboundary Cases of Forest Invasive Species Management during February, at Philippines.

EXHIBITIONS AND VISITORS

Visitors from 77 different Institutes, Departments of Non-Government Organizations and Farmers Group visited KFRI during 2016-2017. KFRI conducted 28 outreach programmes for School students, Government and Non-Government officials of Kerala and outside. The contributions of KFRI was exhibited at several places as given below

1. Sarasmela: Asramammaidanam, Kollam (Dr. KV. Mohammed Kunhi, Mr. Shaji Varghese, Mr. Akhil Gopi)
2. Agri Tech Fest 2016, Idukki (Dr. KV. Mohammed Kunhi, Mr. Shaji Varghese, Mr. Akhil Gopi)_
3. India International Science Festival 2016, IISF, New Delhi (Dr. S. Sandeep)
4. Bamboo Fest 2016, Kerala State Bamboo Mission, Marine drive, Kochi (Dr. KV. Mohammed Kunhi, Dr. AV. Raghu, Mr. Shaji Varghese, Mr. Jiby)

5. National Science Congress, NSC, Bangalore Thiruppathy (Mr. VP. Raveendran)
6. Kerala Science Congress 2017, KSCSTE & KFRI, Marthoma College Thiruvalla, Pathanamthitta, (Dr. KV. Mohammed Kunhi, Dr. KA. Sreejith, Mrs. MK. Raji, Mr. Ranjith, Ms. Anusree. MS, Mr. Shaji Varghese, Mr. Sarath Nair, Mr. Sumod, Mr. Prasad)
7. Kerala State Bio diversity Expo, Kerala State Bio diversity Board**,** Tagore Theater, Trivandrum (Dr. KV. Mohammed Kunhi, Mr. Shaji Varghese)

8. World Forestry Day Celebration 2017, Kerala Forest Research Institute Peechi (Dr. KV. Muhammed Kunhi, Mr. VP. Raveendran, Ms. Sheejakumary. S, Ms. Anusree. PS, Mr. Sabik. S, Mr. Rakesh R, Ms. Fincy Francis, Ms. Aiswarya, Smt. Padmavathy)

ACADEMIC PROGRAMMES

KFRI academics activities include Post-Doctoral, Doctoral and MSc attachment programmes. KFRI is an approved Research Centre for Forest Research Institute University, Dehradun, Cochin University for Science and Technology and Calicut University.

Doctoral Degree awarded

1. Mr. Prashanth KM. Soil and water quality as influenced by land use in Koratty, Kerala. Cochin University of Science and Technology. August 2016.
2. Ms. Sajitha KL. Identification and mass production of bacterial biocontrol against sapstain on rubberwood. Forest Research Institute, Deemed University, Dehradun, August 2016.
3. Mr. Sreejesh KK. *Carbon sequestration potential of teak plantations of Kerala*. Cochin University of Science and Technology. October 2016.
4. Ms. Kripa PK. *Bioindicators for monitoring soil and water quality in Koratty Region, Kerala*. Forest Research Institute, Deemed University, Dehradun, November 2016.

Ongoing Programmes

Start-up research grant for young Scientists

1. Dr. Sugantha Sakthivel - Ecology and patch dynamics of the endangered grizzled giant squirrel, *Ratuyamacroura dandolena* habitats in south India with special reference to its conservation (Department of Science and Technology- SERB)

Post Doctoral

1. Dr. Majesh Thomson - Evaluation of bioactive principles from entomo-fungi for insect pest management (Post Doctoral KSCSTE Fellowship)
2. Dr. Presty John - Risk assessment and development of management protocols for alien invasive ants of Kerala (Post Doctoral KSCSTE Fellowship)

Back to Lab Programme

1. Dr. Thulasi G Pillai - Isolation and characterization of fungal endophytes from certain medicinal plants and RET species in Western Ghats and their therapeutic potentials (KSCSTE Fellowship)

Doctoral Programmes

Forest Research Institute, Dehradun

1. Ms. Keerthy Vijayan - Tracking the invasion: Molecular phylogeography and phyloclimatic modelling of the giant African snail (*Achatina fulica* Bowdich) in south India.
2. Mr. Kuruvila Thomas - Forest management, population structure, carbon sequestration, litter dynamics and propagation of selected rare bamboos of Western Ghats.
3. Ms. Maneetha TK - Faunal responses to biological invasions: A case study of the giant african snail (*Achatina fulica* Bowdich) infestation in Kerala.
4. Ms. Neethu RS - Regional differences in phenotypic and phytochemical profiles of selected medicinal plants in Kerala.
5. Ms. Sijimol. K - Molecular systematics and phylogeny of the genus *Ochlandra* Thw. (Poaceae) and related genera in Western Ghats.
6. Ms. Soumya R - Ecology, phenology and social contexts of invasion by selected alien plants in Kerala.

