INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION, DEHRADUN

(AN AUTONOMOUS COUNCIL OF MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE, GOVERNMENT OF INDIA)

ANNUAL REPORT 2018-19

ANNUAL Report [2018-19]

INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION

(An Autonomous Council of Ministry of Environment, Forest and Climate Change, Government of India)

DEHRADUN (UTTARAKHAND)

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प्रकाश जावडेकर
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सत्यमेव जयते

मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय,
सूचना एवं प्रसारण मंत्रालय
भारत सरकार
Minister
Ministry of Environment, Forest & Climate Change,
Ministry of Information and Broadcasting
Government of India

MESSAGE

Forests are essential for survival and sustenance of humans on this planet. It is not only our prime duty but also the call of the hour to conserve, maintain and enhance the forests. This multifaceted vital task has progressed adequately in the hands of competent foresters and scientists of Indian Council of Forestry Research and Education, an autonomous body of Ministry of Environment, Forest and Climate Change.

The Council publishes its significant achievements in the form of annual reports. This report also, is a document which provides glimpses of research, extension and education activities of the Council during the year. I am pleased to know that ICFRE has very well advanced in the programmes of capacity building of unemployed youth through the Green Skill Development Programmes. The Council with a view to instill the awareness towards forests and environment has rightly initiated an innovative scientist - student connect programme for school children. This is going to make a great difference in future as we are nurturing environment conscious generation. Further, I am happy to state that the Council has earned a Guinness World Records for maximum number of persons extracting DNA simultaneously using ArborEasy™ DNA Isolation Kit.

In addition, the Council's work on preservation of heritage sites and also on the work of providing consultancies through their expertise in developmental sectors viz. river valley and hydroelectric projects, mining of minerals including open cast and thermal power plants has been very good. It has also played a lead role in developing Detailed Project Reports (DPRs) for rejuvenation of major river systems of the country.

The Council is also instrumental in developing REDD+ Strategies that will help the nation in achieving national and international commitments by way of signing MoUs with different organizations.

I am confident that ICFRE Annual Report 2018-19 will provide useful information for formulation of future policies and planning for sustainable growth in the field of forestry.

Date 28.08.2019

(Prakash Javadekar)

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बाबुल सुप्रियो
Babul Supriyo

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स्वच्छ भारत
एक कदम स्वच्छता की ओर

केन्द्रीय राज्य मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
भारत सरकार
Union Minister of State
Ministry of Environment, Forest & Climate Change,
Government of India

MESSAGE

The Annual Report 2018-19 of the Indian Council of Forestry Research & Education (ICFRE), Dehradun, an autonomous body of Ministry of Environment, Forest and Climate Change, New Delhi is an account of activities of the Council that elaborates the immaculate efforts of its officers and scientists.

I am happy to see in present volume some outstanding research achievements like **wood welding** for constructing wood joints without using nails and adhesives, flexible and biodegradable **transparent wood** from poplar, preparation of **High density briquettes** from invasive weeds, **Casuarina Yield Calculator Utility Software** (CYCUS v1.0) for assessing the yield potential of farmers' plantations, **Home Garden Kit** and a A **Mobile App** on "Forest Disease Management in Nurseries and Plantations" which provides an insight to the arduous research efforts put in by the personnel of the Council.

It is pleasing to see that ICFRE is assertively functioning on the extension of its outcomes not only by traditional methods of workshops, seminars, symposia, fairs etc. it has also envisioned new innovative programmes. One such initiative is *Prakriti*, a scientist – student connect programme under which over 6639 students and staff belonging to 28 KVs & 12 JNVs situated in different parts of the country have been sensitized through 35 programmes spreading over 39 days. In another initiative of the MoEF&CC the ICFRE also successfully conducted 21 training programmes under Green Skill Development Programme (GSDP) and trained around 390 candidates.

In the coming year, I am sure ICFRE will continue to be the driver of forest research excellence. I commend ICFRE for its ongoing efforts to contribute towards the development of this great nation of ours.

(***Babul Supriyo***)

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SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

सत्यमेव जयते

सी.के.मिश्रा
C.K.Mishra

MESSAGE

Forests are precious resources of the country which have to be handed over to posterity in a better state than what we inherited. Part of this colossal responsibility is aptly being handled by Indian Council of Forestry Research & Education (ICFRE), Dehradun through conceptualizing futuristic strategies, developing green technologies and creating awareness towards conservation of forests and environment.

The achievements of the Council are presented in its Annual Report in a concise way. During the year 2018-19 the Council come up with a number of new initiatives including *Prakriti*, a scientist - student connect programme, to sensitize our students towards environment and forests and develop scientific temperament in them. Green Skill Development Programme (GSDP) an initiative of the Ministry of Environment, Forest and Climate Change, New Delhi is another such programme which was well taken by the ICFRE through its ENVIS centres. The programme was successfully conducted by organizing 21 trainings in 13 subject areas through ICFRE Institutes across the country.

The Council, as evident from the report, is mainly focusing in the field of conservation of forest genetic resources, biodiversity conservation, ecosystem conservation and management, improving forest productivity, developing REDD+ Strategies, developing green products, providing consultancies for rehabilitation of mined areas and preparing reclamation and rehabilitation plans. ICFRE is also striving to improve forestry education through accreditation of universities imparting forestry education and developing collaborative network for scientific exchange with institutions of repute at regional, national and international level.

I congratulate team ICFRE for their commendable work reflected in the present edition of the Annual Report which provides a panoramic view of vibrant activities performed during the year.

Dated: 14th August, 2019
Place: New Delhi

(C.K. Mishra)

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MESSAGE

सि ान्त दास
SIDDHANTA DAS

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वन महानिदेशक एवं विशेष सचिव
भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
DIRECTOR GENERAL OF FOREST & SPL. SECY.
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

MESSAGE

Forests play a critical role in maintaining the delicate balance in the eco-system. Unless the forests are conserved in the forms those have been created, the very existence of living entities of the world will be at stake. The Indian Council of Forestry Research and Education, an autonomous body of Ministry of Environment, Forest and Climate Change has developed an appropriate strategy to fine tune its research programmes to help conservation efforts in various phyto-geographical zones of the country.

Keeping in view contemporary challenges in the field of forestry research and recent developments in the National priorities and International commitments the Council reworked its vision, mission and objectives maintaining spirit of its mandate.

In the national efforts to accelerate much-needed growth in the forestry sector, as in the past, the Council continues to remain a committed partner and has released five productive clones of *Casuarina junghuhniana* (Jungli saru) suitable for windbreak agroforestry system, developed Eucalyptus varieties with improved productivity in areas affected by salt stress, study on hidden defects (hollowness and multiple cracks) detection technique in standing trees using ultrasonic waves, prepared Pest Calendar for endusers etc.

The Council's commitment to create awareness towards forests and environment has now got a new dimension through a futuristic initiative ***Prakriti*** - A scientist – student connect programme- where students are being sensitized about the environment, forest and forestry research and are being involved in green activities to become environment conscious citizens. **Green Skill Development Programme (GSDP)** is another innovative initiative of ICFRE which targets youth across the country to build competence and capacity for green employment.

The task of "Preparation of Detailed Project Report (DPR) for Rejuvenation of thirteen major Indian Rivers through Forestry Interventions" has been entrusted to ICFRE by MoEF&CC, New Delhi considering the Council's earlier success in preparation of DPR for rejuvenation of river Ganga.

I am glad that ICFRE has developed appropriate synergy for utilizing its resources to its hilt and would like to congratulate the team ICFRE for its commitment and hardwork. I wish ICFRE success in all its endeavours.

(Siddhanta Das)

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Government of India
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FOREWORD

Forestry research has the power to decide the course of our forest in India. The Indian Council of Forestry Research and Education (ICFRE), as the national apex organization for forestry research and education in India, is strongly emphasizing and striving for the holistic development at the national level through planning, promoting, conducting and coordinating research, education, extension and training on all aspects of forestry.

This has been a momentous year for ICFRE in its entirety. Ministry of Environment, Forest and Climate Change, Government of India had assigned the task regarding 'Institutionalization of technical aspects of REDD+ in India'. Accordingly, ICFRE prepared and published National REDD+ Strategy 2018. National REDD+ Strategy has been further submitted by the Ministry to the United Nations Framework Convention on Climate Change (UNFCCC).

A notable accomplishment that speaks of ICFRE's efforts for development and delivery of appropriate technological interventions has been the release of 30 high-yielding clones of Casuarina and Eucalyptus with desirable characters like superior growth, stem form, high pulp yield and tolerance to drought and pests. Clones have also been developed for cultivation in specific environments like windbreak agroforestry system and sodic soils. These new clones have become popular among the farmers, industries and forest development corporations. It is heartening to note that the intellectual property of the new clones is protected in favour of ICFRE. Clonal developmental programmes of ICFRE for Acacia, Calophyllum, Gmelina, Melia, Pongamia, Teak and Thespesia are also in various stages of implementation

I am happy to learn that recently three testing laboratories of Institute of Wood Science and Technology, Bengaluru have been granted National Accreditation Board for Testing and Calibration Laboratories (NABL) accreditation for two years. A flexible and biodegradable transparent wood has been fabricated using poplar wood veneer and also developed nanocellulose networked natural fibers (Jute, arecanut, banana, wood) composite material.

To bring an awareness among the young generation about the environment and forest, ICFRE has entered into MoUs with Kendriya Vidyalaya Sangathan (KVS) and Navodaya Vidyalaya Samiti (NVS) and "Prakriti" – A scientist - student connect programme was envisaged accordingly. This programme is now operational across the ICFRE institutes throughout the country. The activities include visit of students and teachers to ICFRE institutes for sensitization about the general functioning of the institute and exposure to the laboratories, models and other exhibits. Interactive programmes, exposure visits, screening of short documentaries and some practical hands on plantings etc. through active participation of students have been done successfully.

ICFRE has also entered into MoUs with Indian Institute of Forest Management (IIFM), Bhopal; MoEF&CC, New Delhi; University of British Columbia Canada; Green Initiatives Certification and Inspection Agency (GICIA), Noida; Indian Council of Agricultural Research, New Delhi; Technology Information, Forecasting & Assessment Council (TIFAC), New Delhi and Zoological Survey of India (ZSI), Kolkata.

Then in line with the Skill India Mission of Hon'ble Prime Minister, ICFRE has taken up an initiative on the behest of MoEF&CC, New Delhi for skill development in the environment and forest sector to enable India's youth to get gainful employment and/or self-employment, called the Green Skill Development Programme (GSDP). The GSDP training programmes are tailored to suit the specific needs with more emphasis on practical skills. A total of 390 candidates have been successfully trained under 21 Green Skill Development Programmes at different ICFRE institutes.

Realizing the vital importance of a visionary approach to planning process, the Council organised National Research Conference, Silviculture conference, three Regional Research conferences. And also regularly organizes periodical seminars in all its nine Institutes to discuss research status for improving the quality of research and its extension, an opportunity to share knowledge, ideas and provide an in depth analysis of themes as well future research directions for ICFRE.

The Council has given its services not only nationally but internationally by actively involving in conservation of heritage, urban and important trees such as 'Bodhi Vriksha' at Bodh Gaya, Bihar, Ta Prohm temple trees in Cambodia, 'Vat Vriksha' at Jyotisar Kurukshetra, Harayana, trees at Tollygunj, West Bengal and Rastrapati Bhavan, New Delhi. Further, ICFRE is also providing consultancies in three developmental sectors viz. river valley and hydroelectric projects, mining of minerals including open cast and thermal power plants through its nine consultancy projects.

ICFRE and its institutes have been successful in developing a variety of new products like Casuarina Yield Calculator Utility Software (CYCUS v1.0) to facilitate the farmer and other user agencies in yield estimation, Growth boosters for high yielding varieties, a product “Tara red” a natural colourant for food and industries, Home Garden Kit with eco-friendly cloth bag and potting mixture with waste, bio-boosters and biofertilisers for livelihood support.

I compliment ICFRE for its worthy contributions in Research and Development and hope that the information presented in the Annual Report 2018-19 will serve as a knowledge resource for all those keen in forests. I hope the forestry policy makers and planners will also find it useful.

(Dr. Suresh Gairola)

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   Director
   Wildlife Institute of India
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    Bhopal – 462 003 (M.P.)

11. **Shri Omkar Singh**
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    Indira Gandhi National Forest Academy
    P.O. New Forest
    Dehradun – 248 006

12. **Dr. Subhash Ashutosh**
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    Kaulagarh Road
    Dehradun

13. **The Secretary to the Government of India**
    Department of Science and Technology
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CONTENTS

OVERVIEW

OVERVIEW

The annual report for the year 2018-19 is divided into 5 chapters namely Introduction, Research Highlights, Education Vistas, Extension Panorama and Administration & Information Technology.

The overall allotted budget for current financial year 2018-19 was Rs. 220.9 Crore and expenditure was Rs. 212.71 Crore for ICFRE.

In addition to the above, financial assistance for externally aided project was Rs. 52.83 Crore.

- **Plan**
  - Completed Projects 43
  - Ongoing Projects 124
  - New Projects Initiated During the Year 24

- **Externally Aided**
  - Completed Projects 32
  - Ongoing Projects 98
  - New Projects Initiated During the Year 61

Climate Change

Biomass equations were developed for five common species of bamboo of Mizoram by ICFRE. A report is published on one study which is also available on the ICFRE website.

Studies were conducted on carbon dioxide emission from the soils under different forest covers in Uttarakhand. The result shows that promoting soil carbon sequestration is an effective strategy for reducing atmospheric CO_2 and improving soil quality.

ICFRE was nominated by MoEF & CC, New Delhi for preparing the National REDD+ Strategy 2018 which was submitted by the Ministry to the United Nations Framework Convention on Climate Change (UNFCCC).

Also prepared the action plan for State REDD+ for Mizoram and Uttarakhand.

Ecology and Environment

Information on the existing fodder species and requirement of local people in the villages were recorded and analytical protocols for estimation of total carbohydrates, proteins, fats, ash and fibres were standardized for establishment of community fodder banks in forest fringe villages in Uttarakhand and Himachal Pradesh.

Visitor Carrying Capacity of Kuruva Island, Wayanad, Kerala was assessed based on the draft guidelines provided by the MoEF & CC, Govt. of India for ecotourism in and around protected areas. The study recommended that 1150 visitors may be allowed on daily basis to visit the island during the season.

Countrywide assessment of carbon under Agriculture, Forestry and other Land Uses (AFOLU) was undertaken in Nagaland and Upper Assam. Among the various forest types assessed SOC stock ranges from 35.8 t ha^{-1} to 105.8 t ha^{-1} in Naga hill wet temperate forest. While the SOC stock ranges from 25.2 t ha^{-1} to 44.3 t ha^{-1} in Assam valley tropical wet evergreen forest.

Studies conducted on impact of nutrient loading from droppings of nesting migratory waterfowl in the wetland ecosystem of Nelapattu bird sanctuary, Andhra Pradesh revealed that the pond water becomes slightly acidic during winter season due to high population of migratory birds droppings. This makes the water excessively nutrient rich. The growth of lettuce in this nutrient rich water hampers the growth of algae, the main food of fish and also hinders the growth of insects and other zooplanktons which in turn reduce the availability of food for nesting birds.

ICFRE was entrusted with the task of "Preparation of Detailed Project Report (DPR) for Rejuvenation of thirteen major Indian Rivers through Forestry Interventions" in March 2019 by MoEF & CC, New Delhi. The thirteen major rivers belonging to nine river systems i.e. Indus, Ganga, Mahanadi, Godavari, Krishna, Cauvery, Luni, Narmada and Brahmaputra are being covered under this study.

Hydrology

Impact of forest covers change on regulating stream flows of the Narmada river basin using macro scale hydrological model was studied. Due to decreased forest area, surface runoff increased during the decade 1985-1995 and 1995-2005 compared to that of earlier dacades.

Tribal and Traditional Knowledge

Traditional knowledge of *Karbi* tribe of Assam that is using various plants in curing over a dozen different diseases was documented. The knowledge of different *Karbi* crafts like *Hagmar Jong* (a basket), *Bai buk* (garbage tray) along with *Karbi* drink 'Hor-lang' was also documented.

In another study biodiversity of Satpura region with special reference to dependencies of tribals was assessed and a status report on insect, edible fungi and NTFPs were documented.

Advances in Forest Biotechnology

Under studies on micro-propagation of rare and endangered species of orchids and their re-introduction in wild**,** protocol for *in vitro* seedling production of five different orchid species of Mizoram viz., *Dendrobium primulinum*, *D. transparens*, *Aerides odorata, Renanthera imschootiana* and *Cymbidium aloifolium* was developed.

Guinness World Record was created on "Maximum people conducting a DNA isolation experiment simultaneously" at India International Science Festival (IISF), 2018 held at Lucknow from 5 to 8 October 2018 using ArborEasy® DNA Isolation Kit developed by IFGTB. Five hundred and fifty students isolated DNA from banana in 61 minutes breaking the earlier record of 302 students established by Seattle Children's Research Institute, USA.

Tree Health Management

An extensive study has been completed on hidden defects (hollowness and multiple cracks) detection technique in standing trees using ultrasonic waves.

This technique is of prime importance to forest managers for prescribing silvicultural treatment and maintaining healthy forest. It is also important to the industries in terms of making accurate quality assessment which directly affects the production of wood.

Insect pests' spectrum of trees planted outside forests by farmers in different agro-climatic zones of Tamil Nadu was documented. Suitable management measures with a special emphasis on plant based chemicals like combinations of neem oil, pungam oil, Adhatoda and tobacco leaf extract were developed and standardized for the key pests. To the benefits of end users a Pest Calendar was also prepared.

Technical advice was provided for the upkeep and maintenance of holy Bodhi tree, heritage Pipal tree at village Main, Bellaganj and Vat Vriksha at Jyotisar Tirth and three holy saplings at Patna.

Improving Productivity– Tree Improvement

IFGTB, Coimbatore released five productive clones of *Casuarina junghuhniana* (Jungli saru) suitable for windbreak agroforestry system. The microclimatic condition of windbreaks was found more effective in reducing direct water loss from the soil, improves water conservation and allows the crop to make better use of available moisture over the course of a growing season.

Wood welding, a new technique to our country was developed for wood joints without using nails and adhesives making them more natural and chemical free. A wood welding machine has also been designed and fabricated at FRI, Dehradun.

A flexible and biodegradable **transparent wood** has been fabricated using poplar wood veneer and water soluble polymer - polyvinyl alcohol.

Protocol standardization for microchip based e-protection system for valuable trees has been carried out. Development of protocol for microchip based **e-protection** system for sandalwood trees would help to conserve and enhance the status of these precious bio-resources of the country.

High density briquettes were successfully prepared using invasive forest weeds, *Lantana camara* (lantana) and *Prosopis juliflora* (Ballari Jalli) biomass using an industrial briquetting machine. The briquettes produced from *Lantana camara* and *Prosopis Juliflora* were found to have high energy density. Low ash content (<2%) present in the briquettes give an added advantage. Trainings were given to local briquette making industries, Karnataka Forest Department officials and villagers.

New Products/ Applications for Livelihood Support

Casuarina Yield Calculator Utility Software (CYCUS v1.0) has been developed to facilitate the farmers and other user agencies in yield estimation which requires only observations on girth of 100 sample trees per acre of plantation. This software will be very useful to the casuarina growers for assessing the yield potential of their plantations and to transact the sale of trees at the time of harvest.

Home Garden Kit was developed by IFGTB and released during the Inventor-User Meet on 1 October 2018. The home garden kit consists of an eco-friendly cloth bag carrying Tree rich biobooster (an organic potting mixture developed from waste), *Tulsi* sapling (medicinal plant); Sorgamaram (vastu tree) sapling; *Bhendi* sapling; *Bhendi* seeds, organic insecticide along with 'user manual'.

A Mobile App on "Forest Disease Management in Nurseries and Plantations" was developed by IFGTB.

Extension

Prakriti, a scientist – student connect programme, was envisaged for creating awareness amongst the students and accordingly ICFRE entered into MoUs with Kendriya Vidyalaya Sangathan (KVS) and Navodaya Vidyalaya Samiti (NVS). The programme is now operational across the ICFRE institutes throughout the country. Over 6600 students and staff belonging to 28 KVs & 12 JNVs situated in different parts of the country have been sensitized through various programmes spreading over 39 days.

Green Skill Development Programme (GSDP), a programme targeting school and college dropouts across the country through expertise available at ICFRE institutions irrespective of age or profession. Under Green Skill Development Programme (GSDP) for the year 2018-19 ICFRE institutes across the country conducted 21 training programmes under 7 themes for 390 candidates.

IFGTB, Coimbatore organized **Tree Growers Mela** on 13 February 2019 at A.S. Mahal, Tiruvannamalai under the theme "Smart Cultivation for Increasing Farm Income and Green Cover", in collaboration with Tiruvannamalai Forest Division, Tamil Nadu Forest Department.

A bamboo nursery having 20 bamboo species was established in the **Rashtrapati Bhawan,** New Delhi with financial support of the National Bamboo Mission, Ministry of Agriculture & Farmers Welfare, Govt. of India and technical assistance of Forest Research Institute, Dehradun. The nursery was inaugurated by **Hon'ble President of India Shri Ram Nath Kovind** on 16 July 2018.

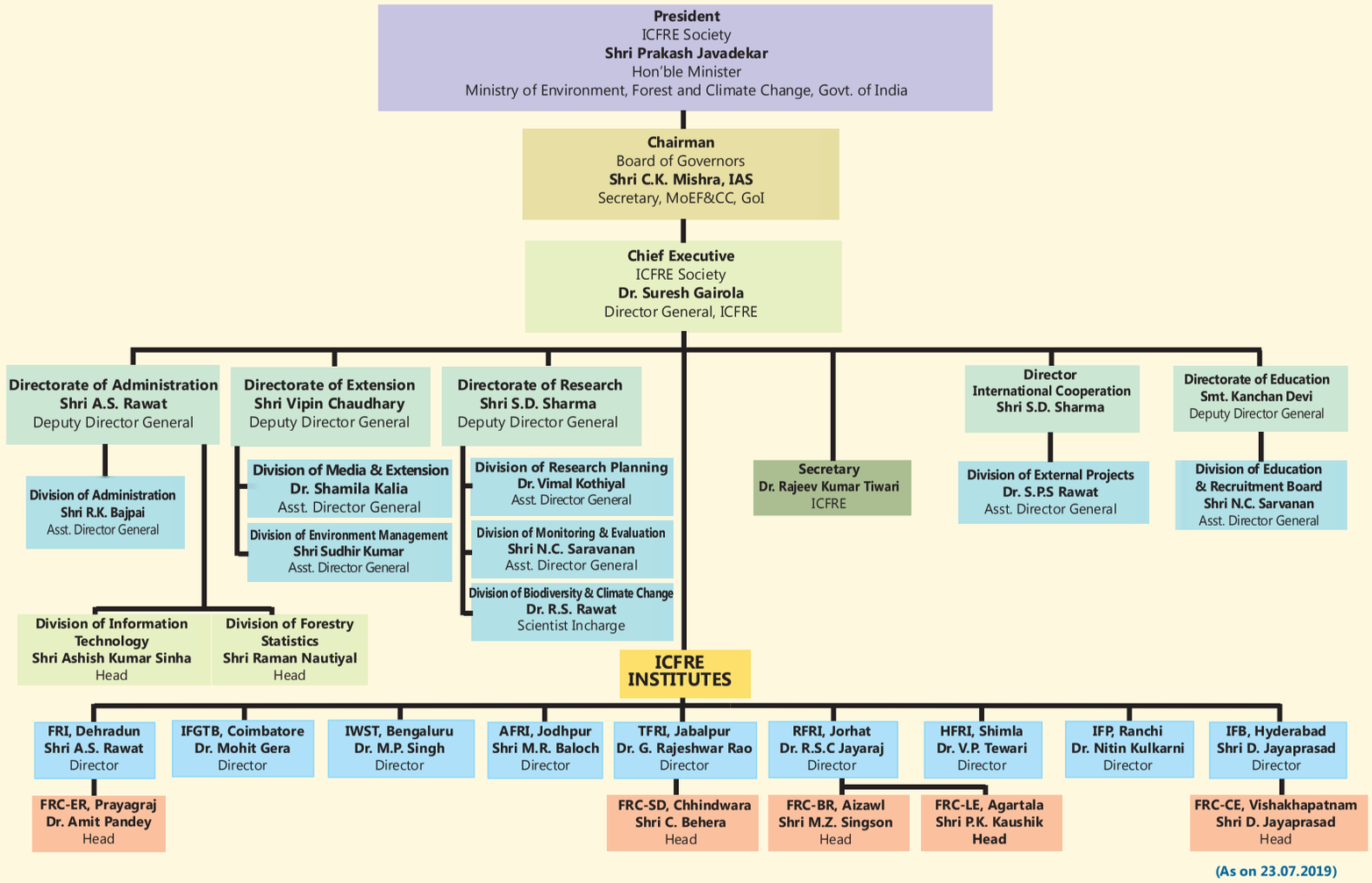
A new *"Extension Strategy and Extension Action Plan for ICFRE 2018-2023"* having essence of earlier strategies along with new initiatives is formulated incorporating the inputs from the ICFRE institutes.

Seminars/ Conferences organized

Periodical seminars/conferences were organized in the institutes to discuss research status on identified topics which are important for improving the quality of research and its extension. This includes,

- Ist National Research Conference (NRC)- "Towards Resilient Ecosystems: The Role of Forestry Research" on 8 and 9 May 2018 at IFGTB, Coimbatore (Tamil Nadu).
- 14th Silviculture Conference- Forest and Sustainability: Securing a Common Future was held from 3 to 5 December 2018 at IWST, Bengaluru (Karnataka).
- Three Regional Research Conference (RRCs) were held at HFRI, Shimla (H.P.); IFP, Ranchi (Jharkhand) and RFRI, Jorhat (Assam).

Organizational Structure of ICFRE Society



(As on 23.07.2019)

INTRODUCTION

CHAPTER

25th Annual General Meeting of ICFRE Society

Introduction

Indian Council of Forestry Research and Education (ICFRE) is an autonomous organization under the Ministry of Environment, Forest and Climate Change (MoEF & CC), Government of India. The Hon'ble Minister of Environment, Forest and Climate Change is the President of ICFRE society and the Director General is its Chief Executive. The General Body is the supreme authority of the ICFRE, headed by the Union Minister, Environment, Forest and Climate Change, Government of India. Its members consist of serving and retired officers from various state governments, educational institutes, and scientific organizations.

In the light of contemporary developments in the field of forestry research and recent developments in the National and International scenario the National priority and International commitments have changed, therefore, it was desired to reframe the vision, mission and also objectives of ICFRE. The same was approved by BoG in its 56th meeting held on 15 October 2018. The new vision, mission and objectives of ICFRE are as follows:

Vision

To achieve long-term ecological stability, sustainable development and economic security through conservation and scientific management of forest ecosystems.

Mission

To generate, advance and disseminate scientific knowledge and technologies for ecological security, improved productivity, livelihoods enhancement and sustainable use of forest resources through forestry research and education.

ICFRE - National Presence

Objectives

i. To undertake, aid, promote and coordinate forestry research, education and extension leading to scientific and sustainable management of forest resources in the country.

ii. To align forestry research programs in the council with national priorities including achievement of Sustainable Development Goals and combating climate change.

iii. To provide scientific advice and policy support to the central and state governments aiding informed decision making in forestry matters of national importance and international commitments.

iv. To act as a repository of scientific knowledge related to forestry, environment and climate change, and disseminate such knowledge to various stakeholders.

v. To provide technical assistance and support to states, forest- based industries, tree growers, farmers and others for forest protection, afforestation, agro- forestry and allied activities.

vi. To develop appropriate forest based technologies, processes and products for sustainable resource use, livelihoods and economic growth.

vii. To provide livelihood support to forest dependent communities through transfer of scientific knowledge and appropriate forest-based technologies.

viii. To develop technically qualified human resource for forestry sector.

ix. To promote forestry education in the country and facilitate universities in improving quality through technical and financial support including development of uniform curricula.

x. To provide consultancy and capacity building services in environment and forest sector.

xi. To develop and maintain National Forest Library and Information Centre for forestry and allied sciences.

xii. To develop environment and forest extension programmes and promote the same through mass media and audio-visual aids.

xiii. To support and advice Government on technical aspects of international conventions and treaties.

xiv. To conduct other activities incidental and conducive to attainment of above mentioned objectives, which the council may consider necessary.

Professional Support

ICFRE Signs MoU with ICAR

ICFRE has extended networking with a number of national and international organizations to achieve greater outreach and cooperation through MoUs including following:

ICFRE Signs MoU with KVS & NVS

- Indian Institute of Forest Management (IIFM), Bhopal
- MoEF & CC, New Delhi and University of British Columbia, Canada
- Green Initiatives Certification and Inspection Agency (GICIA), Noida
- Navodaya Vidyalaya Samiti (NVS), Noida
- Kendriya Vidyalaya Sangathan (KVS), New Delhi
- Indian Council of Agricultural Research, New Delhi
- AFRI, Jodhpur and Jaipur National University (JNU), Jaipur
- HFRI, Shimla and Maharaja Agrasen University (MAU), Solan

New collaborations in pipeline

- Beijing Forestry University (BFU), Beijing
- Forestry and Environment Research, Development and Innovation Agency (FOERDIA), Indonesia
- Brazilian Forest Services (BFS), Brazil
- Kasetsart University (KU), Thailand
- G.B. Pant Institute of Himalayan Environment and Development (GBPNIHESD), Almora
- Chinese Academy of Forestry (CAF), China
- International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal
- Central Arid Zone Research Institute (CAZRI), Jodhpur
- Indian Institute of Science (IISc.), Bengaluru
- Andhra Pradesh State Forest Department (APSFD), Andhra Pradesh
- Griffith University, Australia
- Telangana State Forest College & Research Institute (TSFCRI), Hyderabad

Visit of dignitaries

Shri Siddhanta Das, DGF&SS, MoEF&CC, New Delhi at FRI, Dehradun

Shri C.K. Mishra, Secretary, MoEF&CC, New Delhi at FRI, Dehradun

Shri Giriraj Singh, Hon'ble Minister, MSME, Govt. of India at IWST, Bengaluru

- Shri Siddhanta Das, IFS, Director General of Forests & Special Secretary, MoEF & CC visited IFGTB on 7th May, 2018 and reviewed the research activities of the institute.
- Shri Giriraj Singh, Hon'ble Minister, MSME, Govt. of India visited IWST, Bengaluru on 20th May, 2018.
- Shri Siddhanta Das, DGF&SS, Ministry of Environment, Forest and Climate Change visited FRI, Dehradun on 17th December 2018.
- Shri C.K. Mishra, Secretary, Ministry of Environment, Forest and Climate Change visited FRI, Dehradun on 19th March, 2019.

RESEARCH HIGHLIGHTS

CHAPTER

02 RESEARCH HIGHLIGHTS

2.1 Ecosystem Conservation and Management

2.1.1

Projects under the Theme

➲ **Plan**

- Completed Projects 11
- Ongoing Projects 17
- New Projects Initiated During the Year 04

➲ **Externally Aided**

- Completed Projects 06
- Ongoing Projects 16
- New Projects Initiated During the Year 06

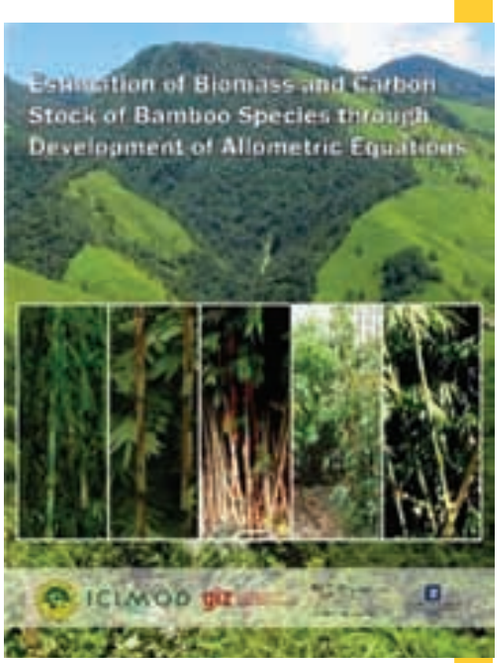
2.1.2

Climate Change

REDD+ Himalayas: Developing and Using Experience in Implementing REDD+ in the Himalayas

Following significant achievements have been made under the project on REDD+ Himalaya during the year:

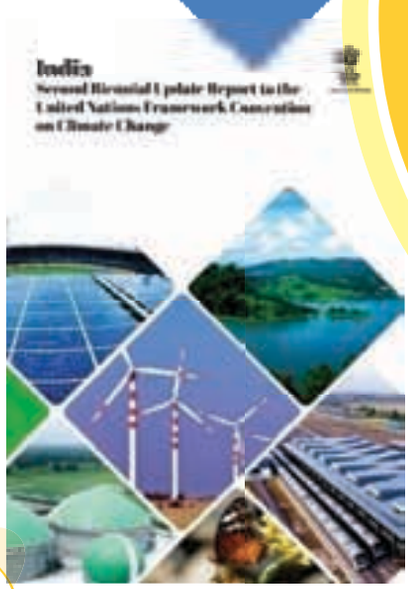
- Biomass equations were developed for five common species of bamboo (*Melocanna baccifera, Dendrocalamus hamiltonii, Dendrocalamus longispathus, Schizostachyum dullooa* and *Bambusa tulda*) of Mizoram for estimation of biomass and carbon stocks. Biomass equations developed are Y= -2.62+0.91*DBH+0.25*ht (for *B. tulda*), Y= 2.43+1.17*DBH-0.70*ht (for *D. hamiltonii*), Y=-3.53+0.71*DBH+0.33*ht (for *D. longispathus*), Y= -1.09+0.60*DBH+0.07*ht (for *M. baccifera*) and Y=-0.32+1/1.85*DBH+1/6.46*ht (for *S. dullooa*). Published a report on biomass and carbon stocks of bamboo species which is also available on ICFRE website.



State REDD+ Action Plans (SRAPs) were prepared for Mizoram and Uttarakhand through multi stakeholders' consultation workshops and expert consultation meetings. Through this process direct drivers of deforestation, forest degradation and barriers to enhancement of forests were identified and prioritized, and necessary intervention packages (sustainable land management and cropping pattern, adoption of horticulture crops, sustainable energy supply creating habitat mosaic for biodiversity conservation, livelihood improvement, forest fire control and management, market linkages for agriculture, and demonstrations of private plantation and agroforestry), strategies along with necessary activities for addressing the identified drivers have been prioritized. SRAP will be helpful in implementation of the National REDD+ Strategy in the states of Mizoram and Uttarakhand and also helpful

in getting the carbon and non-carbon incentives under REDD+ mechanism. The SRAPs have been published and are available on ICFRE web site.

'Preparation of Third National Communication and other new information to the UNFCCC Project'



A biennial update report on mitigation actions, constraints, gaps and related financial, technical and capacity needs to address climate change concerns in forest sector in India prepared and submitted to the National Communication Project Management Cell of Ministry of Environment, Forest and Climate Change, Government of India.

The report provides the updated information on mitigation actions including various afforestation/reforestation programmes, market mechanism in forestry sector and role of National Adaptation Fund for Climate Change in forestry sector. It also highlights the India's submission of National Forest Reference Level to UNFCCC in compliance to decision related to REDD+ and role of forestry sector in meeting targets of Nationally Determined Contribution (NDC).

Ministry of Environment, Forest and Climate Change, Government of India has incorporated the inputs of this report as chapters titled National Circumstances in Land Use and Forests, and Mitigation Actions in Forestry Sector of India Second Biennial for submission to UNFCCC.

Carbon sequestration and carbon dioxide emission from the soils under different forest covers in Uttarakhand (FRI)

CO_2 eflux measurement in sal forest, Dehradun

Data on carbon dioxide emission from the soils under different forest covers in Uttarakhand were collected and average values of the collected data reveal higher CO_2 emissions in sal forest (3.49 µmol $CO_2 m^{-2} sec^{-1}$) as compared to chirpine forest (3.20 µmol $CO_2 m^{-2} sec^{-1}$). The higher values of carbon dioxide emission in sal vegetation correspond to the higher soil temperature (20.10^{0}C and soil moisture (29.27%). Soil temperature is the most important environmental factor controlling soil respiration rates because it affects the respiratory enzyme present in both root and soil microbial biomass. The temperature has a limiting effect on microbial populations at lower temperature than at higher temperature. Comparatively higher soil organic carbon was observed in chirpine vegetation (100.11 t/ha) as compared to the sal vegetation (75.68 t/ha). Promoting soil carbon sequestration is an effective strategy for reducing atmospheric CO_2 and improving soil quality.

Climate change vegetation modeling (FRI)

The result of Lund Potsdam Jena (LPJ) and Joint UK Land Environment Simulator (JULES) for the multiple climate change scenarios of RCP2.6, RCP4.5 and RCP 8.5 for the short (2030), medium (2050) and long (2080) time period for the Indian Western Himalaya (IWH) region are similar to the result of Integrated Biosphere Simulator (IBIS). A framework for adaptation strategies focusing to IWH region is proposed for the mainstreaming adaptation in forest planning and management.

Impact of forest covers change on regulating stream flows of the Narmada River Basin using Macro scale Hydrological Model (TFRI)

Forest change dynamics of Narmada basin reveals that this basin has 36077.3, 35201.8 and 34905.4 km^2 in the years 1985, 1995 and 2005 respectively. The forest was Deciduous Broadleaf and Mixed forest. During 1985–1995, it lost 2.43% (875.58 sq. km of gross forest loss, i.e., sum of all forest area lost) of the forest area that existed in 1985 (36077.3 sq. km), and the rate decreased to 0.84% during 1995–2005 (296.36 sq. km gross loss of 35201.8 sq. km forest in 1995). These statistics does not include plantation and scrub areas.

