



First Indian Forest Congress



November 22-25, 2011

Volume I

Summary of Proceedings



Organized by
Indian Council of Forestry Research and Education, Dehradun
Ministry of Environment and Forests, New Delhi



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Director General, ICFRE

FOREWORD

Forestry issues and research in the country have for long been guided by the recommendations of the periodic silviculture conferences. Eleven such conferences have been held at the Forest Research Institute, Dehradun, since 1918. The dynamics of the forest sector today have changed and the multiple roles of the forest sector present unique opportunities and challenges. The foresters, no longer confined within the forests, have to march out to meet international commitments as well as to negotiate the democratic aspirations of all the stakeholders of forests. Forestry today is a multi-faceted discipline and represents the convergence of the current understanding of the impact forests have on society, environment and the economy at large. It is that appropriate to synergise the impact of efforts undertaken by different stakeholders in the country, the Ministry of Environment and Forests (MoEF), Government of India, appropriately has decided to hold the First Indian Forest Congress in the International Year of Forests-2011 with the central theme of **'Forests in a Changing World'**. The Indian Council of Forestry Research and Education (ICFRE) was entrusted to organise the First Indian Forest Congress, 2011 in New Delhi to raise awareness and strengthen the sustainable management, conservation and sustainable development of all types of forests for the benefit of current and future generations.

The preparations for the Indian Forest Congress were preceded by five Pre-conferences covering the aspects of Forests in Society, Forestry in Expanding Economy, Expanding Frontiers of Forestry Science, Forest Biodiversity and Landscapes and Forests and Climate Change, at the Tropical Forest Research Institute (TFRI), Jabalpur, Arid Forest Research Institute (AFRI), Jodhpur, Institute of Wood Science and Technology (IWST), Bangalore, Rain Forest Research Institute (RFRI), Jorhat, and Himalayan Forest Research Institute (HFRI), Shimla, respectively, working under the umbrella of the Indian Council of Forestry Research and Education (ICFRE), Dehradun. Deliberations at these pre-conferences were carried out in the presence of personalities like Rajendra Singh, Dr. KD Singh, Dr. RB Lal, Dr. CTS Nair, Shri PK Sen, Shri PR Sinha, Dr. HS Panwar, Shri Jagdish Kiswan and Dr. NH Ravindranath Shri Rajendra Singh. These pre-conferences acted as feedback and foundation for the First Indian Forest Congress 2011.

As we know, India is developing country and the majority of its population lives in rural areas. For this vast rural community, there is a continuous need of food, fodder, fuel and timber. Forests play an important role in fulfilling these recurring needs. In remote forest fringe villages, tribals and other local people depend on forests for their subsistence and their livelihood needs. About 70 per cent of India's rural population depends mostly on forests for fuelwood to meet their energy needs. Therefore, forests are an important and vital resource for the rural community. It's a big boon by Mother Nature that India is a mega biodiversity country. Its forests are home for rich flora and fauna from which a variety of products and services are sourced. Today, there is a dire need not only to protect and conserve the natural resources on a sustainable basis but also to increase the forest cover by all means. Since enough forest land is not available, the concept of planting 'Trees Outside Forests' is the best option to increase and sustain the forest cover. This concept is becoming a reality through agro-forestry.

In my view, there is an urgent need to develop a strategy for sustainable protection and propagation of natural resources with active participation of the common people. The event of Joint Forest Management Conclave during the congress also clearly indicated the need for sustainable development in the forestry sector with peoples' participation. The congress also indicated that scientists and other experts need to come forward to share a common platform and work together for sustainable development in the forestry sector.

I have great pleasure in presenting the proceedings of the '1st Indian Forest Congress 2011' organized on November 22-25, 2011. The publication of the proceedings assumes the sharing of knowledge on status of forests and forestry with expectations of common people from forestry sector in India. I hope that the outcome of the 1st Indian Forest Congress 2011 will help people move towards sustainable forestry practices and bring society and forestry sector on a platform of common interest. I would like to thank the Hon'ble Minister for Environment and Forests, Ms. Jayanthi Natarajan, for the insights and directions provided in her inaugural address during the congress. I would like to congratulate Dr. SS Negi, Chairman of the Organizing Committee, and his team for the effort they made for organizing the congress. I would to thank Dr. PP Bhojvaid and all individuals and officials associated with this publication.

Dr. VK Bahuguna



Director, FRI

PREFACE

I take great pleasure in presenting the proceedings of the 'First Indian Forest Congress 2011' organized on November 22-25, 2011 at New Delhi. The Indian Forest Congress 2011 is the outcome of a year-long process of intense deliberations. The congress was preceded by five pre-congresses organized at different institutes working under the Indian Council of Forestry Research and Education on five different themes, viz. Forests in Society, Forestry in Expanding Economy, Expanding Frontiers in Forestry Science, Forest Biodiversity and Landscapes and Forests and Climate Change. These pre-congresses in the order above, were organized by the Tropical Forest Research Institute (TFRI), Jabalpur; Arid Forest Research Institute (AFRI), Jodhpur; Institute of Wood Science and Technology (IWST), Bangalore; Rain Forest Research Institute (RFRI), Jorhat; and, Himalayan Forest Research Institute (HFRI), Shimla, respectively. The proceedings represent the final outcomes of the five pre-congresses and the event of IFC-2011.

A lot of hard work has gone into making the First Indian Forest Congress a huge success. In the initial stage, abstracts were called from scientists, researchers of repute and other personalities associated with forestry sector. Four hundred abstracts and oral presentations were selected on the basis of their relevance to the subject. Nearly 200 presentations were made during the congress. On account of these presentations, nearly a 100 full length papers were received. Apart from the congress, some side events were also conducted. These included the Workshop on Forest Landscape Restoration, Discussion Forum for Forest Services and Scientists, Workshop on Forest Fringe Villages and the Joint Forest Management Conclave. At the end of the congress, a Forest Charter was also released.

The proceedings have been printed in three volumes – Volume I is a summary of the proceedings and the side events, Volume II is a compendium of papers presented by the distinguished speakers on the five themes and subthemes and Volume III covers presentations made by the distinguished speakers at the congress. I hope that the proceedings will add value to the information that exists in the various domains of forestry science and provide a roadmap for research in the emerging frontiers of forestry science.

I would like to thank Ms. Jayshree Ardey Chauhan (IFS), Dr. Charan Singh, Shri Rambir Singh and Shri SP Mangain of Extension Division for compilation of all relevant information relating to the publication of the proceedings. I also express my gratitude to all the directors and scientists/officers of ICFRE institutes for providing the information related to all the events of IFC. Finally, I would like to appreciate the efforts made by Shri MP Singh, Head, Climate Change & Forest Influence, and Head, Resources & Survey Management, for conceptualizing the format and formalizing the publication of the proceedings.

Dr. PP Bhojvaid

1st Indian Forest Congress

Summary of Proceedings



The first Indian Forest Congress was organized in New Delhi from November 22-25, 2011 by the Indian Council of Forestry Research and Education (ICFRE) in collaboration with the Ministry of Environment and Forests. 'Forests in a Changing World' was the central theme of the congress which sought to lay the foundation for better policy options for sustainable forest management. The event was inaugurated in the Dr. BP Pal Auditorium at Indian Agriculture Research Institute by Ms. Jayanthi Natarajan, the Minister of State for Environment & Forests.

About 400 participants from India and abroad took part in the congress, which was held as a key scientific event in India during the ongoing International Year of Forests - 2011. The event provided an opportunity for the forest fraternity and stakeholders to discuss advances in various aspects of forestry. Planners, scientists, forestry professionals, scholars, representatives from industries, farming community and NGOs from across the nation discussed emerging issues in forestry research and development. The multiple roles of the forest sector present unique opportunities and challenges. The foresters, no longer confined within the boundary of forests, have to march out to meet the international commitments as well as to negotiate the democratic aspirations of all the stakeholders of forests.