Cochin University of Science and Technology

1. Mr. Alex CJ - Ecology of Kavvai river asin: A fragmented Landscape in Kerala.
2. Ms. Anoja Kurian - Molecular studies on rattans of south India.
3. Ms. Asheedha K - Influence of biochar on soil carbon dynamics and growth of teak seedlings (*Tectona grandis*)
4. Ms.Divya Soman - Assessment of ecosystem services from Parambikulam Tiger Reserve (KSCSTE Fellowship programme)
5. Ms.Greeshma P - Foraging ecology of birds in the kole wetlands of Thrissur, Kerala (KSCSTE Fellowship programme)
6. Ms. Kavitha C - GIS based soil fertility mapping in agro ecosystems of Thrissur District, Kerala.
7. Ms. Lathika C - Potential of urban waste compost for organic farming.
8. Ms. Renuka R - Chemistry of marshy grassland soils in forest ecosystems of southern Western Ghats, India

9. Ms. Vidhya R. Sankar - Study of the constraints in efficient micropropagation of Bamboo.
10. Ms. Vishnu PS - Pedogenesis and geochemical transformations in forest ecosystems of Western Ghats, Kerala. (KSCSTE Fellowship programme)
11. Ms. Harishma KM - Modeling carbon sequestration and its dynamics in the mangrove systems of Kerala
12. Ms. Ninu Jose - Molecular fingerprints and geochemical interaction of organo-nano composite from Forest floor humic acid in Western Ghats, Kerala.

Calicut University

1. Mr. Bharath Nair - Biocontrol potential of rhizosphere and rhizoplane fungi of grasses against certain fungal diseases of forest nursery seedlings.
2. Ms. Daisy MJ - Impact of climate change on the growth patterns of teak (*Tectona grandis* L.f.) in Western Ghats of Kerala as evidenced from dendrochronological studies.
3. Mr. Dantas K .J - Flora of Aralam Wild Life Sanctuary
4. Mr. Dhaneesh Bhasker - Diversity of beetles (Coleoptera: Insecta) and the impact of prescribed fire practices in Eravikulam National Park and Parambikulam Tiger Reserve.
5. Mr. Mohamad Anaz K - Systematic studies, utilization and conservation of the genus *Salacia* (Celastraceae) in South India.
6. Mr. Muraleekrishnan K - Studies on variability, phenology and management methods of the alien invasive tree, *Senna Spectabilis* (D.C.) Irwin & Barneby in Kerala, India.
7. Mr. Rajkumar K.P - Herpetofaunal diversity in swamp (Vayal) ecosystems in Periyar Tiger Reserve, Western Ghats.
8. Mr. Riju P - Assessment of human-wildlife conflict and mitigation measures in Malappuram District, Kerala, India.
9. Mr. Rini Vijayan - Micropropagation of selected species of *Embelia* Burm.f., characterization and *invitro* production of secondary metabolites.
10. Mr. Sanal C. Viswam - Studies on plus tree selection, variability and seed biology of *Terminalia paniculata* Roth. (Combretaceae) in Kerala part of peninsular India.
11. Mr. Sandeep Das - Ecology and Behaviour of amphibians of Eravikulam National Park, with special reference to Bush Frogs.
12. Mr. Sanil. M.S - Systematics and phylogeny of dipterocarps in the Western Ghats, India.

Post Graduate Attachment Prgrammes

Sl.No.	Name of Student	Subject
1	Ms. Jitha K.C	Environmental Sciences
2	Ms. Ruheena T.V	Environmental Sciences
3	Ms. Ashina M.A	Zoology
4	Ms. VandanaBharathi C.V	Zoology
5	Ms. Athulya P	Environmental Technology
6	Ms. Keerthana V.P	Chemistry
7	Ms. Geethu T.S	Biotechnology
8	Ms. Athira M.P	Biotechnology
9	Ms. Anitha V.A.	Biotechnology
10	Ms. Sruthi C. Madhavankutty	Biotechnology
11	Ms. Henna P. Jojo	Biotechnology
12	Ms. Amrutha K.S	Biotechnology
13	Ms. Sajana Florence Peter	Environmental Science
14	Ms. Silpa A.R	Environmental Science
15	Mr. Nikhil V.G	Environmental Science
16	Mr. Akhlesh.K.B	Environmental Science
17	Ms. Sruthi Sebastian	Environmental Science
16	Ms. Silpa P	Botany
17	Ms. Prajisha	Botany
18	Ms. Jishamol KC	Botany
19	Ms. Meera K	Microbiology
20	Ms. Hafsa M.K	Biochemistry
21	Ms. Reshma K.V	Biochemistry
22	Ms. Anjaly George	B.Sc.-M.Sc., (Integrated) Climate Change Adaptation)
23	Mr. Nidish P. Madhu	B.Sc.-M.Sc., (Integrated) Climate Change Adaptation)
24	Mr. Nirajlal K	B.Sc.-M.Sc., (Integrated) Climate Change Adaptation)
25	Mr. Sarath B	B.Sc.-M.Sc., (Integrated) Climate Change Adaptation)
26	Ms. Haneefa M.K	Microbiology
27	Ms. Sikha K.S	Microbiology
28	Ms. Nima T.G	Microbiology
29	Ms. Jamsheer K	Microbiology
30	Ms. Blaze Maria P.V	Botany
31	Ms. Snema V.R	Botany
32	Ms. Bevina T. George	Botany
33	Ms. Sreeya Francis	Botany
34	Ms. Silpa C.P	Botany
35	Ms. AmruthaVinod	Botany