Due to decreased forest area (876 sq. km) from 1985 to 1995, surface runoff increased in monsoon and post-monsoon season (June- Dec) by 103.2 MCM (Million cubic meter) and baseflow (groundwater contribution to stream) decreased by 2.5 MCM. Similarly, during the years 1995 to 2005, decrease in forest area (296 Sq km) increased surface runoff during monsoon and post-monsoon season (June- Dec) by 34.7 MCM (Million cubic meter) and baseflow (groundwater contribution to stream) decreased by 0.846 MCM.

Thus, forest cover acts as flow regulator which minimizes the peak flow in monsoon season and thereby increases the baseflow in lean season.This study has quantified the impact of forest cover change on stream flow. Decrease in forest cover had double losses; it increased surface flow during monsoon and thereby creating water scarcity in lean season in both the decades by decreasing the baseflow.

Impact of forest cover change on seasonal flow

Decade	Decadal Change in forest Area (km^2)	Change in total runoff during June-Dec. in (mm^3)	Change in baseflow (groundwater contribution to stream) during Jan-May (mm^3)
1985 to 1995	876 (↓)	103.2 (↑)	-2.5 (↓)
1995 to 2005	296 (↓)	34.7 (↑)	-0.846 (↓)

Carbon Sequestration Potential of Existing Land-use Systems in Lahaul Valley, Himachal Pradesh (HFRI)

Study sites for different land use systems i.e. pure agriculture (Kuthbihal, Gushal & Tingrat), pastures (Tandi and Trilokinath), pure horticulture (Thalong Shakoli and Dalang), Agri-Horticulture (Goshal), deodar forest (Tindi), Juniper forest (Shakoli) were selected in the Lahaul valley. Field data on biomass, height, diameter etc. of some identified land use systems were recorded. The value of above and below ground biomass for pasture at Tandi was 1.73t/ha & 2.35t/ha respectively whereas, for pasture at Trilokinath the values were 1.37t/ha & 3.38t/ha respectively. The value

Deodar forest

Grass land/Pasture

of carbon stock for above & below ground components of the Alpine pasture at Tandi was 0.88 t C/ha and 1.13t C/ha whereas for alpine pasture located at Trilokinath values of above & below ground biomass carbon stock was 0.726 t C/ha & 1.656 t C/ha respectively. The soil carbon stock up to 30 cm depth was 52.44 t C/ha and 57.75 t C/ha for Tandi and Trilokinath pasture respectively. The values of biomass and biomass carbon stock for pure agriculture system at Kuthbihal was 13.51 t/ha and 6.372 t C/ha respectively. The soil carbon stock up to 30 cm depth for pure agriculture system was 95.75 t C/ha.

Horticulture System

2.1.3

Ecology & Environment

Assessment of Carbon stock and Carbon sequestration potential of major land use sectors in Nagaland and Upper Assam (RFRI)

Terrace cultivation in Nagaland

Measurement of GBH of a shade tree in tea gardens of Upper Assam

As a part of the countrywide assessment of Carbon under Agriculture, Forestry and other land uses(AFOLU) by DST, the study was undertaken in Nagaland and Upper Assam. Among the various forest types assessed, Soil Organic Carbon (SOC) stock ranges from 35.8 t ha^{-1} in Secondary moist bamboo brakes to 105.8 t ha^{-1} in Naga hill wet temperate forest. In upper Assam SOC stock was found to range from 25.2 t ha^{-1} in Grass land to 44.3 t ha^{-1} in Assam Valley Tropical Wet Evergreen forest.

Innovative technologies for climate change mitigation and biodiversity conservation with alternate livelihood opportunities for mountain communities in North Western Himachal Himalayas (HFRI)

Socio-economic surveys of the project areas of Shimla, Mandi and Kullu districts of Himachal Pradesh were conducted for collection of the baseline data. Seeds of fodder and other species were collected and raised in the nursery for species enrichment programme. Plantation of *Quercus leucotrichophora* (Ban Oak) and *Taxus wallichiana* (Thuner) with active participation of oriented and trained community groups. Solar water heating systems (305 units) were installed in the project areas and initial data analysis showed saving of average 40% fuel wood with solar water heating system and mitigating around 2.5 MT carbon emission/panel/annum. Button mushroom cultivation emerged one of the most successful

Community participation in plantation work at village Dalair and Jalair Kullu (H.P.)

activities for immediate cash returns for the organized women groups. One cultivation cycle at two sites concluded successfully with production of 2236.80 Kg mushroom of gross market value Rs. 2,90,680/- providing benefit to 130 households in three months. Efficient use of fuel wood with solar water heating system is most popular and addressing availability of hot water in mountain and women drudgery reduction. Massive forest conservation and climate change mitigation expected with this intervention.

Installation of solar water heating systems at Mandi (H.P.)

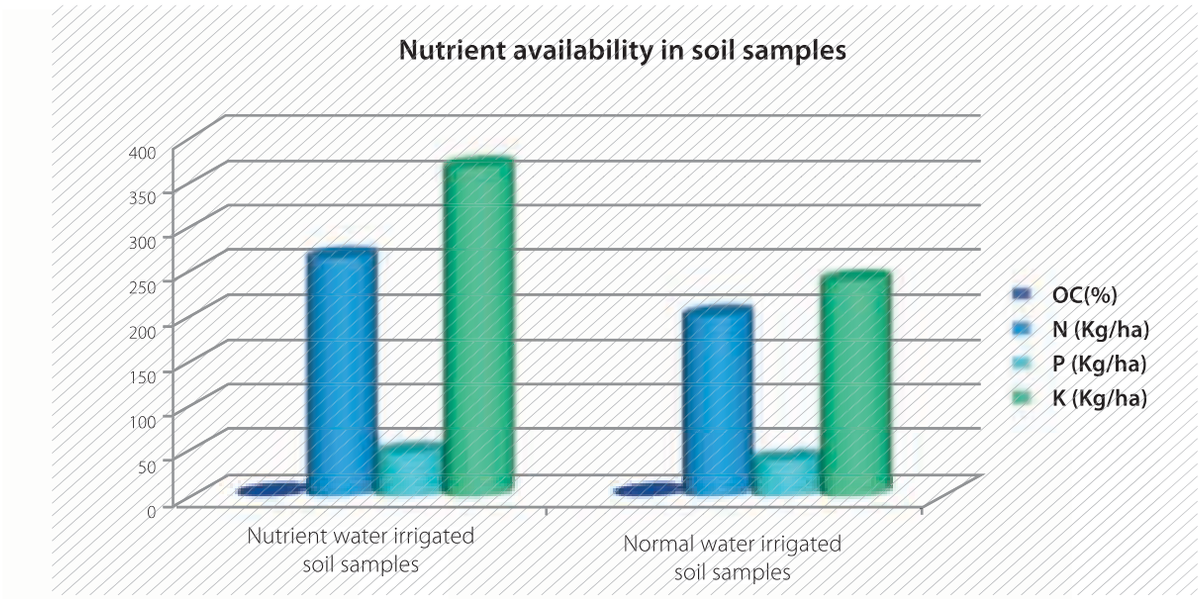
Impacts of nutrient loading from droppings of nesting migratory waterfowl in the wetland ecosystem of Nelapattu bird sanctuary, Andhra Pradesh (IFB)

Nelapattu Bird Sanctuary provides nesting as well as roosting grounds for a significant number of migratory waterfowl. The farmers used nutrient rich freshwater for irrigating their paddy fields. The sediment samples collected from three different locations were analyzed. The pond samples and nutrient water irrigated soil samples are comparatively having the same values of N (213.15 kg/ha), P (49 kg/ha), K (287.63 kg/ha) and O.C (1.4%). Whereas normal water irrigated soil samples slightly differed in N (184.5 kg/ha), P (47.62 kg/ha), K (253.72 kg/ha) and O.C (1.28) with the pond and nutrient water irrigated soil samples. During the winter season the water was slightly acidic (pH=6-6.5) and having high Orthophosphate (0.05-1.13 mg/L) due to high population of birds dropping their faecal matter into the pond.

The water lettuce growing predominantly in this season due to excessive nutrient richness of the water.

Birds in Nelapattu Sanctuary

Wherever water lettuce was more, the algae was found to be less, so food for fish will be less so also other insects and zooplanktons, therefore, the nesting birds get less food. The forest department is cleaning the water lettuce from time to time for this reason.



Comparison of nutrients in sanctuary water with normal water

2.1.4

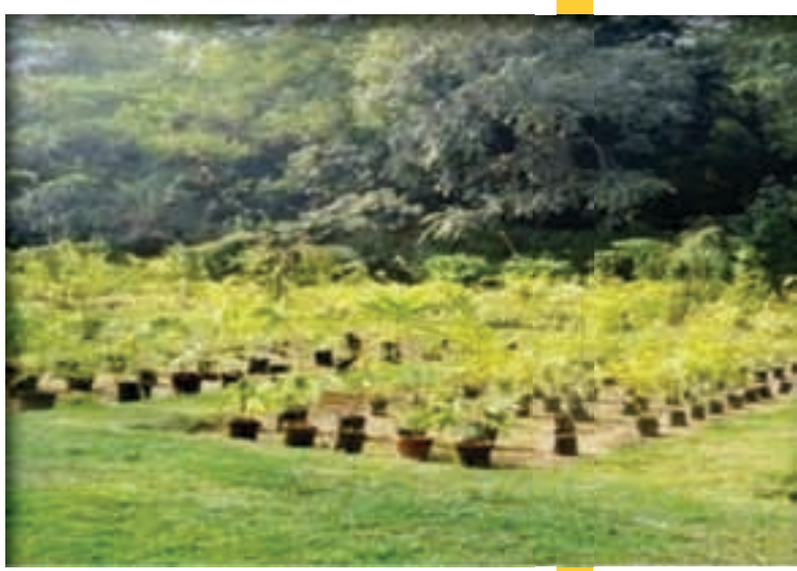
Biodiversity

Bamboo nursery was inaugurated by Hon'ble President of India Shri. Ram Nath Kovind

Establishment of Bamboo Nursery at Rashtrapati Bhawan, New Delhi (FRI)

Forest Research Institute, Dehradun has established a Bamboo Nursery at the Rashtrapati Bhawan, New Delhi to generate awareness among the general public about the bamboo diversity and its uses. Personnel of Rashtrapati Bhavan were trained in FRI for the up keeping, enrichment and maintenance of the established bamboo nursery.

A total of 20 bamboo species [*Bambusa balcooa* Roxb., *Bambusa bambos* (L.) Voss., *Bambusa multiplex* (Lour.) Raeusch. ex Schult., *Bambusa nutans* (Munro) Kuntze, *Bambusa polymorpha* Munro, *Bambusa striata* Lodd. ex Lindl., *Bambusa tulda* Roxb., *Bambusa vulgaris* Schrad., *Bambusa wamin* E.G.Camus, *Dendrocalamus asper* (Schult.) Backe, *Dendrocalamus calostachyus* (Kurz) Kurz, *Dendrocalamus giganteus* Munro, *Dendrocalamus hamiltonii* Nees & Arn. ex Munro, *Dendrocalamus membranaceus* Munro, *Dendrocalamus somdevaii* H.B. Naithani, *Dendrocalamus strictus* (Roxb.) Nees, *Gigantochloa atroviolacea* Widjaja, *Guadua angustifolia* Kunth, *Phyllostachys aurea* Rivière & C. Rivière and *Pseudosasa japonica* (Steud.) Makino] were planted in the nursery. Bamboo Nursery was inaugurated by Hon'ble President of India Shri Ram Nath Kovind on 16 July 2018.



View of Bamboo nursery at Rashtrapati Bhawan, New Delhi

Conservation and restoration strategies for traded trees of Eastern Ghats (IFGTB)

Enrichment planting at Kolli Hills

Successfully identified seed sources, collected fruits, standardized seed handling and nursery techniques for species such as *Aegle marmelos* (vilvam), *Albizia amara* (arappu), *Limonia acidissima* (vilam pazham), *Sapindus emarginatus* (poochakkai), *Santalum album* (santhanam, sandalwood), *Scheleichera oleosa* (poovam), *Strychnos nux-vomica* (yettikai), *Syzigium cumini* (naval), *Canarium strictum* (kungiliyam), *Givotia rottleriformis* (thalamaram), *Celastrus paniculata* (jyotishmati) and *Terminalia bellirica* (thandrikkai).

To understand the species distribution and reproductive status, a total of 60 survey plots were laid at Kolli hills, Pachamalai, Solaimathi and Puliancholai at three different altitudes and enumerated the vegetation. It was found that a total of 291 species falling under 81 families were recorded in the four sites.

Enrichment planting of 12 species was successfully completed at Kolli hills, Puliancholai, Pachamalai and Solaimathi in three different altitudinal ranges i.e., 901 m and above, 401-900 m and 201-400 m. Each seedling was tagged and planting was carried out with the support of TNFD in open forest areas. The GPS co-ordinates of the planting sites were recorded.

Enrichment planting at Kolli Hills

A. Caterpillars of *Pachliopta aristolochiae;*
B. *Mylabris pustulata;*
C. *Trombidium grandissimum*

Edible insects used by tribals for preparation of medicine and food

Total 92 insect species belonging to 35 families of the three orders Lepidoptera (19), Coleoptera (11) and Hymenoptera (05) were collected and identified. It was reported that ten species of insects viz. *Polistes carolina* (wasp), *Trombidium grandissimum* (bir bahuti), *Oeophylla smaragdina* (red ant), *Apis dorsata* (honey bee), *Hieroglyphs banian* (chidda), *Microtermes obesi* (termite), *Pachliopta aristolochiae* (common rose), *Bombyx mori* (kosa kida), *Sceliphron* spp. (mud wasp) are being utilized by traditional vaidraj of tribal pockets of Satpura plateau for the treatment of various diseases and also used as food by tribal people. Total 22 fungal species were collected. Out of this, *Termitomyces* sp., *Sparassis crispa, Pleurotus* sp., *Lentinus* sp, *Agaricus campestris* and *Volvariella volvacea* were edible. Data has been collected from collectors, traders, and retailers for different available non-timber forest produces (NTFPs) from Betul and Chhindwara districts of Madhya Pradesh. The project will help generate data and status report on insect, edible fungi species diversity and NTFPs present in the Satpura plateau which will be helpful in conservation of biological diversity of the area.

Ecological studies in alpine pastures of district Shimla, Himachal Pradesh (HFRI)

View of Alpine Pasture, Mural Danda

Ecological studies in alpine pastures Talra and Mural Danda of Shimla district were conducted during pre-monsoon, monsoon and winter seasons. Findings of the studies are tabulated below:

Talra Alpine Pasture				
Season	**No. of species recorded**	**Dominant Species**	**Diversity Index**	**Biomass (t/Ha)**
Pre-monsoon	40	*Trifolium repens*	3.14	AGB=2.37, BGB= 5.64
Monsoon	47	*Trifolium repens*	3.21	AGB= 2.93, BGB= 5.04
Winter	32	*Anaphalis triplinervis*	3.02	AGB= 1.41, BGB= 3.11

Allium humile

Fritillaria roylei

Mural Danda Alpine Pasture				
Season	**No. of species recorded**	**Dominant Species**	**Diversity Index**	**Biomass (t/Ha)**
Pre-monsoon	44	*Achillea millefolium*	3.46	AGB=2.96, BGB= 6.27
Monsoon	46	*Tanacetum dolichophyllum*	3.51	AGB= 3.86, BGB= 6.98
Winter	28	*Potentilla atrosanguinea*	3.18	AGB= 1.46, BGB= 3.25

AGB= Above ground Biomass, BGB= Below ground Biomass

Assessment of vegetation in Kibber Wildlife Sanctuary, distt. Lahaul Spiti, Himachal Pradesh (HFRI)

Phytosociological data and soil samples were collected from selected sites at Badang, Langza, Komic Demul, Dhinam Gete, Chichham-1 & Chichham-2. A total of 52 plant species belonging to 22 families, 6 shrubs and 46 herbs were recorded from 4 sites.

The study was carried out at three sites during this year i.e Dhinam, Chichham-1 and Gete.

Total 35 plant species including 6 shrubs and 29 herbs were recorded from these sites. The above species play a vital role in fragile ecological habitat and water shed management. The detail is given below:-

Shrubs:
Caragana versicolor, Ephedra sp., *Ephedra gerardiana, Krascheninnikovia ceratoides, Lonicera spinosa, Potentilla arbuscula.*

Herbs:
Aconitum sp., *Aconogonum tortuosum, Allium carolinianum, Arnebia euchroma, Artemisia gmelinii, Astragalus* sp.,

study site: Gete-2

Study site: Chhicham-1

Astragalus rhizanthus, Bergenia stracheyi, Carex sp., *Corydalis* sp., *Cousinia thomsonii, Dracocethalum heterophyllum, Gentiana* sp., *Geranium himalayense, Lindelofia stylosa, Nepeta* sp., *Pedicularis* sp., *Plantago* sp., *Potentilla atrisanguinea, Potentilla biflora, Rheum speciforme, Rhodiola* sp., *Rhodiola tibetica, Saussurea* sp., *Saussurea taraxacifolia, Stipa* sp., *Taraxacum officinale, Thallictrum foetidum, Thermopsis inflate.*

Exploration and utilization of wild mushroom diversity in Mizoram (RFRI)

2.1.5

Tribals and Traditional Knowledge System

247 species of mushroom were collected from the state of Mizoram, out of which, 77 species are reported as new records for Mizoram and 13 species (*Cookeina tricholoma, Galiella rufa, Helvella atra, Leotia lubrica, Conocybe apala, Calvatia booniana, Calbovista subsculpta, Thelephora anthocephala, Clavaria zollingeri, Inocybe lapponica, Laccaria vinaceoavellanea, Abortiporus biennis* and *Albatrellus confluen*) are reported as new records for India.

A., B. *Cookeina tricholoma;*
C., D. *Galiella rufa*

Documentation of the Traditional Ecological Knowledge (TEK) and quantification of medicinal plants used by the Karbi tribe of Karbi Anglong hill district of Assam

Information on the application of Traditional Ecological Knowledge of the *Karbi* tribe has been documented. Medicinal folk healers were interviewed and information was recorded on various medicinal plants. The traditional pesticides (*Celosia argentea, Chromolaena odorata, Bambusa tulda*); fish poisons (*Polygonum glabrum*); household articles (*Bambusa tulda, B. nutans*, *Dendrocalamus hamiltonii*); vegetables (*Diplazium esculentum, Polygonum chinense, Zanthoxylum nitidum, Gnetum gnemon*) etc. were documented. The process of preparations of rice beer called *Hor-lang* was also documented.

Various traditional practices of *Karbi* tribe has been documented including the following-

Plants use as pest traps such as *Celosia argentea* L or '*Mer-aang*' (Karbi), *Chromolaena odorata* (*Jarmani Bon*) (Ass./Karbi) – the whole weed is planted within the agricultural field, *Bambusa tulda* (*Jati bah*) – the leaves covered branches are struck in the field to trap insects.

Documentation of the *Karbi* community fishing festival i.e., *Okhi-Pru* have been done with various fish gears such as *Soklet* made of *Bambusa tulda* used to catch big to small fishes in deep water, *Tokprok made of Dendrocalamus hamiltonii* is used to strike fishes with the spikes in shallow water where, the narrow spikes strike medium to small size of fishes and big fishes are strike with the broad spokes. *Ok-keap-apotmade* made of *Bambusa tulda* which is similar to catapult, that strike fishes with the harpoon and also the fishing net. The above mentioned fish gears can be efficiently used (apart from the net) only when herbal poison is released in the water after threshing. A low-lying herb *Polygonum glabrum* or *Han-birik* (*Karbi*) and an unidentified liana namely, *Ru-Teng* (*Karbi*) are found in hills, are threshed and the juice is released in the water which make the fishes unconscious resulting into easy catching.

Documentation of local *Karbi* drink 'Hor-lang' is done, where the cooked rice is cooled by spreading over a mat for some days. After that a rice cake namely the '***Thap***' is mixed with formerly cooked rice and kept aside in *Tebuk* or pot for five days in winter and three days in summer, fermented and mixed thoroughly with adequate amount of water and later, alcohol is distilled. The *Thap* is prepared altogether from twelve varieties of plants species. Notable of which are leaves of *Solanum melongena*, *Croton joufra,* bark of *Acacia pennata,* etc. Thus prepared liquor is kept in dry gourd shell '*Bongchin*' use to store the *Hor.* It is used as beverage for daily and customary usage, seldom sold in small scale.

Various *Karbi* crafts have been documented such as '*Hagmar Jong*' is a basket made of *Dendrocalamus hamiltonii* which is used for storing clothes, *Bai buk or the garbage tray* made of *Bambusa tulda* or *Bambusa balcooa*, brooms prepared from dried branches of *Sida acuta* and dustbin made of *Bambusa tulda. Jambili Athon* is one of the dignified cultural symbol, made up of '*Bengvoi*' or *Wrightia coccinea* Sims. A local bird known as *Vojaru* or Racked-tailed drongo is placed at central branch, is a symbol of wisdom, intellectuality, leadership. Another local bird named, *Vorale* i.e., Spangled Drongo is placed on other lateral branches are the followers.

The Medicinal plants used by the *Karbi* tribe have also been recorded for different utilization in treating numerous diseases as follows:

S. No	Disease	Plants Used	Method
1	Jaundice	*Achyranthes aspera*	Roots cut into pieces and worn around forehead till 4-5 days
2	Headache	*Cynodon dactylon*	Paste of the grass with few rice grain is applied over forehead – 3-4 days
3	Glands on Body	*Datura stramonium*	2-3 leaves are grinded and applied over glands (2-3 times a day) until cured
4	Any kind of disease	*Oryza sativa* + *Areca catechu* + *Piper nigrum* + *Ocimum* sp.	Bundled together and hanged from roof or any safe place for 1-2 weeks
5	Black fever (*Kala-azar*)	*Capsicum* spp. (Kon jolokia)	Paste of the roots of *Capsicum* spp. is placed on hands.
6	Dog bite	*Thubergia grandiflora*	3-4 leaves are grinded to paste – applied over the injury – 1-2 days
7	Cholera	Stem of *Jatropha gossypiifolia* + *Phlogacanthus thyrsiflorus* + water	Stems of both are grated + mixed with water separately = drunk one after the other
8	Chronic Amoebic Dysentery	Stem of *Ricinus communis* + water	Stem is grated + 1 tbsp water = drunk in empty stomach (1 TIME)
9	Vomiting	Stem of *Ricinus communis*	Stem is cut into pieces and worn as garland around neck until healed
10	Extreme Vomiting	Stem of *Ricinus communis*	Direct stem is worn around the neck until healed
11	Toothache	Garlic + *Sida rhombifolia* + *Musa paradisiaca*	Paste of 5 cloves (woman)/6 cloves (man) + Lower rotten stem of Musa paradisiaca + roots of *Sida rhombifolia* - applied to the area of pain
12	Wounds	*Dendrocalamus hamiltoni*	Powder found in nodes is applied over fresh wound

Household survey at Bokolia block

Interview of Medicinal Folk Healer at Howraghat block

2.2 FOREST PRODUCTIVITY

2.2.1
Projects under the Theme

- **Plan**
  - Completed Projects 04
  - Ongoing Projects 19
  - New Projects Initiated During the Year 04

- **Externally Aided**
  - Completed Projects 01
  - Ongoing Projects 07
  - New Projects Initiated During the Year 06

2.2.2
Silviculture

Development of seed pelleting techniques for commercially important tree species (IFGTB)

Identified seed sources, standardized seed processing and conducted germination studies of *Aegle marmelos* (bel, vilvam), *Albizia lebbeck* (siris,vagai), *Gmelina arborea* (gamhar, kumizh), *Acacia nilotica* (babool, karuvelam), *A. leucophloea* (safed kikkar, velvael), *Melia dubia* (malabar neem, malaivembu) and *Sapindus emarginatus* (reetha, poochakkai). Completed pre-treatments of the above mentioned species to improve germination and standardized seed pelleting and tested the same for viability and storability. Bioinoculants such as *Trichoderma viridae* and phosphorus solubilizing bacteria were isolated and multiplied *in vivo* and used for inoculation in the pelletted seeds. Developed pelleted seeds for supply to various users.

Integrated approach for development of standard nursery techniques and value added products of some socio-economically important species of Madhya Pradesh (TFRI)

Seeds of economically important *Terminalia chebula* (harra), *Madhuca indica* (mahua), *Terminalia bellirica* (baheda) and *Semecarpus anacardium* (bhilwa) were collected and their morphological characterization in respect of size, colour and weight was carried out. Soaking of the depulped harra seeds in water for 48 hours resulted in maximum germination of 59%.Trails to study the influence of organic and inorganic fertilizers on growth of baheda, harra and mahua were laid out and data were recorded. Soil samples collected from nursery and the forests were also analysed for texture, bulk density and organic carbon. Periodic surveys for management of pests and diseases of the above tree species in the nurseries of the institute and SFDs were conducted. Bhilwa fruit powder was found to be suitable for making biscuits.

Evaluation of existing *Santalum album* (sandalwood) plantations and development of agro forestry trials and capacity building to promote cultivation in Gujarat and Rajasthan (AFRI)

Sandalwood plantations at 5 m x 5m spacing were raised at Anand and Rajkot in Gujarat and Jaipur in Rajasthan. Various horticultural plants namely, *Citrus* sp. (lemon), *Psidium guajava* (guava) and *Punica granatum* (pomegranate) were used as medium to long-term hosts in these field trials at a spacing of 1m x1 m / 2m x 2m. During the first year Sunn hemp and bengal gram were intercropped. Intercrops were harvested and yield was recorded.

Sandalwood plantation at Anand Agriculture University campus, Anand

Sandalwood plantation at Jaipur National University Campus, Jaipur

Sandalwood plantation at Rajkot

Establishment of a Bamboo High Tech Nursery at IFGTB, Coimbatore

With the objective of supplying quality and certified planting stock of bamboo, the project was initiated with funding support of National Bamboo Mission through Bamboo Technology Support Group (BTSG-ICFRE), Uttarakhand. Around 9,200 certified quality planting stock of 37 species representing 57 accessions obtained from Rain Forest Research Institute (RFRI), Jorhat; Institute of Wood Science and Technology, Bengaluru; Uravu Indigenous Science & Technology Study Centre(URAVU), Wayanad and Jawaharlal Nehru Tropical Botanical Garden & Research Institute, Palode, Thiruvananthpuram are being maintained as mother plants for further multiplication with identity.

2.2.3

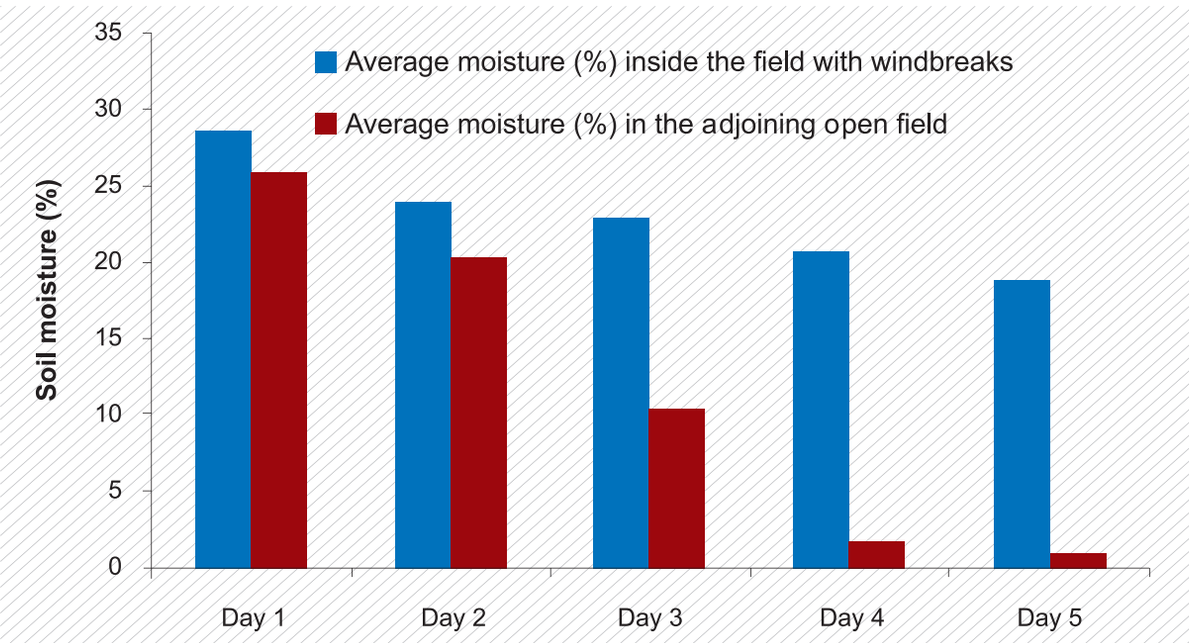
Social Forestry, Agro-forestry/ Farm Forestry

Evaluation of windbreaks for enhancing water use efficiency, crop productivity and climate change resilience in farmlands in semiarid regions of Tamil Nadu (IFGTB)

Measuring soil moisture in the farm field with windbreaks in Coimbatore district of Tamil Nadu

IFGTB, Coimbatore released five productive clones of *Casuarina junghuhniana* (jungli saru) suitable for windbreak agroforestry system. The clones were deployed in semi-arid regions of Tamil Nadu for assessment of their efficacy in micro-climate moderation, enhancing of water use efficiency, agriculture crop productivity and soil moisture retention in the farm fields. Red gram (variety CO-18) was planted both inside the windbreaks

and outside the windbreaks at farm field in Coimbatore. Soil moisture was monitored inside the windbreak farm field and open farm field after irrigation to crops for five consecutive days. The windbreak conserved more soil moisture, around 20% moisture inside the field with windbreaks whereas the open field measured only 1% moisture at the end of 5th day. Thus, the microclimatic condition of windbreaks was more effective in reducing direct water loss from the soil, improves water conservation and allows the crop to make better use of available moisture over the course of a growing season.



Average soil moisture content inside the field with windbreaks and in the adjoining open field during five consecutive days in Coimbatore district of Tamil Nadu

Evaluation of superior phenotypes of *Azadirachta indica* A. Juss. (neem) for agroforestry systems (IFGTB)

Seeds from 25 Candidate Plus Trees of *Azadirachta indica* (neem) selected in western zone of Tamil Nadu were collected and raised in nursery. Six months old seedlings were studied for dry matter allocation in leaf, shoot and root. There existed statistically significant variation among progenies of the selected phenotypes of neem in respect of dry matter allocation. Among the selected candidate trees, family No. N-16 registered greater dry matter accumulation in root (20.03 ± 2.26 g per plant), whereas family No. N-6 showed least dry matter accumulation in root (12.16 ± 1.45 g per plant). Some phenotypes recorded greater proportion of stem biomass and lesser allocation to root biomass which brings scope of developing phenotypes with less root production without compromise on stem wood production, which may in turn aid in developing phenotypes for higher water use efficiency.

Variation in dry matter allocation in roots - Family N 6

Variation in dry matter allocation in roots - Family N 16

Preparation of Volume and Yield Table for indigenous tree species in Tamil Nadu (IFGTB)

This project intends to provide a tool to the farmers in estimation of volume and yield prior to felling. At the end of the project, volume and biomass table will be made available for the fast growing indigenous tree species of *Melia dubia* (Malabar

Biomass sampling of *Melia dubia* for preparation of volume and biomass table

Biomass sampling of *Melia dubia* for preparation of volume and biomass table

neem), *Gmelina arborea* (gamhar) and *Ailanthus excelsa* (mahanimb, maharukh). Presently, biomass sampling has been completed in 8 plantations of *Melia dubia*.

Comparative study on growth, wood quality and financial returns of teak managed under different agroforestry practices in Karnataka (IWST)

25-year-old teak trees grown in three agro-forestry systems namely partially managed line (bund) plantation (PM), unmanaged block plantation (UM) and intensively managed block plantations (IM) were studied for different wood quality parameters. Mean annual increment was as 0.008 and 0.024 m^3/tree/year for UM and PM, respectively. The teak wood from UM exhibited 10-15% and 25-32% higher values for flexural strength and stiffness, respectively compared to PM. Between two types of farm teak plantations studied, wood properties of UM was found superior to PM, though slightly lower compared to natural teak.

The pattern of change in tree species across rural urban transitional gradient in Bengaluru was assessed which indicated decrease in tree species richness from urban to rural area of both southern and northern transect. Tree species like *Cocos nucifera* (Coconut tree), *Mangifera indica* (mango), *Azadirachta indica* (neem), *Artocarpus heterophyllus* (jackfruit), *Tectona grandis* (teak), *Pongamia pinnata* (karanj), *Grevillea robusta* (silver oak) and Eucalyptus hybrid were predominantly found along both the transects. Urban region were significantly higher in terms of species richness and abundance. Crown shapes become more compact in the urban area. The leaves samples analysed from all the domains of the northern transect fell under sensitive zone of classification for all the trees. However, tree species like *Mangifera indica* (mango), *Psidium guajava* (guava) and *Ficus glomerata* (goolar) were found comparatively tolerant amongst all the selected species.

Spatio-temporal land use patterns at rural-urban interface and the relationship between green areas and biophysical features (IWST)

Development of *Gmelina* based agroforestry system in Madhya Pradesh (TFRI)

Medicinal plant *Piper betle* (betel vine) was intercropped with *Gmelina arborea* (gamhar) and analyzed for yield and growth of above ground biomass. Performance of the medicinal plant was found better as sole crop as compared to the intercrop.

Intercropping of *Piper betle* with *Gmelina arborea*

Farmer's adopted agroforestry system

Impact assessment of agroforestry systems existing in farmers fields of Madhya Pradesh (TFRI)

Questionnaire for acquiring information on village profile, land holding, land use pattern, income from present cultivation practice, dependence on forests for fodder and fuel wood, effect of climate change on crop production, reasons for land diversification was prepared. Study areas of existing agroforestry systems were identified.

Using the questionnaire, farmers of Shahpura block and 04 blocks of Seoni of Jabalpur district were interviewed. In Shahpura block 85% farmers were engaged in traditional cultivation practices and 15% diversified their land in tree farming mainly *Eucalyptus* spp., *Gmelina arborea* (gamhar), *Tectona grandis* (teak) and *Bamboo* spp. planted on bund as well as in rows while majority of the farmers of Seoni district adopted *Butea monosperma* (palas)/ *Mangifera indica* (mango)/ Citrus/ *Eucalyptus/Acacia nilotica* (babul) based silvi-agri systems in their fields. Soil samples for assessment of nutrient status of the land were collected, analysed, and soil health card were prepared.

Farmer's adopted agroforestry system

Kosakonia sacchari, diazotrophic bacteria, a free living nitrogen fixer, was isolated from Alder based shifting cultivation system in Khonoma, Nagaland. This is the first report from India. This microbe has been found to increase the yield of rice at least two times in pure culture inoculation and about four times in amalgamation of sterilized vermicompost under controlled conditions.

Performance evaluation of native plant growth promoting rhizo bacteria for crop productivity enhancement in *jhum* fields of Nagaland (RFRI)

PGPR application in Jhum field at Mokokchung, Nagaland

Community dependency on silvipastoral systems for fodder, fuel, medicines etc. was surveyed in nine villages of nine districts of Himachal Pradesh and recorded data on distribution of tree species from three different sites (1 ha each) in eight villages. The data on the density of tree and other vegetations like grasses, herbs & shrubs was recorded and carbon and nitrogen estimation of soil samples from nine sites in three villages completed.

Survey and evaluation of Silvipastoral systems in Himachal Pradesh and its role in sustaining community livelihood (HFRI)

A

B

C

D

A. Documentation of community dependency on silvipastoral systems for fodder, fuel, medicines etc. in Jogipanga, Una; **B.** Collection of soil samples; **C.** Measuring girth of *Prunus cerasoides* (Paja)-Naun, Mandi; **D.** Measuring girth of *Mangifera indica* (mango)- Bakhra, Bilaspur

Community dependency on oak forests for fodder and comparative analysis of different oak species of Himachal Himalayas for nutritive value and leaf biomass production (HFRI)

The leaf samples of different species of oaks collected from 14 forest divisions for community dependency studies were analyzed for their nutritive contents (moisture, dry ash, crude fat and crude protein). With increase in altitude of *Quercus oblongata* (ban oak) (916m-1410m) and *Q. dilatata* (mohru oak) (1810-2455m) crude fat and crude protein found to increase from 5.25% to 7.20%; 3.25% to 5.10%; 7.05% to 13.20%; 6.25 to 9.10%, respectively. Pamphlets on ban oak, *Q. leucotrichophora* (kharsu oak) and mohru oak were developed to spread information and raise awareness of local communities.

Collection of oak leaf samples

Community dependency survey on oak fodder

Ban: A major fodder species in mid Himalayas

Mohru oak forest in WL Sarahan Division

Collection and storage of oak fodder in winter

Survey for fodder usage pattern

Establishment of community fodder banks in forest fringe villages in Uttarakhand and Himachal Pradesh (HFRI)

The project was initiated during June 2018 and plantation sites at different altitudinal locations of Rano village (Deothi panchayat) in Solan forest division, Maraog village in Chopal forest division and Padali village (Chawsha panchayat) were selected. Recorded information on the existing fodder species and requirement of the local people in the villages of the Rano and Maraog. Analytical protocols for estimation of total carbohydrates, proteins, fats, ash and fibres were standardized.