In her inaugural address, Ms. Jayanthi Natarajan, the Minister of State for Environment & Forests (Independent charge), appealed for more scientific analysis of issues relating to forest management in the country in the midst of the ever increasing pressure on the forests and climate change threat. She said that

in India, agro and farm forestry has been promoted in recent years through various schemes and externally aided projects to bridge the gap between demand and supply for timber and fuel wood and also as an alternative livelihood option to enhance the income of farmers. This has enough potential to divert pressure away from natural forests and it is one of the important activities under the Green India Mission, one of the eight missions under India's National Action Plan for Climate Change. This programme focuses on enhancing quality of our forests, and proposes to take a holistic view of greening through landscape approach.

The world is facing complex challenges like economic turbulence, depletion of natural resources, degradation of forests, and environmental crises. The degraded forests and climate change are impacting upon ecological security and the livelihood of forest inhabitants, particularly forest dependent poor people. The poor are the most vulnerable section and they suffer the most. The important ecological services and importance of forests are now being globally recognized, she said. Forests provide both tangible and intangible benefits which have not been quantified in the past, but in 2008-09 FSI has quantified the total price as Rs 88,000 crore, which is 1.7 per cent of total GDP contributed by trees outside the forests. Such information is essential for devising new approaches and technologies. Forests need to be revisited for sustainable supply of goods and services.

She asked the experts to evolve innovative solutions for human-wildlife conflict, development of forest certification in the country and to assess the tangible and non-tangible benefits from





forests. Regarding the forest certification mechanism, she said it is yet to take firm roots in our country but ways and means should be designed to build up a system for its effective implementation for overall betterment of our forests.

For better forest management system, the Minister said that we need a stronger system not only to map forest areas and community boundaries, but also monitor forest change in response to ongoing pressures from people, from fire and change in land use. We need well structured computer databases, necessary to compile the inventory of socio-economic data. We are unable to provide details of data bases on age, classes and structure of forests or perfect details regarding growth and yield of forests, she added.

Reiterating the importance of eco-tourism, she informed that its development has shown great potential for employment generation for local youth. This opportunity must be factored into

Voices from the Field

Citizens of Bharatvarsha have always had a close association with forests from time immemorial. The ideas of sustainability of precious natural resources and livelihood support have been the basis of all their planning processes. But the newly emerged factors and huge anthropogenic pressures have posed renewed challenges. Even under these stressed situations, a number of stakeholders are contributing towards sustained management of forests in their own way. 'Voices from the Field' is an attempt to document these efforts in the form of 36 stories from grassroots to share and inspire.



Forestry in the Service of Nation: ICFRE Technologies

This book provides a comprehensive account of Research and Development initiatives of ICFRE over the years. It provides authentic accounts of technologies and processes developed, extension activities undertaken, contribution in the field of forestry education besides informing the readers about the history of scientific forestry in India.

sustainable management of our forests. She stressed the need for second generation reforms in the Joint Forest Management Programme (JFM) and recognition of the rights of the local people and their capacity building. She praised the community of foresters for doing commendable work in protecting the forests in the midst of increasing population pressure and stressed that current investment in forest management be increased for ensuring food and water security. Communities are being given more efficient rights over forests resources where laws/tradition are not recognized. Our forest officers in JFM are helping them to do this. I believe that there are very good examples in other countries like China, Canada and Nepal where they have achieved the targets and we are lagging far behind. The first step



is to strengthen community cooperatives and federations, strong local institutions and such mechanisms along with training of staff, and micro planning. Societal development of forests and the needs are more than what forests can sustain. The widening gap between societal demand for forest products and the capacity of forests to sustainably supply them is one of the main causes of forest degradation, loss of biodiversity, which are happening at a fast pace.

She urged the need for strengthening the forest bureaucracy in order to meet the increasing pressure on the forests. The existing administrative structure is not enough to cope up with the changing scenario, hence a complete reform is needed to meet the challenges. There is a mismatch between the societal demand on forests and the renewable capacity of forests.

The Minister released books entitled 'Voices from the Field', 'Forestry in the Service of Nation - ICFRE Technologies' and 'Status of JFM in India', all published by ICFRE.



Prof. MS Swaminathan, Member of Rajya Sabha, in his Presidential Address welcomed the initiative of the Indian Council of Forestry Research and Education (ICFRE) to organize the First Forest Congress. Prof. Swaminathan lamented the fact that political commitment for forest conservation as shown by late Prime Minister Indira Gandhi is lacking today. He stressed the need for the ICFRE to conduct focused research on coastal, mangroves, hills and dry zones of the country. Many Van Vigyan Kendras need to be established in the country to promote agro-forestry, he added. He asked the DG, ICFRE to start projects on developing technologies for mining rehabilitation as these areas need immediate interventions. Local heritage sites need to be given special attention in protecting the sacred groves, he further

added.

Ms. Caitlin Wiesen, Country Director of UNDP-India, stated that UNDP is supporting the efforts of mainstreaming the biodiversity conservation and forest based livelihoods. She welcomed the theme areas selected for the congress and pledged the support of UNDP to ICFRE. Dr. Maharaj Muthoo, President of Roman Forum, FAO, in his introductory remarks informed the delegates about international trends in forest management.

Mr. AK Mukherjee, Former Director General of Forests, Government of India, in his keynote address proposed policy changes in the forestry programmes of the country. He stressed the need to bring more and more science into JFM and tribal land issues.

He stated that sustainability of forests management was an essential component of the ecological and environmental conservation efforts and any degradation of forests would have an adverse impact on various life support systems like – water resources, agriculture, biodiversity, environment, climate and human health. A review of the present status of the country's forest policy evolution since independence was necessary to assess the need for further evolution of ensuring sustainable management of forests as per international norms for Sustainable Forest Management. It was imperative – given the country's high GDP growth – that the forestry sector be considered as a priority area for adequate investment and policy support.

Addressing the gathering, Director General of Forests & Special Secretary to Government of India, Dr. PJ Dilip Kumar stressed the need for empowering and capacity building of the





JFM Committee members.

Earlier, Dr. VK Bahuguna, Director General of the ICFRE & Chancellor of FRI University in his welcome address outlined the themes of the congress and said that massive investment in forestry sector is imperative not only for forest management, but also for ensuring food and water security in the country. He informed that the threat from climate change is not only looming large but has started affecting water and food security of the country. There are reports of excessive rainfall in short duration followed by prolonged droughts. As many as 350 million rural poor and tribals living in the fringe areas of forests are heavily dependent on them for their livelihood.

Indian agriculture is largely rain-fed and water security for 85 million hectare out of 143 million hectares of agricultural land depends on the health of adjoining forest lands. The health

of Indian forests, especially in the catchment areas, has to be robust to ensure regulated flow of water and recharging of underground resources which together can make our agriculture production plentiful for the large population. Dr. Bahuguna expressed hope that the deliberations in the congress would help lay the foundation for better policy options for sustainable forest management.

The ICFRE, he said, carries out research on the emerging issues in forestry sector including climate change, biodiversity and various issues of rural poor and tribal people. The future research of the Council, he said would include frontier areas of research like genetic engineering, genome mapping and nano technology. There was an immediate need for identification of forests and non-forest lands for integrated and synchronised land use practices in this country.





Vote of Thanks was extended by the Director of FRI and Vice Chancellor of the FRI University, Dr. SS Negi who is also Chairman of the Organizing Committee.