Sl.No.	Name of Student	Subject
36	Ms. Delna Davis	Botany
37	Ms. Nivya .K.P	Botany
38	Ms. Donna George	Microbiology
39	Ms. Lija Gopinath	Microbiology
40	Ms. Sreedevi P.K	Microbiology
41	Ms. Midhuna M.G	Chemistry
42	Ms. Kavya Ramanujan	Chemistry
43	Ms. Sreelakshmi N	Chemistry
44	Ms. Faniya Toby	Chemistry
45	Ms. Amrutha V.S	Chemistry
46	Ms. Reshma Varghese	Chemistry
47	Ms. Ann Mariya Thomas	Chemistry
48	Ms. Ajay Johnson	Botany
49	Ms. Sreelakshmi Prakash	Environmental Science
50	Ms. AnjanaUnni	Environmental Science
51	Ms. Ayisha Abdul Khalam	Environmental Science
52	Ms. Aswathi .O.S	Environmental Science

Kerala Forest Research Institute Peechi Thrissur

(A unit of Kerala State Council for Science, Technology & Environment. Govt. of Kerala)

BALANCE SHEET AS ON 31 March 2017

Liabilities	**Sch No**	**As at 31.03.2017**	**As at 31.03.2016**	**Assets**	**Sch No**	**As at 31.03.2017**	**As at 31.03.2016**
Reserves & Surplus	I	21,02,51,747	19,65,74,632	Fixed Assets	III	17,84,84,349	16,30,08,172
Current Liabilities & Provisions	II	15,31,02,310	10,33,94,964	Current Assets	IV	29,12,51,673	19,25,14,471
Unspent balance	XI	11,29,57,017	6,34,02,527	Loans & Advances	V	65,75,050	78,49,480
Total		**47,63,11,074**	**36,33,72,123**	**total**		**47,63,11,074**	**36,33,72,123**

Kerala Forest Research Institute Peechi

(A unit of Kerala State Council for Science, Technology & Environment. Govt. of Kerala)

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH, 2017

Expenditure	**Sch No**	**Year ended 31.03.2017**	**Year ended 31.03.2016**	**Income**	**Sch No**	**Year ended 31.03.2017**	**Year ended 31.03.2016**
To Infrastructure Strengthening (Non plan)	IX	1,59,25,967	1,50,19,663	By Grant from Govt. of Kerala	VI	23,65,48,642	18,58,10,879
To Salaries and Allowances (Non plan)	X	12,51,79,054	13,16,15,607	By Other Receipts	VII	1,76,25,393	2,78,27,094
To Depreciation	III	2,32,42,564	2,14,08,337	By Depreciation Written back		2,32,42,564	2,14,08,337
To Other Project Expenses		9,20,06,912	5,77,77,200	By Income from Other Projects	VIII	9,20,06,912	5,77,77,200
To Project Expenses under plan scheme		11,30,69,014	6,70,02,703				
Total		**36,94,23,511**	**29,28,23,510**	**Total**		**36,94,23,511**	**29,28,23,510**

INSTITUTIONAL COMMITTEES

RESEARCH COUNCIL

The KFRI Research Council comprising of eminent Scientists of the country advise in matters concerning research policies and monitors the quality of research undertaken at the Institute.

Chairman

Dr.N.Krishnakumar, Director, Institite of Forest Genetics and Tree Breeding (Indian Council of Forestry Research and Education), P.B.No.1061, R.S.Puram P.O., Coimbatore – 641 002.

Members

Dr. VB.Mathur, Director, Wildlife Institute of India, Member & Ex-Officio Convener, P.O.Box.18, Chandrabani, Dehradun-248 001, Uttaranchal.

Dr. RV. Varma,
Former Chairman,
Kerala State Biodiversity Boad,
Lakshimipuram, Royal avenue,
Thrissur-680 020.

Dr. CK. Sreedharan
Retd. PCCF, Tamil Nadu
Plot No. 06, Sarvaya, Third Main Road,
River view Colony,
Manapakkam, Chennai 600125.

Additional Principal Chief Conservator of forests (Development) Forest Head Quarters, Vazhuthacaud, Thiruvananthapuram 695 014.

Dr. Madhu Verma
Professor-Environment and Developmental Economics.
Coordinator-Centre for Ecological Services Management,
Indian Institute of Forest Management.
P.O. Box 357, Nehru Nagar, Bhopal 462 003,
Madhya Pradesh.

Member & Ex-Officio Convener

Director
Kerala Forest Research Institute
Peechi – 680 653.

New Research Council in place since 29.03.2017 as per Council (M) Order No. 91/17/KSCSTE Thiruvananthapuram, Dated 29.03.2017.

Chairman

Dr. Ramesh BR, Researcher
Institut Francais de Pondicherry,
French Institute of Pondicherry,
UMIFRE 21 CNRS-MAEE

Members

Director, Institute of Genetics and Tree Breeding,
Indian Council of Forestry Research and Education, P.B.No.1061, R.S.Puram P.O.,
Coimbatore – 641 002.

Dr.C.T.S.Nair,
Former Director, KFRI & Former Executive Vice President, KSCSTE.