Sample collection

2.2.4

Forest Soils & Land Reclamation

Post fires impact on soil nutrients and microorganisms in chirpine and oak forests of Uttarakhand (FRI)

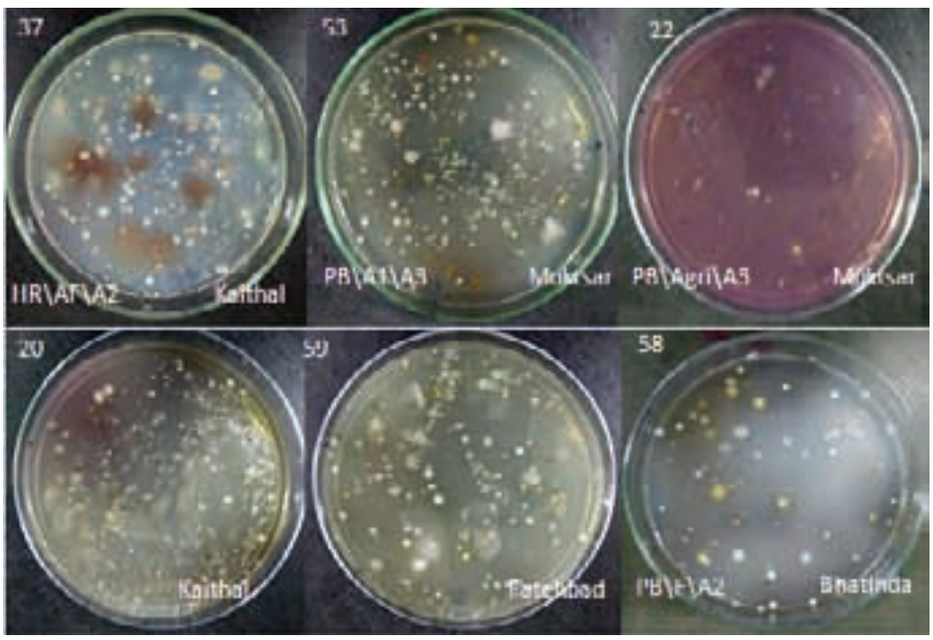
Chirpine forests after winter fires in Binai beat, Tons forest division

Aiming to study the influence of forest fire on soil organic carbon (SOC) and available nutrient status, soil from the burnt and un-burnt chirpine forests in 2017-18 post forest fire period in Tons forest division of Uttarakhand was analyzed for available N, P and K and no significant difference in these contents was found. However, an overall increase in SOC was observed in the burnt forest sites during the first post-fire year, which might be because of *in-situ* addition of organic matter after burning.

Identification and characterization of important bacterial groups from salt affected soils of Haryana and Punjab (FRI)

A total of 250 bacterial colonies were isolated from soil samples collected from Kaithal & Fatehabad districts of Haryana and Muktsar & Bhatinda districts of Punjab. Soil micro flora changed at lower depths (30-60 and 60-90 cm) and the soil was occupied by gram positive bacteria. Out of the 250 bacterial isolates, 150 isolates were tested for phosphorus solublization. However, none of the isolates solublized phosphate in pikovaskya medium.

Majority of the isolates obtained from various sites at Haryana and Punjab included *Enterobacter* spp., *Bacillus*



Different types of bacterial colonies on agar medium

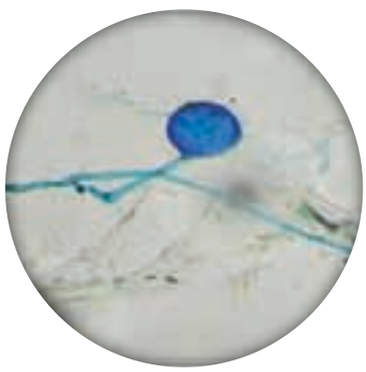
subtilis, Serratia marcescens, Lactobacillus acidophilus, Halobacterium spp., *Pseudomonas fluorescens, Staphylococcus* spp., *Proteus vulgaris, Escherichia coli* and *Bacillus pumilus.*

Effect of altitude and seasons on soil respiration, bacterial communities and enzyme activities in Uttarakhand (FRI)

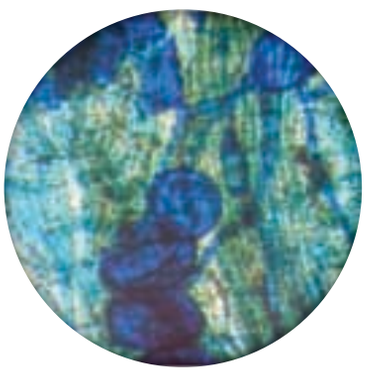
Study sites at different altitudes *viz.* < 500m, 1000m and > 1500 m were selected at different locations in dry deciduous and temperate forest types of Uttarakhand. Analysis of the soil samples collected from *Dalbergia sissoo* (shisham),*Tectona grandis* (teak), *Shorea robusta* (sal), *Pinus roxburghii* (pine), *Cedrus deodara* (deodar), *Quercus leucotrichophora* (Banj oak) forests and mix forests revealed that the C and N are intimately linked and primary source of C and N is found in the soil as an organic matter, in the form of plants and animals debris. Available N and P showed a significantly positive correlation with organic C. Soil physico-chemical properties, ambient temperature and/or substrate availability were found to influence soil bacterial growth and population density at various level of significance. It was demonstrated that soil textural differences significantly affected bacterial populations as the smaller size fractions (silt and clay) host higher bacterial community than larger size particles (sand).There was strong correlation between clay contents and bacterial populations. Carbon and nutrient contents of the soil were positively correlated with the bacterial colonies, while sand and soil pH had a negative correlation with them.

Rehabilitation of salt affected soil with amendments of biofertilizer (AM Fungi) (AFRI)

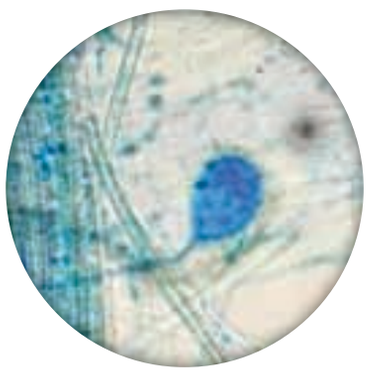
Rhizosphere soils and root samples of *Salvadora persica* (khara jhal) were collected from different selected sites of seven districts of Rajasthan *viz.,* Jodhpur, Bikaner, Jaisalmer, Nagaur, Barmer, Jalore and Pali. Four genera of associated VAM species were identified as *Glomus, Acaulospora, Scutellospora* and *Sclerocystis. Glomus* was most dominant genera with four species including *G. aggregatum, G. microaggregatum*, *G. constrictum*, *G. fasciculatum* and *G. mosseae*. Analysis of the collected soil samples for moisture, pH, electrical conductivity, per cent organic carbon and phosphorus was completed. Mass multiplication of inoculums was done and maintained.



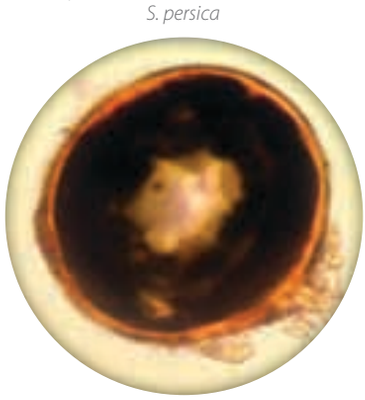
Spore formation in the root of *S. persica*



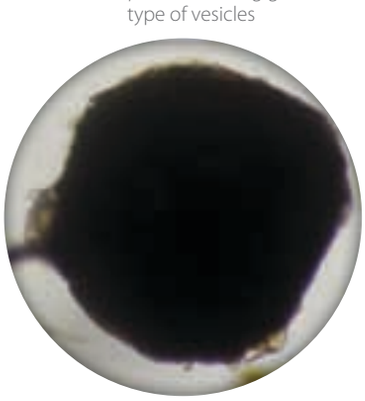
Root of *S. persica* showing globose type of vesicles



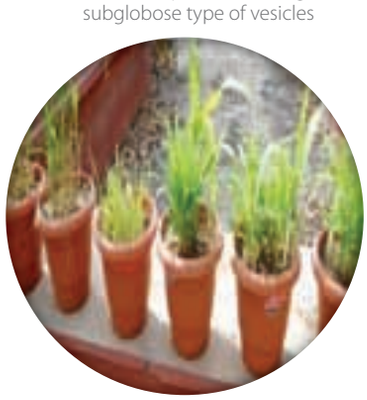
Root of *S. persica* showing subglobose type of vesicles



Glomus species collected from *S. persica*



Scutellospora species collected from *S. persica*



Mass multiplication of inoculum in pots

Different stages of VAM fungi associated with roots of *Salvadora persica* and its mass multiplication

Impact of harvesting on soil nutrients and carbon stock in canal side plantations of Indira Gandhi Nahar Pariyojana (IGNP) (AFRI)

Canal side plantations of IGNP were visited and information on harvesting schedule from the concerned forest officials was recorded. Plots were marked, tree growth was measured and soil samples for analysis were collected. Ten plots comprising four species- *Acacia tortilis* (Israeli babool), *Acacia nilotica* (babool), *Eucalyptus camaldulensis* and *Dalbergia sissoo* (shisham) were enumerated. Five trees in each plot were marked for recording biomass during harvesting. Harvesting for two plots of *E. camaldulensis* and two plots of *Acacia tortilis* was done. Analysis of forty two soil samples collected from 14 plots for pH, electrical conductivity, organic carbon, available NH_4-N, NO_3-N and PO_4-P was continued.

Growth data recording of *A. tortilis* (above) and soil sampling during harvesting of *A. tortilis* in IGNP area (right)

Modeling soil carbon dynamics and land use cover change in Meghalaya (RFRI)

To study the soil carbon dynamics, comparing the data of 2010 with the present situation, surveys were conducted in West Garo hills, Ri-Bhoi East Khasi hills and East Jaintia hills districts of Meghalaya. All the collected soil samples were analyzed for particle size distribution, bulk density, soil organic carbon (SOC) and available nitrogen. Simulation for SOC stock, under different land uses, was done for West Garo hills.

GENETIC IMPROVEMENT 2.3

2.3.1

Projects under the Theme

➲ **Plan**

• Completed Projects	13
• Ongoing Projects	37
• New Projects Initiated During the Year	11

➲ **Externally Aided**

• Completed Projects	08
• Ongoing Projects	28
• New Projects Initiated During the Year	20

2.3.2

Conservation of Forest Genetic Resources

National Programme for Conservation and Development of Forest Genetic Resources: Pilot project on 'Creation of Centre of Excellence on Forest Genetic Resources (CoFGR)' (FRI)

A. FGR Documentation

1. Upgradation and digitization of DD herbarium

With completion of renovation of new herbarium hall, voluminous task of transferring dicotyledonous floral specimens was initiated since February, 2017. The objective was successfully achieved by 100% transfer of dicotyledonous specimens to new renovated herbarium hall. During the period April, 2018 to March, 2019, approximately 15000 specimens have been digitized and entered to the digital herbarium specimen database.

Digitization process of DD herbarium specimens

2. Documentation of FGR diversity

With the objective to document the FGR diversity, record population size and assess regeneration status of different FGR species in Uttrakhand, the information related to the distribution of FGR species has been extracted from literature, working plans and herbariums. Field surveys for ground verification of FGR species & their population status with GPS referencing have been conducted in all 44 forest divisions of Uttarakhand. Species richness and regeneration status of 20 selected FGR species has been completed. Some new species also reported in Uttrakhand.

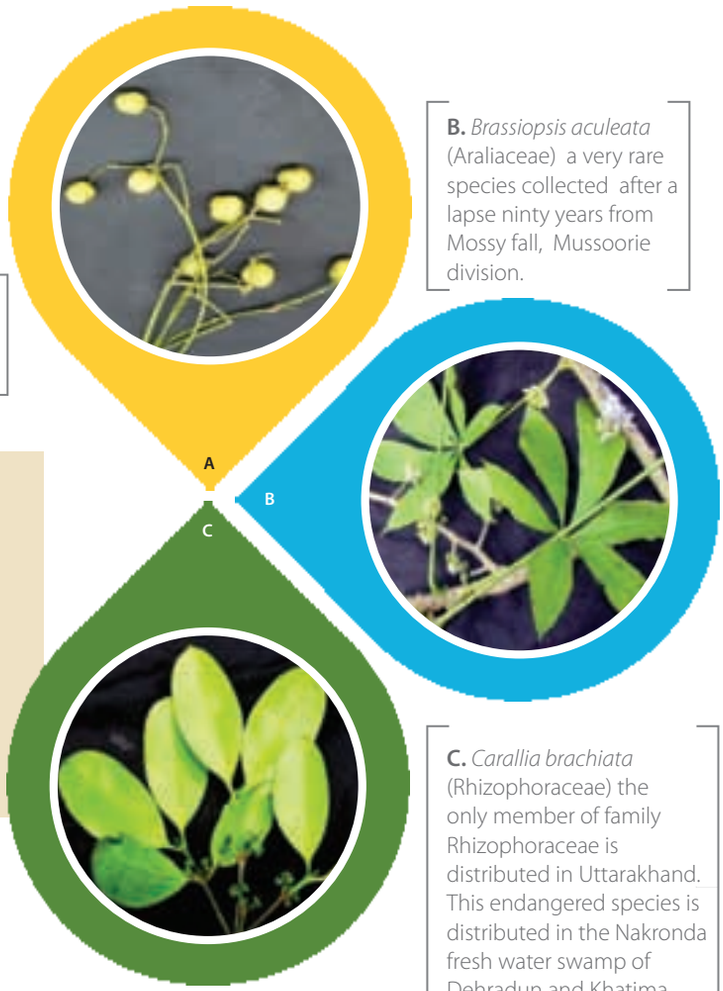
Sterculia villosa at Rudraprayag Range

Prunus undulata at South Jakholi, Rudraprayag

Exploration of rare/threatened/ endangered species of Uttrakhand

A. *Acronychia pedunculata* (Rutaceae) endangered species only distributed in the Gola tappad swamp of Dehradun

Catamixis baccharoides (Asteraceae) an endemic, monotypic species is found in the Shiwaliks of Haridwar, Mohand and also about eleven kilometres after Byasi on Devprayag road, Dehradun. *Dysoxylum binectariferum* (Meliaceae) another endangered species is so far found in Jwala Sal range of Haldwani forest division from Uttarakhand.



B. *Brassiopsis aculeata* (Araliaceae) a very rare species collected after a lapse ninty years from Mossy fall, Mussoorie division.

C. *Carallia brachiata* (Rhizophoraceae) the only member of family Rhizophoraceae is distributed in Uttarakhand. This endangered species is distributed in the Nakronda fresh water swamp of Dehradun and Khatima East Tarai division.

D. *Meizotropis pellita* (Fabaceae) a rare endemic shrub found only in Patuadanger near Nainital, Kumaon

E. *Sloanea tomentosa* (Elaeocarpaceae) a very rare tree having very few populations near Dhaula China, Almora has been collected after a lapse of eighty years. This tree is highly threatened because it is lopped for fodder

Regeneration status of FGR species

Regeneration studies are important for conservation and sustainable management of the species. Under the project, regeneration studies of selected tree species such as *Betula utilis, Hippophae salicifolia* (chuk), *Pinus wallichiana* (kail), *Taxus baccata* (thuner), *Diploknema butyracea* (cheura), *Pterocarpus marsupium* (bijasal), *Buxus wallichiana* (papri) and *Diospyros melanoxylon* (tendu) etc. were carried out using quadrate sampling method.

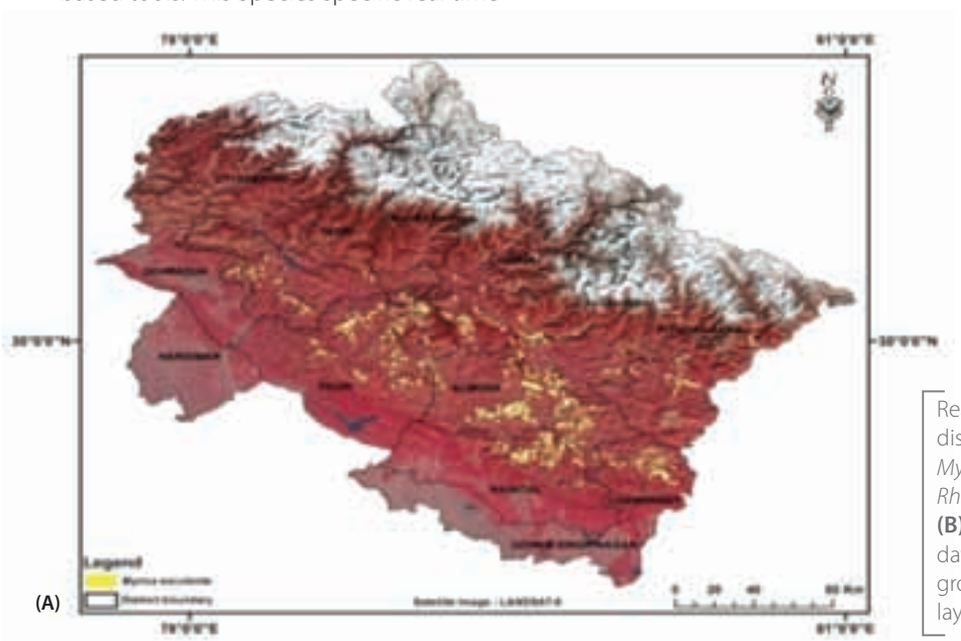
Germplasm Collection

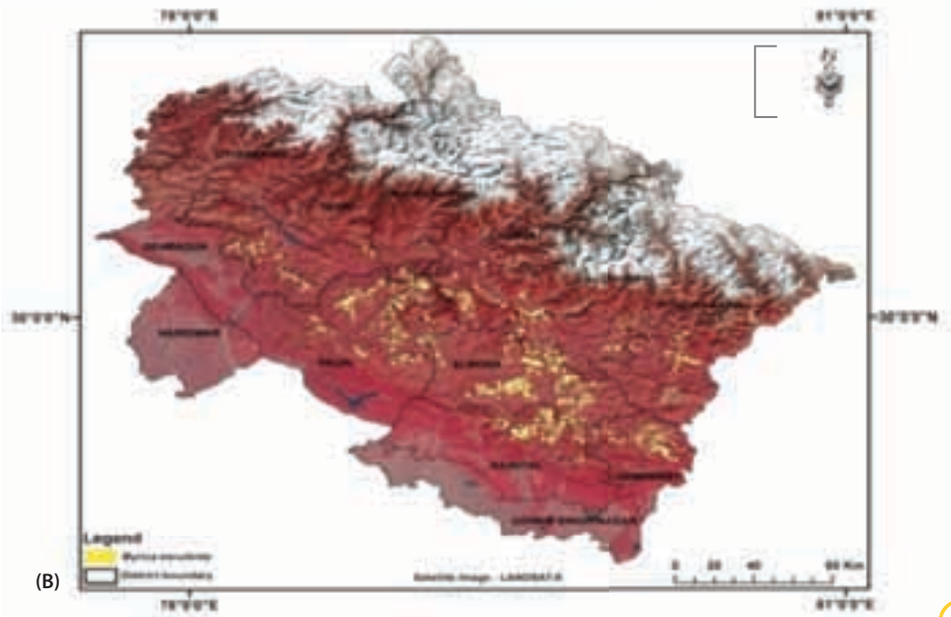
The following threatened and spectacular species collected from different localities for the *ex-situ* conservation in the Botanical Garden.

Sl. No.	Botanical Name	Vernacular name	Family	Locality
1	*Taxus baccata*	Thuner	Taxaceae	Uttarkashi
2.	*Juglans regia*	Akharot (walnut)	Juglandaceae	Chirbitiya, Rudraprayag
3.	*Rhododendron arboreum*	Buransh	Ericaceae	Chirbitiya, Rudraprayag
4.	*Cedrus deodara*	Devdar	Pinaceae	Chirbitiya, Rudraprayag

3. Development of Eco-distribution maps

50 important FGRs species of Uttrakhand have been mapped through RS and GIS based tools. This Species specific real time map will enable us to real time availability of species in that area.





Real time ecological distribution map of *Myrica esculenta* **(A)** and *Rhododendron arboreum* **(B)** based on real time data collection through ground truth and layering on Map

4. FGR Seed and germplasm storage

Seed collection in *Ougeinia oojeinensis*

Seed extraction in *Aegle marmelos;*

For long term storage and conservation, it is intended to collect seeds of important FGR species and their populations which are economically and ecologically important, and the species which are Rare, Endangered, and Threatened (RET). Field tours were undertaken in different forest areas to assess fruit maturity for collecting seeds of prioritized FGR species. Seeds were extracted, processed and were tested for moisture content and germination per cent. The seeds were then dried and stored and their viability was tested at regular intervals to optimize their safe storage conditions. Seed samples of 16 species have been deposited to NBPGR for their long term storage/ conservation.

Seed processing in *Pyrus pashia*

Seed germination in *Aegle marmelos*

The well processed, cleaned, desiccated, initial viability determined seed samples of 16 forestry species (total 28 samples) were labelled and deposited in the seed bank of NBPGR, New Delhi for their long-term conservation.

Long term seed storage of seed samples at NBPGR, New Delhi

Long term conservation of prioritized FGR seed samples in the seed bank of NBPGR, New Delhi at -18^0 C

In vitro storage of FGR species

In vitro storage in the form of slow growing and/or cryopreserved cultures is one of the ways of conserving valuable germplasm in medium and long term, respectively. This objective can be fulfilled once the protocols for whole plant regeneration from these stored cultures i.e. callus, shoot tips, slow growing shoot cultures etc. is developed. With an aim to conserve forest genetic resources (FGRs) of very high conservation concern or those having recalcitrant seeds or both, *in vitro* regeneration protocols have been developed for eight species in order to achieve whole plant regeneration as well as medium term storage. Different explants were used to induce callus formation which was then sub-cultured and multiplied.

In vitro propagation of *Taxus wallichiana*

Provenance resource stands, progeny trials, seed orchards and evaluation trials developed to have new high-yielding clones and seed sources. Pest and disease problems of the species in nursery and natural plantations have been identified and control measures have been developed. Projects are ongoing at multi-location under FRI Dehradun, RFRI Jorhat, IWST Bengaluru and IFGTB Coimbatore.

Melia dubia

2.3.3 Tree Improvement

Neem

Tree improvement work has been undertaken at FRI, Dehradun on one of the important medicinal tree *Azadiracta indica*. Progeny trials and field gene banks of selected 65 CPTs for high oil and azadirachtin yielding varieties has been raised in UP, Rajasthan and Gujarat.

Casuarina

Casuarina is an important commercial tree in South India and IFGTB, Coimbatore has started inter and intra specific hybridization for development of hybrid clones in terms of fast growth and high pulp yield. Selections are being made from Provenance and seed source trials to enhance pulpwood production of *Eucalyptus camaldulensis, Acacia mangium* and *Leucaena* spp. These are industrially important species.

Chironji

At TFRI, Jabalpur tree improvement research are ongoing on *Buchnania cochinchinensis* (Chironji), *Sterculia urens and Tectona grandis* (Teak)**.** In Teak, it was identified that progenies of MHAL-A1 and C-59 family were susceptible to leaf defoliator while MSSR-PT 45 and TNT-No.3 were more susceptible to teak leaf skeletonizer.

Sandalwood

Population of Indian sandalwood growing in Chhattisgarh were assessed for growth, heartwood and oil. This is out of reported native distribution.

Morinda

Morinda tinctoria an important dye producing tree is being studied for high dye content. Selected plus tree analysed for dye content and dye content varied from 7-13% w/w in root bark.

Flemingia

Institute of Forest Productivity at Ranchi took consolidation of tree improvement work in West Bengal. They verified existing plus trees and selected 489 plus trees out of 1093. Also 46 new candidate plus trees of eight species have been added. Eight fast growing genotypes of host plants (*Flemingia semialata* and *Flemingia macrophylla*) of lac insects identified and planted.

Gamhar

IWST started research on *Gmelina arborea,* important agroforestry timber species. Selection of 50 CPTs based on growth superiority, clear bole, and pest and disease resistance were made and multi location clonal and progeny trail with 25 clones were raised at Bengaluru, Shimoga and Dharward.

Agar

Aquilaria malaccensis (agar) an important tree from North Eastern States were introduced in Karnataka through selection of 45 plus trees at nursery to further establish provenance and progeny trials. 733 trials covering 1461 ha area under various species in different locations of Bengaluru, Hoskote, Kolar, Mandya and Tumkur research range were assessed for their growth and survival and respective recommendations were made based on the condition of the trees in the research plot and survival percentage.

Micro-propagation of rare and endangered species of orchids of Mizoram and re-introduction in wild (RFRI)

Protocol for *in vitro* seedling production of five different orchid species of Mizoram viz., *Dendrobium primulinum*, *D. transparens*, *Aerides odorata, Renanthera imschootiana* and *Cymbidium aloifolium* were developed.

A. *In vitro* culture of *Renanthera imschootiana;* **B.** *In vitro* culture of *Dendrobium transparens*

Evaluation of germplasm and transcriptome studies in eucalypts for water logging and salinity (FRI)

Clones of eucalypts are being screened for waterlogging and biodrainage applications. Whereby, it was attempted to screen large number of clones collected from various nurseries as well as from IFGTB, Coimbatore for screening tolerant eucalypts for planting in the farmers field using morphological and physiological parameters. Screening of water logging tolerant 50 clones has been completed and experiment is going on to screen another 40 clones for their tolerance to water logging conditions. The clones have also been planted in the field for their root distribution study. Relatively tolerant clones will be taken to field for final screening. The susceptible clones have shown yellowing of leaves and in some clones there is initiation of adventitious roots.

Photos showing water logging stress tolerance screening experiments and some of the morphological responses like yellowing of leaves and initiation of adventitious rooting in some clones

Conservation and evaluation of bamboo genetic resources of NE India (RFRI)

As a part of long term bamboo conservation and genetic improvement programme, RFRI conducted survey in different regions of NE India for collection of genetic resources of bamboo. 294 accessions of 10 bamboo species *Bambusa tulda*, *B. balcooa*, *B. cacharensis*, *B. nutans*, *B. pallida*, *Dendrocalamus hamiltonii*, *D. giganteous*, *Meloccana baccifera*, *Schizostachyum dullooa* and *Thyrsostychus oliveri* have been collected from different regions of NE states and a germplasm bank has been established at RFRI. Carried out evaluation of existing germplasm bank for different physical properties (wood density, shrinkage percentage) of *Bambusa tulda*, *B. balcooa*, *B. cacharensis*, *B. nutans*, *B. pallida*, *Dendrocalamus hamiltonii*, *Schizostachyum dullooa* and *Thyrsostychus oliveri*.

Development of descriptors and Distinctness, Uniformity and Stability (DUS) testing guidelines for indigenous forest tree species (*Tectona grandis* and *Melia dubia)* and establishment of Field Gene Bank (IFGTB)

Germplasm assemblage of teak at Chandrapur; International Provenance trial of teak at Marademalli, Andhra Pradesh; Clonal seed orchard of teak at Walayar was surveyed. The clonal collections were observed for their DUS characters developed in other locations. Leaf, flower and fruit characters were assessed and image data base was validated for DUS characters. All the clones were studied for their leaf, flower and fruit variation between the clones and uniformity with the clone across the replications.

DUS centre for eucalypts and casuarina (IFGTB)

Visited the clonal trials of eucalypts established at Thiyagadurgam, Marakkanam, Salem, Karunya and Ariyalur. All the listed DUS characters were observed in the planted clones in these places, especially IFGTB-EC6 and ITC7 as part of the DUS testing for conducting the onsite testing of IFGTB-EC6. In casuarina, DUS centre has assembled with around 100 clones of *Casuarina equisetifolia, C. junghuhniana* and their hybrids in Forest Campus, Coimbatore which constitute the example clones used for developing DUS testing guidelines for casuarina. This reference germplasm collection is periodically maintained for expression of all characters mentioned as descriptors in the guidelines. Characters are assessed annually in at least four trees of a clone for developing Clone Vs DUS character matrix. A separate block of 25 tress for the clone IFGTB CJ-9 has been established and being periodically assessed for which application for registration has been filed.

Propagation

Studies on plant propagation using suitable methods are underway at different ICFRE institutes. Some of the work is summarized below:

Name of the Institute	Species	Work done
FRI, Dehradun	*Cinnamomum tamala, Diploknema butyracea, Taxus wallichiana*	germplasm sources multiplied for establishing germplasm banks
	Ginkgo biloba	Development of tissue culture protocol
	Bambusa nutans, B. balcooa, B. tulda, B. vulgaris, Dendrocalamus strictus and *D. asper*	Commercial Production
TFRI, Jabalpur	*Bambusa nutans, Bambusa tulda, B. vulgaris* var. green, *Bambusa balcooa*	The clumps are being maintained
	Buchanania lanzan, Madhuca indica, Tamarindus indica	Development of tissue culture protocols
	Dalbergia latifolia Roxb.	Improving adventitious rooting
	Gmelina arborea	Production of clonal planting material
RFRI, Jorhat	*Bambusa tulda, B. balcooa, B. nutans*	Commercial production of quality planting material
HFRI, Shimla	*Cedrus deodara* (Roxb.) G. Don	Standardization of grafting technique
IFP, Ranchi	*Limonia acidissima* Linn. (Khaitha)	Standardization of clonal propagation technique

IFGTB, Coimbatore	*Aegle marmelos,* (bel), *Oroxylum indicum* (shyonkha), *Gmelina arborea*(ghamari), *Premna integrifolia* (agnimantha)	*In vitro* production of secondary metabolites
	Neolamarckia cadamba	Coppicing ability and rooting percentage have been studied and established
	Swietenia macrophylla	Standardization of vegetative propagation technique
	Casuarina and *Leucaena*	Farmer nurseries have been developed to propagate the clones
	Pterocarpus santalinus	Vegetative propagation methods of the identified genotypes were tried Coppice shoots multiplication seed germination
	Melia dubia	Vegetative multiplication garden established
IWST, Bengaluru	*Diospyros ebenum* J. Koenig ex Retz.	propagation through seeds and *in vitro* techniques
AFRI, Jodhpur	*Schizostachyum dullooa* (kite bamboo)	Development of tissue culture protocol
	Leptadenia reticulata	Developing tissue culture protocol

2.4.1

Projects under the Theme

➲ **Plan**

- Completed Projects 00
- Ongoing Projects 00
- New Projects Initiated During the Year 02

➲ **Externally Aided**

- Completed Projects 03
- Ongoing Projects 08
- New Projects Initiated During the Year 08

2.4.2

Sustainable Forest Management (SFM)

Assessment of Visitor Carrying Capacity of Kuruva Island, Wayanad, Kerala (IFGTB)

Visitor carrying capacity of the Pakkom - Kuruva Ecotourism site in South Wayanad division, Kerala was assessed based on the primary data collected through field inspection, interactions with officials of forest department and various stakeholders of the ecotourism site. The Visitor carrying capacity was assessed at the following three levels, Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC) and Effective Carrying Capacity (ECC). The visitor carrying capacity assessed in the study will be used by the SFD to limit the entry of visitors to the ecotourism sites.

The study recommended that a total of 1150 visitors may be allowed to visit the island on daily basis during the season, when the park is open for the visitors subject to the variation in limiting factors. The study also concluded that the number of visitors entering the area was high for the years 2014-15 to 2016-17 and it was well within the limits of carrying capacity for the last year, i.e. 2017-18.

Restoration of Orchid Flora of Makum coal field areas of Digboi Forest division (RFRI)

Site for establishment of Orchidarium was selected in the location of Tikok colliery of Makum Coal Field. *In-vitro* seed culture of a few orchid species was initiated for mass multiplication of the orchids.

Dendrobium nobile Lindl.

Aerides rosea Lodd.ex Lindl. & Paxton

Rhynchostylis retusa (Linn.) Blume

Papilionanthe teres (Roxb.) Schltr.

Capacity building on bamboo treatment techniques for promotion of earth quake resilient housings and structures in hill regions of Tripura (RFRI)

Bamboo housing structure for establishing micro-enterprise was constructed. One Vacuum Pressure Impregnation (VPI) treatment plant was installed at Barkathal to support these micro-enterprises and also for training and demonstration at the project site.

Awarness- cum-training on bamboo treatment

Vacuum pressure impregnation plant

Estimation of species wise bamboo resources and assessment of their utilization pattern in Mokokchung district of Nagaland, India (RFRI)

Six bamboo species viz., *Bambusa tulda*, *Bambusa pallida, Cephalostachyum capitatum, Dendrocalamus hamiltonii*, *D. sikkimensis* and *Schizostachyum dullooa* were identified in patches and growing stock was assessed . The traditional use of bamboos was documented.

Species-wise utilization pattern of Bamboo:

Scientific name	Vernacular name	Uses
Dendrocalamus hamiltonii	Aou	• Sert-Weighing machine • Chi- Basket • Khu- Basket • Khumong-Basket • Chi-khumong- Basket • Muluk- Basket • Mats • Plates • Yong • Aket- Storage for clothes
Schizostachyum dullooa	Ani	• Tempong- Container • Mats
Dendrocalamus spp.	Changpo	• Chong- Warrior shield
Bamboosa tulda	Longmi	• Spoon • Merci-sempong- Mortar and Pestle • Nukpang- Machete handle

Some of the utilization pattern

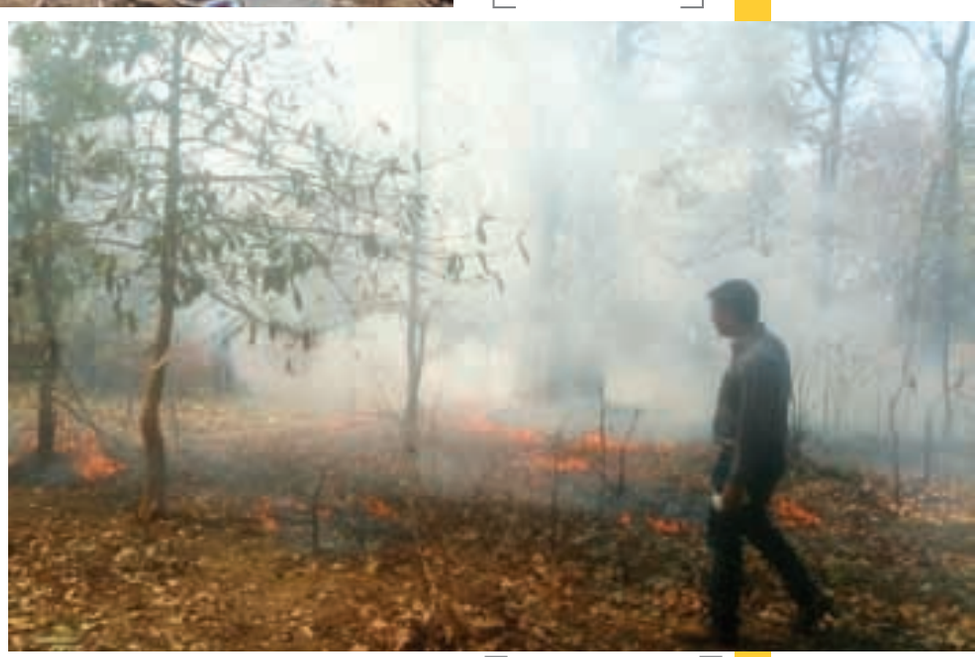
Bamboo enumeration

Collection of tendu leaves

Assessing the impact of pruning of *Diospyros melanoxylon* bushes on its yield, quality and natural regeneration of tree species in Maharashtra (TFRI)

Maximum Specific Leaf Area (SLA) was found for healthy leaves, followed by defoliated, diseased and gall infected tendu leaves in State Forest Department (SFD) and Community Forest Rights (CFR) controlled forests in Gondia and Gadchiroli forest divisions of Maharashtra. SLA of second and third harvest in the same season was reported higher as compared to first harvest leaves, which shows that the quality of tendu leaves increased with age. Carbohydrates content was reported maximum in healthy leaves, followed by gall infected and defoliated leaves and minimum in diseased leaves, while ascorbic acid was reported higher in defoliated leaves.

Controlled fire experiment was conducted at Mehtakheda (dist. – Gondia), where pruned bushes and non-pruned poles were present. The number of healthy leaves in both pruned bushes (72.03%) and non-pruned poles (48.36%) was reported higher in fire experiment than their respective controls (49.20% and 32.84%, respectively), while defoliated, diseased and gall infested leaves were found more in control. The SLA of healthy leaves (14.24 mm^2/mg) in controlled fire experiment was also observed higher than control (11.20 mm^2/mg). The controlled fire experiment enhanced the quantity and quality of tendu leaves.

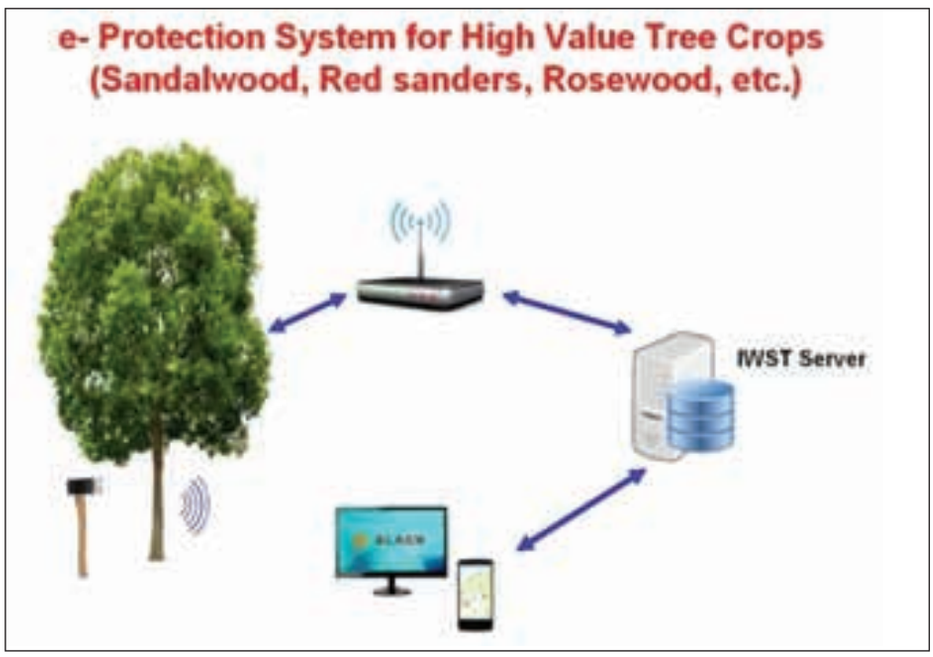


Control fire experiment conducted Mehtakheda-2, Maharashtra

2.4.3

Information and Communication Technology (ICT)

Protocol standardization for microchip based e-protection system for valuable trees (IWST)



Protocol standardization for microchip based e-protection system for valuable trees has been carried out, model microchip assembled and communication between the microchip has been tested. Microchips have been installed in sandalwood trees at IWST campus (50) and farmer's fields (30) respectively

IWST has also established a data server to interlink the microchips that are embedded with the high value trees.