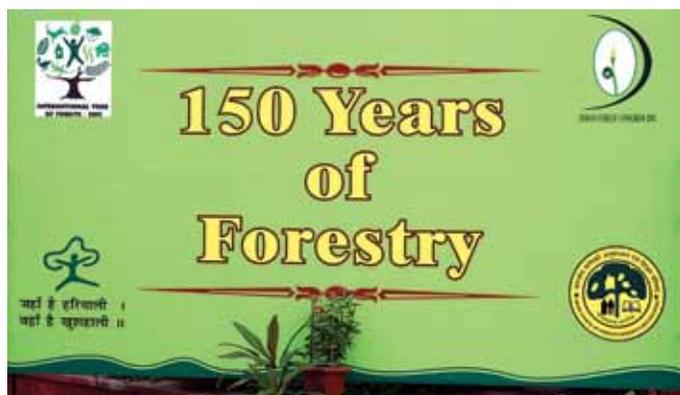
The four-day congress was attended by the invited national and international experts, officers from Government of India and Forest Department, scientists, farmers, NGOs and others. There were five themes and 28 sub-themes running concurrently, at NASC Complex. A special JFM conclave was held on November 24. The organization of the First Indian Forest Congress culminated the year-long celebrations, of as many as 36 events, during the International Year of Forests.

The Congress worked for a collective search for sustainable solutions to address development and environmental challenges and discuss advances on various aspects related to forestry. For effective organization and conduction of discussion on each theme, Pre-Congress workshops were held in the different institutes of the ICFRE for each theme with the aim to assemble the main contributors to present their papers for peer review. During the Congress, each theme was introduced by two eminent speakers who covered the national perspective highlighting different aspects of the theme.

The main themes were:

- Forests in Society
- Forestry in an Expanding Economy
- Expanding Frontiers of Forestry Sciences
- Forest Biodiversity and Landscapes
- Forests and Climate Change.

Under these themes, papers were presented, discussions held and poster presentations were made.



The main themes and sub-themes under which papers were invited for oral and poster presentations were:

• Forests in Society

- a) Forests and land use policy
- b) Forests in urban landscape
- c) Forest governance and institutional reforms
- d) Forests and community: forging partnerships
- e) Forests and traditional knowledge

• Forestry in an Expanding Economy

- a) Managing the forests: old and new paradigms
- b) Reconciling growth with conservation towards sustainable development
- c) Forest certification: opportunities and challenges
- d) Agro-forestry: production, opportunities and institutional framework
- e) Forest products: management for livelihood
- f) Forest products in industry

• Expanding Frontiers of Forestry Sciences

- a) Geomatics: applications and opportunities
- b) Managing forest resources: scientific base
- c) Forest genetics and biotechnology
- d) Forest survey and inventory
- e) Information technology as a tool in forestry management

• Forest Biodiversity and Landscapes

- a) Forests ecosystem and biodiversity management
- b) Protected areas management: new paradigms
- c) Man-animal interface
- d) Ecosystem goods and services and forest resource accounting
- e) Eco-tourism
- f) Wildlife crime control and enforcement of CITES

• Forests and Climate Change

- a) Green India Mission: opportunities and challenges
- b) Mitigation/adaptation and challenges
- c) Ecosystem resilience and forest biodiversity
- d) Climate change models/forests and Carbon fluxes
- e) Carbon balances: policy instruments
- f) India and REDD+



The proceedings of Theme 1, 'Forests in Society', were conducted in Committee Room no. III, NASC Complex as per the schedule from November 22-23. Dr. Nitin Kulkarni, Scientist – F, Nodal Officer and Organizing Secretary of the Theme (IFC), from Tropical Forest Research Institute, Jabalpur formally welcomed the invited/ lead speakers and the distinguished delegates. The proceedings of the theme were conducted under five technical sessions.

Sub-theme 1.1 was Forests and Land Use Policy. It was chaired by Dr. Bransdon Corrie, APCCF, Kerala State Forest Department, and the Co-Chairman was Shre RK Upadhyay, CCF, Tamil Nadu State Forest Department. Before deliberating on Sub-Theme I, an invited presentation was made by Shri Rajendra Singh, Ramon Magsaysay Awardee and Social Activist from Tarun Bharat Sangh, Alwar (Rajasthan), on the main theme 'Forests in Society'.

This was followed by presentation of the lead paper by Shri AK Jha, Commissioner, Tribal Research and Training Institute, Pune (MS). On special request, lead paper on Sub-theme 1.3 by Shri Sanjay Upadhyay, Advocate, Supreme Court, was also delivered with due permission of the chair. Dr Corrie gave an oral presentation entitled 'Taking forestry in India to new levels' while Shri RC Dhiman spoke about the 'Need for a separate policy and institutional framework for production forestry on non-forest areas'. Vote of thanks was given by Dr. Nitin Kulkarni,

Scientist – F and Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-chairman.

Sub Theme 1.2 was 'Forests in Urban Landscape'. This session was chaired by Shri Maharaj Muthoo, President, Roman Forum, FAO, and co-chaired by Shri SP Singh, Kerala State Forest Department. The lead paper was presented by Shri Subhash Chandra, DIG, MoEF, New Delhi. Besides the lead presentation, two oral presentations were also made.

Sub Theme 1.3 was 'Forest Governance and Institutional Reforms'. The session was chaired by Shri AK Mukharjee, Ex-DGF and SS, MoEF, New Delhi, and co-chaired by Shri Dheerendra Sharma, PCCF, Chhattisgarh. The lead paper for this sub-theme was presented in technical session 1. In addition, an oral presentation was made by Dr. Arvind Boaz, APCCF, Chhattisgarh Forest Department.

Sub Theme 1.4 was 'Forests and Community: Forging Partnerships'. This session was chaired by Dr. Ranjan Chatterjee, Planning Commission, GoI, and co-chaired by Dr. Bransdon Corrie, APCCF, Kerala State Forest Department. The lead paper was presented by Shri Kartikeya Sarabhai, Director, CEE, Ahmedabad. An oral presentation was made by Shri M Ayoub Dar, Shri S Nautiyal and Ms. Meena Bakshi. In addition, there was also one poster presentation.

Sub Theme 1.5 was 'Forests and Traditional Knowledge'. This session was chaired by Dr. DN Tiwari, ex-Member, Planning

Commission, GoI, and co-chaired by Shri RK Upadhyay, Tamil Nadu State Forest Department. Two lead papers were presented. One by Dr. DK Ved, I-AIM FRLHT, and the other by Shri BS Sajwan, PCCF, Arunachal Pradesh. Besides these, three poster papers were also presented.

Theme 2 was 'Forests in an Expanding Economy' and deliberations started on November 22. The venue of the second theme was the Committee Room No II at the NASC Complex. The opening session of this theme was chaired by Dr. PJ Dilip Kumar, Director General Forests, MoEF, and Shri Pradeep Khanna, PCCF, Gujarat, was the co-chair for this session. The rapporteurs for the opening session were Shri N Bala, Scientist E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The first keynote speaker, Dr. KD Singh, President, Academy of Forests and Environmental Science, Dehradun, talked about the theme 'Forests in an Expanding Economy' describing the historical relation between forest area changes and economic development since 1900. The second keynote speaker Dr. RB Lal, Director, IIFM, Bhopal, Madhya Pradesh spoke on 'Valuing the Forests for Sustainable Development'. In his talk, he spoke on the status of forest resources in India. After both the presentations were over, the house was declared open for discussion. Dr. DN Pandey commented that the problem was not of making science available to forestry, but the problem was of linking science with forestry. It was suggested by Dr. Pyare Lal, that agro-forestry has actually saved the forests and dependent industries. He emphasised the importance of quality planting stock for increased productivity and proper marketing support. Dr. JV Sharma suggested that each ecosystem has its own type of services and the evaluation study in each type of ecosystem and landscape/forest types should be



carried out. The suggestions were accepted by the house.