Prof. Dr.N. Parthasarathy,
Professor & Dean,
Sciences and School of Life Sciences
Pondicherry University, Puducherry – 605 014.

Dr. RV. Varma,
Former Chairman,
Kerala State Biodiversity Board,
Lakshmipuram, Royal Avenue,
Thrissur-680 020.

Dr. Raman Sukumar, Professor, Centre for Ecological Sciences,
Indian Institute of Science,
Bangalore – 560 012.

Member & Ex-Officio Convener

Director
Kerala Forest Research Institute,
Peechi – 680 653.

MANAGEMENT COMMITTEE

The Management Committee looks after the administrative functions of the Institute. Under the Chairmanship of Director, the Committee takes care of the proper execution of administrative rules, smooth conduct of research activities and welfare of employees.

Director, Kerala Forest Research Institute	:	Chairman
Shri. KB. Santhosh Kumar Addln. Secretary & Joint Chief Protocol Officer General Administration Departmnet Thiruvananthapuram.	:	Member
Member Secretary, Kerala State Council for Science Technology and Environment.	:	Member
The Executive Director Centre for Water Resources Development and Management, Kunnamangalam (P.O), Kozhikode.	:	Member
Dr.EA. Jayson Scientist F, Kerala Forest Research Institute	:	Member
Registrar, Kerala Forest Research Institute	:	Convener

Various programmes and activities in the Institute are implemented through the following Committees.

1. CONSULTATIVE GROUP FOR FORESTRY RESEARCH MANAGEMENT

(PROGRAMME ADVISORY GROUP)

(Vide Council (M) Order No. 45/2003/KSCSTE, Thiruvananthapuram, dated 12-11-2003 & Council (M) Order No.104/06/KSCSTE, Thiruvananthapuram, dated 15-3-2006 – Modified here).

1.	The Principal Chief Conservator of Forests & Head of Forest Forces	…	Chairman
2.	The Additional PCCF (D&P) & Disciplinary Authority	…	Member
3.	The Additional PCCF (FMIS)	…	Member
4.	The Additional PCCF (Development)	…	Member
5.	The Additional PCCF (WP&R)	…	Member
6.	The Additional PCCF (E&TW) The Additional PCCF (Administration)	…	Member
7.	The Additional PCCF(Southern Region)	…	Member
8.	The Additional PCCF (Protection)	…	Member
9.	The Additional PCCF (Vigilance)	…	Member
10.	The Additional PCCF (Northern Region)	…	Member
11.	The Additional PCCF (BDC)	…	Member
12.	The Additional PCCF (IHRD)	…	Member
13.	The Additional PCCF (SA&NO)	…	Member
14.	The Principal Chief Conservator of Forests Wildlife & Chief Wildlife Warden	…	Member
15.	The Principal Chief Conservator of Forests (Social Forestry)	…	Member
16.	The Principal Chief Conservator of Forests (Vigilance)	…	Member
17.	The Principal Chief Conservator of Forests (Dev. & PFM)	…	Member
18.	The Chief Conservator of Forests (Protection)	…	Member
19.	The Chief Conservator of Forests (FMlS)	…	Member
20.	The Chief Conservator of Forests (HRD)	…	Member
21.	The Chief Conservator of Forests (Administration)	…	Member
22.	The Chief Conservator of Forests (Vigilance)	…	Member
23.	The Chief Conservator of Forests (Social Forestry)	…	Member
24.	The Regional Chief Conservator of Forests (North)	…	Member
25.	The Regional Chief Conservator of Forests (South)	…	Member
26.	The Conservator of Forests (Biodiversity)	…	Member
27.	The Deputy Conservator of Forests (Research) North	…	Member
28.	The Deputy Conservator of Forests (Research) South	…	Member
29.	The Managing Director, Kerala Forest Development Corporation	…	Member
30.	The Associate Dean, Forestry Faculty, Kerala Agricultural	…	Member

University

31.	The Director, Tropical Botanic Garden & Research Institute, Palode	…	Member
32.	The Director, Institute of Forest Genetics & Tree Breeding, Coimbatore	…	Member
33.	The Managing Director, Oushadi, Thrissur	…	Member
34.	The Director, Center for Earth Science Studies, Thiruvananthapuram	…	Member
35.	The Director, Center for Water Resources Development and Management	…	Member
36.	The Director, Rajiv Gandhi Center for Biotechnology, Trivandrum	…	Member
37.	The Managing Director, Oushadhi, Thrissur	…	Member
38.	The Director, Medicinal Plant Research Center, Arya Vaidya Sala, Kottakkal	…	Member
39.	The Managing Director, Hindustan Newsprint Ltd., Kottayam	…	Member
40.	The Managing Director, Kerala State Wood Industries Ltd., Nilambur	…	Member
41.	The Managing Director, Kerala State Bamboo Corporation Ltd.	…	Member
42.	The Director, Salim Ali Center for Ornithology and Natural History, Coimbatore	…	Member
43.	Director, Kerala Forest Research Institute, Peechi	…	Member
44.	Joint Director (Science & Technology Promotion), KSCSTE, Trivandrum	…	Member
45.	Research Coordinator, KFRI, Peechi	…	Member
46.	All Scientists of KFRI	…	Invitees
47.	Programme Coordinator, Training & Extension Division, KFRI	…	Convener

2. <u>INTERNAL RESEARCH GROUP</u> (IRG)

(Vide Proceedings G.53/KFRI/79 dated 13 January 2009 – Modified here).