During the 2nd phase, the technology will be further upgraded (reduction in size of microchip and camouflage) to make technology commercially viable. Development of protocol for microchip based e-protection system for sandalwood trees would help to conserve and enhance the status of these precious bio-resources of the country.

Development of database on Non-Timber Forest Produce (NTFP) in Karnataka (IWST)

Web database has been developed based on expert's and stakeholders opinion on various field of NTFP. Primary data about the availability and pricing was collected from 23 NTFP markets of Karnataka while secondary information about NTFPs was collected from various sources (published lilterature). This NTFP information system will interconnect the Large-sized Adivasi Multipurpose Cooperative Societies (LAMPS) and decision makers of the Karnataka forest department.

2.5.1

Projects under the Theme

➲ **Plan**

- Completed Projects 08
- Ongoing Projects 12
- New Projects Initiated During the Year 02

➲ **Externally Aided**

- Completed Projects 04
- Ongoing Projects 10
- New Projects Initiated During the Year 06

2.5.2

Wood and other Lignocellulosic Composites

Formaldehyde emission reduction from wooden panel products (IWST)

Emission of Formaldehyde from wood composites (Particle boards, plywood etc.) is cause of major concern from environmental point of view because it is harmful for human health. Efforts are on in minimizing such emissions throughout the world. Such an effort is also going on at Institute of Wood Science and Technology, Bengaluru. Particle boards were prepared from *Melia dubia* wood using Urea Formaldehyde (UF) resin mixed with different proportion of chemical scavenger (Ammonium bicarbonate and Sodium metabisulfite). Both the scavengers were found very effective in reducing formaldehyde emission to acceptable limits (E1 class i.e. <8mg/100g)) without affecting the bond strength.

Development of bamboo lumber using different bamboo species and evaluating its utilization potential as alternate to solid wood lumber for different structural applications (IWST)

Laminated Bamboo Lumbers (LBL) were prepared using matured culms of two bamboo species (*D. brandisii* and *B. vulgaris*) by selecting various combinations of pressures and durations. The process parameters were optimized for better strength properties. The strength properties of lumber of both the species were found to be better than teak and can be recommended for use in load bearing applications.

Laminated bamboo lumber

Value-addition of low density woods by producing nano-wood-composites (NWC) with enhanced properties for high end applications (IWST)

Density is main parameter for mechanical strength in wood. Abundantly available low density woods can be better utilized if their density is increased. Three low density timber species, namely, *Maesopsis eminii*, *Melia dubia* and *Ailanthus excelsa* were impregnated with two resins (phenol formaldehyde and melamine formaldehyde) blended with different proportions of nano-clay using vacuum-pressure technique for improving their various technologically important quality parameters. Compared to untreated control, improvements in density and flexural strength ranging from 15-20% and 30-52% respectively, were observed after resin impregnation.

Nanocellulose Networked Natural Fiber Composites (IWST)

Nanocellulose Networked Composites

A protocol to synthesize nanocellulose from pulp fibers was standardized and the unique property of nanocellulose to form a complex network was effectively used to develop completely biodegradable natural fiber based composite material. The nanocellulose film exhibited very high stiffness (storage modulus – 120 GPa) and negligible damping coefficient. Composites with density ranging from 0.100 g/cc to 0.800 g/cc were prepared by mixing nanocellulose suspension with fibers. Tensile strength, flexural strength, dynamic modulus of elasticity and electrical resistance of thus made composites increased with increasing density. The developed material can be used as biodegradable packaging material.

Radio frequency cured wood composites (IWST)

Time is very important factor in commercial production of composites by industry. Curing of adhesives using hot press is in practice in composite wood industry and takes substantial time. Attempts are underway to develop technology to reduce the curing time of adhesives and pressing time in wood composites in project "Role of nano-fillers in composites and finger jointed wood". The results of the study conducted so far clearly indicate that substantial reduction in curing time is achievable using the technique.

2.5.3

Wood Processing

Hollowness detection technique in standing trees (FRI)

An extensive work has been completed on hidden defects (hollowness and multiple cracks) detection technique in standing trees using ultrasonic waves. The technique is effective and user friendly because available ultrasonic generator is portable and can be easily taken to test site. Status of hollowness in more than 50 standing trees of different species (*Grevillea robusta*, *Eucalyptus* spp., *Chorisia speciosa*, *Syzygium cumini*, *Mangifera indica*, *Adenanthera microsperma*, *Pleiogynium cerasiferum*, *Lagerstroemia speciosa*, *Chorisia speciosa*, *Sapindus mukorossi*, *Adenanthera*

Ultrasonic testing technique for hollowness and cracks detection in standing trees

pavonina, *Melia* spp., *Delonix regia*, *Peltophorum* spp., *Adina cordifolia*, *Pinus roxburghii*, *Chukrasia* spp., *Araucaria* spp. etc.) along different road sides in the Forest Research Institute campus has been detected successfully by this technique. This technique is of prime importance to forest managers for prescribing silvicultural treatment and maintaining a healthy forest. It is also important to the industries in terms of making accurate quality assessment which directly affects the production of wood. FRI is in communication with Uttarakhand Forest Department for imparting training on this technique to their staff.

Exploratory studies on wood welding on common Indian wood species (FRI)

Wood welding is new to our country. In this technique wood joints can be made without using nails and adhesives making them more natural and chemical free. A wood welding machine has been designed and fabricated at Forest Research Institute, Dehradun. Extensive research work is going on using this machine. Success has been achieved in spin welding of wood pieces of few species.

Welded wood piece

Wood welding machine set-up

Efficacy of Nano metal oxides as wood preservative (IWST)

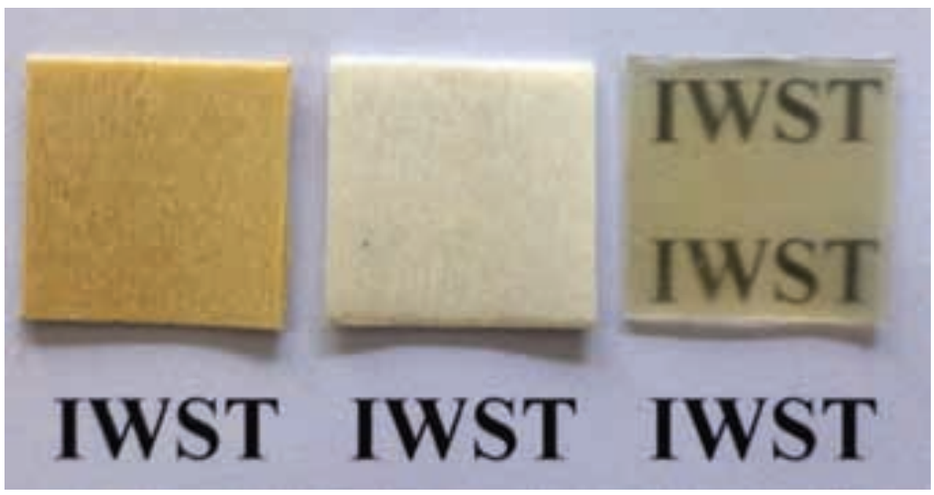
Treatment of perishable timber with wood preservative chemicals is essential for enhancement of service life of timber. Many times a proven wood preservative chemical cannot be used for treatment of impermeable species due to constricted capillaries in wood and bigger size of molecules of preservative chemical. Nano size molecules are able to penetrate timber through and though with less efforts and time. Wood specimens of *Hevea braziliensis* (Rubber wood) treated with nano metal zinc oxide by pressure and non-pressure methods showed that nano zinc oxide is well absorbed by the wood specimens and gets fixed (92% fixation in leaching experiments). The efficacy of nano zinc oxide against termites in the field, and brown rot and white rot fungi in the laboratory was evaluated and compared with normal zinc oxide. Nano zinc oxide shows more antifungal property than normal zinc oxide. The pressure treated wood specimens were found to be in sound condition against termites after 24 months of field exposure. The study reveals that nano zinc oxide could potentially be used as an effective wood preservative.

2.5.4 Value Addition and Utilization

Development of wood finger joints with better mechanical strength (FRI)

Finger joints have been of prime importance in solid wood industries. Finger jointed wood is widely used by wood industry in pallet manufacturing. In the continuing efforts to improve the efficiency of finger joints with eucalyptus hybrid sections using adhesive manipulation, 14 different adhesives combinations have given field applicable results. The study revealed that UF (Urea Formaldehyde) and PU (Polyurathane) could yield bending strengths exceeding 60 % of clear wood sections by adopting a suitable finger profile.

Development of transparent wood (IWST)



Schematic illustration and photographic images of Natural wood (Left most), Lignin modified wood (middle) and Transparent wood (right most) placed on a paper with letters "IWST"

A flexible and biodegradable transparent wood has been fabricated using poplar wood veneer and water soluble polymer - polyvinyl alcohol. The transparent wood exhibited high optical transmittance, high haze and light diffusing property.

2.6.1

Projects under the Theme

➲ **Plan**

• Completed Projects	04
• Ongoing Projects	16
• New Projects Initiated During the Year	01

➲ **Externally Aided**

• Completed Projects	00
• Ongoing Projects	11
• New Projects Initiated During the Year	07

2.6.2

Resource Development of NWFPs

Characterization and extraction of eco-friendly dyes from eucalypts, melia and casuarina-leaves and bark; their application in textile industry (IFGTB)

Extraction of dye from the leaves and barks of *Eucalyptus* spp. (thailam), *Casuarina equisetifolia* (savaku), *Melia dubia* (malai vembu) were carried out to evolve maximum dye components. Different mordants were tried to study the dye binding capacity in different fabrics. Adapted different protocols for screening and isolation of potential dye from the species. Cost effective natural dyes can be utilized in small scale dyeing industries.

Studies on estimation of agro-economics, market price spread and gap analysis in cultivation and processing of senna and isabgol in Jodhpur division of Rajasthan (NMPB, New Delhi) (AFRI)

Preliminary survey revealed that RI-1 variety of isabgol is generally cultivated by 90% farmers in Jodhpur division. However, a few farmers used their own seeds while some farmers purchased seeds from private companies like Weston, Urmi and Avni. RI-1 variety is sold at Rs. 120/kg and it yields 12-16 q. seeds/

ha whereas the treated seeds of private companies cost around Rs. 200-250/- per kg. Four kg seed is required for sowing in 1 ha area. On an average 9.00-12.55 quintals of seeds of isabgol per hectare was obtained by farmers depending on variety and cultural operations. The straw is used as cattle feed and straw yield is double than the seed yield.

Collection, Processing and Storage Methods

No proper collection, processing and storage method is adopted for the crop. Harvested crop is collected and left in open space in sunlight for 5-6 days or until processing. Chances of crop damage are frequent at this stage. Untimely rain may destroy the harvested crop or crop may absorb moisture from atmosphere and may get damaged.

Isabgol harvesting in farmers field

Existing value chain: Though farmers sell the seed either in the local market/ APMC or to the village level traders, however, all stock finally goes to Unjha Mandi, in Gujarat from where it is purchased by processors. From here, the channel is divided into three:

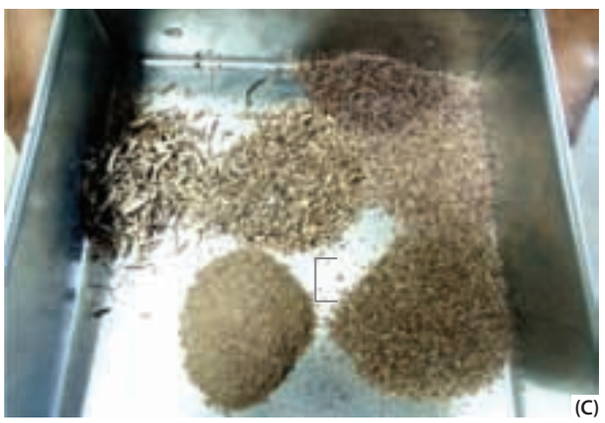
The 1st one is for domestic markets- where pharma/health care companies take the commodity either from the processor directly or through distributors and sell it in their branded and packed form.

The 2nd channel ends up with export market which is eventually 90% of the total processed isabgol. Both the processors and distributors engage in export of isabgol.

The 3rd channel is animal husbandry sector, where the animal feed processors take the balance part of the seed to use it as animal feed. They again distribute it through their channel after mixing with other ingredients.

(A)

(B)



(C)

A. Auction of Isabgol in APMC; **B.** Isabgol processing in factory; **C.** Separation of extraneous particles from Isabgol

Sonamukhi : Existing Value Chain

Farmers sell the seed and pod either directly to the processor or to the village level trader, and traders in turn, sell it to the processor. However, all stock finally goes to Phalodi & Sojat processing unit. The processor pay the Mandi tax on the material purchased either directly from farmers or middlemen.

After processing, pharma/health care companies take the senna either from the processor directly or through distributors and sell it in their branded and packed forms.

Sonamukhi crop in farmers field

Grading of Sonamukhi leaves etc. after processing

Capacity building of VFPCs/SHGs through value addition of selected underutilized NTFPs for enhanced livelihood opportunities in arid and semiarid Rajasthan (AFRI)

Several villages in two districts namely, Pali (103 villages) and Sirohi (24 villages) of Rajasthan were surveyed for documentation on collection, use and marketing of seven NTFPs in rural areas.

Collection, use and marketing of some NTFPs in Pali and Sirohi

S. No.	Name	Parts collected	Quantity collected/ year in Kg (Mean± S.D.)	Prevailing market rate (Rs./Kg)	Value added products from NTFPs
1	*Tamarindus indica*	Fruits	(51.25 ± 5.04)	30-40	Juice and pickle from pod
2	*Momordica dioica*	Fruits	(35.31± 15.68)	40-60	Dried fruits storage and pickle
3	*Leptadaenia reticulata*	Pods	(19.25 ± 6.04)	80-100	Pickle from pod
4	*Cordia gharaf*	Fruits	(21.12 ± 2.36)	600-800	Murraba from fruit
5	*Feronia limonia*	Fruits	(30.50 ± 5.25)	40-50	Murabba/Chutni/ Pickle/Jam from fruit
6	*Butea monosperma*	Leaves	As & when required	--------	Pattal Dona (Leaf Plate)
7	*Butea monosperma*	Flowers	(18 .50 ± 2.25)	40-50	Herbal Gulal

Value addition: *Feronia limonia* fruits were collected; and analysis of moisture percent, total sugar, protein and ash content was carried out. Two products namely, pickle and murrabba were prepared from collected fruits. The products were preserved and no microbial growth was observed up to five months. Further study is under progress.

Value addition of *Tamarindus indica* : Fresh mature tamarind pods were collected and squash, chutni and jam were prepared. No microbial growth was observed after three months. Further study is under progress.

Value addition of *Diospyros melanoxylon* : Fresh mature tendu fruits (Timru) were collected and squash and jam were prepared. Microbial growth was observed after one week. Work is in progress to increase the shelf life.

Standardization of inoculation technique for agarwood formation in *Aquilaria malaccensis* Lamk. in Khasi and Garo Hills of Meghalaya (RFRI)

Artificial inoculation was carried out in 4 districts of Meghalaya, viz.,South West Khasi Hills, North Garo Hills, West Garo Hills and South West Garo Hills. All total 139 nos. of *Aquilaria malaccensis* trees were inoculated with three different types of fungal cultures. Data on formation of agarwood was recorded at monthly interval at the site of artificial inoculation. Hands on training on artificial induction of agarwood was also imparted to the farmers of Anangpara (West Garo Hills).

Training at Anangpara (West Garo hills)

Formation of Agarwood

Provenance Resource Stand (PRS) was established with the seedlings from 14 provenances. Agar-based agroforestry models were established at Namti in Sivasagar district of Assam and at FRCBR, Aizawl. Powder formulation of three fungi responsible for agarwood formation were tried in different agar plantations of Assam and this yielded positive response. Macropropagation trial of *A. malaccensis* using different growth regulators, rooting media and type of cuttings revealed that hard and semi hard cuttings treated with Indole Butyric Acid (IBA) in coarse sand media was best in terms of sprouting/ rooting.

Formation of agarwood can be visualized from the discoloration of the wood at the point of inoculation. Maximum discoloration could be noticed up to 33.74 cm from the point of inoculation at RFRI campus after13 months of inoculation.

Co-ordinated Research Programme on agar (*Aquilaria malaccensis* Lamk.) (RFRI)

A. Microbial formulations prepared for future inoculation; **B.** Inoculation of *Aquilaria* trees with freshly prepared microbial formulation; **C.** Formation of agarwood after one month of inoculation; **D.** Formation of agarwood after nine months at Duliajan; **E. F.** Growth of rooted plantlets raised from branch cuttings in polybags

Evaluation of genetic superiority and stability of identified high active ingredient content accessions of *Picrorhiza kurroa* Royle ex Benth., *Valeriana jatamansi* Jones and *Podophyllum hexandrum* Royle through multi-location trials and promotion of their cultivation amongst rural communities (HFRI)

Field Gene Bank of *Valeriana jatamansi* (mushkbala) at Shilly, Solan

Observation on morphometric traits of mushkbala, kutki & ban kakdi raised in multi-location trials at Kullu, Solan, Shimla and Kinnaur districts of Himachal Pradesh were recorded. These species were multiplied through seed and macro-proliferation techniques for distribution among stakeholders. To evaluate genetic superiority and stability of these species active ingredient is being analyzed.

2.6.3

Chemistry of NWFPs, Value Addition and Utilization

Bioprospecting of *Pinus roxburghii* needle wax and other extractives (FRI)

Fiber from pine needle

Pinus roxburghii Sarg. is the most abundant species in Himalayan region. The needles of the species largely contribute to the forest biomass and remain the major cause of forest fires leading to climate change, biodiversity loss, etc. In our further quest for utilization of pine needles, it was envisaged to find out the possibility towards preparation of pine fibres from pine needles for diverse applications. The fibre was isolated in quantitative yield of 40% using facile and green process which can be replicated on large scale and is cost effective. The Pine fibres prepared may be utilized in several industries for varied applications. Further, pine needles were also tested for Agarbatti manufacture and laboratory results indicated their suitability for the purpose.

Utilization of forest biomass through value added application as source of natural dyes (FRI)

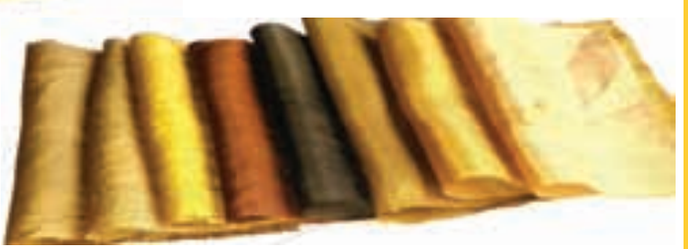
Inadequate supply of raw material (plant biomass) and inconsistency in colours are the key reasons behind non-emergence of natural dyes as practicable substitute of synthetic dyes. Therefore, exploration of new source plants for natural dye is realized. With this milieu, renewable biomass of altogether 10 plants namely *Alternanthera philoxeroides, Cassia fistula, Erythrina suberosa, Ardisia solanacea, Cassia occidentalis, Terminalia alata, Mimosa himalayana, Acacia modesta*, *Prosopis juliflora,* and *Lannea coromandelica* were investigated for yield and dyeing characteristics. The yield of natural dye ranged from 9.03 to 19.68 % and their dyeing performance on silk, wool and cotton fabric was found excellent to very good. This evidently established these plants as promising source of natural dye, thereby augmenting the existing raw material source for natural dye production.

Dye yield and dyeing performance of natural dyes from investigated plants

Plant Species Investigated	Dye yield (%)	Dyeing & Fastness Characteristics on Fabrics (on 5 point scale as per BIS)		
		Silk	Wool	Cotton
Alternanthera philoxeroides (Alligator weed, Phackchet)	15.51	Excellent	Excellent	Very Good
Cassia occidentalis (Kasunda, Bari kasondi)	17.46	Excellent	Excellent	Very Good
Terminalia alata (Indian Laurel)	9.62	Excellent	Excellent	Good
Acacia modesta (Phulai)	14.18	Excellent	Excellent	Good
Prosopis juliflora (Vilayati babul)	14.88	Excellent	Excellent	Very Good
Ardisia solanacea (Duck's eye)	10.49	Excellent	Excellent	Very Good
Cassia fistula (Amaltas)	14.60	Excellent	Excellent	Good
Mimosa himalayana (Shiahkanta)	19.68	Excellent	Excellent	Very Good
Erythrina suberosa (Dhaul dhak)	10.89	Excellent	Excellent	Good
Lannea coromandelica (Indian ash tree /Mohin)	9.03	Excellent	Excellent	Very Good

[5-4 = Excellent; 4-3 = Very good; 3-2 = Good]

Dyed wool fabrics



Dyed silk fabrics

Dyed cotton fabrics

The product "**Tara red**" a natural colourant developed from red tamarind, *Tamarindus indica* var. *rhodocarpa* has been utilized in the preparation of Jam, lipstick and for dyeing cotton and silk fabrics. The anythocyanin pigment, Cyanidine 3 glycoside was identified in the red tamarind extract which is responsible for red colour as well as possessing antioxidant properties. The stability and the mandatory parameters of the products were retained for 10 months. Therefore, the extract may be used as natural colourant in food and cosmetic industries.

Ailanthus excelsa for alternate protein: as a potential fodder in terms of nutritive value and qualitative assessment (IFGTB)

Leaves were collected from the *A. excelsa* accessions during winter season in order to study the seasonal variation in the chemical composition and processed for further analysis. Estimation of minerals in 64 accessions of *A. excelsa* leaves was made. HPLC analysis of the leaves of *A. excelsa* revealed the presence of essential amino acids like histidine, threonine, methionine, phenylalanine, tryptophane, leucine and lysine and non essential amino acids like glycine, norleucine, aspartic acid, cysteine, glutamic acid, serine, cystine and proline. It was observed that the CF was comparatively low and optimum during the winter season than in summer. *In vitro* Dry Matter Digestibility (IVDMD) analysis was performed for selected accessions of *A. excelsa* based on high protein content collected during winter season and it ranged between 47.17 % and 68.14 % and almost all accession found to have IVDMD

A. excelsa plantation at IFGTB field research station at Kurumbapatti, Salem

more than 50%. Over all the leaves of *A.excelsa* collected during winter season found to have all required constituents at par with BIS specification recommended for cattle and found promising. Out of 20 amino acids 15 were found in leaf of *A. excelsa*. The outcome will help in development of value added product from fodder tree species as cattle feed.

Collection and processing of *A. excelsa* leaf samples from IFGTB field research station at Kurumbapatti, Salem

Exploration of methods to enhance the shelf-life and fixative property of neem based eco-friendly preservatives (IWST)

Extraction of neem oil from seeds and phyto-chemicals from leaves carried out and 13 different formulations were made for evaluation of their shelf life. Physio-chemical properties of neem oil and different formulations, viz, refractive index, specific gravity, acid value and ester value were also analysed at regular intervals for assessing its shelf-life and fixative properties. The new formulations will be cheaper and also efficient as natural preservative and fixative.

2.6.4

Biofuels and Bioenergy

Study on production of briquettes from invasive forest weed and its utilization by JFM villages (IWST)

Briquettes made of *Lantana camera*

High density briquettes were successfully prepared using *Lantana camara* (lantana) and *Prosopis Juliflora* (ballari jalli) biomass using an industrial briquetting machine. The density of briquettes ranged from 1.17 g/cc to 1.25 g/cc. The briquettes produced from *Lantana camara* and *Prosopis Juliflora* were found to have high energy density i.e. 5.56 Gcal/m^3 and 5.46 Gcal/m^3, respectively. Low ash content (<2%) present in the briquettes gives an added advantage. Trainings were given to local briquette making industries, Karnataka Forest Department officials and villagers on the process and briquettes were distributed for usage and feedback. The feedback from the industries was encouraging.

2.7 FOREST PROTECTION

2.7.1

Projects under the Theme

➲ **Plan**

- Completed Projects 03
- Ongoing Projects 23
- New Projects Initiated During the Year 00

➲ **Externally Aided**

- Completed Projects 10
- Ongoing Projects 18
- New Projects Initiated During the Year 08

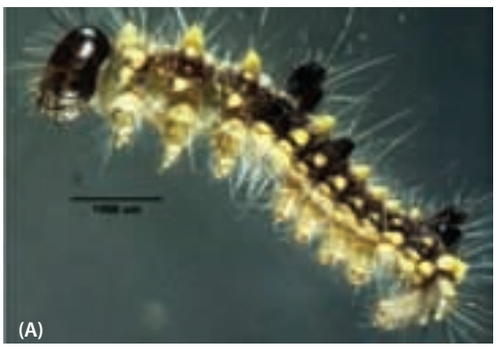
2.7.2

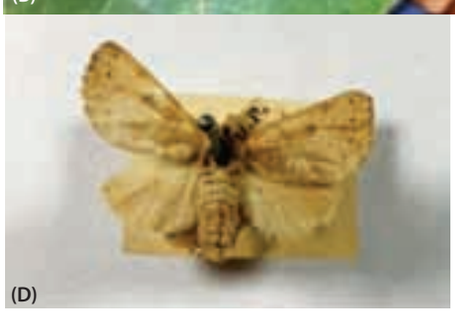
Insect pests, diseases and control

Screening of poplar clones for tolerance against poplar leaf defoliator, *Clostera cupreata* But. (FRI)

To assess the tolerance level of different poplar clones against *Clostera cupreata* through feeding preference, laboratory experiments were conducted. The preliminary screening study of thirty five newly developed clones of FRI-FS series was done in comparison with G-48 and it was found that five clones developed by FRI have showed resistance against *C. cupreata*. Biochemicals responsible for insect resistance (total phenols, tannins, and flavanoids) were also studied which also shows significant difference among these thirty five clones.

Egg mass of *Clostera cupreata*





A. Larva of *Clostera cupreata* 4 days old; **B.** Larval stage of *Clostera cupreata* feeding on poplar; **C.** Pupal stage of *Clostera cupreata;* **D.** Adult stage of *Clostera cupreata*

Development and extension of *Trichoderma* spp. based formulation for disease bio-control and plant growth promotion of eucalypts seedlings (FRI)

Trichoderma spp. have been found to protect plants against diseases and help in better growth. In this project, effective *Trichoderma* isolates were identified for enhancing *Eucalyptus* seedlings growth and protection against important diseases. Cultivation protocol for *Trichoderma* on agrowastes such as sugarcane bagasse, wheat and paddy straw was demonstrated in different Green Skill Development Programme, Van Vigyan Kendra, Extension trainings, Kumbh Mela, training conducted at FRC-ER, Prayagraj, exhibitions organized by FRI etc.

Trichoderma sp. mass production on agrowaste

Germination in *Trichoderma* treated seeds

Sal mortality in Uttar Pradesh Forests (FRI)

Sal mortality in Gorakhpur Forest Division, Uttar Pradesh was found to be caused by root rot fungus *Polyporus shorae*. Four forest ranges were found to be affected with the disease. All the sites had high water table and good under storey growth of weeds leading to high moisture favouring the disease.

Sal mortality in Gorakhpur Forest Division

Fungal sporophores at the base of sal tree

Health Status Assessment of the Trees in 'C' Hexagon Area near India Gate (FRI)

In the honour of Armed Forces, a National War Memorial and War Museum adjoining Princess Park area in the vicinity of the India Gate, New Delhi was to be erected. Maj. Gen. & Chief Project Coordinator (NWM&M) communicated regarding the need for the health survey of old and infirm trees in 'C' Hexagon area near India gate to enhance their life. Thus this project was envisaged for the health assessment of old trees in lawn no. 1, 2 & 3 i.e. area where National War Memorial was coming up. Tree health assessment was done at National War

Mounding, asphyxiation and leaf yellowing in Jamun

Heart rot in tree trunk in jamun

Memorial and adjoining lawns near India Gate, New Delhi where more than 450 trees were examined for pathological, entomological, physiological and edaphic problems. Stag head symptoms and leaf yellowing could be seen in some trees. Mechanical injuries and pruned branches served as infection court. Some jamun trees were being strangulated by parasitic angiosperm plants. The heart rot in main trunk and branches of trees need to be monitored. Insect infection in amaltas was observed. *Ganoderma* sp. infection was observed in one partially dead gulmohar tree.

Providing technical advice for the upkeep and maintenance of holy bodhi tree, heritage pipal tree at village Main, Bellaganj, Vat Vriksha at Jyotisar Tirth and three holy saplings at Patna (FRI)

The holy bodhi vriksha was regularly examined for pathological, entomological, physiological and edaphic problems. Accordingly, treatments and management practices were recommended and their execution was monitored. Holy pipal tree at historical Koteshwarnath temple was found to be infected with *Dendrophthoe falcata*, hence removal of infected branch portions followed by disinfectant application was suggested. Removal of the remnants of net meshes, iron chain with lock placed up on higher branches and unwanted stuff near root zone of Vat Vriksha at Jyotisar tirth was recommended. Holy saplings in Buddha Smriti Park, Patna were found be infested with insects and fungal infections. Accordingly suitable treatments were administered.

Holy pipal tree at historical Koteshwarnath temple infected with *Dendrophthoe falcata*

Treatment of pruned branch stub of holy bodhi vriksha

Insect pest complexes on medicinal plants and the influence of pest damage on their active principles (IFGTB)

Documentation of insect pests spectrum of medicinal plants importantly the species like *Gloriosa superba* (gloriosa lilly or bachnag) , *Withania somnifera* (ashwagandha), *Cassia angustifolia* (senna or Tirunelveli senna), *Aloe vera* (aloe) and *Mentha arvensis* (mint or pudina) in different agro-climatic zones of Tamil Nadu and Kerala exhibited 16 different species of insects were associated with the species and causing damage. Feasible eco-friendly management measures using plant based chemicals such as combinations of neem oil, pungam oil, adhatoda and tobacco leaf extract were developed. Variations in active principles in insect infested and un-infested medicinal plants identified. A pest calendar was prepared based on the periodicity and intensity of attack of the pests on each species of the medicinal plants studied. Farmers involved in raising medicinal plants will be benefited by the package of practices developed through this project to manage pest problems in medicinal plant species.

Insect pests of out planted saplings of ToF (Trees Outside Forests) species and their management (IFGTB)

Insect pests spectrum of trees like *Tectona grandis* (teak), *Gmelina arborea* (gamhar), *Ailanthus excelsa* (Indian tree of heaven) *Santalum album* (sandal), *Thespesia populnea* (poovarasu), *Melia dubia* (malabar neem) *Pterocarpus marsupium* (venga), *Azadirachta indica* (neem) and *Pterocarpus santalinus* (red sanders) planted outside forests by farmers in different agro-climatic zones of Tamil nadu was documented. About 39 species of insects belonging to different types of defoliators, sapsuckers, gall makers were recorded. Suitable management measures with a special emphasis on plant based chemicals like Combinations of neem oil, pungam oil, adhatoda and tobacco leaf extract were developed and standardized for the key pests. To the benefits of end users a pest calendar was also prepared based on the periodicity and intensity of attack of the insect pests on each species.

Probable pest infestation level — L- LOW | M- MEDIUM | H- HIGH

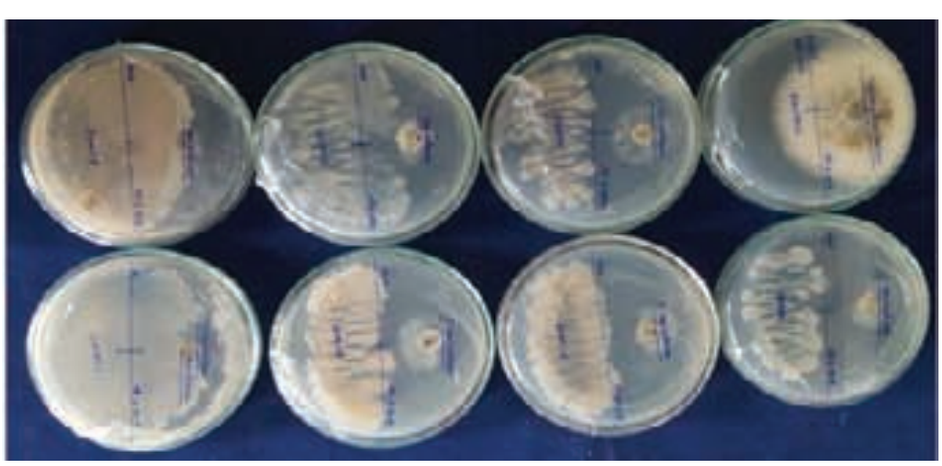
TREE	PEST	INJURY	MONTH											
			J	F	M	A	M	J	J	A	S	O	N	D
Ailanthus excelsa	*Eligma narcisus*	Defoliation	H					L				H	H	H
	Atteva fabricella	Defoliation	M	M						M		H	H	H
	Thrips	Sap feeding	L	L										
Gmelina arborea	*Tingis beesoni*	Sap feeding	H	M			M	H		H		H	H	
	Eupterote geminata	Leaf feeding												
	Alcides gmelinae	Stem boring										H		
	Yaminia gmelini	Leaf defoliation	L					M					H	
	Leaf miner	Sap feeding	M											
Melia dubia	*Dolichothrips indicus*	Sap feeding	L											
	Dasynus sp.	Sap feeding												
	Parlatoria sp	Sap feeding	M		L									
Tectona grandis	*Hyblea purea*	Defoliation	M				H	M	M	H		L	H	H
	Eutectona machaeralis	Skeletenizer	M									H	H	
	Ferrisia virgata	Sap feeding	H					L	H	L				
	Hard scale	Sap feeding	L											
	Puff gall		M	H	L	M	M	L	M					
	Aphids	Sap feeding	M											
	Psyllids	Sap feeding	M	L	M					M				
	Thrips	Sap feeding						L	L					
	Mites	Sap feeding						M	M					

Probable pest infestation level — L- LOW | M- MEDIUM | H- HIGH

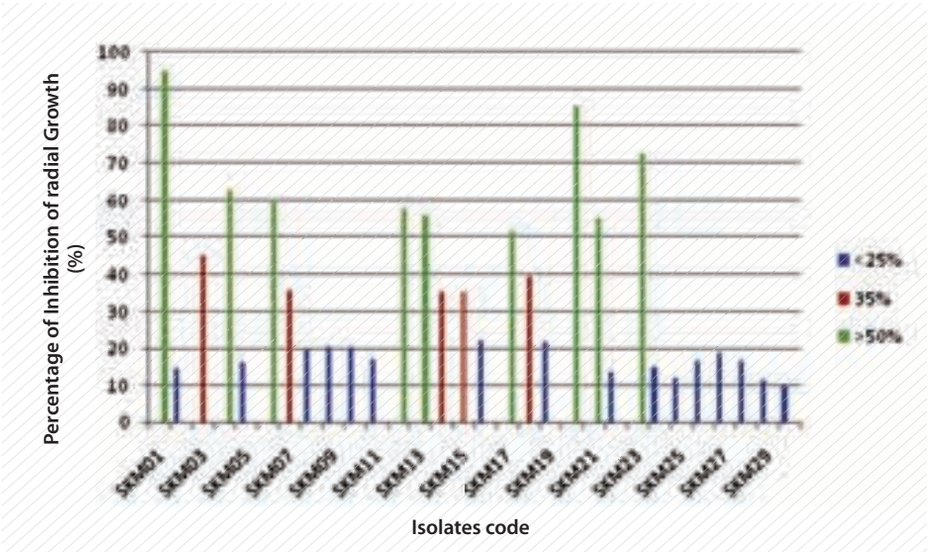
PLANT SPECIES	PEST	INJURY	MONTHS											
			J	F	M	A	M	J	J	A	S	O	N	D
	Cryptocephalus sp.	Defoliation							L	L	L			
Aloe vera	Snail	Spot feeding	H											H
Gloriosa superba	*Polytela gloriosae*	Defoliation								L	M	H	H	L
	Plusia signata	Defoliation								L	L	M	H	L
Mentha spiciata	*Spodoptera littura*	Defoliation	L	L	L	L	M	M	M	M	L	L	L	L
	Syngamia abruptalis	Defoliation					M	M						
	Aphis gossypii	Sap feeding					M	M						
Mentha viridis	*Cochlochila bullita*	Sap feeding	H							M				
Senna spp.	*Catopsilia crocale*	Defoliation					L							
	Etiella zinckenella	Seed pod feeder						M			M			
	Eumeta cramerii	Defoliation					L				L	L		
Withania somnifera	*Epilachna viginti octopunctata*	Defoliation									L	L	L	L

Investigation on mortality of *Casuarina equisetifolia* and *C. junghuhniana* (savukku, jungli saru, jaun, and katradi) in different districts of Tamil Nadu revealed that the problem was associated with different causal organisms such as *Diplodia natalensis, Fusarium oxysporum, Phytophthora infestans, Ralstonia solanacearum* and *Trichosporium vesiculosum*. With a view to develop suitable management measures different isolates of beneficial microbes such as *Bacillus* and *Trichoderma* species obtained from the rhizosphere of healthy plantations of casuarina were evaluated for their antagonistic effect against the pathogen *T. vesiculosum* under *in vitro* condition. Nine isolates of *Bacillus velezensis* effectively inhibited the mycelial growth of the fungal pathogen.