The first sub-theme of Technical Session 2 was 'Managing the Forests: Old and New Paradigm'. The session was chaired by Dr. PJ Dilip Kumar, DG Forests, MoEF, Govt. of India and co-chaired by Shri Pradeep Khanna, PCCF, Gujarat. The rapporteurs for this session were Shri N Bala, Scientist E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The lead speaker for this session was Shri Tasneem Ahmed, PCCF & DG, Social Forestry, Maharashtra, who spoke on 'Managing Forests: Old and New Paradigm'. He emphasised on the need to optimise efficiency of our forests. In his presentation, he spoke about the need for maintaining optimal growing stock to sequester carbon from the atmosphere by applying appropriate silvicultural practices. There



were a total of five oral presentations in this session.

The second sub-theme of Technical Session 2 was 'Reconciling Growth with Conservation towards Sustainable Development'. This session was chaired by Dr. AK Bansal, Addl. DG (Forests), MoEF and co-chaired by Dr. DN Pandey, Member Secy., RSPCB, Jaipur. The rapporteurs for this session were Shri N Bala, Scientist E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The first lead speaker, Dr. Ashok K Saxena, CCF, Vadodara, Gujarat, while expounding on the topic of the sub-theme, explained that the role of markets would be determined by the interaction of more than one relationship. The market institution may reduce the scarcity, or may aggravate the scarcity depending upon the strength and speed of various relationships that emanates from the relationships between scarcity of resource and the price increases of the resource in the context of developing countries, particularly in India. The second lead speaker of the session, Dr. A Mishra, Addl. Director, National Institute of Entrepreneurship and Small Business Development, suggested economic development of the people residing near the forests is as important as the management of forests. He stressed that for sustainable forest management, the forest managers should develop their forest plan in consultation with citizens, business organizations and other interested parties in and around the forest tracks. In addition, two oral presentations were also made in this session.

The third sub-theme of Technical Session 2 was 'Agro-forestry: Production, Opportunities and Institutional Framework'. This session was held on November 23, 2012 and was chaired by Shri

Tasneem Ahmad, PCCF & DG, Social Forestry, Maharashtra, and co-chaired by Dr. JC Tewari, Principal Scientist, CAZRI, Jodhpur. The rapporteurs for this session were Shri N Bala, Scientist-E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The first lead speaker, Dr. DN Pandey, Secretary, RSPCB, Jaipur, Rajasthan spoke on "Multifunctional Agro-forestry Systems in India: Science-Based Policy Options". According to him, in order to use agro-forestry systems as an important option for livelihoods improvement, climate change mitigation and adaptation, and sustainable development in India, research, policy and practice will have to progress towards effective communication with people in order to enhance the agro-forestry practices with predominance to multifunctional values. The second lead speaker Dr. SP Singh, APCCF, Research, Ext. & Lokvaniki, Bhopal, spoke on 'Agro-forestry in perspectives of biophysical, socio-economic, ecological and sustainable biomass production'. According to him, systematic research was needed in the field of agro-forestry. The third lead paper was presented by Dr. J Coosje Hoogendroon, DG, INBAR. Dr. Hoogendroon spoke about bamboo's contribution to a pro-poor, green economy. She presented the global scenario on commercial and economic aspects of bamboo and rattan. She discussed about poverty eradication and social improvement through an approach which involves bamboo based industry. After both the presentations were over, the house was declared open for discussion, following which ten oral presentations were made in this session.

The fourth sub-theme of Technical Session 2 was 'Forest





Products: Management for Livelihoods'. This session was chaired by Dr. CN Pandey, Director, IPIRTI and Dr. MM Yadav, Associate Professor, IIFM. The rapporteurs for this session were Dr. DK Mishra, Scientist E, AFRI and Shri N Bala, Scientist E, AFRI.

The lead speaker Shri AK Singh, PCCF and Managing Director, CGMFP Federation, told the audience that in Chhatisgarh, 14 lakh families were engaged in MFP collection to earn their livelihood. The State Government he said had ensured fair price of nationalised MFPs to the poor MFP collectors and enhanced their income by undertaking the activities of processing, packaging and marketing of non-nationalised species. He recommended that this type of integrated development models should be properly extended throughout the country specially in the States with the abundance of MFP. After the presentation, house was declared open for discussion. Following this, eight oral presentations were also made in this session.

The fifth sub-theme of Technical Session 2 was 'Forest Products in Industry'. This session was chaired by Dr. DN Tewari, Ex-member Planning Commission and co-chaired by Dr. Manoranjan Bhanja, APCCF (Andhra Pradesh). The rapporteurs for this session were Shri N Bala, Scientist E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The first lead speaker, Dr. CN Pandey, Director, IPIRTI, Bangalore, presented statistics on the status and opportunities for development of wood based industries in India. He gave an in-depth review of past developments and informed that the industrial demand for wood (in round wood equivalents) in India is estimated to increase from 74 million m³ in the year 2005 to 153 million m³ by the year 2020. By then more than 90 per cent of the total wood supply in the country will come from

non-forest sources. The second lead speaker of the session, Dr. Vimal Kotiyal, Scientist F & Head, Forest Products Division, FRI, Dehradun, spoke on 'Wood based industry in India: Past, Present and Future Prospects'. He said that significant contributions have been made in the field of forest products derived from timber, bamboo and other lignocellulosic material in the past in India. After the lead speakers, there were five oral presentations in this session.

The sixth and final sub-theme in Technical Session 2 was 'Forest Certification: Opportunities and Challenges'. This session was chaired by Shri RK Goyal, IGF, External Projects and co-chaired by Dr. TS Rathore. The rapporteurs for this session were Shri N Bala, Scientist E, AFRI, Jodhpur and Dr. Tarun Kant, Scientist E, AFRI, Jodhpur. The first lead speaker, Dr. AM Singh, DIG (SU, MoEF) spoke on the theme 'Forest Certification: Opportunity and Challenges'. He told the audience that forest certification was a market driven voluntary instrument created in 1990s as a tool to check massive deforestation and forest degradation. The challenges to forest certification in India, he enumerated as the multiplicity of forest types, policies/Acts related to forests and land ownership, livelihood issues, dependency of local people on the forests for their needs, less demand for certified wood and forest products in domestic market, developing and implementing the standards. The second lead speaker Dr. MM Yadav, Associate Professor, IIFM, Bhopal, spoke at length on the theme and emphasised that public concern for the environment has grown remarkably in the recent past, as a result, environmental issues are beginning to take more of a centrestage in global economic and trade policies. Following this, six oral presentations were



delivered in this session.

The proceedings of the technical sessions related to Theme 3 focused on 'Expanding Frontiers in Forestry Sciences'. The opening session was chaired by Shri Ajay Kumar Singh, PCCF Chhattisgarh. Dr. CTS Nair in his talk on 'Expanding Frontiers of Forestry Science: Meeting the Future Challenges of Forestry in India' presented an overview of the development of forest science in the context of Indian forestry. Dr. Nair emphasised that there are number of key developments in science and technology, including information and communication technologies, biotechnology and ongoing efforts in nanotechnology and bio-refineries. While a whole spectrum of technologies exist and more are being developed, there are several challenges in their application, including their relevance and appropriateness to the social, economic and environmental context.