1.	Director, KFRI	…	Chairman
2.	Dr. K. Mohanadas(till retirement)/Dr. E. A. Jayson (after the retirement of Dr. Mohanadas	…	Convener
3.	Dr. V. Anitha	…	Associate Convener
4.	All scientists	…	Members

3. <u>Ph.D. RESEARCH & PG PROJECT ATTACHMENT ADVISORY COMMITTEE</u>

(Vide 6. G.53/KFRI/79 dated 6 May 2006)

1.	Dr. MP. Sujatha	…	Ph. D. Research Coordinator

& Chairman

2. Dr. TV. Sajeev … Convener
3. All Recognized Research Guides … Member

4. EQUIPMENT/ INFRASTRUCTURE DEVELOPMENT COMMITTEE

1. Dr. VB. Sreekumar … Chairman
2. Dr. T.. Hrideek … Member
3. Dr. AV. Raghu … Member
4. Smt. Anoja (Purchase In – Charge) … Convener

5. PURCHASE COMMITTEE

(Vide Council (M) Order No. 37/2003/KSCSTE Thiruvananthapuram, dated 29-10-2003)

1 Dr. TK. Dhamodaran (as Scientist F & Registrar) … Chairman
2 Dr. T V. Sajeev … Member
3 CA. K. Satheesakumar (DRF) … Convener

6. LIBRARY ADVISORY COMMITTEE

(Vide 6. G.53/KFRI/79 dated 19 July 2008)

1 Dr. E A. Jayson … Chairman
2 Dr. M. Amruth … Convener
3 Dr. KA. Sreejith … Member
4 Dr. K F. George … Member
5 Smt. N. Sarojam … Convener

7. COMPUTER, INFORMATION NETWORKING, WEBSITE, SOFTWARE & COMMUNICATION DEVELOPMENT COMMITTEE

(Vide 6. G.53/KFRI/79 dated 13 October 2008)

1 Dr. TK. Hrideek … Chairman
2 Dr. M. Amruth … Member
3 Dr. KA. Sreejith … Member
4 Smt. Ricy Eliner Varkey … Convener

8. KERALA FOREST SEED CENTRE ADVISORY COMMITTEE

(Vide Proceedings G.53/KFRI/79 dated 11 February 2004 – Modified here)

1.	Director , KFRI	…	Chairman
2.	PCCF (WP & Research), KFD	…	Member
3.	CF (Central Circle), KFD	…	Member
4.	SRO (North), KFD	…	Member
5.	SRO (South), KFD	…	Member
6.	Dr. UN. Nandakumar, HoD, Silviculture Dept, KFRI	…	Member
7.	Dr. TV. Sajeev, KFRI	…	Member
8.	Dr. VB. Sreekumar KFRI	…	Member
9.	Dr. E A. Jayson, Research Coordinator, KFRI	…	Member
10	Dr. PK. Chandrasekhara Pillai, S-i-C, KFSC	…	Convener

9**. TEAK MUSEUM AND NATURE TRAIL ADVISORY COMMITTEE**

1.	Dr. UM. Chandrasekhara	…	Chairman
2.	Dr. K V .Mohammed Kunhi	…	Member
3.	Dr. AV. Raghu	…	Member
4.	Dr. PK. Thulasidas		Member
5.	Smt. Sani Lookose, Teak Museum Curator	…	Convener

10. FINANCE COMMITTEE

1.	Director	…	Chairman
2.	Registrar	…	Ex-Officio Member
3.	Two Elective Member from the IRG	…	Member
4.	CA Satheesakumar, DRF	…	Ex-Officio Member Convener

11. GARDEN DEVELOPMENT COMMITTEE

1.	Dr. PA. Jose	…	Chairman
2.	Dr. EM. Muralidharan	…	Member
3.	Smt. Anupa Vasu	…	Member
4.	Dr. P. Sujanapal	…	Convener

12. CAMPUS DEVELOPMENT COMMITTEE

1.	Dr. TV. Sajeev	…	Chairman
2.	Smt. M. K. Raji	…	Member
3.	Shri Abdul Jaleel	…	Member
4.	Shri PI. Shereef	…	Convener
	One Representative from Research Scholars Hostel		

13. JOURNAL OF BAMBOO AND RATTAN (JBR) EDITORIAL COMMITTEE

(Vide 6. G.53/KFRI/79 dated 13 October 2008)

1.	Dr. EM. Muralidharan	…	Chief editor
2.	Dr. V. Anitha	…	Associate Editor
3.	Dr. UM. Chandrashekaa	…	Associate Editor
4.	Dr. S. Sandeep	…	Associate Editor
5.	Smt. N. Sarojam	…	Associate Editor

14. NEWSLETTER (EVERGREEN) & ANNUAL REPORT COMMITTEE

1.	Dr. V. Anitha	…	Chief Editor &Chairman
2.	Dr. M. Amruth	…	Assoc. Editor Member
3.	Dr. TK. Hrideek	…	Assoc. Editor Member
4.	CA. Satheesakumar, DRF	…	Finance Member
4.	Dr. TB. Suma	…	Assoc. Editor Member
5.	Dr. R. Jayaraj	…	Assoc. Editor & Convener