Investigations on casuarina mortality in different agro-climatic zones of Tamil Nadu and developing of suitable management measures including identification of tolerant materials (IFGTB)



Antagonistic effect of isolates of *Bacillus* against stem wilt disease pathogen



Antagonistic effect of different bacterial isolates against the stem wilt disease pathogen, *T. vesiculosum* under *in vitro*

Bioformulations of *Micromonospora* for bio control and biofertilization activity in Casuarinas (IFGTB)

The beneficial microbe, *Micromonospora* spp. isolated from the root nodules of *Casuarina equisetifolia* (jungli saru) was mass cultured and tested for its bio-control and bio fertilization activities in the field. The microbe applied to the wilt affected saplings of casuarina clone (CH5) at farmers field could effectively control the diseases and 100% recovery of the affected plants was observed. Three strains of *Micromonospora* spp. obtained from the field were identified as *M. maritama*, *M. chalceae* and *M. shwarzwladiensis* through 16s rRNA sequence. These sequencing were deposited in National Centre for Biotechnology Information (NCBI).

Sapling of casuarina clone (CH5) affected by wilt disease (left) and recovery of the seedling from the disease after application of *Micromonospora* (Right)

Development of Integrated Pest Management (IPM) strategies against the major defoliating pests of Mangroves in the Thane district of Maharashtra (IWST)

Observations were made on the pest problems of important mangrove species *Avicennia marina*, *Avicennia officinalis*, *Sonneratia apetala* and *Sonneratia alba*. Nine different types of defoliating pests (five caterpillars, two grasshoppers and two beetles) were collected from the mangrove ecosystem. The leaf minor attack was of moderate level intensity. The skeletonizer/shoot attack was more during October and November. The defoliator *Hyblaea purea* attack was more during the period August and September and the intensity level was moderate. Semi-looper attack was also of moderate level intensity feeding on *A. marina* and *A. officinalis*. One entomopathogenic fungus isolated from cadavers of an unidentified lepidopteran larvae was identified as *Nomuraea rileyi* (Farl.) Samson under the family Clavicipitaceae. Three predatory spiders and one species of predatory mantid were collected from the field. One predatory coccinellid beetle was collected from the field. Pathogenicity test was conducted by using the entomopathogenic fungus *N. rileyi* on the shoot and leaf feeders at the concentrations 2.4×10^{10}, 2.4×10^{8}, 2.4×10^{6} and 2.4×10^{4} Spores/ml and found 2.4×10^{10}, 2.4×10^{8}, 2.4×10^{6} spores/ml were effective in laboratory conditions.

Decline of *Acrocarpus fraxinifolius* (Balangi)

Premature dying of trees of *Acrocarpus fraxinifolius* (Balangi) in parts of Kodagu district (IWST)

Acrocarpus fraxinifolius is adopted as an important shade tree by coffee growers and being cultivated in coffee plantations of kodagu district from the state of Karnataka. In some parts of Kodagu district this tree species has undergone severe stress & the symptoms were drying and decline leading to mortality. Investigation revealed change in climatic conditions, like erratic and insufficient rainfall pattern in Kodagu district plays a crucial role and found to be predisposing factor for the decline. Unscientific pruning followed by insects and pathogens attack has contributed to tree decline. Root rot caused by *Phytophthora* sp. was also contributing in mortality in some trees.

Scientific pruning has to be practiced in order to avoid infection to the trees.

Regular monitoring study on a long term basis is needed to know the effect of local climate on susceptibility of the tree species. Resistant trees with initial impact caused by predisposing factors could recover under natural conditions, while the susceptible trees fall prey to other factors.

Assessment of the potential hazard risk of ageing urban trees in and around Bengaluru City (IWST)

A study on health assessment of ageing urban trees in and around Bengaluru revealed that street trees are highly prone to defects caused by anthropogenic activities. Our assessment revealed that out of 454 trees, 50% of trees are defective, of which the species *Peltophorum ferrugineum* was the most affected one followed by *Swietenia macrophylla* and *Delonix regia*. Tagging of unhealthy trees and scientific pruning for removal of dead/ dried branches for symmetrical and healthy growth of trees is recommended.

Determining bio-control efficacy of spiders against insect pests of rice agroforestry system (TFRI)

Three varieties of paddy viz., Dantwari (early variety), MTU1010 (mid variety) and Kranti (late variety), 500gms each, were obtained from the seed bank of Jawharlal Nehru Krishi Visva Vidyalaya, (JNKVV), Jabalpur. 36 number of 2x3 meters beds were prepared in 3 cluster where the above three varieties of rice were sown. Three different types of traps were constructed with bamboo

and 18 bamboo-pole-traps, six of each type were mounted in the experimental beds. Mature nests of social spider *Stegodyphus sarasinorum* (Arachnida: Araneae: Eresidae) were fixed on the pole. Pests trapped in the sticky web were collected from inside the nest and were identified as *Nephotettix virescens* (green leaf hopper), *Leptocoris aacuta* (gandhi bug), *Scirpophaga incertulas* (yellow stem borer), *Hieroglyphus banian* (grasshopper) *Psalis pennatula* (hairy caterpillar) and *Cnapholocrocis medinalis* (leaf folder). Parabolic arch type trap was the best for establishment of social spider population and hence selected for final experiment to be conducted during 2019-2020.

Social-spider-trap-pole mounted in the rice field

Rice agroforestry experimental site

Fixing nest of social spider in the trap-pole

Diversity of insect pollinators and their role in fruit/ pod production of *Acacia senegal*, *Capparis decidua* and *Prosopis cineraria* in Rajasthan (AFRI)

Pollinators provide an essential ecosystem service that contributes to the maintenance of biodiversity and ensures the survival of plant species including crop plants. It has been estimated that over three quarters of the world's crops and over 80 per cent of all flowering plants depend on animal pollinators, especially bees. Despite the recognition of the general importance of pollination for crops and NTFP production, there is little systematic documentation of the proportion of crops and NTFP benefiting from the pollinators and the identity of the pollinators themselves. In this project, *Capparis decidua*, *Acacia senegal* and *Prosopis cineraria* are taken which are important tree species of Rajasthan state and their fruit and pods are important ingredient of famous panchkuta and trikuta vegetable.

Data on diversity and population abundance of pollinator insects on *P. cineraria, A. senegal* and *C. decidua* was collected. Insect pollinators visiting the blossoms were collected, properly pinned and placed in the display showcase. Insect pollinators were recorded during morning to evening hours of a day. The number of visits made by insect pollinator and the time spent by insect pollinator were recorded during flowering period.The foraging insects were found maximum between 10.00h to 12.00h.

On *Acacia senegal* 42 species of insect pollinators belonging 5 families and 11 genera of order Hymenoptera; 4 families, 7 genera of order Coleoptera; 6 families, 14 genera of order Lepidoptera; 2 families, 2 genera of order Diptera and 1 family, 1 genera of order Hemiptera were observed.

On *C. decidua* 27 species of insect pollinators belonging to 5 families: 9 genera of order Hymenoptera; 3 families: 7 genera of order Lepidoptera; 1 family: 1 genera of order Diptera; 1 family: 1 genus of order Coleoptera and 1 family:1 genus of order of Hemiptera were recorded.

On *P. cineraria* 36 species of insect pollinators were observed belonging to 8 families: 16 genera of order Hymenoptera; 2 families: 2 genera of order Diptera and 3 families: 7 genera of order Lepidoptera were recorded.

Honeybees (*A. dorsata* and *A. florea*) foraged extensively within a single canopy, generally moving between flower heads that were close together and are important and efficient pollinators. The most abundant pollinator in *C. decidua*, *A. senegal* and *P. cineraria* were *A. florea* among Hymenoptera insect. No fruit set was observed in the bagged inflorescence (pollinator exclusion). However where specific insect pollinator was released in the bags, fruit setting was observed in case of *P. cineraria, Acacia senegal* and *C. decidua*. Data on fruit setting and fruit parameters were also recorded. Project will be beneficial in finding out role of insect pollinators in fruit/pod production of Khejri, Kair and Kumat.

Screening for establishing bio-efficiency of ethno-insecticidal plants from the forest of Andhra Pradesh (IFB)

Investigation on Bio-efficiency of ethno-insecticidal plants, relative feeding potential and toxicity and relative toxicity of four test insects (*Hyblea purea, Eutectona machearalis, Tinolius eburneigutta* and *Atteva fabricella*) at different concentrations of seven plant extracts [*Azina tetracantha* (Beesting bush), *Chlorxylon sweietenia* (Satin wood tree), *Clerodendrum viscosum* (Hill glory), *Cleistanthus collinus* (Karra), *Lippia javanica* (lemon bush), *Ocimum americanum* (American basil), *Sphearanthus indicus* (East Indian globe thistle)] was studied. Among all the plant extracts tested, *Clerodendrum viscosum* 1.0% exhibited highest antifeedant activity against a *T. eburneigutta* larva, while *L. javanica* afforded least antifeedant activity against *T. eburneigutta*. Among the plant extracts tested against *H. purea* larvae *A. tetracantha* 1.0% showed highest least antifeedant activity while *C. collinus* exhibited the least antifeedant activity. *O. americanum* showed highest antifeedant activity against *skeletonizer* larvae while *S. indicus* afforded least antifeedant activity to the same insect. *C. viscosum* 1.2% exhibited highest antifeedant activity against *A. fabricella* while *S. indicus* afforded least antifeedant activity. The degree of relative toxicity of different plant extracts varied from insect to insect. Hence depending upon the pest problem, a particular type of extract has to be applied for effective control of the pest.

Toxicity and relative toxicity of different plant extracts against certain leaf feeding insects

Test insect/Plant extracts	*C. collinus*	*S. indicus*	*O. americanum*	*L. javanica*	*A. tetracatha*	*C. viscosum*	*C. sweietenia*
A. LC_{50} Values of different plant extracts against certain leaf feeding insects							
T. eburneigutta	0.4214	0.4168	0.596	0.6471	0.6001	0.4316	--
H. purea	0.5372	0.6194	0.3169	0.6298	0.5253	0.439	0.6071
E. machearalis	0.4775	0.6455	0.3115	0.6228	0.548	0.5373	0.6998
A. fabricella	0.6642	0.6001	0.7015	--	0.6525	0.5253	--
B. Relative toxicities of different plant extracts against certain leaf feeding insects							
T. eburneigutta	1.024	1.035	0.724	0.667	0.719	0.725	--
H. purea	0.817	0.709	1.385	0.697	0.836	1.023	1.051
E. machearalis	1.125	0.832	1.725	0.863	0.98	0.958	0.824
A. fabricella	0.791	0.875	0.749	--	0.805	1.083	--

2.7.3

Mycorrhizae, rhizobia and other useful microbes

Identification of superior strains of arbuscular mycorrhizal fungi and rhizobium for improving planting stocks of *Pterocarpus santalinus* L. (IFGTB)

Three strains of AM (arbuscular mycorrhizal) fungi and 2 species of rhizobium bacteria associated with native populations of *Ptercoarpus santaliunus* (raktha chandan) were identified from Seshasylum forest area of Andhra Pradesh. Nursery experiment conducted to test the efficacy of the bacterial species, *Rhizobium aegyptiacum* and *R. mesoamerricanum* on growth improvement and biomass production of *P. santaliunus* revealed that the seedlings inoculated with *R. aegyptiacum* had two fold growth and biomass increment than the seedlings inoculated with *R. mesoamerricanum*. The nitrogenase activity was also observed higher in *R. aegyptiacum* than *R. mesoamericanum*.

Field performance of the *Pterocarpous snatalinus* seedling inoculated with AM fungi and *Rhziobiumn*

Successful rooting of *P. santalinus* stem cuttings with IBA

Evaluation of plant growth promoting (PGP) activity of rhizobium from native legumes and development of consortia with other PGP rhizobacteria (AFRI)

The result shows that the isolates of rhizobium are highly compatible with the Azotobacter isolated and can be used in consortia form. These isolates can tolerate high salinity condition and pH upto 11. Moreover, some strains of *Rhizobium* can not only fix atmoshpheric nitrogen but also solubilize phosphorus and can be used as biological control agent as they have shown positive chitinase activity.

2.7.4

Weeds and Invasive species

Biological control of invasive species with reference to Meghalaya Forest (RFRI)

Invasive alien species (IAS) are considered as one of the main driver of biodiversity loss. Three approches appropriate for controlling invasive weeds viz.,: mechanical, chemical (herbicides), and biological. The state of Meghalaya is infested with various invasive weeds such as: *Mikania micrantha, Chromolaena odorata*, *Ageratum conyzoides, Spilanthes paniculata* and *Spermacoce hispida*. A study on biological control of invasive weeds in Meghalaya was taken up and survey for natural fungal enemies against these target weeds were carried out in different districts of Meghalaya with the objective of identifying potential biocontrol agents. A total of four pathogenic fungi were isolated from infected leaves of these target weeds. Two fungi isolated from leaf spot and leaf necrosis disease of *Mikania micrantha* were identified as *Gliocladium roseum* and *Phomopsis* sp. respectively. The fungus isolated from *S. paniculata, C. odorata, A. conyzoides* was *Fusarium solani* and from *Spermococe hispida* was *F. acuminatum*. Bio-safety test carried out on target weeds and agricultural crops grown in Meghalaya (maize, chilli, tomato, rice and ginger) showed that all the isolated fungi were found infecting the weeds from which they were isolated and also maize and tomato. However, these fungi did not infect the seedlings of some economically important tree species of Meghalaya viz., *Pinus kesiya, Magnolia champaca, Alnus nepalensis, Chukrasia tabularis, Exbucklandia populnea* and *Castanopsis indica* when tested against them. Further, *in vivo* application of these fungi on target weeds in the forest of Meghalaya had also shown positive results.

Pathogen spray on *M. micrantha* at Kharkutta, Meghalaya

Infection after spraying

Pathogen inoculated on *C. odorata* at Kharkutta, Meghalaya

Fungal infection after spraying

EDUCATION VISTAS

CHAPTER

03 EDUCATION VISTAS

3.1

FRI University

FRI deemed to be University has been offering following M.Sc. courses:

1. Wood Science & Technology
2. Environment Management
3. Forestry
4. Cellulose & Paper Technology

A total 137 students were admitted and 122 students passed out during 2018-19. A total of 55 students got the placement in different organization/ companies. In the current academic year, 48 Research Scholars are registered for Ph.D. at the FRI deemed to be University and a total of 41 Ph.D. degrees have been awarded. Students from different SAARC countries have joined various M.Sc. and Ph.D. programmes under the SAARC Fellowship programme announced by Hon'ble Prime Minister.

18th Annual Games and Sports meet of FRI Deemed to be University

3.2

Trainings Organized

Some of the important areas on which the trainings were organized are as follows:

- Value Addition and Marketing of NTFPs, Medicinal Plants, production of Quality Planting Material**,** Forestry Acts and Policy, Propagation and Management of Bamboo under Green Skill Development Programme
- Gender Mainstreaming in REDD+ implementation
- Remote Sensing and GIS in forest resource assessment
- Advances in Agroforestry for farmers, frontline staff & other stakeholders
- Biodiversity Conservation & Nature Education
- Bio-prospecting and Bio-piracy
- Integrated Pest and Disease Management in Farm Forestry
- Advances in Plantation Technology for Productivity Enhancement
- Wood Polymer Composites

- Forestry for eco-restoration, Climate Change and Mitigation
- Biodiversity and Ecosystem Services
- Trees outside Forest (TOF)
- Intellectual Property Rights in Forestry Research
- Artificial induction of agarwood in Agar tree
- Forestry in addressing livelihood issues of people of North Eastern States
- Role of Forestry in Sustainable Development
- Skill Development on Bamboo Handicrafts for Promotion of Community Enterprise
- Eco-restoration of mined out areas and wastelands
- Application of biofertilizers in forest nurseries
- Modern Nursery Techniques for Raising Quality Nursery Stock

3.2.1

HRD Plan

Following training programmes were organized for scientists/ technical/ministerial staff of ICFRE and its institutes under HRD Plan:

Scientist:

- Advance Molecular techniques - pathogenic and beneficial microbes
- Hydrologic Modeling using SWAT
- Valuation/Quantification of Ecosystem Service

Technical Staff:

- Digital Library/Repository/RFID Technology
- Research Methodology and Statistical Tools in Forestry

Ministerial Staff:

- Administrative Vigilance and Disciplinary Procedures
- Office Procedure, Noting and drafting
- Training programme on GeM and e-procurement
- Financial Management

Training programme on GeM at ICFRE (HQ), Dehradun

Sl. No.	Name of Institute	No. of Trainings	Duration (in days)	No. of participants
1.	ICFRE (HQ)	24	69	626
2.	FRI, Dehradun	30	258	491
3.	IFGTB, Coimbatore	22	124	931
4.	IWST, Bengaluru	35	226	813
5.	TFRI, Jabalpur	65	230	2047
6.	AFRI, Jodhpur	14	138	293
7.	RFRI, Jorhat	34	312	763
8.	HFRI, Shimla	18	35	579
9.	IFP, Ranchi	86	328	2740
10.	IFB, Hyderabad	14	40	890
	Total	**342**	**1760**	**10173**

Trainings organised at ICFRE

3.3 Awards

ICFRE has instituted two Awards for the Scientific Community as well as ICFRE Employees.

1. ICFRE Awards of Excellence in Forestry
2. ICFRE Outstanding Employee Award

1. ICFRE Awards of Excellence in Forestry

To promote and motivate the professionals competence in the scientific community in the field of forestry for the year 2018, ICFRE Awards of Excellence in Forestry was awarded to the following candidates for the year 2018:

Sl. No.	Category of Awards	Name and designation of candidate
1.	**Awards for ICFRE personnel serving in ICFRE (HQ) and its Institutes/Centres**	
(i)	ICFRE Outstanding Research Award	Dr. Girish Chandra, Scientist 'C', ICFRE (HQ)
(ii)	ICFRE Best Research Paper Award	Dr. Vineet Kumar, Scientist 'G', FRI, Dehradun
(iii)	ICFRE Technology Innovation Award	(i) Dr. Shakti Singh Chauhan, Scientist 'G', IWST, Bengaluru (ii) Dr. Pankaj Aggarwal, Scientist 'G', IWST, Bengaluru
(iv)	ICFRE Woman Professional Award	Dr. Modhumita Dasgupta, Scientist 'F', IFGTB, Coimbatore
(v)	ICFRE Forestry Research Award (b) Individual/NGO	Dr. Ayyanadar Arunachalam, Principal Scientist, ICAR, New Delhi

"ICFRE Awards of Excellence in Forestry" conferred on the occasion of International Day of Forest, 2019

2. ICFRE Outstanding Employee Award

To promote and motivate the employees to carry out their duties in an efficient, transparent and professional manner. This award was given in two categories:

(i) ICFRE Outstanding Employee Award

(ii) ICFRE Lifetime Meritorious Service Award

3.4 Center for Forest Policy Research (CFPR)

The Centre for Forest Policy Research (CFPR) has been established at ICFRE (HQ.) which was approved by the Board of Governors (BoG) in its meeting held on 9 January 2018 and was notified vide ICFRE Notification dated 6 February 2018 to take up policy research studies, for providing inputs to Government of India for policy decisions and appropriate interventions.

The Advisory Committee headed by the Director General, ICFRE has finalized 11 topics for taking up policy research studies. The Terms of Reference (ToRs) for these 11 Policy Research Studies has been finalized.

EXTENSION PANORAMA

CHAPTER

4

04 EXTENSION PANORAMA

4.1

Seminars /Symposia/ Workshops etc. organized

Sl. No	Name of Institute	No. of Seminars/Symposia/ Workshops/ meetings etc. organized	No. of days	No. of participants
1.	ICFRE	1	3	60
2.	FRI, Dehradun	11	55	439
3.	IFGTB, Coimbatore	11	13	650
4.	IWST, Bengaluru	12	14	934
5.	TFRI, Jabalpur	12	12	546
6.	RFRI, Jorhat	15	33	501
7.	HFRI, Shimla	18	18	690
8.	IFP, Ranchi	17	17	1821
9.	IFB, Hyderabad	22	23	1279

The 14th National Silviculture Conference on "Forest & Sustainability: securing a common future" was organized by IWST (ICFRE), Bengaluru from 3 to 5 December 2018. It was attended by 350 participants from Forest Departments and other stakeholders like academicians, students, industrialists, farmers etc.

PRAKRITI - A Scientist - Student Connect Programme

Prakriti – A scientist - student connect programme was envisioned and accordingly ICFRE entered into MoUs with Kendriya Vidyalaya Sangathan (KVS) and Navodaya Vidyalaya Samiti (NVS). The programme is now operational across the ICFRE institutes throughout the country.

The programme is categorized into two groups i.e. junior & senior group of students and various activities are organized and arranged according to the grasping level of students. The activities include visit of students and teachers to ICFRE institutes for sensitization about the general functioning of the institute and exposure to the laboratories, models and other exhibits. Interactive programmes are also being organized to make it more effective through active participation of students.

The lectures that are delivered on various aspects of forestry and environment are devised in simple language including vernacular languages with a view to make it more acceptable and enthusiastic.

During the year 35 different programmes were organized across the 28 Kendriya Vidyalayas and 12 Navodaya Vidyalayas spreading over 39 days benefitting 6639 students.

ICFRE entered in collobration with TIFAC for effective dissemination of ICFRE technologies. Technologies identified for dissemination in joint consultation process are transferred during the year as below:

4.2 Technologies Transferred

Name of technology	Users/ Stakeholders
Cultivation of edible mushrooms	'Self-help' groups, Farmers, Women and youth
Cultivation of medicinal mushroom (*Ganoderma lucidum*)	'Self-help' groups, Farmers, Women and youth
Bio-control of plant diseases	Farmers/ Nursery growers
ArborEasy® DNA isolation kit	Reserachers, Industries
Fast growing clones of Casuarina & Eucalyptus	Farmers and Tree Growers
N Fixer (Frankia)	Farmers
IFGTB Tree growth booster (VAM)	Farmers

Technical Services

- Testing of wood and wood products
- Testing for moisture content and wood seasoning samples
- Plant identification
- Testing of wood samples for wood properties and identification.
- Sandalwood and analysis of sandalwood oil samples
- Identification and analysis of soil

Guinness World Record

IFGTB, acted as Chief Instructor in the Guinness World Record attempt on "Most people conducting a DNA isolation experiment simultaneously" at India International Science Festival, 2018 held at Lucknow from 5 to 8 October 2018. A new Guinness World Record was set successfully using ArborEasy® DNA Isolation Kit developed by IFGTB, Coimbatore. Five hundred and fifty students isolated DNA from banana in 61 minutes breaking the earlier record of 302 students established by Seattle Children's Research Institute, USA.

Standardization and popularization of treated bamboo products in ericulture (RFRI)

Skill Development Training for 20 eri entrepreneurs on various methods of bamboo treatment and to promote use of treated bamboo in making the appliances used in ericulture organized.

Skill development training

Training on conservation of Chilgoza at Thangi, Kinnaur

Awareness training for conservation of *Pinus gerardiana* (Chilgoza) through scientific intervention in Moorang forest range of district Kinnaur, Himachal Pradesh (HFRI)

To stop indiscriminate harvesting of cones awareness training on harvesting of Chilgoza cones through Scientific methods was given to frontline staff of State Forest Department, Mahila Mandal, Yuva Mandal, representatives of panchayat, local farmers and horticulturalists.

Transfer of products/technology on biobooster to Irular tribes in forest fringe villages of Coimbatore, Tamil Nadu: An alternate source of livelihood support (IFGTB)

The waste from coconut industry, coir pith and locally available waste material viz., weeds, flower and vegetable wastes was composted into a value added product called "Treerich Biobooster" that increased the efficacy and germination percentage. The home garden kit consists of an eco-friendly cloth bag with Treerich Biobooster packets containing 5 discs along with user manual prepared and distributed at the cost of Rs.250/ kit.

Release of Home Garden Kit by Padma Shri Dr. P.R. Krishna Kumar, MD, AVP, Coimbatore

Cloth basket of treated bamboo weaved by GSDP trainees

Green Skill Development Programme (GSDP)

In line with the Skill India Mission of Hon'ble Prime Minister, Ministry of Environment, Forest & Climate Change (MoEF & CC) utilising the vast network and expertise of ENVIS Hubs/ RPs, has taken up an initiative for skill development in environment and forest sector to enable India's youth to get gainful employment and/or self-employment, called the Green Skill Development Programme (GSDP). The programme endeavours to develop green skilled workers having technical knowledge and commitment to sustainable development, which will help in the attainment of the Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), National Biodiversity Targets (NBTs), as well as Waste Management Rules (2016).

Participants being demonstrated and explained about propagation of forestry species in a Mist Chamber

The GSDP training programmes are tailored to suit the specific needs with more emphasis on practical skills. The purpose was to have various GSDP course modules targeting school and collage dropouts across the country through expertise available at ICFRE institutions irrespective of age or profession. The candidates are selected by a committee of experts of the related fields so that the deserving candidates get the opportunity to improve and utilize the skill for livelihood. Reservations for SC/ST/women participants are also being considered while choosing the trainees for the courses.

ICFRE has received Rs. **2,53,25,000/-** funding for conducting **21** training programmes on **7** themes i.e. Management of small botanical gardens, Forest entomology & pest control, Propagation and management of bamboo, Forestry acts and policy, Value addition & marketing of NTFPs (Plant Origin), Lac & Tassar cultivation and Waste Management under GSDP through ENVIS, MoEF & CC. Total **390** candidates have successfully completed the different courses under Green Skill.

Propagation of mushroom production among the villagers as an additional source of income (TFRI)

The aim of this project is to propagate the methods of production of Oyster mushroom standardized by the Institute among the tribal's/villagers, on the basis of economic survey, so as to aware them. Visits were conducted for Jabalpur located Bargi region's villages Khirwa, Durganagar, Padriya, Mankedi, Harduli and Gaganda; discussions were conducted in regards to the mushroom production with the tribal's/ villager's and the curiousness was there among the villagers for this work.

In Mankedi and Durganagar villages, a lecture on the production method of Oyster mushroom on the husk of wheat and training on practical technique were imparted. 46 villagers participated in this programme.

In Mushroom production, the production cost of one kilogram bag is on an average comes to Rs. 25 to 26 and by selling this produced mushroom (by selling at market rate of Rs. 80/kg) a good profit is obtained.

Exploration of potential beneficial microbes in different forest and agriculture ecosystems in Kolli hills, Tamil Nadu and imparting training cum demonstration on bio-fertilizer production and application in nursery and field (IFGTB)

Efficacy of different beneficial microbes (Vesicular Arbucular Mycorrhizal (VAM) fungi, *Azospirillum*, *Azotobacter*, Phosphobacteria) tested on growth improvement of ten different economically important forestry species in nursery exhibited that the seedlings inoculated with combination of all bio-inoculants [(AM + *Azotobacter* + *Azospirillum* + Phosphate Solubilizing Bacteria (PSB)] especially Nitrogen fixer and Phosphate solubilizer/mobilizer showed the highest growth and biomass production. Training on "production and application methods of biofertilizers in nursery and field" was conducted for the field staff of State Forest Department, farmers, Women Self Help Groups, tribal womenfolk, Forest Protection Committee members, tree growers and NGOs.

Training on Importance of Bio-fertilizers: Production and Application Methods in Nursery and Field

Digital Initiatives

- IFGTB, Coimbatore released a mobile App **'Forest Tree Diseases'** which deals with 16 major forest nursery and plantation diseases. Diseases caused by fungi, bacteria and viruses have been detailed in the mobile application for ready reference.
- FRI, Dehradun established a Call Center named **Vaniki Sahayata Kendra** for enquiry by farmers on forestry aspects on trial basis.
- **Casuarina Yield Calculator Utility Software (CYCUS v1.0):** software has been developed to facilitate the farmer and other user agencies in yield estimation which requires only observations on girth of 100 sample trees per acre of plantation. This software will be very useful to the Casuarina growers for assessing the yield potential of their plantations and to transact the sale of trees at the time of harvest. The major advantages of CYCUS software over the manual Yield Table Calculations are: a) No need for working out frequency distribution of girth classes, b) No need for height measurements of standing trees and c) No manual calculations for estimating expected yield.

4.3

National Forest Library and Information Centre (NFLIC) and Environmental Information System (ENVIS)

National Forest Library and Information Centre (NFLIC)

The National Forest Library and Information Centre (NFLIC) is the richest in document collection on forestry and allied sciences in South and South-East Asia. During the year (2018-19) 22927 books were loaned to the users for outside reading. Besides, 47439 documents were consulted inside the library. New members (309 Nos.) were enrolled during the year.

The document collection of the NFLIC was enriched by the addition of 524 books and other documents. The NFLIC subscribed to 98 Indian periodical titles in the year. It also received 504 issues of the periodicals as gratis.

During the year 209 books and 07 VCDs were sold by NFLIC to State Forest Departments, universities, etc. and revenue of Rs. 32,356/- was earned.

The National Forest Library and Information Centre (NFLIC) have started internship to the students of Library Science and information. 10 numbers of students of Library science have successfully completed their internship during the year 2018-19.

National Forest Library and Information Centre

Environmental Information System (ENVIS)

The Ministry of Environment Forests and Climate Change Govt. of India established ENVIS Centre on Forestry at NFLIC about twenty one years ago. The Centre involves in activities like preparing databases on Indian Forestry Abstracts, Participatory Forest Management, *Prosopis juliflora*, Poplars and Environment and Forests in Press which are accessible through the website of the Centre at URL: www.frienvis.nic.in.

Publications: The ENVIS Resource Partner on Forestry and Forest Related Livelihoods compiled six issues of *Environment and Forests News Digest* published in the form of CDs. The issues also accessible through the website of the Centre at URL: www.frienvis.nic.in.

4.4 Research Publications

Publications are important tools for communicating the research output to the target audience. ICFRE has published a number of publications in different forms which are as follows:

Name of Institute	Books	Booklets/ Brochures/ Bulletins/ Pamphlets	Article in Seminars/ Conferences/ Workshops etc.		Popular Article	Research Papers in Journals		Chapters in Books/ Proceedings
			Articles	Abstracts		Foreign	Indian	
ICFRE	9	1	04	04	-	06	03	02
FRI, Dehradun	4	4	25	23	01	42	91	23
IFGTB, Coimbatore	5	13	45	34	9	22	17	27
IWST, Bengaluru	1	2	40	14	1	22	21	06
TFRI, Jabalpur	4	17	18	28	16	17	25	20
AFRI, Jodhpur	-	-	-	11	05	3	9	4
RFRI, Jorhat	-	02	-	07	03	16	12	-
HFRI, Shimla	03	09	03	15	07	5	13	4
IFP, Ranchi	04	*	02	03	-	02	05	-
IFB, Hyderabad	-	01	05	10	07	01	02	01

*Study material for the trainees under BTSG & GSDP training programmes

Books published during the year 2018-19 are as follows

- Strategies for Addressing the Drivers of Deforestation and Forest Degradation in the state of Mizoram(ISBN 978-81-936157-2-0)
- Estimation of Biomass and Carbon Stock of Bamboo Species through Development of Allometric Equations (ISBN 978-81-936157-5-1)
- Identification and Adoption of Appropriate Technology for REDD+ Implementation in Mizoram (ISBN 978-81-936157-3-7)
- Manual on Species for Implementation of REDD+ Activities in Mizoram (ISBN 978-81-936157-4-4)
- Strategies for High Conservation Networks and Biodiversity Indicators for REDD+ in Mizoram (ISBN 978-81-936157-6-8)
- Forest Carbon Stocks of REDD+ Project Area in Mizoram: Baseline Report

- Mainstreaming of REDD+ Activities in Forest Management Plan
- Framework for Model Project Idea Note and Project Design Document: Mamit Community REDD+ Project (Mizoram, India)
- REDD+ Working Groups for North-Eastern States & Identification of Organisations and Experts for REDD+
- Agroforestry: Anecdotal to Modern Science
- Rhododendrons of Himachal Pradesh. HFRI, Shimla
- *Betula utilis* D. Don: a tree of the Himalayan treeline
- *Bans Paudhshala evam Prabhandhan*
- *Bans Pravardhan evam Prabhandhan*
- *Lac evam Tassar Utpadan*
- *Poplar Aadharit Krishi Vaniki ki Vaigyanik Vidhiyan evam Sambhavanayen*
- Bamboos of India
- Birds of TFRI Campus
- Agroforestry Systems
- *Lakh ki Kheti evam uska prabandhan*
- Records of Indian Fungi, Part-I and II

A new *"Extension Strategy and Extension Action Plan for ICFRE 2018-2023"* **having essence of earlier strategies** along with new initiatives is formulated incorporating the inputs from the ICFRE institutes. This is a comprehensive but concise hand book on forestry extension in ICFRE as all guidelines, norms, formats etc. pertaining to extension is incorporated in the document.

4.5 Van Vigyan Kendras (VVKs) and Demo Villages (DVs)

ICFRE institutes have established thirty one Van Vigyan Kendras and nine Demo Villages. Thirty four trainings, two workshops, three meetings, three exposure visits and two awareness programmes were conducted in 2018-19 across the country. Farmers, State Forest Departments, NGOs, Joint Forest Management Committee (JFMC), students, teachers, and artisans etc. were benefitted from the programmes.

Tree Growers Mela - 2019

Institute of Forest Genetics and Tree Breeding, Coimbatore organized IFGTB Tree Growers Mela on 13 February 2019 at Dharmapuri.

Tree Growers Mela on "Smart cultivation for increasing farm income and green cover" at Tiruvannamalai

Director, IFGTB Addressing at Tree Growers Mela

4.6 Consultancies

09 consultancy projects belonging to three developmental sectors viz. river valley and hydroelectric projects, mining of minerals including open cast and thermal power plants were undertaken for

- Himachal Pradesh Power Corporation Limited (HPPCL), Shimla;
- Tehri Hydro Development Corporation India Ltd (THDCIL)., Rishikesh;
- Ministry of Environment, Forest and Climate Change (MoEF & CC), GoI, New Delhi;
- Uttrakhand Jal Vidyut Nigam Limited (UJVNL), Dehradun;
- Coal India Limited (CIL), Kolkata;
- Singareni Collieries Company Limited (SCCL), Telangana;
- National Mineral Development Corporation Limited (NMDC), Hyderabad
- National Thermal Power Corporation Limited (NTPC), Noida

Overall a total of 37 reports were submitted to various agencies as detailed below:

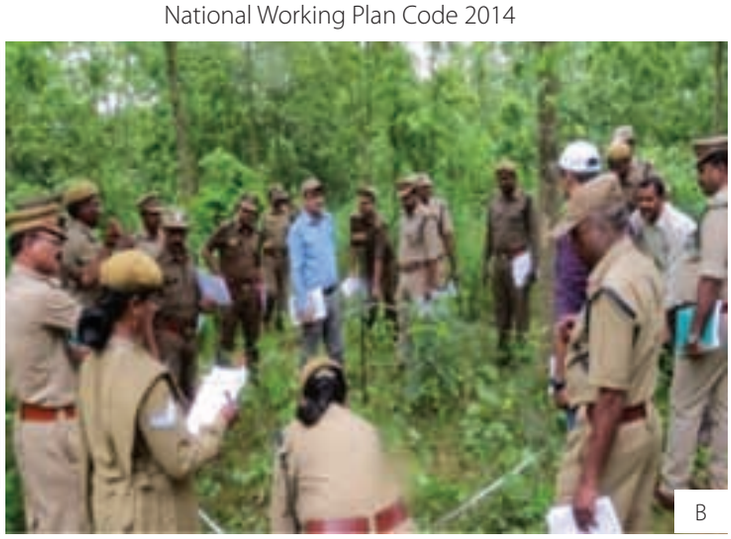
- The Reclamation and Rehabilitation (R&R) Plans for seven (07) iron ore mines of category A (01 mine), category B (02 mines) and category C (04 mines) in Bellary, Chitradurga and Tumkur (BCT) districts, Karnataka which were submitted to Govt. of Karnataka and have been approved by Central Empowered Committee (CEC) of Hon'ble Supreme Court of India for implementation by individual lessees. Reclamation and Rehabilitation of mined out areas to various mining firms have contributed to the process of bringing back the mined out land to an acceptable environmental condition through biological and engineering measures. The implementation of R&R Plans in BCT sector of Karnataka is being monitored by Monitoring Committee constituted by Hon'ble Supreme Court of India.
- The Environmental Audit report of twenty (20) open cast coal mines operated by seven subsidiaries of Coal India Limited (CIL); and three (03) open cast coal mines operated by Singreni Collieries Company Limited (SCCL), Kothagudem, Telangana; EMP and R&R Plan for two (02) iron ore mines of BIOM of National Mineral Development Corporation (NMDC) Ltd. Kirandul, Chhattisgarh helped CIL, SCCL and NMDC have helped the concerned stakeholder to find the effectiveness of EC compliances, identify the impact and mitigation measures and to further expedite the EC compliances for effective environment management.
- Based on EIA/EMP/SIA Report for Thana Plaun HEP (141 MW) HEP Project the EAC of MoEF & CC granted the Environmental Clearance (EC) in favour of HPPCL, Shimla, Govt. of H.P.
- Six monthly Third Party Monitoring of CAT Plan of Vishnugad Pipalkoti HEP, Chamoli, Uttarakhand was done for THDCIL, Rishikesh.
- The Additional study for Cumulative Environment Impact Assessment (CEIA) study of hydro electric projects including <10 MW HEPs in Sutlej River Basin in Himachal Pradesh in association with IIT, Roorkee; SACON, Coimbatore and DCFR, Bhimtal was presented before EAC of MoEF & CC, GoI, New Delhi and suggested for effective implementation.
- Annual Monitoring of NTPC Accelerated Afforestation programme of plantation of 10 million trees – in the states of Madhya Pradesh, Maharashtra, Assam, Karnataka, Andhra Pradesh, Telangana and Bihar helped NTPC Ltd., Noida to expedite its plantation drive for better survival and creating additional carbon sink potential.