Sub-theme 3.1 was titled 'Geomatics - Applications and Opportunities.' This session was chaired by Shri Ajay Kumar Singh, PCCF Chhattisgarh. Dr. Devendra Pandey was the first lead speaker and he spoke on 'Geomatics in Sustainable Management of Forests'. Dr. Pandey brought out the issues facing the implementation of the geomatic technologies in India like the lack of skilled human resource and lack of appreciation of the technologies. The second lead speaker was Dr. SPS Kushwaha who presented the topic 'Geomatics: Applications and Opportunities' highlighting the use of remote sensing, GIS and GPS technologies in the forestry sector with plenty of case studies carried out by Indian Institute of Remote Sensing. He discussed the application of geomatics in monitoring land-use pattern changes, forest fires, shifting cultivation, avenue tree mapping and biodiversity characterisation. The two lead presentations of sub-theme 3.1

were followed by two voluntary paper presentations.

Sub-theme 3.2 was 'Managing Forest Resources: Scientific Base'. This session was co-chaired by Dr. RD Jakati, Director, IGNFA, Dehradun, and Shri SC Joshi, Director, IWST. The first lead speaker Dr. G Kumarvelu deliberated on the topic 'Nature is Our Future'. He emphasised on the need for maintaining an ecological balance in the forests considering functioning of different aspects of the forest ecosystem. The second speaker was Dr. Manoranjan Bhanja, who presented on 'Natural Forest Management – Issues and Approaches' and suggested few areas of research which needed to be considered for expanding the frontiers of forest science. The two lead speakers were followed by following 13 voluntary paper presentations.

Sub-theme 3.3 was 'Forest Genetics and Biotechnology'. The session was co-chaired by Shri PK Sharma, Addl. PCCF, Andhra Pradesh, Shri AN Prasad, CVO, NPCC, and Shri SC Joshi, Director, IWST. The session started with the presentation of two lead speakers. One on 'Expanding Frontiers in Forest Genetics and Biotechnology' by Dr. Krishna Kumar, Director, IFGTB, and the other on 'Forest Genetic Resource Conservation and Improvement: Aspects & Prospects' by Dr. HS Ginwal. Dr. Kumar deliberated on the traditional tree improvement programmes and also on emerging technologies like genomics, whole genome sequencing, metabolomics, accelerated breeding programmes, transgenics, forensic science, and biotechnological tools in conservation. Dr. Ginwal presented the work carried out in ICFRE, including breeding strategies of different species, new clones and varieties developed by different ICFRE institutes. This was followed by following 39 voluntary paper presentations.

Sub-Theme 3.4 was 'Forest Survey and Inventory'. This session

was chaired by Dr. Devendra Pandey, Ex Director, FSI. The session started with the presentation by the lead speaker Shri Rajesh Kumar on 'National Forest Inventory – Indian Experience'. He deliberated on the methodology and approaches adopted for national level inventory of trees inside and outside the forest areas. He also discussed preliminary results of national forestry inventory on intensity of regeneration, incidence of fire, grazing, humus, plantation potential, growing stock of top five species i.e., *Shorea robusta*, *Tectona grandis*, *Pinus roxburghii*, *Terminalia crenulata*, *Anogeissus latifolia*. This was followed by one voluntary paper presentation.

Sub-theme 3.5 was 'Information Technology as a Tool in Forestry Management'. This session was also chaired by Dr. Devendra Pandey, Ex-Director of FSI. There were two lead papers and one voluntary paper. The first lead speaker, Shri Anil Oberoi, highlighted the role of ICT in planning, implementation and monitoring and its various applications in forestry. The second lead speaker was Shri P Raghuvveer, whose topic was 'IT as a Tool in Forestry Management'. He discussed the development of a framework for a Forest Resource Management Information System.

The fourth theme, 'Forest Biodiversity and Landscapes', was organized by Rain Forest Research Institute, Jorhat at Committee Room I, National Academy of Sciences, NASC. The event was successfully conducted in six technical sessions for various sub-themes. The theme presentation was initiated by the two renowned invited speakers and each sub-theme was led by total nine lead speakers of respective areas. As many as 30 oral presentations and 7 posters presentations were also made in this theme.



Sub-theme 4.1 was 'Forest Ecosystem and Biodiversity Management'. Ms. Imtiena Ao, Director, ARCB, Aizwal welcomed the expert delegates and the representatives from State Forest Departments (SFD's), forest based industry and farming community. This session was chaired by Dr. VK Bahuguna, Director General, ICFRE, and co-chaired by Dr. VB Mathur, Dean, Wildlife Institute of India. Invited speakers were Padmashree PK Sen and Shri PR Sinha, Director, Wildlife Institute of India. Lead speakers were Shri VB Sawarkar, Ex. Director Wildlife Institute of India, Dehradun, Dr. AJT Johnsingh, Nature Conservation Foundation, Mysore and WWF India, and Dr. VB Mathur, Dean, Wildlife Institute of India. This was followed by six oral presentations on the sub-theme.

Sub-theme 4.2 was 'Protected Area Management: New Paradigm'. The session was chaired by Dr. Promode Kant, IFS (Retd.), Director, Institute of Green Economy, New Delhi, and co-chaired by Dr. YC Tripathi, Scientist-E & Head, Chemistry Division, FRI. The lead speaker was Shri DVS Khati, Chief Conservator of Forest, Garhwal, Uttarakhand. He stressed on the importance of maintaining the genetic diversity of wildlife and taking the landscape approach for their management rather than conservation in isolated inviolate islands. The session also had several oral presentations from forestry professionals, scientists and researchers deliberating on the paradigm shifts taking place in different parts of the country.

Sub-theme 4.3 was 'Man and Animal Interface'. This session was chaired by Dr. AK Bhattacharya, CEO, MP Eco Tourism Development Board and co-chaired by Dr. Madhu Verma, IIFM Bhopal. The first lead speaker Shri Vivek Menon, CEO, Wildlife Trust of India, pointed out the many aspects of life and livelihood that man and animals share and how thinking out of the box and innovative schemes for relief and compensations could help in managing conflicts situations. The second lead speaker was Dr. MD Madhusudan, Nature Conservation Foundation, Mysore. He pointed out the hardening of edges between protected and production landscapes and how these two are tightly interwoven systems. He suggested that a functional understanding of the pathways that bind wildlife in protected areas to people in

production areas may help not only to alleviate conflict but also to advance both wild life conservation and human well being.

Sub-theme 4.4 was 'Ecosystem Goods and Services and Forest Resources Accountings'. This session was chaired by Dr. RK Shrivastava, Addl. PCCF, Manipur Forest Department, and co-chaired by Dr. B Shivaraju, Addl. PCCF, Kerala Forest Department. The lead speaker Dr. Madhu Verma, from IIFM Bhopal, stressed on the need to utilise economic values for conservation through payments for ecosystem services and also suggested fiscal policy reforms and economic instruments as a catalyst for greening the forest sectors. This was followed by several oral presentations.

Sub-theme 4.5 was 'Eco-tourism'. The session was chaired by Dr. RK Shrivastava, Addl. PCCF, Manipur Forest Department, and co-chaired by Dr. UK Tomar, Scientist 'E', Arid Forest Research Institute, Jodhpur. Dr. AK Bhattacharya, CEO, MP Eco-tourism Development Board, was the lead speaker and said that eco-tourism was one of the most effective way to ensure development hand-in-hand with conservation, bringing economic and social benefits to local communities. He said eco-tourism should be people-centric, dynamic, responsive, participatory, multilevel and sustainable.

The last sub-theme 4.6 was 'Wildlife Crime Control & Enforcement of CITES'. The lead speaker was Shri Samir Sinha, Head, TRAFFIC India, who said that illegal trade in wild life is a soft source of money threatening the ecological and environmental security of the country. He pointed out the need to address the adequacies in the wildlife act regarding the floral diversity and the need for multi-agency engagement to combat wildlife crime.