15. SPORTS COMMITTEE

1.	Dr. TK. Hrideek	…	Chairman
2.	Smt. MK. Raji	…	Member
3.	Shri. PK. Rajendran	…	Convener
4.	Representative of Project Staff		

16. SEMINAR COMMITTEE

1.	Dr. KV .Mohammed Kunhi	…	Chairman
2.	Dr. S. Shambukumar	…	Member
3.	Dr. AV. Raghu	…	Member
4.	Dr. PK. Shandrasekhara Pillai	…	Member
5.	Dr. M. Amruth	…	Convener

17. COMMITTEE FOR TRANSFORMATION OF OFFICIAL LANGUAGE TO MALAYALAM

(Vide KSCSTE letter no. 38/C6/09 dated 10 Feb. 2009)

1.	Shri Renjithkumar , DRA	…	Chairman
2.	Smt. Sherly Issac	…	Member
3.	Smt. Keerthy K	…	Member
4.	Smt. Maymol Joseph	…	Member
5.	Smt. K. Annapoorni	…	Convener

18. TRAINING & EXHIBITION ADVISORY COMMITTEE

(Vide 6. G.53/KFRI/79 dated 13 October 2008)

1.	Dr. KV. Mohammad Kunhi	…	Chairman
2.	Dr. VB. Sreekumar	…	Member
3.	Dr. AV. Raghu	…	Member
4.	Dr. PK. Thulasidas	…	Member
5.	Mr. VP. Raveendran	…	Convener

19. COMMITTEE TO PREVENT SEXUAL HARASSMENT ON WOMEN

(Vide No.1763/B6/03/KSCSTE dated 5-12-2003)

1.	Dr. MP. Sujatha	…	Chairman
2.	Dr. TB. Suma	…	Member
3.	Smt. Seetha Sadanandan (C/o Kudumbasree State Poverty Eradication Mission, Ward 16, Cheenikkadavu, Kannara, Pananchery Panchayath, Trichur Dist.)	…	Member
4.	Dr. TK. Dhamodaran	…	Member
5.	Smt. Sabitha Balakrishnan	…	Convener

20. ADVISORY COMMITTEE FOR HOSTEL (MEN'S & WOMEN'S), IGH & CAFETERIA

1.	Dr. TK. Dhamodaran (Registrar)	…	Chairman
2.	Dr. TV. Sajeev	…	Member
3.	Dr. TK. Hrideek	…	Member
4.	Smt. Anupa Vasu	…	Member

5.	Shri. PI. Shereef	…	Member
6.	Representative from the Research Scholars" Hostel	…	Member
7.	Smt. MK. Raji	…	Convener

21. BUILDING COMMITTEE

(Vide Note No. G 53/KFRI/Estt/79 dated 12 April 2010)

1.	Dr. TK. Dhamodaran	…	Chairman
2.	Dr. Mamman C.	…	Member
3.	Dy. Registrar (Accounts)	…	Member
4.	Shri. UY. John, Engineer-Convener	…	Convener

22. VEHICLE ADVISORY COMMITTEE

1.	Dr. P. Sujanapal	…	Chairman
2.	Shri. Kamalakaran, SO (Accounts)	…	Member
3.	Dr. KA. Sreejith	…	Member
4.	CA. K. Satheesakumar, DRF	…	Member
5.	Shri. PS. Sudheesh, Vehicle-in-Charge	…	Convener

23. ENDOWMENT COMMITTEE

1.	Director	…	Chairman
2.	Dr. TK. Dhamodaran	…	Member
3.	Dr. V. Anitha	…	Member
4.	Dr. Shijo Joseph	…	Member
5.	Dr. M. Amruth	…	Member
6.	Dr P. Sujanapal	…	Member
7.	Smt. K. Annapoorni	…	Member
8.	Dr. KV. Mohammed Kunji	…	Convener

24. FRC DEVELOPMENT COMMITTEE

1.	Dr. TK. Dhamodaran (Registrar)	…	Chairman
2.	Dr. V. Anitha	…	Member
3.	CA. K. Satheesakumar, DRF	…	Finance Member
4.	Dr. VB. Sreekumar	…	Member
5.	Er. Jineesh, V. C.	…	Member
6.	Dr. KV. Mohammed Kunji	…	Convener

25.BAMBUSETUM, ARBORETUM, PALMATUM, DEVELOPMENT COMMITTEE

1.	Registrar	…	Chairman
2.	Dr. VB. Sreekumar	…	Member
3.	Dr P. Sujanapal	…	Member
4.	Dr. EM. Muralidharan	…	Member
5.	Dr. Yogesh Joshi	…	Member
6.	Shri. VP. Raveendran	…	Convener

26.BAMBOO PROCESSING CENTRE DEVELOPMENT COMMITTEE

1.	Dr. TK. Dhamodaran	…	Chairman
2.	Dr. EM. Muralidharan	…	Member
3.	Er. VC. Jineesh	…	Member
4.	Dr. KV. Mohammed Kunji	…	Convener