ICFRE has been actively involved in conservation of heritage, urban and important trees. ICFRE has given its services not only nationally but internationally also and work was quite crucial in conservation of heritage trees such as 'Bodhi Vriksha' at Bodh Gaya, Bihar, Ta Prohm temple trees in Cambodia, 'Vat Vriksha' at Jyotisar, Kurukshetra, Harayana, trees at Tollygunj, West Bengal and Rastrapati Bhavan, New Delhi.

ICFRE also runs consultancy projects with:

- International Paper APPM Limited to increase the dissemination of high-yielding varieties of Casuarina and Leucaena,
- Archaeological Survey of India, Old Goa,
- 'Identification of Drivers of Deforestation' in Meghalaya
- Himachal Pradesh state Biodiversity Board, Shimla for preparation of People's Biodiversity Registers (PBRs) of 20 Panchayats
- A consultancy project on the 'Assessment of Forest Resources for Preparation of Working Plan' as per National Working Plan Code 2014


A


B

A., B.- AP working plan inception training and demonstration in the field

DPR for rejuvenation of major rivers

The task of "Preparation of Detailed Project Report (DPR) for Rejuvenation of thirteen major Indian Rivers through Forestry Interventions" was awarded to ICFRE by MoEF & CC in March 2019. The thirteen major rivers (viz. Beas, Chenab, Jhelum, Ravi, Sutlej, Yamuna, Brahmaputra, Mahanadi, Narmada, Krishna, Godavari, Cauvery, Luni) belonging to nine river systems (Indus, Ganga, Mahanadi, Godavari, Krishna, Cauvery, Luni, Narmada, Brahmaputra) are being covered under this study.

4.7

Activities of Rajbhasha

ICFRE and its institutes conduct the following on regular basis:-

- Quarterly meetings of official language implementation committees
- Quarterly training workshops on implementation of official language Hindi

ICFRE and its institutes enthusiastically observed Hindi Week/ Fortnight during the month of September 2018.

DG, ICFRE addressing the gathering at closing ceremony of Hindi fortnight 2018 at ICFRE, Dehradun

4.8

Radio/ TV Talks

- FRI, Dehradun sponsored 16 Radio Talks on All India Radio and 10 Doordarshan Talks on various forestry technologies developed by Scientists of FRI, Dehradun.
- AFRI, Jodhpur participated in Radio Talk on *"Paryavaran Santulan Mein Aam Aadmi Ki Bhumika"* broadcasted on 26 July 2018 and on " *Paryavaran se Jude Hamare Teej Tyohar*" broadcasted on 8 November 2018.

- IFP, Ranchi participated in a live TV programme organized by the Doordarshan to mark the occasion of "Wildlife Week Celebration" on 5 October 2018.
- IFP, Ranchi participated in a discussion/ talk on Doordarshan, Ranchi in "*Beech Bahas Me*" on "Forestry Researches and Challenges" on 6 July 2018 and on "Forestry Research and Constraints" on 16 February 2019.

4.9 Miscellaneous

International Day of Biological Diversity

The International Day of Biological Diversity was celebrated on 22 May 2018 with the theme "celebrating 25 years of action of Biodiversity" across all the ICFRE institutes and centres.

Special Activities (Such as Van Mahotsava, Forestry Day and Other occasions)

International Day of Biological Diversity (TFRI)

International Day of Biological Diversity (FRI)

International Day of Biological Diversity (RFRI)

World Environment day (TFRI)

ENVIS Poster on "Beat Plastic Pollution"

World Environment Day

World Environment Day was celebrated on 5 June 2018 at all ICFRE institutes to sensitize the public and to spread awareness towards the cause of environment protection.

World Environment day (HFRI)

Swatch Bharat Abhiyan

ICFRE and its institutes celebrated 'Swatch Bharat Abhiyan' on 02 October 2018.

Swatch Bharat Abhiyan at HFRI, Shimla

International Day of Forests 2019

'International Day of Forests 2019' was organized by ICFRE on 19 March 2019 on behalf of Ministry of Environment, Forest and Climate Change (MoEF & CC), Govt. of India. All the ICFRE institutes observed the day in a befitting manner.

International Day of Forests – 2019 at FRI, Dehradun

International Day of Yoga

ICFRE and its institutes celebrated International Day of Yoga-2018 on 21 June 2018. Shri Narendra Modi, Hon'ble Prime Minister of India graced the occasion at FRI, Dehradun.

Shri Narendra Modi, Hon'ble Prime Minister of India practicing Yoga at FRI, Dehradun on Yoga Day 2018

ADMINISTRATION AND INFORMATION TECHNOLOGY

CHAPTER

05 ADMINISTRATION AND INFORMATION TECHNOLOGY

Upgradation of ICFRE Data Centre (Server Farm)

ICFRE Data Centre services are available 24x7x365 at ICFRE Head Qtr, 9 Institutes and 3 Centres across the country since 01.02.2010.

The Data Center of ICFRE was upgraded during the year 2018-2019. All the required hardware and software were procured and installed. The concept of virtualization techniques was implemented for the upgradation of Data Centre for optimum use of resources. The Unified Threat Management (UTM) is implemented as security system for ICFRE Data Centre. The webcast server is also installed with audio video capture card for the implementation of web casting facilities.

Some of the services provided by the newly upgraded Data Centre are Mail, Internet, Web, Video conferencing, Antivirus, FTP, Network Security System, Databases, Building Management System (BMS), Virtual Private Network (VPN) services, Push Mail Service, Web casting etc.

Following new applications/websites were developed / implemented

A. Database of Research Projects undertaken in ICFRE since 1990

B. Online application for the recruitment of Scientist-B at ICFRE

Screenshot of Database of Research Projects undertaken in ICFRE since 1990

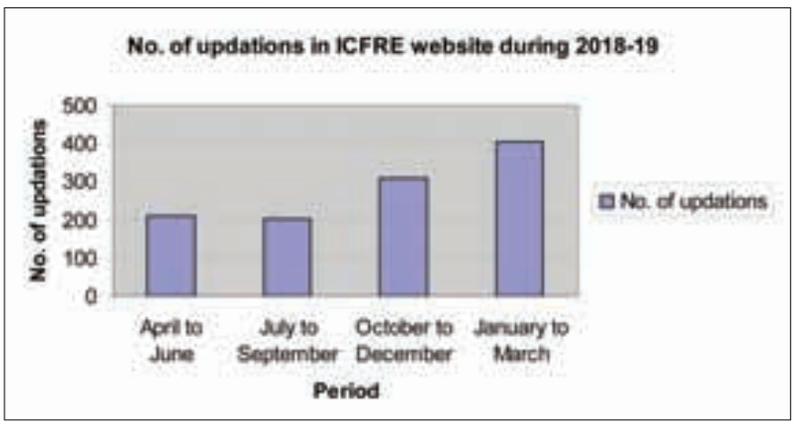
Online application for the recruitment of Scientist-B at ICFRE

C. ICFRE bilingual websites: ICFRE bilingual website was redesigned and developed as per Guidelines of Indian Government Website (GIGW). URL of the English website is http://icfre.gov.in/ and hindi website is http://hindi.icfre.org/

Screenshot of ICFRE Bilingual website

Updation of website of ICFRE (http://icfre.gov.in):

ICFRE's website is promptly updated. Details of updation in ICFRE Website during 1st April 2018 to 31st March, 2019 is as below:



e-Office

: E-Office is a software application developed by NIC which contains Personnel Information System, Leave Applications, e-Tour & Document Management System, e-Filing , online APAR etc. aimed towards making the paperless office. Implementation of e-Office at ICFRE and its institutes is underway.

Information on the status of activities under "The Rights of Persons with Disabilities Act, 2016" during the year for the persons with disabilities

1. Information about the total budget provision of the Ministry/Department for Persons with Disabilities-

   No separate budget provision is made for persons with disabilities

2. Allocation under various schemes for the benefit of persons with disabilities, the amount released and the amount utilized-

   Rs. 13,18,038/- has been paid to persons with Disabilities as double TPT.

3. The number of beneficiaries with disabilities and their percentages in relation to the total number to beneficiaries-

   No. of beneficiaries with disabilities – 28 out of 1334 employees i.e. 2.10%.

BALANCE SHEET

CHAPTER

06 BALANCE SHEET

भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्

Indian Council of Forestry Research & Education

देहरादून - **DEHRADUN**

(उत्तराखण्ड - **UTTARAKHAND)**

तुलन पत्र

2018–19

BALANCE SHEET

2018-19

जुलाई 30, 2019

JULY 30, 2019

ASHISH KUMAR GUPTA & ASSOCIATES
Chartered Accountants

Head Office : RAJ PLAZA COMPLEX
1st Floor, 75 Rajpur Road, Dehradun (U.K.)
Ph. & Fax : 0135-2746655, Mob. : 9358111116
e-mail : akgupta70@gmail.com
akgupta70@rediffmail.com

Independent Auditor's Report

To
The Members
Indian Council of Forestry Research and Education
Dehradun-248006
Uttarakhand

Report on the Financial Statements

We have audited the financial statements of Indian Council of Forestry Research and Education, which comprised the Balance Sheet as at March 31, 2019 and the Income and Expenditure Account for the year ended 2019 and notes to the financial statement including summary of significant accounting policies.

In our opinion, and to the best of our information and according to the explanations given to us the aforesaid financial statements, subject to the matters discussed in Basis for Qualified Opinion paragraph below, the consequential impact, if any, whereof is not quantifiable, give a true and fair view, in conformity with the accounting principles generally accepted in India, of the financial statement of the entity for the financial year 2018-19.

Responsibilities of Management and Those charges with Governance for the Financial Statements.

Management is responsible for the preparation and presentation of these financial statements that give a true and fair view of the financial position and financial performance of the entity in accordance with the accounting principles generally accepted in India.

In preparing the financial statements, management is responsible for assessing the entity's ability to continue as going concern and also includes design implementation and maintenance of adequate internal financial controls that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditors Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We have taken into account the relevant provisions and rules framed thereunder, the accounting and auditing standards and matters which are required to be included in the audit report under the provisions of the Act and the Rules made thereunder.

We conducted our audit in accordance with the standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

As part of an audit in accordance with SAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstarces, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control.
  Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the entity's ability to continue as a going concern. If we conclude that a material uncertainty exists. We are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the entity to cease to continue as a going concern.
- We communicate with those charged with governance regarding, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

We believe that we have obtained sufficient and appropriate audit evidences to provide a basis for our qualified audit opinion on the financial statements.

Basis for Qualified Opinion

1. The Fixed Assets purchased against the various projects funds has not been capitalized by the Institute in the past years as well as in financial year 2018-19 amounting to Rs. 2,40,49,060/- not capitalized.

2. The following advances made by ICFRE to CPWD and CCU are still pending for adjustments and sufficient and appropriate information not provided in this regards.

a.	CPWD-RFRI (NE)	: Rs. 6,01,7600.00
b.	CCU- Budget Section (NE)	: Rs. 5,91,7000.00
c.	CCU-FRI (Plan)	: Rs. 2,73,65,500.00
d.	CCU-IWST	: Rs. 6,97,100.00
e.	Scientific Equipment	: Rs. 7,81,472.00

3. ICFRE has not provided sufficient and appropriate evidences and justification regarding amount recoverable from controller ICFRE amounting to Rs 81,21,476.00 as reported under Schedule-11(A) of the Balance Sheet.

4. ICFRE has not provided sufficient and appropriate evidences and justification regarding the amount payable to other units of Rs 16,72,945.00 as reported under schedule-7 of the Balance Sheet.

5. Forest and Travelling Advances are not timely recovered by the ICFRE Institutes within the time frame as prescribed under Rule 323(2) of GFR 2017.

6. During the course of audit of ICFRE Institutes, we observed the following:-

IFP-Ranchi Institute

- A Cheque amounting to Rs 4,900.00 issued in the financial year 2016-17 is still reflecting in the Bank reconciliation Statement as on 31.03.2019 submitted by ICFRE Institute IFP-Ranchi.

- Tenders process has not been followed by the ICFRE Institute IFP-Ranchi in the case of advertisement contract awarded to RDS Advertisement and Marketing Group.

- The Institute is not compiling the provisions of Section 51 of CGST Act 2017 as required to deduct GST-TDS and file monthly GSTR 7 returns.

FRC-BR, Aizawl Centre

- The Institute is not compiling the provisions of Section 51 of CGST Act 2017 as required to deduct GST-TDS and file monthly GSTR 7 returns.

- GST Invoice has not been obtained from M/s J. J. Security Service providing security services to the *ICFRE Centre FRC-BR, Aizawl*.

- Capital expenses has been booked as revenue expenditure regards Battery purchased of Rs. 198000/-.
- Most of the bills of material amount were not verified by Head of the division. Since vouching is done on sample basis hence exact amount cannot provided.

HFRI-Shimla Division

- The Institute is not deducting GST-TDS as specified under Section 51 of CGST Act 2017 and also no GST Returns filed by Institute from October, 2018 and onwards.

FOR ASHISH KUMAR GUPTA & ASSOCIATES
(CHARTERED ACCOUNTANTS)

(ASHISH KUMAR GUPTA)
FCA, PARTNER, CHARTERED ACCOUNTANTS
MEMBERSHIP NO. 075985
DATED: 30/07/2019
PLACE: DEHRADUN
UDIN: 19075985AAAAAI16506

SCHEDULE	PARTICULARS
	BALANCE SHEET AS AT MARCH 31, 2019
	INCOME AND EXPENDITURE ACCOUNT FOR THE PERIOD ENDED MARCH 31,2019
	SCHEDULE FORMING PART OF BALANCE SHEET AS AT MARCH 31,2019
SCHEDULE - 1	CORPUS/CAPITAL FUND:
SCHEDULE - 2	RESERVES AND SURPLUS:
SCHEDULE - 3	EARMARKED/ENDOWMENT FUNDS
SCHEDULE - 4	SECURED LOANS AND BORROWINGS:
SCHEDULE - 5	UNSECURED LOANS AND BORROWINGS
SCHEDULE - 6	DEFERRED CREDIT LIABILITIES:
SCHEDULE - 7	CURRENT LIABILITIES AND PROVISIONS
SCHEDULE - 8	FIXED ASSETS
SCHEDULE - 9	INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS
SCHEDULE - 10	INVESTMENTS-OTHERS
SCHEDULE - 11	CURRENT ASSETS,LOANS,ADVANCES ETC.
SCHEDULE - 11	CURRENT ASSETS,LOANS,ADVANCES ETC.(Cont.)
SCHEDULE - 12	INCOME FROM SALES/SERVICES
SCHEDULE - 13	GRANTS/SUBSIDIES
SCHEDULE - 14	FEES/SUBSCRIPTION
SCHEDULE - 15	INCOME FROM INVESTMENTS
SCHEDULE - 16	INCOME FROM ROYALTY, PUBLICATION ETC.
SCHEDULE - 17	INTEREST EARN
SCHEDULE - 18	OTHER INCOME
SCHEDULE - 19	INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS
SCHEDULE - 20	ESTABLISHMENT EXPENSES
SCHEDULE - 21	OTHER ADMINISTRATIVE EXPENSES ETC.
SCHEDULE - 22	EXPENDITURE ON GRANTS, SUBSIDIES ETC.
SCHEDULE - 23	INTEREST PAID
SCHEDULE - 24	SIGNIFICANT ACCOUNTING POLICY AND NOTES TO ACCOUNTS
	RECEIPTS AND PAYMENTS FOR THE YEAR ENDED MARCH 31,2019

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

BALANCE SHEET AS AT 31ST MARCH, 2019

(Amount in Rs.)

CORPUS/CAPITAL FUND AND LIABILITIES	SCHEDULE	CURRENT YEAR AS ON 31.03.2019		PREVIOUS YEAR AS ON 31.03.2018	
		RS.	RS.	Rs	Rs
CORPUS/CAPITAL FUND	1		1,29,68,16,112.37		1,26,59,87,353.00
RESERVES AND SURPLUS	2		-		-
EARMARKED/ENDOWMENT FUNDS :	3		62,63,85,958.50		56,92,92,607.50
a One Time Special Grant				2,96,60,936.00	
b Project Unspent Balance		48,56,02,772.50		40,30,71,003.00	
c Chair of Excellence		14,37,83,186.00		13,67,60,669.00	
SECURED LOANS AND BORROWINGS	4		-		-
UNSECURED LOANS AND BORROWINGS	5		-		-
DEFFERED CREDIT LIABILITIES	6		-		-
CURRENT LIABILITIES AND PROVISIONS					
(A) CURRENT LIABILITY:	7		13,06,08,144.00		12,51,31,387.00
(B) PROVISIONS:			-		-
TOTAL			2,05,38,10,194.87		1,96,04,11,547.00

ASSETS		CURRENT YEAR AS ON 31.03.2019		PREVIOUS YEAR AS ON 31.03.2018	
		RS	RS.		RS
FIXED ASSETS	8		1,09,58,45,962.58		1,18,19,68,254.00
INVESTMENTS-FROM EARMARKED/ENDOWMENT					
a F (I) E.(For One Time Special Grant)	9		14,36,35,000.00		15,57,69,200.00
b F (I) E.(With Institutes)			-		-
INVESTMENTS-OTHERS	10		-		-
a F (I) E.(With Institutes)					
CURRENT ASSETS, LOANS, ADVANCES ETC.	11		81,23,29,232.29		64,26,74,093.00
MISCELLANEOUS EXPENDITURE		-	-		-
a (to the extent not written off or adjusted)					
b (items under reconciliation)					
TOTAL			2,05,38,10,194.87		1,96,04,11,547.00

DR. SURESH GABRIYAL (Director General, ICFRE)

SH A. S. RAWAT, (Dy. Director General, Admin., ICFRE)

SH RAJ KUMAR BAJPAI, (Asstt. Director General, Admin., ICFRE)

SH BRIJESH KUMAR SHARMA (Section Officer, Budget Section, ICFRE)

AS PER OUR SEPARATE REPORT OF EVEN DATE ANNEXED

FOR ASHISH KUMAR GUPTA & ASSOCIATES (CHARTERED ACCOUNTANTS)

(ASHISH KUMAR GUPTA)
F.C.A.[illegible]
(PARTNER)
MEMBERSHIP NO. [illegible]
DATED: [illegible]
PLACE: DEHRADUN

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Schedule	Current Year 31.03.2019	Previous Year 31.03.2018
		RS	RS.
Income from sales/services	12	30,79,782.00	-
Grants/Subsidies	13	2,13,49,00,000.00	1,91,00,00,000.00
Fees/Subscriptions	14	1,24,03,066.84	1,53,49,244.00
Income from Investments (income on Invest .from earmarked/endow	15	-	-
Income from Royalty, Publications etc.	16	-	-
Interest Earned	17	1,28,64,394.00	1,32,83,556.00
Other Income	18	15,59,31,932.36	12,58,09,376.00
Increase/(decrease) in stock of finished goods and works-in-progress	19	-	-
			-
Total(A)		2,31,91,79,175.20	2,06,44,42,176.00

EXPENDITURE	Schedule	Current Year 31.03.2019	Previous Year 31.03.2018
		RS.	RS.
Establishment Expenses	20	1,76,16,74,916.39	1,83,09,01,893.00
Other Administrative Expenses etc.	21	46,79,88,217.02	35,48,04,364.00
Expenditure on Grants, Subsidies etc.	22	5,24,704.00	18,95,270.00
Interest	23	-	-
Depreciation(Net Total at the year end-corresponding to Schedule 8)		16,26,23,714.43	9,27,64,631.00
TOTAL(B)		2,39,28,11,551.84	2,28,03,66,158.00
Balance being excess of Income over Expenditure(A-B)		(7,36,32,376.63)	(21,59,23,982.00)
Transfers to Special Reserve(Specify each)		-	
Transfer to/from General Reserve		-	
BALANCE BEING DEFICIT CARRIED TO CORPUS FUND		(7,36,32,376.63)	(21,59,23,982.00)
SIGNIFICANT ACCOUNTING POLICIES	24		
NOTES ON ACCOUNTS	25		

DR. SURESH GAIROLA, (Director General, ICFRE)

SH A. S. RAWAT , (Dy. Director General, Admin., ICFRE)

SH RAJ KUMAR BAJPAI, (Asstt. Director General, Admin., ICFRE)

SH BRIJESH KUMAR SHARMA (Section Officer, Budget Section, ICFRE)

AS PER OUR SEPARATE REPORT OF EVEN DATE ANNEXED

FOR ASHISH KUMAR GUPTA & ASSOCIATES
(CHARTERED ACCOUNTANTS)

(ASHISH KUMAR GUPTA)
FCA,DISA
(PARTNER)
MEMBERSHIP NO. 87088
DATED: 30.07.2019
PLACE: DEHRADUN

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount (Rs)

SCHEDULE 1-CORPUS/CAPITAL FUND	CURRENT YEAR	31.03.2019	PREVIOUS YEAR	31.03.2018
	RS.	RS.	RS.	RS.
Balance as at the beginning of the year	1,26,59,87,553.00		1,43,91,36,556.00	
Add: Assets Purchased from OTNC Capital	2,94,60,936.00	1,29,54,48,489.00	27,73,000.00	1,44,19,11,556.00
Add: Contributions towards Corpus/Capital Fund Plan Account	7,30,00,000.00	7,30,00,000.00	4,00,00,000.00	4,00,00,000.00
Add/Less: Surplus/ (Deficit) income over expenditure for		(7,56,32,376.63)		(21,59,23,983.00)
BALANCE AS AT THE YEAR-END		1,29,68,16,112.37		1,26,59,87,553.00

SCHEDULE 2-RESERVES AND SURPLUS	CURRENT YEAR	31.03.2019	PREVIOUS YEAR	31.03.2018
	RS.	RS.	RS.	RS.
1. Capital Reserve:				
As per last Account	-	-	-	-
Addition during the year	-	-	-	-
Less: Deductions during the year	-	-	-	-
2. Revaluation Reserve:	-	-	-	-
As per last Account	-	-	-	-
Addition during the year	-	-	-	-
Less: Deductions during the year	-	-	-	-
3. Special Reserves:	-	-	-	-
As per last Account	-	-	-	-
Addition during the year	-	-	-	-
Less: Deductions during the year	-	-	-	-
4. General Reserve:	-	-	-	-
As per last Account	-	-	-	-
	-	-	-	-
Addition during the year	-	-	-	-
Less: Deductions during the year	-	-	-	-
	-			
TOTAL	-	-	-	-

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

SCHEDULE 3-EARMARKED/ENDOWMENT FUNDS	FUND -WISE BREAK UP			TOTALS	
	ONE TIME SPECIAL GRANT	PROJECT ACCOUNTS	Chair of Excellence	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.		RS.	RS.
a)Opening balance of the funds	2,94,60,936.00	40,30,71,002.00	13,67,60,669.00	56,92,92,607.00	56,46,25,461.00
b)Additions to the Funds:				-	
i) Donations/ grants				-	
One Time Special Grant (General)				-	
One Time Special Grant (Creation of Assets)				-	
ii) Income from investments made on account of funds			99,03,597.00	99,03,597.00	85,85,930.00
iii) Other additions (specify nature)				-	8,00,00,000.00
iv) Project Receipts		52,83,47,511.24		52,83,47,511.24	32,75,60,244.00
TOTAL(a+b)	2,94,60,936.00	93,14,18,513.24	14,66,64,266.00	1,10,75,43,715.24	98,07,71,635.00
C) Utilisation/Expenditure towards objectives of funds				-	-
i) Capital Expenditure				-	-
- Fixed Assets	2,94,60,936.00			2,94,60,936.00	2,19,28,968.00
- Others				-	-
				-	
ii) Refunded to Ministry				-	
- Amount refunded to ministry of Environment & forests	-			-	17,27,000.00
- Amount transferred to Chair of Excellence Fund				-	8,00,00,000.00
				-	
iii) Revenue Expenditure				-	-
- Salaries, Wages and allowances etc				-	-
- Rent				-	-
- Other Administrative expenses				-	-
- Project Payments	-	45,08,15,740.74		45,08,15,740.74	30,78,23,060.00
				-	
iv) Amount warmly returned			8,81,100.00	8,81,100.00	
TOTAL(C)	2,94,60,936.00	45,08,15,740.74	8,81,100.00	48,11,57,776.74	41,14,79,028.00
NET BALANCE AS AT THE YEAR END(a+b-c)	-	48,06,02,772.50	14,57,83,166.00	62,63,85,938.50	56,92,92,607.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

SCHEDULE 4-SECURED LOANS AND BORROWINGS:	CURRENT YEAR 31.03.2019		PREVIOUS YEAR 31.03.2018	
	RS.	RS.	RS.	RS.
1. Central Government	-	-	-	-
2. State Government(Specify)	-	-	-	-
3. Financial Institutions				
a) Term Loans	-	-	-	-
b) Interest accrued and due	-	-	-	-
4. Banks:				
a) Term Loans	-	-	-	-
-Interest accrued and due	-	-	-	-
b) Other Loans(specify)	-	-	-	-
-Interest accrued and due	-	-	-	-
5. Other institutions and Agencies	-	-	-	-
6. Debentures and Bonds	-	-	-	-
7. Others(specify)	-	-	-	-
TOTAL	-	-	-	-

Note: Amount due within one year

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

Schedule 5-UNSECURED LOANS AND BORROWINGS	Current Year 31.03.2019 RS.	Previous Year 31.03.2018 RS.
1. Central Government	-	-
2. State Government	-	-
3. Financial Institutions	-	-
4. Banks:	-	-
a) Term Loans	-	-
b)Other Loans (specify)	-	-
5. Other Institutions and Agencies	-	-
6. Debentures and Bonds	-	-
7. Fixed Deposits	-	-
8. Others(specify)	-	-
TOTAL	-	-
Note: Amount due within one year		

SCHEDULE 6-DEFERRED CREDIT LIABILITIES:	Current Year 31.03.2019 RS.	Previous Year 31.03.2018 RS.
a) Acceptances secured by hypothecation of capital equipment and other	-	-
b) Others	-	-
TOTAL	-	-
Note: Amounts due within one year		

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount (Rs)

SCHEDULE 7-CURRENT LIABILITIES AND PROVISIONS	CURRENT YEAR 31.03.2019		PREVIOUS YEAR 31.03.2018	
	RS.	RS.	RS.	RS.
A. CURRENT LIABILITIES				
1.Acceptances	-	-	-	-
2.Sundry Creditors:	-	-	-	-
a)For Goods	-	-	-	-
b)Others	-	-	-	-
3.Advances Recovery from staff on behalf of ICFRE	-	-	-	-
4.Interest accrued but not due on:	-	-	-	-
a)Secured Loans/borrowings	-	-	-	-
b)Unsecured Loans/borrowings	-	-	-	-
	-	-	-	-
5.Statutory Liabilities:	-	-	-	-
a)Overdue	-	-	-	-
b)Others	-	-	-	-
	-	-	-	-
6.Other Current Liabilities	-	-		
	-			
Security & EMD Account	-	1,46,27,050.00	-	1,31,97,086.00
	-			
Amount Payable to Controller, Pension Cell, ICFRE	-	69,41,853.00		40,36,157.00
Amount Payable to Other offices on behalf on staff deputation		(18,540.00)		
Amount Payable to PAO (F), NEW DELHI	-	5,76,885.00		5,76,885.00
GPF Subscription/ Refund	3,58,692.00		3,58,692.00	
CGEGIS	91,740.00		91,740.00	
Any Other Recovery	1,28,451.00		1,28,451.00	-
	-			
Amount Payable to Other Units				
Saving Fund	89,361.00		89,361.00	
Death Claim	44,013.00		44,013.00	
Advance Recovery	541.00		541.00	
Other	15,40,971.00		15,40,971.00	
CGEIS	(1,961.00)	16,72,943.00	(1,961.00)	16,72,943.00
	-			
Amount Payable to Others	-			
LIC	-			
T.D.S./Service Tax/ Professional Tax				
Payable to Controller ICFRE				
Misc. Recoveries				
Inter Unit Account				-
	-			
Salary Payable Account	-			
Opening Balance	10,56,46,316.00		8,33,70,076.00	-
Add: Salary of March 2019 Payable in April 2019	10,77,05,985.00		10,56,46,968.00	
Total	21,33,52,301.00		19,10,17,022.00	
Less: Paid in April, 2018	10,56,46,316.00	10,77,05,985.00	8,33,70,706.00	10,56,46,316.00
TOTAL(A)		13,06,09,161.00		12,51,31,387.00
B. PROVISIONS				
1.For Taxation	-	-	-	-
2.Gratuity	-	-	-	-
3.Superannuation/Pension	-	-	-	-
4.Accumulated Leave Encashment	-	-	-	-
5.Trade Warranties/Claims	-	-	-	-
6.Others(Specify)	-	-	-	-
TOTAL(B)		-		-
TOTAL(A+B)		13,06,09,161.00		12,51,31,387.00

FIGURE

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount (Rs.)

SCHEDULE 8: FIXED ASSETS														
DESCRIPTION	GROSS BLOCK					DEPRECIATION						NET BLOCK		
	As on 01.04.2018	Additions during the year before 30.09.2018	Additions during the year after 30.09.2018	Transfer During the Year	As on 31.03.2019	Rate of depreciation	As at the beginning of the year	On Additions during the year before 30.09.2018	On Additions during the year after 30.09.2018	Prior period Depreciation	Total up to the Year-end	As at the Current year-end	As at the previous year-end
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.
A. Fixed Assets:													
1.LAND:													
a)Freehold	10,76,91,420.00	-	-	9,26,12,000.00	1,86,79,420.00	0%	-	-	-	-	-	1,86,79,420.00	10,76,91,420.00
b)Leasehold	-	-	-	-	-	-	-	-	-	-	-	-	-
2.BUILDINGS:	-	-	-	-	-	-	-	-	-	-	-	-	-
a)On Freehold Land	1,09,06,19,589.00	9,26,12,000.00	40,00,936.00		1,18,74,32,164.00	10%	29,52,56,694.00	9,50,22,899.40	2,00,009.00	27,13,900.00	39,07,84,313.20	85,86,67,470.00	83,76,12,894.00
3.PLANT MACHINERY & EQUIPMENT	-	-	-		-	-	-	-	-		-	-	-
a)Scientific Equipment	24,45,45,823.00	1,44,510.00	91,66,007.00		25,08,76,130.00	15%	12,54,44,964.00	1,78,66,473.00	6,62,450.25		14,39,73,887.25	10,73,02,240.65	11,90,98,452.00
b) I.T Equipment	5,89,17,907.00	2,94,89,617.00	5,15,76,619.00		9,37,83,130.00	60%	2,45,89,092.00	1,51,30,973.80	62,74,922.80		4,79,95,987.60	4,57,87,142.40	83,37,913.00
4.VEHICLES	1,34,93,537.00	-	-		1,34,93,537.00	15%	66,76,220.00	7,91,329.55	-		74,67,779.55	60,05,544.45	52,77,137.00
5.FURNITURE,FIXTURES	2,29,24,264.00	61,560.00	4,25,217.00		2,34,11,041.00	10%	86,51,687.00	14,53,437.70	21,160.85		99,07,665.55	1,35,03,375.45	1,44,95,217.00
6.OFFICE EQUIPMENT	9,92,98,410.00	13,80,624.00	19,59,308.00		10,16,88,372.00	15%	4,90,89,467.00	76,94,195.55	1,82,898.15		5,68,76,660.75	4,48,11,711.25	4,90,08,943.00
7.ELECTRIC INSTALLATIONS	21,91,700.00	-	-		21,91,700.00	15%	12,13,668.00	1,45,204.65	-		13,58,872.65	8,32,827.35	9,68,032.00
8.LIBRARY BOOKS	8,21,44,866.00	5,13,603.00	12,38,907.00		8,39,97,366.00	40%	4,09,15,150.00	1,66,97,453.60	2,67,595.60		5,78,80,199.20	2,61,17,243.80	4,12,29,996.00
10.TUBEWELLS & WAIUPPLY	-	-	-		-	5%	-	-	-		-	-	-
12.TOOLS & INSTRMENTS	33,67,361.00	-	-		33,67,361.00	15%	18,84,384.00	2,25,450.00	-		21,09,834.00	12,57,527.00	14,83,000.00
TOTAL OF CURRENT YEAR	1,64,44,25,837.00	12,40,05,944.00	4,31,07,829.00	9,26,12,000.00	1,77,34,27,260.00		51,34,05,656.00	15,20,50,234.95	73,40,179.40	27,13,900.00	67,46,27,550.43	1,09,53,99,939.58	1,10,10,22,291.00
PREVIOUS YEAR													
11.CAPITAL WORK-IN-PROGRESS	4,44,023.00	-	-	-	4,44,023.00		-	-	-		-	4,44,023.00	4,44,023.00
TOTAL	1,64,53,71,860.00	12,40,05,944.00	4,31,07,829.00	9,26,12,000.00	1,77,38,71,283.00	-	51,34,05,656.00	15,20,50,234.95	73,40,179.40		67,46,27,550.43	1,09,58,43,962.58	1,10,14,66,314.00

(Note: In the FY 2017-18 assets to be deducted from land wrongly added and asset to be added in Building wrongly deducted. (Now Rectification made)

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

SCHEDULE - 9 INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS	CURRENT YEAR 31.03.2019 RS.	PREVIOUS YEAR 31.03.2018 RS.
1. In Government Securities		
> F.D.R.(For One Time Special Grant)	14,56,35,000.00	13,57,69,200.00
> F.D.R.(With Institutes)		
2. Other Approved Securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. Others(to be specified)	-	-
TOTAL	14,56,35,000.00	13,57,69,200.00

SCHEDULE 10- INVESTMENTS-OTHERS	CURRENT YEAR 31.03.2019 RS.	PREVIOUS YEAR 31.03.2018 RS.
1. In Government Securities		
> F.D.R.(With Institutes)		-
2. Other approved Securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. Others(to be specified)	-	-
TOTAL	-	-

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

SCHEDULE - 11 CURRENT ASSETS,LOANS, ADVANCES ETC.	CURRENT YEAR 31.03.2019		PREVIOUS YEAR	31.03.2018
	RS.	RS.	RS.	RS.
A.CURRENT ASSETS:				
1.INVENTORIES:				
» Stores and Spares				
» Loose Tools				
» Stock in trade				
» Finished Goods				
» Work-In- Progress				
» Raw Materials				
2.Sundry Debtors:				
» Debts Outstanding for a period exceeding six months				
» Others				
4.Cash balances in hand(including cheques/drafts and		1,41,400.10	2,06,329.00	2,06,329.00
5.Bank Balances:				
a)With Scheduled Banks:				
» On Current Accounts	3,36,90,922.04		3,09,93,565.00	
» On Deposit Accounts	9,01,13,775.00		9,86,41,494.00	
» On Savings Accounts	53,98,61,871.70	66,36,66,568.74	37,85,94,749.00	50,82,29,808.00
b)With non-Scheduled Banks:				
» On Current Accounts				
» On Deposit Accounts(includes margin money)				
» On Savings Accounts				
6.Cheque in Transit				25,75,628.00
TOTAL (A)		66,38,07,978.29	-	50,78,11,965.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2019

Amount-(Rs)

SCHEDULE 11 - (A) CURRENT ASSETS,LOANS,ADVANCES ETC.(Cont.)	CURRENT YEAR 31.03.2019		PREVIOUS YEAR	31.03.2018
	RS.	RS.	RS.	RS.
B.LOANS,ADVANCES AND OTHER ASSETS				
1. Loans				
a) Staff Advance	63,88,984.00			54,76,756
b) Other Entities engaged in activities/ objectives similar to that of the Entity				
c) Other(Statutory Dues)	67,28,157.00	1,31,17,141.00		8,82,673.00
2. Advances and other amounts recoverable in cash or in kind or for value to be received.				
a) On Capital Account				
CPWD-TFRI	2,80,255.00		43,89,010.00	
CPWD-NE RFRI	60,17,600.00		60,17,600.00	
CCU- NE BUDGET SECTION	59,17,000.00		59,17,000.00	
CCU- (PLAN ACCOUNT)FRI	2,71,65,500.00		2,71,65,500.00	
CCU-(CHESG) BUDGET SECTION	-		396.00	
CCU- IFGTB	12,83,415.00		42,91,500.00	
CCU-IWST	6,97,100.00		6,97,100.00	
SCIENTIFIC EQUIPMETS	7,81,472.00		7,81,472.00	
ADVANCES FOR BUILDING RENOVATIONS	66,70,750.00	4,89,32,540.00	51,26,300.00	5,45,87,078.00
b) Others				
Amount Recoverable From Controller, Pension Cell, ICFRE		8,42,911.00		1,18,72,389.00
Amount Recoverable From PAO (F) NEW DELHI		24,75,967.00		26,25,967.00
Amount Recoverable from Other Units				
Inter unit accounts	4,38,40,226.00		4,30,30,225.00	
Misc Recoveries	61,71,926.00		70,67,757.00	
Payable to controller ICFRE	81,21,476.00		81,21,476.00	
Other Unit	(83,663.00)	5,80,47,965.00	(83,663.00)	6,01,33,775.00
3. Income Accrued:				
a) On Investments from Earmarked/Endowments Funds				
b) On Investments-Others				
c) On Loans and Advances	2,31,04,734.00	2,31,04,734.00	20,83,390.00	
d. Claims Recevable				20,83,390.00
TOTAL(B)		**14,65,21,256.00**		**13,56,62,126.00**
TOTAL(A+B)		**81,23,29,232.29**		**64,26,74,093.00**

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT

FOR THE YEAR ENDING 31ST MARCH, 2019

SCHEDULE 12 – INCOME FROM SALES/SERVICES	Current Year	Previous Year
1) Income from Sales		
a) Sale of Finished Goods		-
b) Sale of Raw Material		-
c) Sale of Scrap		-
2) Income from Services		
a) Service Charges	30,79,782.00	
b) Professional /Consultancy Services	-	-
c) Agency Commission and Brokerage	-	-
d) Maintenance Services(Equipment/Property)	-	-
e) Others(Specify)	-	-
f) Shairing Cost received from Other Users of KV		-
TOTAL	30,79,782.00	-

SCHEDULE 13 –GRANTS/SUBSIDIES	Current Year	Previous Year
(Irrevocable Grants& Subsidies Received)		
1) Central Government - To Plan (GC-General)	2,13,49,00,000.00	1,91,00,00,000.00
2) State Government		
3) Government Agencies		
4) Institutions/Welfare Bodies		
5) International Organisations		
6) Others(Specify)		
TOTAL	2,13,49,00,000.00	1,91,00,00,000.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH, 2019

SCHEDULE 14 -FEES/SUBSCRIPTION	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
1) Entrance Fees		
2) Annual Fees/Subscription		
3) Seminar/Program Fees/Recruitment fees	3,11,683.00	-
4) Consultancy Fees	1,16,31,550.00	1,33,69,244.00
5) Others(Sharing Cost)	2,59,833.84	
TOTAL	1,24,03,066.84	1,33,69,244.00

SCHEDULE 15-INCOME FROM INVESTMENTS	Investment -Others	
(Income on Invest .from Earmarked/Endowment funds transferred to Funds)	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
1) Interest	-	-
a) On Govt. Securities	-	-
b) Other Bonds/Debentures	-	-
2) Dividends	-	-
a) On Shares	-	-
b) On Mutual Fund Securities	-	-
3) Rents	-	-
4) Others(Specify)	-	-
	-	-
	-	
TOTAL	-	-

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH, 2019

(Amount – Rs.)