Detailed deliberations were held on Theme 5 which was 'Forests and Climate Change'. The main session for this theme was chaired by Shri BS Sajwan, PCCF, AGMUT, and co-chaired by Dr. PP Bhojvaid, APCCF, Haryana. There were two invited speakers. The first was Shri Jagdish Kishwan, Additional Director General (Wildlife), MoEF, who spoke on 'Planning Commission: Sub-Group on Climate Change for 12th Five Year Plan on Mitigation and Adaptation in Forestry Sector – A Draft Report'. The second speaker was Prof. NH Ravindranath, Chairman, Center for Sustainable Technologies (CST), Indian Institute of Science (IIS),





Bangalore. His topic was 'Climate Change and Forests in India.' In all, 23 presentations were made by experts on the theme and its various sub-themes.

Sub-theme 5.1 was 'Green India Mission: Opportunities and Challenges'. The chairperson for this session was Shri AK Raha, PCCF, West Bengal. He was assisted by Shri JS Walia, APCCF, Himachal Pradesh. The lead speaker was Shri BMS Rathore, Joint Secretary, MoEF, New Delhi, who deliberated on the issues and challenges in the Green India Mission. Four oral presentations and one poster presentation was also made under the sub-theme.

Sub-theme 5.2 was 'Mitigation/Adaptations and Challenges'. The session was chaired by Shri RG Kalaghathi, APCCF, Andhra Pradesh, and co-chaired by Dr. B Shivaraju, APCCF, Kerala. The lead speaker was Dr. Promode Kant, Director, Institute of Green Economy, New Delhi. He spoke on 'Possible Contours of Mitigation and Adaptation in Forestry Sector in India in the Coming Decade'. In addition, there were seven oral presentations and two poster presentations.

Sub-theme 5.3 was 'Ecosystem Resilience and Forest Biodiversity'. The lead speaker was Dr. S Balaji, APCCF & Director, TN Forest Academy, Coimbatore. He spoke on 'Ecosystem Resilience and Forest Biodiversity Enhancement through Joint Forest Management – Tamil Nadu Experience.' There were also two oral presentations.

Sub-theme 5.4 was 'Climate Change Models/Forests and Carbon Fluxes'. The lead paper, 'Indian Forest Carbon Cycle Assessment', was presented by Dr. VK Dadwal and Dr. MSR Murthy, National Remote Sensing Agency, Hyderabad. It reviewed the availability of nationally relevant databases and



gaps, comparative evaluation of forest carbon pool and flux studies, need for development of remote sensing based periodic biomass assessment, associated emerging areas of research and challenges in forest carbon assessment. There were also two oral presentations.

Sub-theme 5.5 was 'Carbon Balances: Policy Instruments'. The session was chaired by Prof. NH Ravindranath, IISC, Bangalore, and co-chaired by Prof. Madhu Verma, IIFM, Bhopal. Shri RK Sethi, Director, CEA, the lead speaker for this sub-theme,



though invited to present his paper, could not however, make it since, he was away from the country. However, on the request of authorities from IIFM, Bhopal, Prof. Anatoly Shvidenko and Dr. Hannes Boettcher, Program Leader Ecosystem Services and Management Programme (IIASA), Laxenburg, Austria, presented their lead paper 'Understanding the Present and Future Carbon Cycling of Forests: Some Methodological Problems'. In addition, there were three oral presentations and one poster presentation.

The last sub-theme of Technical Session 5 was 'India and REDD'. The session was chaired by Dr. Promode Kant, Director, IGE. and co-chaired by Dr. Mji Vijge. The lead speaker was Ms. Renu Singh, ADG, ICFRE. Her topic was 'India and REDD Opportunities and Challenges of Implementation'. Her paper focused on the development of the national REDD++ system in India under the given UNFCCC policy framework of REDD++. It explained and analyzed the opportunities available in the national forest policy framework of India for implementation of REDD++ activities. Also, Dr. Swapan Mehra made his presentation titled 'Marketing of REDD Projects: Financing REDD++ Implementation'.

Chairing the valedictory session of the Indian Forest Congress, Dr. Ranjan Chatterjee, IAS, Principal Advisor, Planning Commission, categorically stated that inclusive sustainable growth was the buzzword for 12th Five Year Plan of India and forests have a very important role in that. The focus of ensuing plan will be to have systems in place, GIS based monitoring and mapping and strengthening of scientific institutions. Forests belong to everyone and we all need to join hands to preserve them, said Dr. Chatterjee. Complimenting Dr. VK Bahuguna, DG, ICFRE, for his management skills for a highly successful IFC, he said that Planning Commission was keenly looking forward to the outcomes of the congress. Earlier Dr. PJ Dilip Kumar, DG and SS Forests, MoEF, asserted that human survival is at stake without one-third of our earth under natural ecosystems.

Dr. VK Bahuguna welcomed the chief-guest and implored upon the need for unrelenting support of Planning Commission to the forestry sector. Dr. SS Negi outlined journey of Forest Congress and proposed vote of thanks. The house gave a standing ovation to the organizing committee.

1st Indian Forest Congress – Adoption of Charter

While the United Nations declared 2011 as International Year of Forests and India was on the verge of completing 150 years of forestry, the 1st Indian Forest Congress was organized by Indian Council of Forestry Research and Education (ICFRE), Dehradun, in collaboration with Ministry of Environment and Forests, Government of India, in New Delhi from November 22-25, 2011. The central theme of the congress was *'Forests in a Changing World'*. Pre-congress workshops were organized by five institutes of ICFRE on the themes of the congress – *'Forests in Society'* by TFRI, Jabalpur, *'Forests in an Expanding Economy'* by AFRI, Jodhpur, *'Expanding Frontiers of Forestry Science'* by IWST, Bangalore, *'Forest Biodiversity and Landscape'* by RFRI, Jorhat, and *'Forests and Climate Change'* by HFRI, Shimla. More than 600 abstracts of papers were screened by the expert committee and 400 abstracts were selected for oral and poster presentations.

The event was inaugurated on November 22, 2011, by Ms. Jayanthi Natarajan, Hon'ble Minister of Environment and Forests, Government of India. Three publications of ICFRE – *'Voices from the Field'*, *'Status of JFM in India'* and *'ICFRE Technologies in the Service of the Nation'* were released by the chief guest during the opening ceremony. A daily news bulletin was published to highlight the important events/proceedings at the congress and keep the delegates abreast of all sessions and activities.

The delegates of 1st Indian Forest Congress unanimously adopted the following 'Indian Forest Congress Charter 2011':