27.ETHICS COMMITTEE

1.	Dr. Mamman Chundamannil	…	Chairman
2.	Dr. V. Anitha	…	Member
3.	Dr. M. Amruth	…	Convener

28.AUCTION & DISPOSAL COMMITTEE

1.	Registrar	…	Chairman
2.	CA. K. Satheesakumar, DRF	…	Member
3.	Institute Engineer (Shri. U. Y. John)	…	Member
4.	Dr. M. Amruth	…	Member
5.	Smt. K. Raji	…	Member
6.	Shri. P. I. Shereef	…	Member
7.	Store – in – Charge (Shri. K. P. Manoj)	…	Convener

29.STORES COMMITTEE

1.	Dr. TV. Sajeev	…	Chairman
2.	Dr. TK. Hrideek	…	Member
3.	Dr. VB. Sreekumar	…	Member
4.	Shri. KP. Manoj	…	Convener

STAFF LIST

Sl.No	Name	Designation	DOJ
SCIENTIFIC STAFF			
1	Dr. P.G Latha	Director (Additional Charge)	22-02-2015
2	Dr. George Varghese	Director (Additional Charge)	07-01-2016
3	Dr. S. Pradeep Kumar	Director (Additional Charge)	18-08-2016
4	Dr.Bransdon Corrie,IFS	Director	09-11-2016
RESEARCH MONITORING & EVALUATION UNIT			
5	Dr.EA.Jayson	Senior Principal Scientist	16-12-1981
SUSTAINABLE FOREST MANAGEMENT			
6	Dr. UN Nandakumar	Senior Principal Scientist	23-03-1983
7	Dr. MP Sujatha	Principal Scientist	11-12-1987
8	Dr. Ap. Sujanapal	Scientist-B	09-12-2010
9	Dr. S. Sandeep	Scientist-B	09-03-2011
10	Dr.P.K.Chandrasekhara Pillai	Scientist	18-10-1983
FOREST GENETICS & BIOTECHNOLOGY			
11	Dr.EM.Muraleedharan	Principal Scientist	27-05-1991
12	Dr.Suma Arun Dev	Scientist-B	08-12-2010
13	Dr. TK. Hrideek	Scientist-B	08-12-2010
FOREST ECOLOGY AND BIODIVERSITY CONSERVATION			
14	Dr. UM. Chandrashekara, Scientist i/c, KFRI Sub Centre, Nilambur	Principal Scientist	15-07-1992
15	Dr. PA. Jose	Senior Scientist	18-10-2014
16	Dr.Yogesh Joshi	Senior Scientist (Resigned ……..)	15-03-2016
17	Dr. VB. Sreekumar	Scientist-B	01-03-2011
18	Dr. KA. Sreejith	Scientist-B	01-03-2011
19	Dr. R. Jayaraj	Scientist-B	28-03-2011
FOREST HEALTH			
20	Dr. TV. Sajeev	Senior Scientist	06-02-1997
21	Dr. Shambu Kumar	Senior Scientist	29-02-2016
22	Dr. GE. Mallikarjunana Swamy	Scientist-B	20-12-2010
WOOD SCIENCE & TECHNOLOGY			
23	Dr.PK. Thulasidas	Scientist	28-06-1984
FORESTRY AND HUMAN DIMENSIONS			
24	Dr.Mammen Chundamannil,	Senior Principal Scientist (Superannuated on 28-02-2017)	29-05-1982
25	Dr.V. Anitha	Senior Scientist	07-09-1998
26	Dr. M. Amruth	Scientist-B	01-03-2011
FOREST MANAGEMENT INFORMATION SYSTEM			
27	Dr. Shijo Joseph	Senior Scientist	26-02-2016