SCHEDULE 16 – INCOME FROM ROYALTY, PUBLICATION ETC.	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
1) Income from Royalty	-	-
2) Income from Publications	-	
3) Others (specify)	-	
4) Revenue Received (House License Fees,Guest	-	-
TOTAL	-	-

SCHEDULE 17 – INTEREST EARNED ETC.	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
1) On Term Deposits:	-	
a) With Scheduled Banks	-	
b) With Non-Scheduled Banks		
c) With Institutions		
d) Others		
2) On Saving Accounts:		
a) With Scheduled Banks	1,22,21,678.00	1,26,17,395.00
b) With Non – Scheduled Banks		
c) Post Office Savings Accounts		
d) Others		
3) On Loans		
i) Interest accrued during the year		
a) Employees/Staff		
ii) Interest earned during the year		
a) Employees/Staff	6,42,716.00	6,66,161.00
4) Interest on Debtors and Other Receivables	-	
	-	
TOTAL	1,28,64,394.00	1,32,83,556.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT
FOR THE YEAR ENDING 31ST MARCH, 2019

(Amount – Rs.)

SCHEDULE 18 – OTHER INCOME /PRIOR PERIOD ITEMS:	CURRENT YEAR 31.03.2019 RS.	PREVIOUS YEAR 31.03.2018 RS.
1) Profit on Sale/disposal of Assets:		
a) Owned assets		-
b) Assets acquired out of grants, or received free of cost		-
2) Revenue (Excluding interest on bank deposits, loans and	9,25,37,814.22	7,46,51,638.00
2) Recovery of various amount from OTSG	-	-
3) Fees for Miscellaneous Services		-
4) Miscellaneous Income	6,18,88,731.68	5,11,57,738.00
5) Revenue earn but not yet transfer	5,66,838.46	
6) Prior Period Items		
Income under booked	37,448.00	
Bank interest over capitalised	8,81,100.00	
TOTAL	15,59,31,932.36	12,58,09,376.00

SCHEDULE 19 – INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS	CURRENT YEAR 31.03.2019 RS.	PREVIOUS YEAR 31.03.2018 RS.
a) Closing stock		
- Finished Goods	-	-
- Work-in-progress	-	-
b) Less: Opening Stock	-	
- Finished Goods	-	-
- Work-in-progress	-	-
NET INCREASE/(DECREASE) [a-b]	-	-

SCHEDULE 20 – ESTABLISHMENT EXPENSES	CURRENT YEAR 31.03.2019 RS.	PREVIOUS YEAR 31.03.2018 RS.
a) Salaries and Wages		
Plan (General Components-General)		
Salaries	1,46,13,87,632.00	1,37,68,16,893.00
Grant to KV	12,52,78,641.00	9,63,99,000.00
b) Allowances and Bonus	-	-
c) Contribution to Provident Fund	-	-
d) Contribution to other Fund (specify)	-	
Revenue Paid to pension cell ICFRE	16,12,64,000.00	15,76,86,000.00
Revenue transfer to ICFRE PHS	1,00,00,000.00	
e) Misc Expenditure in Revenue Account	2,86,887.39	-
f) Expenses on Employees' Retirement and Terminal Benefits	-	-
g) Other (Refunded to Ministry)	34,37,756.00	-
h) Salary paid in excess than provisions of previous year	-	-
TOTAL	1,76,16,74,916.39	1,83,09,01,893.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT
FOR THE YEAR ENDING 31ST MARCH, 2019

(Amount – Rs.)

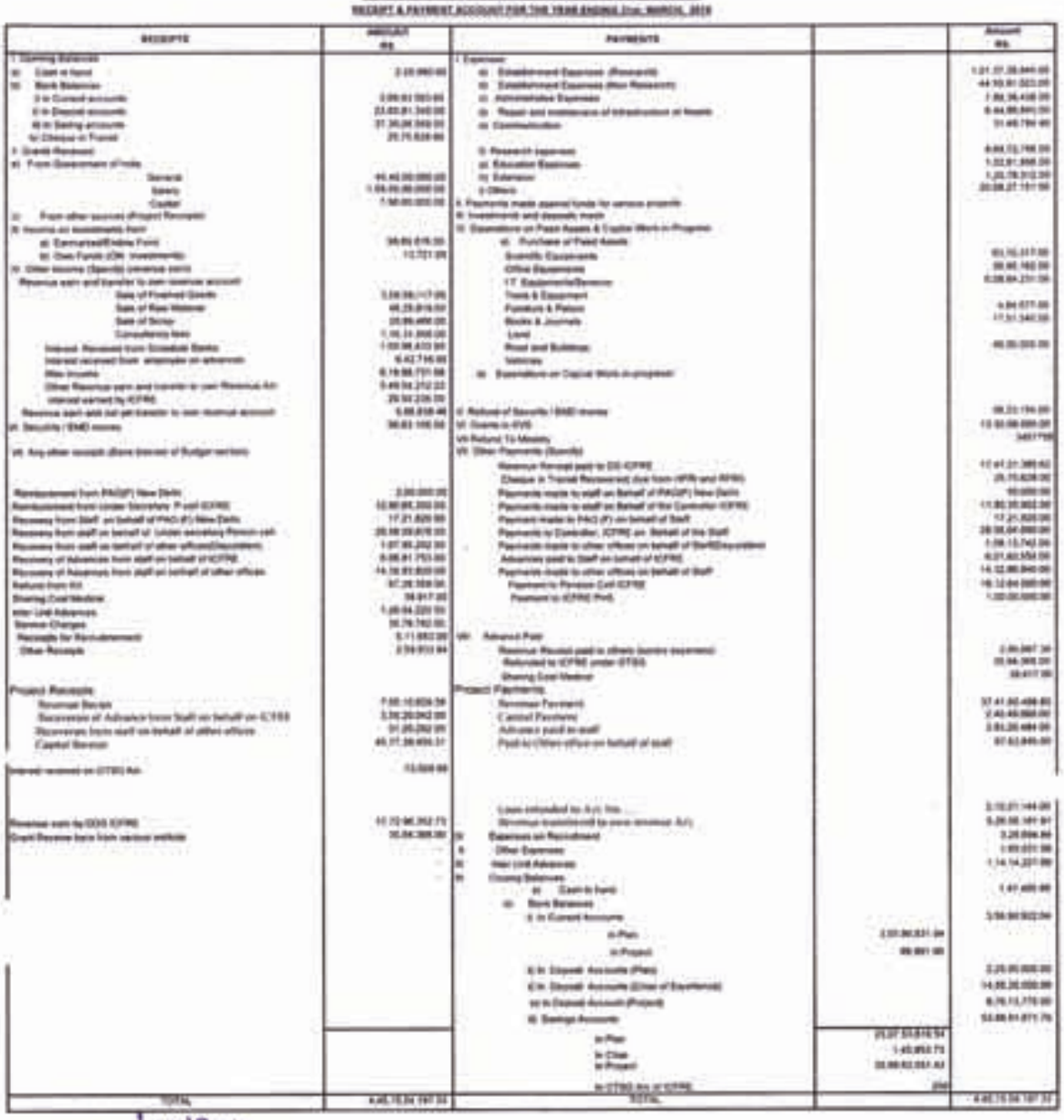
SCHEDULE 21 – OTHER ADMINISTRATIVE EXPENSES ETC.	CURRENT YEAR 31.03.2019		PREVIOUS YEAR	31.03.2018
	RS.		RS.	
a) Purchases		-		
b) Labour and processing expenses		-		
c) Cartage and Carriage Inwards		-		
d) Electricity and Water Charges		4,99,88,661.00		4,35,58,287.00
e) Insurance		-	-	
f) Rent, Rates and Taxes		2,36,14,218.00		14,15,773.00
g) Vehicles Running and maintenance				
> Fuel	44,21,932.00		36,72,136.00	
> Repair	71,95,842.00		2,74,066.00	
> Road Taxes / Insurance	9,51,625.00	1,25,69,399.00	15,44,447.00	54,90,649.00
h) Postage, Telephone & Communication Charges		31,49,784.46		3148874
i) Printing and Stationary				
> Printings & Publication	27,32,810.00		16,91,791.00	
> Stationery	16,84,469.00	44,17,279.00	19,11,659.00	36,03,450.00
ii Traveling and Conveyance Expenses				
> T.E. (Technical Staff)	1,25,33,783.00		1,57,19,628.00	
> T.E. (Non Technical Staff)	1,35,12,332.00		62,24,011.00	
> O.E. (Technical)	-	2,60,46,115.00	-	2,19,43,639.00
j) Expenses on Seminar/Workshops				
> Seminar / Conference / HRD	92,87,674.00		17,59,213.00	
> Extension - Normal	41,41,194.00		28,73,299.00	
> V.V.K. & Demo Villages	29,52,757.00		18,76,202.00	
> Direct to Consumer Project	3,25,616.00		2,94,331.00	
> DOE	-		-	
> Field Research Expenses	2,74,53,058.00		2,36,86,047.00	
> R.A.G. Expenses	17,15,811.00	4,58,76,110.00	16,91,768.00	3,21,80,860.00
k) Subscription Expenses		-		
p) Expenses on fees				
> Fellowship/Scholarship/cash Awards		3,10,89,787.00		21255394
l) Auditors Remuneration		1,94,952.00		182509
m) Hospitality Expenses		-		0
n) Professional Charges/legal/consultancy charges		39,92,396.00		2172527
o) Training Expenses/Recruitment Expenses		3,28,694.84		2033946
p) Consumables		1,09,67,751.00		11013954
q) Packing Charges		-		0
r) Freight and Forwarding Expenses		-		0
s) Distribution Expenses		-		0
t) Advertisement and Publicity		19,25,435.00		1693962
u) Maintenance of Equipments				
> Scientific	1,96,469.00		25,10,124.00	
> Office/IT Equipments	1,74,04,868.00		1,24,64,067.00	
> Furniture Expenses	2,56,651.00		3,45,755.00	
> Vehicle	37,87,612.00		28,77,469.00	
> Building and Minor Work	4,61,39,084.00	6,77,84,684.00	3,34,15,009.00	5,16,12,424.00
v) Others (specify)		2,84,277.00		672555
w) Contingency Expenditure		17,57,64,690.00		14843698
x) Medicines / X-ray		4433135.00		3491746
y) Liveries		0.00		110918
z) Newspaper Bill		1203177.00		785909
aa) Other Expenses		165031.56		
zb) Prior Period Expenses				
> Expenditure under booked		5752040.16		
TOTAL		46,79,88,217.02		35,45,04,364.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
SCHEDULES FORMING PART OF INCOME EXPENDITURE ACCOUNT
FOR THE YEAR ENDING 31ST MARCH, 2019

(Amount – Rs.)

SCHEDULE 22 – EXPENDITURE ON GRANTS, SUBSIDIES ETC.,	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
a) Grants given to Institutions/Organisations	-	
» Grants to Universities	24,704.00	18,95,270.00
b) Subsidies given to Institution/Organisations	5,00,000.00	
TOTAL	5,24,704.00	18,95,270.00

SCHEDULE 23 – INTEREST.	CURRENT YEAR 31.03.2019	PREVIOUS YEAR 31.03.2018
	RS.	RS.
a) On Fixed Loans	-	-
b) On Other Loans (including Bank Charges)		
c) Other (specify)		
TOTAL	-	-



RECEIPTS	AMOUNT Rs	PAYMENTS		Amount Rs
I Opening Balances		I Expenses		
(a) Cash in hand		(a) Establishment Expenses (Pensions)		
(b) Bank Balances		(b) Establishment Expenses (Non Pensions)		
i) in Current accounts		(c) Administrative Expenses		
ii) in Deposit accounts		(d) Repair and maintenance of Infrastructure or Assets		
iii) in Saving accounts		(e) Communication		
iv) Cheque in Transit				
II Grants Received		(f) Research Expenses		
a) From Government of India		(g) Education Expenses		
General		(h) Extension		
Salary		(i) Others		
Capital		II Payments made against funds for various projects		
(b) From other sources (Project Receipts)		III Investments and deposits made		
III Income on investments from		IV Expenditure on Fixed Assets & Capital Work-in-Progress		
(a) Earnest/Endow Fund		(a) Purchase of Fixed Assets		
(b) Own Funds (On investments)		Scientific Equipments		
IV Other Income (Specify) (revenue nature)		Office Equipments		
Revenue earn and transfer to own revenue account		I.T. Equipments/Software		
Sale of Finished Goods		Tools & Equipment		
Sale of Raw Material		Furniture & Fixture		
Sale of Scrap		Books & Journals		
Consultancy fees		Land		
Interest Received from Scheduled Banks		Road and Buildings		
Interest received from employees on advances		Vehicles		
Misc Income		(b) Expenditure on Capital Work-in-progress		
(Other Revenue earn and transfer to own Revenue Act: interest earned by ICFRE)				
Revenue earn and not yet transfer to own revenue account		V Refund of Security / EMD money		
VI Security / EMD money		VI Grants in aid		
		VII Refund To Ministry		
VII Any other receipts (Bank Interest of Budget section)		VIII Other Payments (Specify)		
		Revenue Receipt paid to DG ICFRE		
		Cheque in Transit Recovered) due from (RFN and RFN)		
Reimbursement from PAG(F) New Delhi		Payments made to staff on Behalf of PAG(F) New Delhi		
Reimbursement from Under Secretary, F and G(ICFRE)		Payments made to staff on Behalf of the Controller ICFRE		
Recovery from Staff on behalf of PAG (F) New Delhi		Payment made to PAG (F) on behalf of Staff		
Recovery from staff on behalf of Under secretary Person con		Payments by Controller, ICFRE on Behalf of the Staff		
Recovery from staff on behalf of other officers(Deputation)		Payments made to other offices on behalf of Staff(Deputation		
Recovery of Advances from staff on behalf of ICFRE		Advances paid to Staff on behalf of ICFRE		
Recovery of Advances from staff on behalf of other offices		Payments made to other offices on behalf of Staff		
Refund from AG		Payment to Pension Cell ICFRE		
Sharing Cost Medicine		Payment to ICFRE PAO		
Inter Unit Advances				
Service Charges				
Receipts for Recruitment		IX Advance Paid		
Other Receipts		Revenue Receipt paid to others (some expenses)		
		Refunded to ICFRE under DTEE		
		Sharing Cost Medicine		
Project Receipts		Project Payments		
Revenue Receipts		Revenue Payment		
Recoveries of Advance from Staff on behalf on ICFRE		Capital Payments		
Recoveries from staff on behalf of other offices		Advance paid to staff		
Capital Receipt		Paid to Other office on behalf of staff		
Interest received on DTEE AC				
		Loan refunded to A/c No.		
Revenue earn by DDG ICFRE		(Revenue transferred to own revenue A/c)		
Grant Receive here from various entities		X Expenses on Recruitment		
		XI Other Expenses		
		XII Inter Unit Advances		
		XIII Closing Balances		
		(a) Cash in hand		
		(b) Bank Balances		
		i) in Current Accounts		
		a) Plan		
		b) Project		
		ii) In Deposit Accounts (Plan)		
		iii) In Deposit Accounts (Other than Earmarked)		
		iv) In Deposit Accounts (Project)		
		v) Savings Accounts		
		a) Plan		
		b) Other		
		c) Project		
		vi) DTEE A/c of ICFRE		
TOTAL		TOTAL		

(DR. SUBESH) GAJBHIYE, (Director General, ICFRE)

SH A. S. RAWAT, (Dr. Director General, Admin., ICFRE)

SH RAJ KUMAR BAJPAI (Addl. Director General, Admin., ICFRE)

SH BRIJESH KUMAR SHARMA (Senior F&AO, Budget Section, ICFRE)

AS PER OUR SEPARATE REPORT OF EVEN DATE ANNEXED

FOR A.MAJUMDER GUPTA & ASSOCIATES
(CHARTERED ACCOUNTANTS)

(ASHOK KUMAR GUPTA)
F.C.A.,M.A.
(PARTNER)
M.NO.
DATED: 30.09.2019
PLACE: DEHRADUN

INDIAN COUNCIL FORESTRY RESEARCH AND EDUCATION

NOTES TO ACCOUNTS FOR THE YEAR ENDED MARCH 31, 2019

Schedule 24: Significant accounting policies and notes to accounts

Significant accounting policies

1. **Accounting convention**
   The financial statements have been prepared following going concern concept. Accounts are not maintained as per dual accounting concept. The entity has primarily followed cash system of accounting, in respect of salary which is accounted for on accrual basis at year end in the month of March.

2. **Use of Estimates**
   The preparation of financial statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities , the disclosures of contingent assets and liabilities on the date of the financial statements and reported amount of revenues and expenses during the period reported. Actual results could differ from those estimates.

3. **Depreciation**
   Depreciation in the books of accounts has been provided at written down value method at the rates specified in Income Tax Act 1961. Additions in fixed assets during the first half of the year are depreciated at full rates and additions in the later half are depreciated at half rates.

4. **Revenue Recognition**
   Revenue is recognized when income is actually transferred to 'own revenue account' maintained by centers.

5. **Fixed Assets, Intangible Assets and Capital Work in Progress**
   Fixed Assets have been valued at historical costs. The cost of an asset comprises its purchase price and any directly attributes cost of bringing the asset to working condition for its intended use.
   Capital work in progress includes cost of fixed assets that are not ready for their intended use at the date of balance sheet.
   In the financial year 2017-18 building amounted to Rs. 4.6306 crore was wrongly added in land and also wrongly subtracted from building. In the financial year 2018-19 rectification has been made by reducing the balance of land by Rs. 9.2612 crore and similarly by increasing the balance of building by Rs. 9.2612 crore to nullify the effect. Also prior period depreciation has been charged by crediting the fixed assets account by Rs. 0.2315 crore and debiting income expenditure account by Rs. 0.2315 crore.

6. **Earmarked Fund**

   Project Accounts: The receipts and payments of consultancy projects and externally aided projects are included in this head.

7. **Grants and subsidies**

   Amount of Grant from Ministry of Environment Forest and Climate Change (MOEF&CC) are recorded on receipts basis. Grants received for salaries and general expenses are recognized as income on receipt basis and grants received for procurement of capital assets is credited to Corpus Fund irrespective of their subsequent utilization.

8. **Employee Benefits**

   The Society has various schemes of employee benefits such as Provident Fund, Gratuity and Pension Schemes. Pension, leave encashment etc. and the accounting in respect thereof is being done on cash basis. Accordingly, no provision has been made in books of accounts for expenditures pertaining to such schemes and are recorded on payment basis.

9. **Taxation**

   The society is registered under section 12AA of the Income Tax Act, 1961. The income of society is exempt under section 12A.

10. **Contingencies Liabilities and assets**

    A disclosure for a contingent liability is made when there is a possible obligation or a present obligation that probably will not require an outflow of resources or where a reliable estimate of obligation cannot be made.

    Contingent liabilities are not recognized in the financial statements nor disclosed in the notes to the financial statements.

Notes to Accounts

1. **One Time Special Grant (OTSG):** Grant received from the Ministry of Environment Forest and Climate Change, New Delhi from financial year 2010-11 to 2015-16 was amounted to Rs. 56.2736 crore. Out of which capital expenditure incurred was amounted to Rs. 34.8055 crore, revenue expenditure incurred was amounted to Rs. 12.7672 crore, Fixed Deposits of Rs. 8.00 crore was used for chair of excellence and balance amount of Rs. 0.7009 crore was refunded to the Ministry.

   However, in the financial year 2014-15 and 2015-16 capital expenditure amounted to Rs. 3.024599 crore was under capitalized and similarly in financial year 2015-16 revenue expenditure from OTSG was under capitalized by Rs. 0.083392 crore and also amount refunded from CCU amounted to Rs. 0.1401 crore was not booked.

Due to the above differences the balance of OTSG under schedule 3 in the financial year 2017-18 was Rs. 2.9460 core which was not actually exist. Hence, in the financial year 2018-19 the difference has been rectified by debiting OTSG account by Rs. 2.9460 crore and crediting corpus account by Rs. 2.9460 crore and hence no balance exist in OTSG account as on 31.03.2019. (Details provided in annexure 2).

2. **Chair of Excellence:** In the financial year 2014-15 actual interest on Fixed Deposit was Rs. 8373704, whereas in balance sheet it was capitalized at Rs. 9254959. Hence, interest in financial year 2014-15 was over capitalized by Rs. 881255.
   Similarly, in the financial year 2016-17 actual interest on FDs and saving account was Rs. 9080400, whereas the same was capitalized at Rs. 9080245 in balance sheet. Hence interest was under- capitalized by Rs. 155.
   Now in the financial year 2018-19 the rectification has been made by reducing the balance of chair of excellence fund (in schedule 3) by Rs. 881100 and crediting the same from income and expenditure account.

3. **Fixed Assets:** In the financial year 2017-18 building amounted to Rs. 4.6306 crore was wrongly added in land and also wrongly subtracted from building. In the financial year 2018-19 rectification has been made by reducing the balance of land by Rs. 9.2612 crore and similarly by increasing the balance of building by Rs. 9.2612 crore to nullify the effect. Also prior period depreciation has been charged by crediting the fixed assets account by Rs. 0.2315 crore and debiting income expenditure account by Rs. 0.2315 crore.

4. **Cheque in Transit:** At the end of financial year 2017-18 HFRI Shimla division has issued cheque amounted to Rs 652294 and RFRI Jorhat division has issued cheque amounted to Rs 1922702 to ICFRE Budget section which has now been realized by ICFRE(Budget Section) in the beginning of Financial Year 2018-19.

5. **Loans , Advances and Other Assets:** Advances given by TFRI Jabalpur of Rs 43,88,010.00 to CPWD and by IFGTB Coimbatore of Rs 42,91,500.00 upto the end of financial year 2017-18 for repair and maintenance of roads and building has been utilized to the extent of Rs 41,87,755.00 and Rs 30,08,087.00 by TFRI Jabalpur and IFGTB Coimbaore respectively in the financial year 2018-19 and hence the same has been credited from loans and advances and debited to other administrative expenses.

6. **Prior Period Adjustments** : In the financial year 2017-18 expenses to the extent of Rs 57,52,040.00 has been under booked, which has now been reported under Schedule 21 of Income and Expenditure account in the financial year 2018-19.

7. In the management's view, there is no contingent liability pertaining to society.

DR. SURESH GAIROLA,
(Director General, ICFRE)

FOR ASHISH KUMAR GUPTA &
ASSOCIATES
(CHARTERED ACCOUNTANTS)

SH A. S. RAWAT,
(Dy. Director General, Admin., ICFRE)

(ASHISH KUMAR GUPTA)
FCA,DISA
(PARTNER)
MEMBERSHIP NO. 075985
DATED: 30.07.2019
PLACE: DEHRADUN

SH RAJ KUMAR BAJPAI,
(Asstt. Director General, Admin., ICFRE)

SH BRIJESH KUMAR SHARMA
(Section Officer, Budget Section, ICFRE)

BALANCE SHEET OF CONTROLLER,PENSION CELL, OF (GPF, GSLIS, PENSION SCHEME AND NEW PENSION SCHEME,) INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN AS ON 31ST MARCH, 2019

ANNEXURE 1

CORPUS/CAPITAL FUND AND LIABILITIES	CURRENT YEAR AS ON 31.03.2019	PREVIOUS YEAR AS ON 31.03.2018
GENERAL PROV.FUND A/C	83,83,07,636.00	81,14,53,126.00
GSLIS A/C	15,70,308.11	17,11,084.00
PENSION ACCOUNT	79,80,78,118.00	95,15,83,815.00
NEW PENSION FUND A/C	47,78,100.00	48,77,454.00
ICFRE PHS	4,24,99,299.61	3,56,98,568.00
TOTAL	1,68,52,33,461.72	1,80,53,24,047.00
FIXED ASSETS		
CURRENT ASSETS LOANS & ADV.		
INVESTMENTS-OTHERS	967578118.00	1,55,55,72,520.00
CASH & BANK BALANCES:	71,76,55,343.72	24,97,51,527.00
TOTAL	1,68,52,33,461.72	1,80,53,24,047.00

DR. Suresh Gairola (Director General, ICFRE)

SH A. S Rawat, (Dy. Director General, Admin., ICFRE)

SH Raj Kumar Bajpai, (Asstt. Director General, Admin., ICFRE)

SH Brijesh Kumar Sharma (Section Officer, Budget Section, ICFRE)

AS PER OUR SEPARATE REPORT OF EVEN DATE ANNEXED

FOR ASHISH KUMAR GUPTA & ASSOCIATES
(CHARTERED ACCOUNTANTS)

(ASHISH KUMAR GUPTA)
FCA,DISA
(PARTNER)
MEMBERSHIP NO. 075985
DATED: 30.07.2019
PLACE: DEHRADUN

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

ANNEXURE 2

PENSION-INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH 2019

INCOME	AMOUNT
Received from Revenue ICFRE	16,12,64,000.00
Interest	10,50,39,546.00
TOTAL:.....	26,63,03,546.00
EXPENDITURE	**AMOUNT**
Expenditure	652.00
Excess Of Income Over Expentiture	26,63,02,894.00
TOTAL:.....	26,63,03,546.00

GPF-INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH 2019

INCOME	AMOUNT
Interest	5,09,94,791.00
TOTAL:.....	5,09,94,791.00
EXPENDITURE	**AMOUNT**
Expenditure	-
Excess Of Income Over Expentiture	5,09,94,791.00
TOTAL:.....	5,09,94,791.00

GSLIS-INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31ST MARCH 2019

INCOME	AMOUNT
Interest	50,610.00
TOTAL:.....	50,610.00
EXPENDITURE	**AMOUNT**
Expenditure	17.44
Excess Of Income Over Expenditure	50,592.56
TOTAL:.....	50,610.00

NEW PENSION ACCOUNT INCOME & EXPENDITURE A/C FOR THE YEAR ENDING 31ST MARCH, 2019

INCOME	AMOUNT
Interest	3,30,959.00
TOTAL:.....	3,30,959.00
EXPENDITURE	**AMOUNT**
Expenditure	9,396.00
Excess Of Income Over Expentiture	3,21,563.00
TOTAL:.....	3,30,959.00

ICFREPHS INCOME & EXPENDITURE A/C FOR THE YEAR ENDING 31ST MARCH, 2019

INCOME	AMOUNT
Received from Revenue ICFRE	1,00,00,000.00
Interest	23,30,511.00
TOTAL:.....	1,23,30,511.00
EXPENDITURE	**AMOUNT**
Expenditure	-
Excess Of Income Over Expentiture	1,23,30,511.00
TOTAL:.....	1,23,30,511.00

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
DETAILS OF PENSION FUND AS ON 31ST MARCH 2019

ANNEXURE 3

Recieipts	GPF (3491)	GSLIS (3498)	PENSION FUND (3660)	NEW PENSION (4994)	ICFREPHS (7440)	TOTAL	Previous year
Opening Balance	811,433,126.00	1,711,083.55	951,583,815.00	4,877,454.00	35,698,567.61	1,805,324,046.16	1,957,566,120.00
Add : Bank Interest	50,994,791.00	50,615.00	105,039,546.00	330,939.00	2,330,511.00	158,746,417.00	90,691,429.00
						0.00	
Add : TTd from General Fund						0.00	0.00
Amount recd from PAO (T) New Delhi	130,447.00					130,447.00	168,286.00
Amount recd from other offices	539,240.00		268,106.00			807,346.00	135,024.00
Saving Fund under GSLIS		3,115,588.00				3,115,588.00	2,456,897.00
Death Claim / Insurance Claim		226,280.00				226,280.00	917,037.00
Received from PAO						0.00	0.00
Subscription/contribution/Refund Adv	187,316,809.00	1,485,733.00	81,610,566.00	35,634,731.00	3,096,300.00	289,944,139.00	289,527,526.00
Amount recd from DDG Admn			161,364,000.00		10,000,000.00	171,364,000.00	137,686,000.00
New Pension Scheme/LSHC			0.00			0.00	0.00
Inter transfer	935.00		20,000,000.00			20,000,935.00	16,000,000.00
Any other recipts				232,376.00	47,000.00	279,376.00	340.00
TOTAL:	1,030,435,348.00	6,589,264.55	1,319,766,033.00	41,075,520.00	51,972,378.61	2,449,838,574.16	2,515,148,659.00
Payments							
Exps :							
Advances to Hospital					47,000.00	47,000.00	524,556.00
Death Claim Paid		214,334.00				214,334.00	854,576.00
Saving Fund		3,094,797.00				3,094,797.00	1,987,764.00
Subscription to LIC of GSLIS /GINP		1,477,472.00				1,477,472.00	1,532,696.00
GPF Advance Reimbursement	20,042,355.00					20,042,355.00	18,919,316.00
GPF Part/Final Payment	76,970,000.00					76,970,000.00	62,528,965.00
GPF Final Payment	71,114,422.00					71,114,422.00	62,174,836.00
Pensionary Benefit paid			110,886,236.00			110,886,236.00	443,908,903.00
Pension Arrears			313,392,898.00			313,392,898.00	
Paid to NSDL on A/c of NPS Contr. DCRG		232,376.00		36,288,024.00		36,520,400.00	36,083,751.00
Inter unit transfer	20,000,935.00		97,408,129.00			97,408,129.00	56,419,995.00
Medical reimbursement					326,079.00	20,000,935.00	16,000,000.00
ISO Charges/Miscellenous Payments						326,079.00	0.00
Payment to other Institutes	0.00				9,100,000.00	0.00	0.00
Advances paid (FRI and HFRI)						9,100,000.00	0.00
GSLIS						0.00	8,886,804.00
Misc payments		17.44	652.00	9,396.00	0.00	0.00	340.00
TOTAL:	192,127,712.00	5,018,998.44	521,687,915.00	36,297,420.00	9,473,079.00	10,065.44	2,109.00
						764,605,112.44	709,824,613.00
Closing Balance Fixed	16,000,000.00					16,000,000.00	
FDR's	820,000,000.00		93,078,118.00	3,500,000.00	35,000,000.00	951,578,118.00	
Cash at Bank Account	2,307,656.00	1,570,308.11	705,000,000.00	1,278,100.00	7,499,299.61	717,655,343.72	
Balance A-B	838,307,656.00	1,570,308.11	798,078,118.00	4,778,100.00	42,499,299.61	1,685,233,461.72	1,805,324,046.00
TOTAL:	838,307,656.00	1,570,308.11	798,078,118.00	4,778,100.00	42,499,299.61	1,685,233,461.72	1,805,324,046.16

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services	9,25,000.00	5,00,000.00
Grants/Subsidies	19,56,73,000.00	15,55,05,000.00
Fees/Subscriptions	5,63,18,000.00	93,40,000.00
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.	12,500.00	2,700.00
Interest Earned	5,31,169.00	43,67,443.00
Other Income	2,18,77,690.86	2,17,70,241.00
Increase/(decrease) in stock of finished goods and works-in-progress		
Total(A)	27,53,37,359.86	19,14,85,384.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	13,84,60,968.00	14,69,10,000.00
Other Administrative Expenses etc.	5,17,59,805.00	4,47,82,666.00
Creation of assets under Capital	5,78,19,390.00	77,99,960.00
Expenditure on Grants, Subsidies etc.	24,704.00	10,00,000.00
Interest paid	58,31,169.00	43,67,443.00
Depreciation(Net Total at the year end-corresponding to Schedule 8) prior period item (Depreciation for last year).		
Other Income	2,18,79,890.86	2,21,40,768.00
Institutional Charges	9,25,000.00	50,00,000.00
Income from Royalty, Publications etc.	12,500.00	2,700.00
	27,67,13,426.86	23,20,03,537.00

Signature of DDO
Accounts Officer
I.C.F.R.E. (Hq.)

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

IN OME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
In ome from		
C nts general	2,774,000.00	2,417,000.00
C ts capital asse	520,000.00	43,000.00
In me from Rec s /Investments (Income on invest .from	1,403,043.00	1,566,726.00
e marked/endow unds transferred to Funds)		
In est received fro maintenance charges	291,730.00	1,571,020.00
In st received fro bank	6,185.00	
In me from maint ance charges	1,432,900.00	-
In set in Maint ch es	120,390.00	-
Total(A	6,548,148.00	5,597,746.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
E tablishment Exp es from service charges	851,790.00	703,799.00
A ministrative ex es from Grants	2,772,015.50	2,586,655.59
E penditure on Cr to assets	511,030.00	474,722.00
In rest paid	291,730.00	
D duction from Re ue account	15,194.06	
R venue transferre to DG ICFRE- dditn	1,672,255.54	1,668,711.55
TOTAL B)	6,114,018.10	5,435,858.14
Balance being exce of Income over Expenditure(A-B)	434,129.90	161,857.86
Tr nsfers to Specia eserve(Specify each)	nil nil	nil nil
Tr nsfer to/from C eral Reserve		
B LANCE BEING EFICIT CARRIED TO CORPUS FUND	nil	
SI NIFICANT AC UNTING POLICIES	nil	
C NTINGENT LI ILITIES AND NOTES ON ACCOUNTS	nil	

Signature of DDO

DDO
Van Vigyan Bhawan
Sector R. K. P
New Delhi

Signature of Director with Seal

Resident Director
Van Vigyan Bhawan, New Delhi

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services (Total Revenue)	4,34,59,269.60	5,03,96,492.00
Grants/Subsidies	79,72,20,440.00	73,11,10,611.00
Fees/Subscriptions		
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.		
Interest Earned		
Other Income		
Increase/(decrease) in stock of finished goods and works-in-progress		
Total(A)	**84,06,79,709.60**	**78,15,07,103.00**

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	54,37,01,597.00	55,01,48,661.00
Other Administrative Expenses etc.	19,64,21,792.00	14,13,44,869.00
Expenditure on Grants, Subsidies etc.		
Interest paid		
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
prior period item (Depreciation for last year).		
TOTAL(B)	**74,01,23,389.00**	**69,14,93,530.00**
Balance being excess of Income over Expenditure(A-B)	10,05,36,320.60	9,00,13,573.00
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND		
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

* **Note:-** Out of Rs. 4,34,59,269.60 on account of Revenue earned during 2018-19, a sum of Rs. 56,93,568.00 has been paid to other and Rs. 3,66,18,147.60 has been paid to DG, ICFRE. Thus, the balance in Revenue is left Rs. 11,45,554.00 which includes Balance being excess of Income over Expenditure .