1. In order to achieve the 'Millennium Development Goals', inter-alia for reducing poverty, it is necessary that enhanced and need-based investment is made in the forestry sector. The contribution of the forestry sector to India's GDP is under-rated (only 1.7 per cent), which represents the sector inadequately and needs to be properly assessed and authenticated. Valuation of forest ecosystem services, ecotourism, water and soil-conservation, grazing and fuel-wood as well as income generation through forest-based products' processing and of forest-based industry should also be included as contribution of forestry sector to GDP. A system of natural resource accounting, which accounts for enhanced forest and related resource capital, needs to be set in place and accordingly need-based investment in forestry sector should be made as proposed by Forestry Working Group, set up by the Planning Commission for drafting the 12th Plan for forestry sector, commensurate with contribution of this sector.
2. Wider stakeholder consultation is necessary for evolving policy options in forest conservation and sustainable management. The Government of India established the 'Central Board of Forestry' in 1950 with the Minister as chairperson and state forest ministers and independent experts as members. However, the board did not function after 1988 following the approval of Forest Policy 1988 and adoption of JFM approach. The Central Board of Forestry should be revived as an apex body to be headed by the Prime Minister to ensure involvement of all stakeholders regarding national forest policy and strategic issues.
3. There is a need to give a push to futuristic research in frontline themes like tree genetics and breeding, genomics, proteomics, genome mapping, nanotechnology, genetic engineering, bamboo, fibre, food, medicines and nutraceuticals from fungi, biofuels, and application of geomatics in forest survey and inventory so that future demand and expectations of the society from the forests are met sustainably. There is an urgent need to improve the forestry database and forest information system at the State/UT and district/division level of the country to make forestry planning more effective. Application of the modern scientific tools, such as computer, remote sensing, GIS and GPS in data collection, storage, processing and analysis of the forest resource has to be accelerated in all the States/UTs. This will also help in making the working plans, management plans and micro-plans more accurate and fast.
4. The new futuristic management regime for the forests demands that proper study and assessment of ecosystem goods and services, including biodiversity, climate change, hydrology and NTFPs, provided by the forests should be undertaken to correctly assess the contribution of forests to the economy and social needs.
5. Forest vegetation and hydrology change monitoring is essential to know the impact of climate change on mitigation and adaptation. ICFRE and other research organizations should network and develop a focussed research programme on this subject. A task force for revisiting the forest types of the country should be set up by ICFRE to prepare baseline data on the changes and to bring them on par with international standards and meet the requirements of REDD+.
6. Forest extension activities need to be accelerated on priority. Only a few Van Vigyan Kendras (VVKs) and demonstration villages are presently functioning and helping in technology dissemination to stakeholders. In order to ensure that non-forest lands are brought under tree cover to meet the national target of bringing 33 per cent land mass under forest/tree

- cover, more VVKs and Demonstration Villages should be established to give the desired impetus to agroforestry/farm forestry and also to 'Green India Mission'.
7. Special focussed efforts at the central and state levels are necessary for convergence between forestry activities and non-forestry land use/schemes for the regeneration of degraded fringe forests and upliftment of poor people, particularly the tribals and others in the fringe villages.
 8. The Joint Forest Management programme has clearly established its potential with proven facts that it is not only a sustainable forest management model but also an agent of overall socio-economic development of poor forest dependent communities. Forestry should be considered as part and parcel of development of the country. However, community based management systems need to be put in place with innovative scientific inputs for better productivity and ecological sustainability. Now, the time is ripe for second generation reforms in JFM. An expert group should be constituted for this purpose for developing the roadmap for reforms. JFM committees need to be adequately empowered to manage the forest resources, their capacity built up and legal backing given to them for their success. For the institutional strengthening of the JFMCs, local youth should be engaged to act as facilitators for better communication between forest departments, JFMCs and panchayats. A National Institute for Research and Training on JFM and Forest Based Livelihoods may be set up for capacity building and technical support to the JFMCs. A federation of JFM committees should be created under the Union Minister of Environment and Forests for better coordination and policy inputs. The JFMCs should be legally empowered and maintained as a separate entity. Independent auditing of JFMCs should be introduced.
 9. India, in spite of its large human and livestock population, is still able to support good floral and faunal biodiversity. However, human and wildlife conflicts are on the rise and timely steps are needed to minimise the conflicts. Eco-development activities in and around protected areas should be taken up in the 'XII Five Year Plan' on priority with sufficient allocation of funds to ensure sustainable wildlife management. The Wildlife Institute of India should bring out biennial assessment report on the status of the national parks and sanctuaries on the lines of the 'State of Forest Report' by the Forest Survey of India (FSI).
 10. Each state of the country should have a well equipped research organization to support forestry activities. Scientific human resource at ICFRE needs to be strengthened to cater to the new emerging areas of research. Existing human resource at the state level needs structural reform as the existing staff is unable to meet the future requirement of forest management.
 11. The requirement of frontline staff is to be reassessed at beat levels upwards in the state to be manned by technology-savvy frontline staff with modern gadgets and headed by appropriate level of well trained professionals for better delivery. A special provision in the 'XII Five Year Plan' is needed for restructuring the frontline organization of forest departments across the country to meet the emerging expectations of the society. Similarly, the training programmes of IFS and SFS officers and frontline staff need to be reoriented to meet the emerging requirements.
 12. ICFRE, a premier organization in forestry should play a lead role in networking with South Asian and other international research institutions for knowledge sharing, scientific exchange programmes and joint research plans. Similarly, the Forest Survey of India (FSI) should be adequately strengthened to provide the latest technology support to the forestry sector.
 13. It is noted that mining often causes serious disturbance to the environment, and mineral maps and forest maps of the country overlap. Mining in forest areas should be done on scientific lines well supported with bioremediation. Presently, there is no foolproof system of scientific rehabilitation nor are any expert organizations involved. This is leading to serious environmental degradation. The mining and restoration of mined out areas should go side-by-side. The feasibility of underground mining in forest areas should be studied through three-dimensional subsidence analysis, especially for coal bearing forested regions, so that better technology and forest restoration is employed in the mineral resource exploitation process. All proposals for transfer of forest land for mining should be submitted to the Ministry of Environment and Forest with GIS-based maps verified by the state forest department for consideration and future monitoring.
 14. The provisions of 'Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006' aims at addressing the longstanding insecurity of tenure in cultivated lands in forest areas and legal right of the forest dwelling scheduled tribes and other traditional forest dwellers over the NTFPs. It is essential to use high resolution remote sensor imagery and GPS/PDA to prepare GIS-based maps for clearly demarcating the land to all the forest eligible dwellers in a fair way and also to ensure that there is no scope for encroachment.
 15. There is a need for extensive research in eco-tourism – its potential, carrying capacity, socio-economic aspects, provision of eco-tax and payment of ecosystem services, etc.
 16. Forestry issues at the national level need to be inculcated in the developmental process holistically. In this context, it is necessary to professionalise the forestry sector and include forestry issues in policy, strategic planning and decision making for sustainable social and economic development.
 17. ICFRE headquarters should be shifted to New Delhi for better coordination with national and international organizations.



Details and Recommendations of Technical Sessions

NASC Complex, New Delhi

THEME 1: FORESTS IN SOCIETY

Sub-themes

- 1.1 **Forest and Land Use Policy**
- 1.2 **Forests in Urban Landscape**
- 1.3 **Forest Governance and Institutional Reforms**
- 1.4 **Forests and Community: Forging Partnerships**
- 1.5 **Forests and Traditional Knowledge**

Organizing Team:

Dr. Nitin Kulkarni, Scientist-F and Nodal Officer
Dr. Girish Chandra, Scientist-C
Dr. SC Biswas, Scientist-B
Dr. SN Mishra, Research Officer

Organised By:

Tropical Forest Research Institute
PO. RFRC Mandla Road, Jabalpur

The proceedings of 'Theme 1: Forests in Society' were conducted in committee room no. III, NASC Complex, as per

the schedule from November 22-23, 2011. Dr. Nitin Kulkarni, Scientist-F, Nodal Officer and Organizing Secretary of the Theme (IFC), from Tropical Forest Research Institute, Jabalpur, formally welcomed invited/lead speakers and distinguished delegates. The proceedings of the theme were conducted under five Technical Sessions. The details of the proceedings on each sub-theme under five Technical Sessions are as given below.

Date: November 22, 2011

Sub-theme 1.1: Forests and Land Use Policy

Chairman: Dr. Bransdon Corrie, APCCF, Kerala State Forest Department

Co-Chairman: Shri RK Upadhyay, CCF, Tamil Nadu State Forest Department

Before deliberating on the Sub-theme I, an invited presentation was made by the invited speaker, Shri Rajendra Singh, Ramon Magsaysay Awardee and social activist from Tarun Bhaskar Sangh, Alwar (Rajasthan), on the main theme, 'Forests in Society.'