Sl.No	Name	Designation	DOJ
EXTENSION & TRAINING			
28	Dr.K.Mohanadas, Head, Extension Dept.	Senior Principal Scientist (Superannuated on 31-08-2016)	01-06-1982
29	Shri.VP. Raveendran	Scientist	25-02-1993
30	Dr. KV.Muhammed Kunhi	Senior Scientist	24-10-1994
31	Smt. Sani Lookose, Curator, Teak Museum, KFRI Sub Centre, Nilambur	Scientist -Teak Museum Curator	07-08-2002
32	Dr. AV. Raghu	Scientist-B	07-12-2010
LIBRARY & INFORMATION			
33	Smt. N. Sarojam, Librarian	Scientist, Librarian i/c	06-07-1981
34	Dr. KF. George	Scientist	23-12-1994
ADMINISTATIVE STAFF			
1	Dr. TK.Dhamodaran,	Registrar i/c & Chief Scientist, Head, Wood Science & Technology Dept.	02-08-1982
2	Shri. K. Venugopal	Dy.Registrar Admin	27-05-2008
3	Shri. K. Satheesakumar	Dy.Registrar Accounts & Registrar ic	20-12-2013
4	Shri. Ranjithkumar	Dy. Registrar Admin	04-06-2014
5	Shri. Madhusudhanan Pillai	Dy. Registrar Admin (Deputation from Secretariat) Relived on 05-01-17	20-06-2016
6	Shri. Ameer C A	Dy. Registrar Admin (Deputation from Secretariat) Relived on28-02-17	10-01-2017
7	Smt. Sabitha Balakrishnan	Asst. Registrar	03-09-1999
8	Smt. Shirly Issac	Section Officer	16-09-2003
9	Shri. K.Kamalakaran	Section Officer	10-12-2009
10	Smt. K. Annapoorni	P A to Registrar	12-07-1982
11	Smt. Grace Andrews	PA to Director	27-01-1987
12	Shri. VS. Krishnanunni	Assistant	28-08-2010
13	Smt. CK. Sindhumol	Assistant	19-08-2010
14	Smt. P. Anupa Vasu	Assistant	01-10-2011
15	Smt.Anuja Prasannan	Assistant	17-10-2011
16	Smt. K. Keerthy	Assistant	06-01-2012
17	Smt. Maymol Joseph	Assistant	16-08-2011
18	Shri. TM. Abdul Vahab	Spl.Gr.Word Processing Assistant	27-01-1989
19	Shri. PS. Sudeesh	Assistant	16-09-2015
20	Shri. KP.Manoj	Office Superintendent	28-08-1992
21	Shri. P.Rajeesh	Typist	14-06-2000
22	Smt. C.Rugmini	Typist	29-05-2012
23	Shri .PV. Santhosh Kumar	Typist	29-05-2012
24	Smt. PK. Sugadha Devi	Typist	02-02-2016
25	Shri K Mohammed Habeebulla	Typist/Data Entry Operator (deputation from JNTBGRI)	01-03-2016

Sl.No	Name	Designation	DOJ
26	Shri. TC.Paul	Spl.Gr.Driver	01-07-1994
27	Shri. PK.Rajendran	Driver	09-01-2009
28	Shri. EO.Mathai	Driver	09-01-2009
29	Shri. C H. Herald Wilson	Driver	24-02-2012
30	Shri.K. Krishnadasan	DriveR	29-05-2012
31	Smt. K. Aparna	Clerical Assistant	23-08-2004
32	Shri. MC. Mohandas	Senior Attendant	24-10-1977
33	Shri. TP. Padmanabhan	Spl.Gr.Cook Cum Attendent (Superannuated on 30-06-2016)	17-12-1991
34	Smt. N. Baby	Attendant	24-11-1995
35	Smt. KK. Vanaja	Office Attendant	26-08-2003
36	Smt. AM. Lalitha	Office Attendant	01-08-1986
37	Smt. TG. Chandrika	Office Attendant	01-03-1988
38	Shri. VK. Mohandas	Office Attendant	01-01-1992
39	Shri. NI. Thankappan	Office Attendant	01-01-1992
40	Shri. EP. Ulahannan	Office Attendant	01-01-1992
41	Shri. CP. Shoukathali	Helper Gr.III	01-03-1988
42	Shri. K. Mohammed	Helper Gr.III	01-01-1992
43	Shri. KK. Mohammed	Helper Gr.III	05-07-1994
44	Smt. P. Deepa	Office Attendant	06-08-2009
45	Shri. IO.Thomas	Helper	01-12-2009
46	Shri. TP.Valsan	Helper	11-06-2010
47	Shri. AV.Chamy	Helper	27-10-2010
48	Smt. S. Ashamole	Office Attendant	19-08-2010
49	Shri. E. Hamsa	Office Attendant	19-Aug-10
50	Shri. K. Abdul Jaleel	Office Attendant	16-08-2010
51	Smt. C. Sujatha	Office Attendant	21-08-2010
52	Shri.T S. Prakash	Helper	29-05-2012
53	Shri.MS. Santhosh Kumar	Helper	29-05-2012
54	Shri. N. Rajan	Helper	29-05-2012
55	Shri. T O. Simon	Helper	29-05-2012
56	Shri. C P. Ummer	Helper	29-05-2012
57	Smt. PS. Kadeeja	Helper	29-05-2012
58	Smt. V L. Alphonsa	Helper	29-05-2012
59	Shri. MK. Suresh	Helper	29-05-2012
60	Shri. KA. Thankachan	Helper	29-05-2012
61	Shri. CB. Sajy	Helper	29-05-2012
62	Shri. T P. John	Helper	29-05-2012
63	Shri. NK. Rajan	Nuresry Man	31-07-2007
64	Smt. S. Padmavathy	Nuresry Man	27-09-2008
65	Shri. K. Rajan	Nursery Man	29-09-2008

Sl.No	Name	Designation	DOJ
TECHNICAL STAFF			
1	Shri. UY. .John	Sr. Special Grade Technical Officer	09-01-1981
2	Shri. MR. Anilkumar	Sr.Special Grade Technical Assistant	30-01-1989
3	Shri. PB. Sajeeva Rao	Sr.Special Grade Technical Assistant	30-01-1989
4	Shri. PI. Shereef	Technical Officer (Electrical)	10-08-2010
5	Smt. MK. Raji	Technical Officer (Civil)	18-08-2010
6	Smt.Ricy Eliner Varkey	Technical officer	01-03-2006
7	Shri. VC. Jinesh	Technical Officer	04-07-2014
8	Shri. OP Ranjith	Technical Assistant (Binder)	03-10-2011


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