Signature of DDO
वेतन अधिकारी/Accounts Officer
वन अनुसंधान संस्थान/FRI
देहरादून/Dehradun

Group Coordinator (FM)
R.C.S., F.R.I.
Dehradun

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019
FRC-ER, Prayagraj

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services		
Grants/Subsidies-Salary and General	16,529,000.00	17,021,600.00
Grants/Subsidies-Capital	125,000.00	223,000.00
Fees/Subscriptions		
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.		
Interest Earned		
Other Income	132,315.00	220,400.00
Increase/(decrease) in stock of finished goods and works-in-progress		
Total	**16,786,315.00**	**17,465,000.00**

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	15,772,026.00	15,555,541.00
Other Administrative Expenses etc.		3,392,060.00
Creation of assets under Capital	141,156.00	208,350.00
Expenditure on Grants, Subsidies etc.		
Interest paid		
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
price period item (Depreciation for last year).		
Other Income	131,681.00	220,400.00
Institutioeal Charges		
Income from Royalty, Publications etc.		
Total	**16,044,863.00**	**19,376,351.00**

Signature of DDO with Seal

D.D.O.
Forest Research Centre
for Eco-Rehabilitation

Institute of Forest Genetics & Tree Breeding, Coimbatore-641002

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services	481,376.00	2,188,200.00
Grants/Subsidies		
Plan:		
Salaries	170,473,000.00	160,198,000.00
General	43,276,000.00	39,344,000.00
Capital Assets	675,000.00	3,317,000.00
Fees/Subscriptions		
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.	59,456.00	39,236.00
Interest Earned	1,708,221.00	1,475,410.00
Other Income	8,334,323.80	6,600,841.69
Grants received under EAPs	60,597,713.30	44,389,774.00
Service Charges	379,427.00	331,060.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
Total(A)	**285,984,517.10**	**257,883,521.69**

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	158,339,958.00	191,972,576.00
Other Administrative Expenses etc.	25,388,119.00	24,755,400.00
Research & Operational Expenses	18,516,973.00	15,989,208.00
Capital Assets	676,575.00	3,322,265.00
Interest		
Other Payments		
Revenue Transferred to ICFRE HQ	10,528,733.80	12,154,366.69
Expenditure under EAPs	51,255,298.09	43,682,756.00
Expenditurer under Service Charges A/c	158,524.00	61,303.00
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
prior period item (Depreciation for last year).		
TOTAL(B)	**264,864,180.89**	**291,937,874.69**
Balance being excess of Income over Expenditure(A-B)	21,120,336.21	(34,054,353.00)
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND	**21,120,336.21**	**(34,054,353.00)**
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

(N. Usha)
Accounts Officer
IFGTB, Coimbatore

(Mohit Gera)
Director
IFGTB, Coimbatore

INSTITUTE OF WOOD SCIENCE AND TECHNOLOGY, BANGALORE

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS
Income from sales/services	34828227	8943958
Grants/Subsidies	184609000	166864000
Fees/Subscriptions		
Income from Investments (Income on Invest .from earmarked/endow		
Income from Royalty, Publications etc.		
Interest Earned	1160579	835009
Other Income	3525916	3622175
Increase/(decrease) in stock of finished goods and works-in-progress		
Total(A)	22,41,23,722	18,02,65,142

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS
Establishment Expenses	142375059	149876298
Other Administrative Expenses etc.	30954295	23816836
Expenditure on Grants, Subsidies etc. ICFRE PI IS		
Interest		
Depreciation(Net Total at the year end-corresponding to Schedule 8)	12739174	15762328
	3790450	4454046
TOTAL(B)	18,98,58,978	19,39,09,508
Balance being excess of Income over Expenditure(A-B)	3,42,64,744	(1,36,44,366)
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND	3,42,64,744	(1,36,44,366)
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Drawing & Disbursing Officer
Institute of Wood Science & Technology Bangalore-03

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019 RS	Previous Year 31.03.2018 RS.
Income from sales/services	83,12,556.00	
Grants/Subsidies		
a. Salaries (including KVS)	17,90,47,000.00	23,10,97,343.27
b. General	3,43,18,000.00	
Fees/Subscriptions		1,67,61,009.11
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.		
Interest Earned	18,01,102.61	22,85,351.20
Other Income	1,07,47,577.01	64,67,412.76
Increase/(decrease) in stock of finished goods and works-in-progress		
Total(A)	**23,42,26,235.62**	**25,66,11,116.34**
Capital Asset	29,91,000.00	

EXPENDITURE	Current Year 31.03.2019 RS.	Previous Year 31.03.2018 RS.
Establishment Expenses	17,00,30,855.00	17,84,89,522.00
Other Administrative Expenses etc.	3,48,30,570.37	3,41,76,153.31
Expenditure on Grants, Subsidies etc.		1,80,52,923.00
Interest paid	10,63,750.00	7,65,777.60
others income	89,39,859.76	3,78,272.40
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
prior period item (Depreciation for last year).		
TOTAL(B)	**21,48,65,035.13**	**23,18,62,648.31**
Balance being excess of Income over Expenditure(A-B)	1,93,61,200.49	2,47,48,468.03
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND		
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		
Capital Asset	2996022	

Signature of DDO with Seal

D. D. O.
I.F.R.I., Jabalpur

Signature of Director with Seal

Director
Tropical Forest Research Institute
Jabalpur

Name of Institute/Centre: FOREST RESEARCH CENTRE FOR SKILL DEVELOPMENT , CHHINDWARA(M.P.)
INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	Rs.	Rs.
Income from sales/services(Total Grants Received)	14112000.00	6117000.00
Grants/Subsidies	-	-
Fees/Subscriptions	-	-
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)	-	-
Income from Royalty, Publications etc.	-	
Interest Earned(Bank and HBA Interest)	188176.00	309318.00
Other Income	196000.00	150498.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
Total(A)	**14496176.00**	**6576816.00**
EXPENDITURE	**Current Year 31.03.2019**	**Previous Year 31.03.2018**
	Rs.	Rs.
Establishment Expenses(Salary)	12084125.00	13407492.00
Other Administrative Expenses etc.(General)	1656360.52	1620118.40
Expenditure on Grants, Subsidies etc (capital)	11055.00	-
Interest paid	-	-
Depreciation(Net Total at the year end-corresponding to Schedule 8) prior period item (Depreciation for last year).	-	-
TOTAL(B)	**13751540.52**	**15027610.40**
Balance being excess of Income over Expenditure(A-B) Transfers to Special Reserve(Specify each) Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND		
SIGNIFICANT ACCOUNTING POLICIES CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

DIRECTOR
TFRI
CHHINDWARA

(Dr. Vishakha Kumbhare)
DDO
FRC-SD
CHHINDWARA

D.D.O.
FRC-SD, Chhindwara

Indian Council of Forestry Research & Education, Dehradun

Income & Expenditure Account for the Year ended 31st March, 2019

Name of Institute: **Arid Forest Research Institute, Jodhpur**

(Amount in Rs.)

Income	Current Year 31.03.2019	Previous Year 31.03.2018
Income from Sales/ Service		
Grants/ Subsidies	158444000	157700000
Fees/ Subscriptions		
Income from Investments (Income on invest from earmarked/ endow.)		
Income from Royalty, Publications etc.		
Interest Earned	316627	337867
Other Income	13759213	12385734
Increase/ Decrease in Stock of Finished Goods and Works-in-Progress		
Total (A)	**172519840**	**170423601**

Expenditure	Current Year 31.03.2019	Previous Year 31.03.2018
Establishment Expenses	116342610	128271034
Other Administrative Expenses etc.	31017100	26896163
Expenditure on Grants, Subsidies etc.		
Interest		
Depreciation (Net Total at the year end - Corresponding to Schedule 8)		
Total (B)	**147359710**	**155167197**
Balance being Excess of Income over Expenditure (A - B)		
Transfers to Special Reserve (Specify each)		
Transfers to/ from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPUS FUND		
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Accounts Officer
Arid Forest Research Institute
Jodhpur

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services	90,395.00	1,11,360.00
Grants/Subsidies	9,41,60,000.00	8,72,56,000.00
Fees/Subscriptions	2,97,345.00	3,51,650.00
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		-
Income from Royalty, Publications etc.		-
Interest Earned	2,23,429.00	4,58,756.00
Other Income	30,03,062.00	37,68,238.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
	-	-
Total(A)	9,77,74,231.00	9,19,46,004.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	7,32,07,174.00	7,65,13,526.00
Other Administrative Expenses etc.	1,30,56,623.00	1,05,21,780.00
Expenditure on Grants, Subsidies etc.	35,97,143.00	48,26,150.00
Interest paid		
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
prior period item (Depreciation for last year).		
TOTAL(B)	8,98,60,940.00	9,18,61,456.00
Balance being excess of Income over Expenditure(A-B)	79,13,291.00	84,548.00
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND		
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Signature of DDO with Seal

Signature of Director

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

Name of Institute/Centre: Institute of Forest Productivity, Ranchi

Previous year 31.03.2018	EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018	INCOME	Current Year 31.03.2019
RS		RS	RS.		RS.
7,33,92,663.00	Establishment Expenses	7,24,41,754.00		Income from sales/services	
52,59,330.00	Other Administrative Expenses etc.	99,84,525.00		Grants/Subsidies	
			7,45,25,000.00	(1.) Salaries	7,96,32,000.00
			7744000.00	(2.) General	13125000.00
36,38,217.00	Research and operational Expenses	32,25,854.00		Fees/Subscriptions	
	Expenditure on Grants, Subsidies etc.			Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)	
	Interest		0.00	Income from Royalty, Publications etc.	
	Other payment		296963.00	Interest Earned	346108.00
				Other Income	
40,87,095.00	Revenue Income transferred to ICFRE HQ	51,54,031.00	4785092.00	Revenue Income	4462965.00
	Depreciation(Net Total at the year end-corresponding to Schedule 8)			Increase/(decrease) in stock of finished goods and works-in-progress	
8,63,77,305.00	Total Expenditure	9,08,06,164.00	8,73,51,155.00	Total Income	9,75,65,473.00
9,73,850.00	Balance being excess of Income over Expenditure(A-B)	67,59,309.00			
	Transfers to Special Reserve(Specify each)				
	Transfer to/from General Reserve				
9,73,850.00	Total Balance	67,59,309.00	-	-	-

Signature of DDO with Seal

लेखा एवं संवितरण अधिकारी
Drawing & Disbursing Officer
वन उत्पादकता संस्थान
Institute of Forest Productivity
राँची / Ranchi-835303

Signature of Director with Seal

निदेशक / Director
वन उत्पादकता संस्थान
Institute of Forest Productivity
राँची / Ranchi-835303

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services		-
Grants/Subsidies	5,29,09,000.00	4,44,53,000.00
Fees/Subscriptions		
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.		
Interest Earned	3,40,926.00	2,95,434.00
Other Income	10,32,134.00	1,37,834.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
	-	-
Total(A)	5,42,82,060.00	4,48,86,268.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	3,64,93,446.00	3,81,16,715.00
Other Administrative Expenses etc.	1,01,69,998.00	98,41,966.00
Expenditure on Grants, Subsidies etc.		
Interest paid		-
Depreciation (Net Total at the year end-corresponding to Schedule 8) prior period item (Depreciation for last year).	11,45,000.00	14,79,588.00
TOTAL(B)	4,78,08,444.00	5,22,86,586.33
Balance being excess of Income over Expenditure (A-B)	64,73,616.00	(41,62,425.33)
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPLUS FUND	64,73,616.00	(41,62,425.33)
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Drawing and Disbursing Officer

आहरण एवं संवितरण अधिकारी
Drawing & Disbursing Officer
वन जैव विविधता संस्थान
Institute of Forest Biodiversity

निदेशक / Director
वन जैव विविधता संस्थान
Institute of Forest Biodiversity
हैदराबाद / Hyderabad - 14.

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services	600,345.00	0
Grants/Subsidies	165305031	147,195,038.00
Fees/Subscriptions	11,610.00	
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)		
Income from Royalty, Publications etc.	24,849.00	
Interest Earned	449244	1,879,077.84
Other Income	4573334.37	6495034
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
	-	-
Total(A)	**170,964,413.37**	**155,569,149.84**

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses		
Other Administrative Expenses etc.		
Expenditure on Grants, Subsidies etc.		
Interest paid		
North-East Expenses	131,944,124.60	135,013,642.40
EAP Expenditure	16,178,390.49	-
Depreciation(Net Total at the year end-corresponding to Schedule 8)		
prior period item (Depreciation for last year).		
TOTAL(B)	**148,122,515.09**	**135,013,642.40**
Balance being excess of Income over Expenditure(A-B)	22,841,898.28	20,555,507.44
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPUS FUND	**22,841,898.28**	**20,555,507.44**
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Signature of DDO

Signature of Director

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services	5,170.00	1,000.00
Grants/Subsidies	1,42,76,776.00	1,19,20,000.00
Fees/Subscriptions	-	-
Income from Investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)	-	-
Income from Royalty, Publications etc.	-	-
Interest Earned	91,684.00	48,264.00
Other Income	3,19,412.00	2,71,551.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
	-	-
Total(A)	1,46,93,002.00	1,22,40,815.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	69,15,409.00	70,65,686.00
Other Administrative Expenses etc.	55,23,831.00	44,03,044.50
Creation of Assets under Capital	-	4,68,217.00
Expenditure on Grants, Subsidies etc.	-	0
Interest paid	91,684.00	48,264.00
Depreciation(Net Total at the year end-corresponding to Schedule 8)	-	-
prior period item (Depreciation for last year).		
TOTAL(B)	1,25,30,924.00	1,19,85,211.50
Balance being excess of Income over Expenditure(A-B)	21,62,078.00	2,55,603.50
Transfers to Special Reserve(Specify each)	-	-
Transfer to/from General Reserve	-	-
BALANCE BEING DEFICIT CARRIED TO CORPUS FUND	-	-
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Drawing & Disbursing Officer
Forest Research Centre
for Bamboo and Rattan
Aizawl : Mizoram
with Seal

Signature of Head
with Seal
Forest Research Centre
for Bamboo and Rattan
Aizawl : Mizoram

INDIAN COUNCIL OF FORESTRY RESEARCH & EDUCATION, DEHRADUN
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2019

INCOME	Current Year 31.03.2019	Previous Year 31.03.2018
	RS	RS.
Income from sales/services		
Grants/Subsidies	6,899,000.00	6,250,200.00
Fees/Subscriptions	-	-
Income from investments (Income on Invest .from earmarked/endow. Funds transferred to Funds)	-	-
Income from Royalty, Publications etc.	-	-
Interest Earned	41,143.00	97,223.00
Other Income (Guest House Rent, Sale of Plant Materials, Sale of Tender Documents)	92,400.00	304,456.00
Increase/(decrease) in stock of finished goods and works-in-progress	-	-
	-	-
Total(A)	7,032,543.00	6,651,879.00

EXPENDITURE	Current Year 31.03.2019	Previous Year 31.03.2018
	RS.	RS.
Establishment Expenses	4,103,308.00	4,527,706.00
Other Administrative Expenses etc	2,049,290.00	1,908,355.00
Expenditure on Grants, Subsidies etc.	-	1,980,816.00
Interest paid	41,143.00	97,223.00
Other payments	118,440.00	868,494.00
Depreciation(Net Total at the year end-corresponding to *schedule 8)	-	-
prior period item (Depreciation for last year)		
TOTAL(B)	6,312,181.00	9,382,594.00
Balance being excess of Income over Expenditure(A-B)	720,362.00	
Transfers to Special Reserve(Specify each)		
Transfer to/from General Reserve		
BALANCE BEING DEFICIT CARRIED TO CORPUS FUND		
SIGNIFICANT ACCOUNTING POLICIES		
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS		

Signature of DDO
with Seal

Signature of Head
with Seal

Head of Office

Statement of Allotment & Expenditure for the year 2018-19 (Rs.in lakh)

Sl. No.	Budget Sub-Head / Name of Institutes/Centres	Plan (GC)											
		Salaries				General				Capital			
		Budget Allot.	Opening balance	Total	Exp. 2018-19	Budget Allot.	Opening balance	Total	Exp. 2018-19	Budget Allot.	Opening balance	Total	Exp. 2018-19
1	ICFRE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	VVB, New Delhi	0.00	0.00	0.00	0.00	27.74	0.26	28.00	27.73	5.20	0.00	5.20	5.11
3	DDO, ICFRE	1436.43	131.96	1568.39	1384.59	526.50	-2.50	517.80	517.57	563.18	14.97	578.15	578.29
4	FRI, Dehradun	3314.31	493.39	6807.90	3437.02	1872.93	0.06	1872.99	1872.92	91.13	0.18	91.31	91.30
5	FRC-ER, Prayagraj	124.31	13.78	138.29	118.57	38.36	0.73	39.31	39.14	1.42	0.00	1.42	1.43
6	IFGTB, Coimbatore	1704.73	199.81	1903.54	1585.41	432.76	6.43	439.19	439.04	6.75	0.03	6.78	6.76
7	IWST, Bangalore	1536.55	161.78	1698.33	1423.75	309.54	0.00	309.54	309.53	25.00	0.00	25.00	25.00
8	TFRI, Jabalpur	1790.47	138.24	1928.71	1703.65	342.42	11.52	353.94	349.47	29.91	0.09	30.00	29.95
9	FRC-SD, Chhindwara	124.85	15.76	140.61	120.85	16.35	1.85	18.09	16.58	0.12	0.03	0.15	0.11
10	AFRI, Jodhpur	1273.31	100.86	1374.17	1163.43	311.13	1.29	312.42	310.18	6.68	0.02	6.70	6.68
11	HFRI, Shimla	811.32	63.11	874.43	731.56	130.28	0.35	130.63	130.57	1.58	0.02	1.60	1.60
12	IFP, Ranchi	796.32	63.68	860.00	724.41	131.25	0.88	132.13	132.10	4.38	-0.03	4.35	4.25
13	IFB, Hyderabad	415.96	24.04	440.00	366.07	101.70	0.00	101.70	101.70	11.45	0.00	11.45	11.45
14	RFRI, Jorhat	1159.77	121.23	1281.00	1080.35	235.40	0.55	235.95	235.94	3.20	0.30	3.50	3.17
15	FRC-LE, Agartala	42.64	8.36	51.00	41.03	26.35	2.61	28.96	20.31	0.00	0.00	0.00	0.00
16	FRC-RE, Aizawl	68.85	19.18	88.03	69.15	52.27	2.12	54.39	35.26	0.00	0.00	0.00	0.00
	Total	16800.00	1554.40	18354.40	13947.84	4345.00	25.99	4370.99	4358.24	780.00	15.61	795.61	794.98

Statement of Revenue received in Budget Section, ICFRE for the year 2018-19 (Rs.in lakh)

Sl. No.	Name of Institutes/Centres	Revenue Generated								
		Externally Aided Projects	Consultancy	Scientific Consultancy charges other than consultancy projects	Internal Resource Generation	Sale of Forest Products	Income from Interest	Misc. Income	Any other source which have not been mentioned above	Total
1	ICFRE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	VVB, New Delhi	0.00	0.00	0.00	0.00	0.00	2.98	13.74	0.00	16.72
3	DDO, ICFRE	260.99	0.00	0.00	0.00	0.00	22.41	23.54	0.04	306.98
4	FRI, Dehradun	71.38	0.00	0.00	25.65	63.20	80.83	243.98	0.00	433.04
5	IFGTB, Coimbatore	32.79	0.00	0.00	4.90	12.56	0.17	35.48	19.38	105.27
6	IWST, Bangalore	17.41	33.34	0.30	23.57	275.54	10.88	31.53	1.00	393.57
7	TFRI, Jabalpur	4.60	74.71	0.00	7.36	0.48	10.58	90.90	0.91	191.74
8	AFRI, Jodhpur	10.10	0.00	0.00	1.83	22.22	1.79	106.78	0.01	142.73
9	HFRI, Shimla	21.44	5.90	1.50	1.86	0.00	1.13	6.99	3.67	42.49
10	IFP, Ranchi	10.63	0.00	1.20	20.92	0.58	11.43	6.63	0.15	51.54
11	FRC-ER, Prayagraj	0.17	0.00	0.00	0.02	0.00	1.12	0.00	0.00	1.31
12	FRC-SD, Chhindwara	0.00	0.00	0.00	1.35	0.04	1.88	0.58	0.01	3.84
13	IFB, Hyderabad	1.22	0.00	0.00	1.99	0.00	3.33	7.66	0.00	14.20
14	RFRI, Jorhat	18.96	21.92	0.00	1.79	3.84	14.63	20.00	3.10	84.22
15	FRC-LE, Agartala	0.00	0.00	0.00	0.00	0.74	0.41	0.19	0	1.34
16	FRC-RE, Aizawl	0.00	0.00	0.00	0.00	0.05	0.92	3.48	0.00	4.45
	Total	491.66	135.87	3.00	91.42	377.25	114.48	591.48	28.27	1793.43

Statement of Allotment & Expenditure upto July 2019

(Rs.in lakh)

Sl. No.	Budget Sub-Head: Name of Institutes/Centres	Plan (GC)					
		Salaries		General		Capital	
		Budget Allot.	Exp. upto July 2019	Budget Allot.	Exp. upto July 2019	Budget Allot.	Exp. upto July 2019
1	ICFRE	0.00	0.00	74.74	0.00	0.00	0.00
2	VVB, New Delhi	0.00	0.00	29.50	7.85	0.00	0.00
3	AO, ICFRE	1600.00	560.23	494.01	118.62	84.62	20.76
4	FRI, Dehradun	5100.00	2134.17	1562.24	386.85	180.80	47.76
5	FRC-ER, Prayagraj	130.00	41.58	49.80	16.75	5.40	1.97
6	IFGTB, Coimbatore	1715.00	711.91	461.97	102.94	46.80	12.09
7	IWST, Bangalore	1450.00	560.97	308.54	62.08	55.28	7.93
8	TFRI, Jabalpur	1694.17	623.77	352.44	76.32	26.25	7.91
9	FRC-SD, Chhindwara	130.00	48.70	27.00	3.55	12.50	0.00
10	AFRI, Jodhpur	1423.00	475.94	332.46	91.69	18.26	3.77
11	HFRI, Shimla	755.83	292.25	135.83	29.71	12.55	6.28
12	IFP, Ranchi	805.00	303.02	139.81	20.07	16.75	3.70
13	IFB, Hyderabad	522.00	167.63	126.48	30.15	12.54	0.00
14	RFRI, Jorhat	1050.00	462.59	338.83	60.83	23.00	1.66
15	FRC-LE, Agartala	50.00	18.01	20.35	5.09	2.25	0.00
16	FRC-BR, Aizawl	75.00	23.32	46.00	13.64	3.00	0.00
Total		**16500.00**	**6424.09**	**4500.00**	**1026.14**	**500.00**	**113.83**

Statement of Revenue Generated upto July 2019

(Rs.in lakh)

Sl. No.	Name of Institutes/Centres	Approved Revenue Target for 2019-20	Revenue Generated upto July, 2019
1	VVB, New Delhi	20.00	6.13
2	AO, ICFRE	400.00	58.53
3	FRI, Dehradun	400.00	126.55
4	FRC-ER, Prayagraj	15.00	0.39
5	IFGTB, Coimbatore	160.00	19.44
6	IWST, Bangalore	180.00	24.76
7	TFRI, Jabalpur	180.00	47.86
8	FRC-SD, Chhindwara	15.00	2.39
9	AFRI, Jodhpur	180.00	37.83
10	HFRI, Shimla	120.00	7.28
11	IFP, Ranchi	120.00	0.00
12	IFB, Hyderabad	60.00	1.63
13	RFRI, Jorhat	120.00	8.81
14	FRC-LE, Agartala	15.00	3.36
15	FRC-BR, Aizawl	15.00	0.61
Total		**2000.00**	**345.57**

Proposed Budget Estimate for the Financial Year 2020-21

(Rs.in lakh)

Sl.No.	Budget Component	Proposed BE 2020-21
1	Grant-in-aid "Salary"	23000.00
2	Grant-in-aid "General"	6000.00
3	Grant-in-aid "Capital"	800.00
	Total	**29800.00**

Target Proposed for Revenue ICFRE (Hqtr.) Institutes/Centres for the year 2020-21

(Rs.in lakh)

S.No.	Name of Institutes/Centres	Target Proposed
1	VVB, New Delhi	20.00
2	DDO, ICFRE	400.00
3	FRI, Dehradun	400.00
4	FRC-ER, Prayagraj	15.00
5	IFGTB, Coimbatore	160.00
6	IWST, Bangalore	180.00
7	TFRI, Jabalpur	180.00
8	FRC-SD, Chhindwara	15.00
9	AFRI, Jodhpur	180.00
10	HFRI, Shimla	120.00
11	IFP, Ranchi	120.00
12	IFB, Hyderabad	60.00
13	RFRI, Jorhat	120.00
14	FRC-LE, Agartala	15.00
15	FRC-BR, Aizawl	15.00
	Total	**2000.00**

ANNEXURE

ANNEXURE

Annexure - I

Right to Information

A Public Information Officer and Appellate Authority are functioning in Public Authority, ICFRE under the RTI Act 2005. During the year 2018-19, RTI application (681) and RTI Appeals (38) are disposed off. Consolidated Quarterly RTI returns of the Public Authority are regularly uploaded by the ICFRE on CIC website (*rtir.nic.in*).

RTI Applications/ Requests	**No. of applications received as transfer from other P/As u/s 6(3)**	**Received (including cases transferred to other Public Authority)**	**Number of cases transferred to other Public Authorities u/s6(3)**	**Decisions where requests/ Appeals rejected**	**Decisions where requests/ Appeals accepted**
1st Quarter	36	106	04	--	129
2nd Quarter	40	96	04	--	119
3rd Quarter	74	133	01	--	252
4th Quarter	50	125	06	--	181
Total	**200**	**460**	**15**	--	**681**
RTI First Appeals			--	--	
1st Quarter	N/A	07	N/A	--	02
2nd Quarter	N/A	04	N/A	--	05
3rd Quarter	N/A	19	N/A	--	21
4th Quarter	N/A	06	N/A	--	10
Total	**--**	**36**	**--**	--	**38**

Name and Address of Public Information Officers and Appellate Authorities Under the Right to Information Act 2005 in ICFRE and its Institutes

Headquarters / Institutes	Appellate Authorities	Public Information Officers	Subject matter(s) allocated
Indian Council of Forestry Research and Education (ICFRE Hq.), P.O. New Forest Dehradun-248 006	Shri S.D. Sharma, Director (IC) Phone (O) : 0135-2224831, 0135-2756497 E-mail : dir_res@icfre.org	Shri Raman Nautiyal, Phone (O) :0135-2224811, E-mail : nautiyalr@icfre.org	All matters related to ICFRE Hqrs., Dehradun
Forest Research Institute, P.O. New Forest, Dehradun-248 006	Shri A.S. Rawat, IFS Director Forest Research Institute P.O. New Forest Dehradun- 248006 Phone: 0135-2224444, 2755277 Fax: 0135- 2757021 E-mail: dir_fri@icfre.org	Dr. N.K. Upreti Group Coordinator Research, FRI, P.O. New Forest Dehradun- 248 006 Phone : 0135- 2224315, 0135-2752670, 0135-2757021 Email: groupco_fri@icfre.org	All Research & Account matters
		Smt. Neelima Shah, Registrar, FRI Phone : 0135-2757021-26 (O) Email : registrar_fri@icfre.org	Establishment, Administrative & all other matters
		Dr. A.K. Tripathi, Registrar & PIO Deemed University, FRI Phone : 0135-2224439 (O) 0135-2751826 (O) Email : tripathiak@icfre.org	University Matters
Forest Research Centre for Eco-Rehabilitation (FRC-ER), 3/1, Lajpat Rai Road, New Katra, Prayagraj-211 002	Shri A.S. Rawat, IFS Director Phone: 0135-2224444, 2755277 0135- 2757021 E-mail: dir_fri@icfre.org	Shri Amit Pandey Director, FRC-ER Phone:0532-2440796 Fax :0532-2440795 E-mail: dir_csfer@icfre.org	All matters related to FRC-ER, Prayagraj
Institute of Forest Genetics and Tree Breeding, Forest Campus, P.B.No 1061 R.S. Puram, Coimbatore - 641 002	Dr. Mohit Gera, Director IFGTB, Coimbatore, Phone: 0422-2484100 (O) Fax. 0422-2430549 E-mail: dir_ifgtb@icfre.org	Dr. S. Murugesan, Scientist 'G', IFGTB, Coimbatore Phone: 0422-2484102 (O)	All matters related to IFGTB, Coimbatore
Institute of Wood Science & Technology, PO Malleswaram, Bengaluru -560003	Shri N. Mohan Karnat, IFS, Director IWST, Bengaluru Phone : 080-23341731, E-mail: dir_iwst@icfre.org	Dr. H.R. Prabuddha, IFS IWST, Bengaluru, Phone: 080-22190107(O)	All matters related to IWST, Bengaluru
Tropical Forest Research Institute, Jabalpur P.O. – R.F.R.C, Mandla Road, Jabalpur – 482 021	Dr. G. Rajeshwar Rao, Director TFRI, Jabalpur Phone : 0761-2840483 Fax: 0761-4044002 E-mail: dir_tfri@yahoo.co.in	Shri Vijay Kamble, Assistant Director (OL) TFRI Jabalpur. Phone: 0761-2744119 (O)	As per provision and guidelines provided under RTI Act, 2005

Headquarters / Institutes	Appellate Authorities	Public Information Officers	Subject matter(s) allocated
Forest Research Centre for Skill Development, (FRC-SD) P.O. Kundalikala, Poama, Chhindwara - 480001	Shri C. Behera, IFS, Head Phone : 07162-292061 E-mail:head_cfrhrd@icfre.org	Shri C. Behera, IFS, Head Phone : 07162-292061 E-mail:head_cfrhrd@icfre.org	As per provision and guidelines provided under RTI Act, 2005
Rain Forest Research Institute Post Box No. 136, Deovan, Sotai, A.T. Road, Jorhat- 785 001(Assam)	Dr. R.S.C. Jayraj Director, RFRI Jorhat Phone: 0376-2305101(O) Fax. 0376-2305130 E-mail: dir_rfri@icfre.org	Shri B.K. Sonowal RFRI, Jorhat Phone: 0376-2305130 (O)	All matters related to RFRI, Jorhat
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Annexure - II

Information on Vigilance cases

A Chief Vigilance Officer is functioning at ICFRE, Dehradun. During the year 2018-19, the cases handled were as follows:

Vigilance cases carried forward from previous years	Vigilance cases initiated in the year	Vigilance cases disposed	Vigilance cases pending	Nature of such cases
04	01	01	04	Violation of conduct rules

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Annexure - III

Information on Audit Objections

An Internal Audit Cell is functioning at ICFRE, Dehradun under the Head, Internal Audit, ICFRE. During the year 2018-19, the audit objections handled were as follows:

Information on the Audit Objections raised by Principal Director of Audit (Scientific Department), New Delhi

Audit objections carried forward from previous year	Audit objections initiated in the year	Audit objections disposed	Audit objections pending	Nature of Audit objections	Remarks, if any
76	NIL	10	66	Paras of Research / Projects/Admin./Accounts	Reply of the all Audit Paras have been submitted

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Annexure - V

List of Abrreviation

AFOLU	-	Agriculture, Forestry and Other Land Users
AFRI	-	Arid Forest Research Institute
AGB	-	Above Ground Biomass
AICRP	-	All India Coordinated Research Project
AM	-	Arbuscular Mycorrhiza
APCCF	-	Additional Principal Chief Conservator of Forest
ARS	-	Agriculture Research Station
BA	-	Benzyl Adenine
BGB	-	Below Ground Biomass
BIS	-	Bureau of Indian Standards
BoG	-	Board of Governors
BSI	-	Botanical Survey of India
BTSG	-	Bamboo Technical Support Group
CCR	-	Cinnamoyl CoK Reductase
CFPR	-	Centre for Forest Policy Research
CG	-	Chhattisgarh
CPC	-	Candidate plus clump
CPT	-	Camptothecin
CPT	-	Candidate Plus Tree
CSIR	-	Council for Scientific and Industrial Research
CSO	-	Clonal Seed Orchads
DBH	-	Diameter at Breast Height
DBT	-	Department of Biotechnology
DG	-	Director General
DNA	-	Deoxyribonucleic acid
DoPT	-	Department of Personnel and Training
DST	-	Department of Science and Technology
DTC	-	Direct to Consumer
DUS	-	Distinctness, Uniformity and Stability
DV	-	Demo Village
EAC	-	Expert Appraisal Committee
EAP	-	Externally Aided Projects
EC	-	Electrical Conductivity

EIA	-	Environmental Impact Assessment
EM	-	Environment Management
ENVIS	-	Environmental Information System
ESIP	-	Ecosystem Services Improvement Project
ET	-	Evapo- Transpiration
EWI	-	Earthwatch Institute
FGR	-	Forest Genetic Resource
FGRMN	-	Forest Genetics Resource Management Network
FRC	-	Forest Research Centre
FRC-ER	-	Forest Research Centre for Eco-Rehabilitation
FRC-SD	-	Forestry Research Centre for Skill Development
FRI	-	Forest Research Institute
FRI&C	-	Forest Research Institutes and Colleges
FRIM	-	Forest Research and Information Management
FSI	-	Forest Survey of India
FYM	-	Farm Yard Manure
GBH	-	Girth at Breast Height
GeM	-	Government e- Marketplace
GFM	-	Gass Forest Museum
GIS	-	Geographic Information System
GM	-	Genetically Modified
GoI	-	Government of India
GPS	-	Global Positioning System
GSDP	-	Green Skill Development Programme
GUI	-	Graphical User Interface
HFRI	-	Himalayan Forest Research Institute
HoD	-	Head of Division
HoFF	-	Head of Forest Force
HPLC	-	High Performance Liquid Chromatography
HPSFD	-	Himachal Pradesh State Forest Department
HPTLC	-	High Performance Thin Layer Chromatography
HRD	-	Human Resources Development
IAA	-	Indole Acetic Acid
IBA	-	Indole Butyric Acid
ICAR	-	Indian Council of Agricultural Research
ICBN	-	International Conference on Bio-technology & Nano-technology
ICFRE	-	Indian Council of Forestry Research and Education
ICIMOD	-	International Centre for Integrated Mountain Development
ICRAF	-	International Council for Research on Agroforestry
ICT	-	Information and Communication Technology
IFB	-	Institute of Forest Biodiversity
IFGTB	-	Institute of Forest Genetics and Tree Breeding
IFP	-	Institute of Forest Productivity
IFRIS	-	Indian Forestry Research Information System

IFS	-	Indian Forest Service
IGNP	-	Indira Gandhi Nahar Project
IM	-	Intensively Managed Block Plantation
IPDM	-	Integrated Pest Management and Development
IPM	-	Integrated Pest Management
IPMA	-	India Paper Manufactures Association
IVDMD	-	In-vitro Dry Matter Digestibility
IUFRO	-	International Union of Forestry Research Organisation
IWH	-	Indian Western Himalayas
IWST	-	Institute of Wood Science and Technology
JFMC	-	Joint Forest Management Committee
JNKVV	-	Jawaharlal Nehru Krishi Vishwavidyalaya
JNV	-	Jawahar Navodaya Vidyalaya
KV	-	Kendriya Vidyalaya
KVK	-	Krishi Vigyan Kendra
LAMPS	-	Large Scale Adivasi Multipurpose Society
LAN	-	Local Area Network
LBL	-	Laminated Bamboo Lumber
LCM	-	Leaf Compost Manure
LC-MS	-	Liquid Chromatography-Mass Spectrometry
MAPs	-	Medicinal and Aromatic Plants
Mg	-	Mega Gram (10^6 g)
mM	-	Milli mole
MoA	-	Memorandum of Agreement
MoE	-	Modulus of Elasticity
MoEF & CC	-	Ministry of Environment, Forest and Climate Change
MoR	-	Modulus of Rupture
MoU	-	Memorandum of Understanding
MP	-	Madhya Pradesh
MPCA	-	Medicinal Plant Conservation Area
MPSFD	-	Madhya Pradesh State Forest Department
MS	-	Maharashtra
MTE	-	Mid Term Evaluation
NABARD	-	National Bank for Agriculture and Rural Development
NAP	-	National Afforestation Programme
NATCOM	-	National Communication
NBFGR	-	National Bureau of Forest Genetics Resource
NBM	-	National Bamboo Mission
NBPGR	-	National Bureau of Plant Genetic Resources
NCBI	-	National Centre for Biotechnology Information
NFLIC	-	National Forest Library And Information Center
NFRP	-	National Forestry Research Plan
NGO	-	Non Governmental Organisation
NGT	-	National Green Tribunal

NIC	-	National Information Centre
NKN	-	National Knowledge Network
NMBA	-	National Mission of Bamboo Application
NMPB	-	National Medicinal Plant Board
NPC	-	National Project Coordinator
NTFP	-	Non Timber Forest Produce
NTGB	-	National Teak Germ Plasm Bank
NTPC	-	National Thermal Power Corporation
NVS	-	Navodaya Vidyalaya Samiti
NWFP	-	Non-Wood Forest Produce
NWM&M	-	National War Memorial & War Museum
PAR	-	Photosynthetic Active Radiation
PBR	-	Peoples Biodiversity Register
PCCF	-	Principal Chief Conservator of Forests
PF	-	Project Formulation
PGPR	-	Plant Growth Promoting Rhizo bacteria
PIMS	-	Personnel Information Management System
PMS	-	Payroll Management system
PSB	-	Phosphate solubilizing bacteria
RBD	-	Randomized Block Design
RCER	-	Research Complex for Eastern Region
REDD+	-	Reducing Emissions from Deforestation and Forest Degradation
RET	-	Rare Endangered and Threatened Species
RFD	-	Rajasthan Forest Department
RFID	-	Radio-frequency identification
RFRC	-	Regional Forest Research Centre
RFRI	-	Rain Forest Research Institute
RIMS	-	Research Management Information System
RP	-	Resource Partner
RPC	-	Research Policy Committee
RS	-	Remote Sensing
RSP	-	Rourkela Steel Plant
RTI	-	Right to Information
SAARC	-	South Asian Association for Regional Cooperation
SLEM	-	Sustainable Land and Ecosystem Management
SOC	-	Soil Organic Carbon
SPA	-	Seed Protection Area
SSO	-	Seedling Seed Orchard
SSP	-	Single Super Phosphate
SSR	-	Simple Sequence Repeat
SWAT	-	Strengths, Weaknesses, Opportunities and Threats
TBO	-	Tree Borne Oil seeds
TEK	-	Traditional Ecological Knowledge
TFRI	-	Tropical Forest Research Institute

TG	-	Tree Growers
TOF	-	Tree Outside Forests
TSO	-	Teak Seed Orchards
UF	-	Urea Formaldehyde
UM	-	Unmanaged Block Plantation
UNCCD	-	United Nations Convention to Combat Desertification
UNDP	-	United Nation Development Programme
UNEP	-	United Nation Environment Programme
UNFCCC	-	United Nations Framework Convention on Climate Change
UP	-	Uttar Pradesh
URL	-	Uniform Resource Locator
UT	-	Union Territory
UV	-	Ultra violet
VAM	-	Vesicular Arbuscular Mycorrhiza
VMG	-	Vegetative Multiplication Garden
VPN	-	Virtual Private Network
VVK	-	Van Vigyan Kendra
WAN	-	Wide Area Network
WL	-	Wild Life
WPC	-	Wood Polymer Composite

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