It was followed by presentation of Lead Paper by Shri AK Jha, Commissioner, Tribal Research and Training Institute, Pune (MS),



on Sub-theme 1.1-Forests and Land Use Policy. On special request, Lead Paper on Sub-theme 1.3 by Shri Sanjay Upadhyay, Advocate, Supreme Court, was also delivered with due permission of the chair.

Besides the Lead Presentation, there were 5 oral and 3 poster presentations, out of which 2 oral presentations were made, including the oral presentation of Dr. Bransdon Corrie, which was earlier listed as a poster presentation. Besides the invited and lead papers, the following papers were presented and posters displayed.

1. Oral Presentation entitled *Taking Forestry in India to New Levels* by Dr. Bransdon Corrie.
2. Oral Presentation entitled *Need for a Separate Policy and Institutional Framework for Production Forestry on Non-forest Areas* by RC Dhiman.

Recommendations: All the presentations were deliberated and discussed at length leading to following recommendations:

1. Forest management practices to adopt an ecosystem approach, whereby forests are managed for ecosystem goals and services following sustainable and equitable approach.
2. The IFC-2011 must develop vision, mission and goals for forest departments.
3. There is requirement of a more professional approach from the forest department in protection of forest and water resources through effective people participation.
4. There should be forest and river management plans to be prepared by the forest department.
5. Forest, wildlife and people governance models should be developed.
6. Decentralisation of forest management is needed today, more than ever.
7. There should be a holistic land-use policy, based on landscape approach.
8. More effective public-private partnership models should be developed.
9. Proper enactment or modification of available laws may be considered to allow benefits to a large section of people, including landless.
10. The house also felt that rules regarding planting, felling and transit of forest produce be rationalised.

As a token of remembrance, mementos were presented to the Lead Speakers, Chairman and Co-Chairman. The session ended with the vote of thanks by Dr. Nitin Kulkarni, Scientist-F and





Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-Chairman.

Date: November 23, 2011

Sub-theme 1.2: Forests in Urban Landscape

Chairman: Shri Maharaj Muthoo, President, Roman Forum, FAO

Co-Chairman: Shri SP Singh, Kerala State Forest Department

The presentation of Lead Paper was made by Shri Subhash Chandra, DIG, MoEF, New Delhi, on the sub-theme 'Forests in Urban Landscape'.

Besides the Lead Presentation, there were 3 oral and 1 poster presentations listed, out of which two oral presentations were made, which are listed below -

1. Oral Presentation entitled *Assessment of Tree Health along Trevor Road, New Forest, Dehradun: A Case Study* by Ms. Kavita Bhambani and NSK Harsh.
2. Oral Presentation entitled *Air Layering – A Technique for Creating Urban Landscape* by Kshitij Malhotra, Dinesh Kumar and VRR Singh.

Recommendations: All the presentations were deliberated upon and discussed at length leading to following recommendations:

- 1) Forestry or tree planting activities should be a component of urban planning.
- 2) Technique on Air layering for creating urban landscape can also be applied for the rural areas too.
- 3) There is need of proper guidelines for tree plantations in the urban areas.
- 4) The components on forestry should be included in the funds under the JNNURM.

As token of remembrance, mementos were presented to the Lead Speakers, Chairman and Co-Chairman. The session ended

with the vote of thanks by Dr. Nitin Kulkarni, Scientist-F and Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-Chairman.

Sub-theme 1.3: Forest Governance and Institutional Reforms

Chairman: Shri AK Mukherjee, Ex-DGF and SS, MoEF, New Delhi

Co-Chairman: Shri Dheerendra Sharma, PCCF, Chhattisgarh

The presentation of Lead Paper for this sub-theme by Shri Sanjay Upadhyay, presented in session I with due permission of the chair, was also discussed and deliberated upon.

There were 7 oral and 1 poster presentations listed, out of which following one oral presentations was made -

Oral Presentation entitled *Forest Sector Challenges Need for Forestry Institutions to Adapt* by Dr. Arvind Boaz, APCCF, Chhattisgarh Forest Department.

Recommendations: All the presentations were deliberated and discussed at length leading to following recommendations:

- 1) Concepts in JFM models should be developed based on the requirement of the local local communities for effective people participation.
- 2) Sustainability of resource and livelihoods with rights and responsibilities should be the guiding principle of forest governance and management.
- 3) The concentrated efforts should be to resolve the conflicts of Forest Departments with local tribals and industries with proactive role of executive rather than dependence on judiciary.
- 4) The frontline staff needs to be given more opportunities of trainings to equip themselves with the latest developments in the forestry.

As token of remembrance, mementos were presented to the

Lead Speakers, Chairman and Co-Chairman. The session ended with the vote of thanks by Dr. Nitin Kulkarni, Scientist-F and Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-Chairman.

Sub-theme 1.4: Forests and Community: Forging Partnerships

Chairman: Dr. Ranjan Chatterjee, Planning Commission, GoI
Co-Chairman: Dr. Bransdon Corrie, APCCF, Kerala State Forest Department

The Presentation of Lead Paper was made by Shri Kartikeya Sarabhai, Director, CEE, Ahmedabad, on the Sub-theme 'Forests and Community: Forging Partnership'.

Besides the Lead Presentation, there were 3 oral and 4 poster presentations enlisted, out of which following one oral and one poster presentations were made:

1. Oral Presentation on *Growth, Chlorophyll Fluorescence and Biochemical Markers in Progenies of Babool (Acacia nilotica) at Nursery Stage* by M Ayoub Dar, S Nautiyal and Meena Bakshi.
2. Poster Presentation on *Forest Dependency of Dhurva Tribe in Netanar village of Eastern Boundary of Kanger Valley National Park in Bastar Region of Chhattisgarh State* by Bipul Paul, Sajiwan Kumar, VK Soni and Sharad Nema.



Recommendations: All the presentations were deliberated and discussed at length leading to following recommendations:

1. Forest Departments to move away from the buzzword 'management', and manage forests for ecosystem goods and services on sustainable and equitable principles.
2. JFM is both an art and a science – we need to see both 'the woods and the trees' for the second governance reform in which Joint Forest Management must focus on forest protection.
3. Tenurial rights for the people having dependence on forests should be included for effective poverty alleviation and these rights should be given to the community for larger benefits towards developing feeling of ownership.
4. More efforts need to be done to sensitise people towards the protection of forests with more active involvement of women.
5. The mindset, vision and professionalism of forest

professionals need to be addressed in the 12th Five Year Plan.

6. A strategic management team to be formed at the national level to effectively and efficiently upgrade forest management practices.

As token of remembrance, mementos were presented to the Lead Speakers, Chairman and Co-Chairman. The session ended with the vote of thanks by Dr. Nitin Kulkarni, Scientist-F and Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-Chairman.

Sub-theme 1.5: Forests and Traditional Knowledge

Chairman: Dr. DN Tiwari, Ex-Member, Planning Commission, GoI

Co-Chairman: Shri R K Upadhyay, Tamil Nadu State Forest Department

There were two Lead Papers, which were presented by Dr. DK Ved, I-AIM FRLHT and Shri BS Sajwan, PCCF, Arunachal Pradesh, on Sub-Theme Forests and traditional knowledge.

Besides the above two Lead presentations, there were 3 oral and 8 poster presentations enlisted, out of which following three Poster Papers were presented -

1. Poster Presentation entitled *Plants Prevalent in Traditional Knowledge Amongst Gond Tribes of Madhya Pradesh* by Dr. Rajiv Rai, Extension Division, TFRI, Jabalpur.
2. Poster Presentation entitled *Traditional Knowledge of Medicinal Plants with Special Reference to Lord Buddha Period* by Shiwesh Kumar and Rakesh Kumar, Shakya Muni College, Bodhgaya (Bihar).
3. Poster Presentation entitled *Seasonal Abundance of Insect Pests Associated with Abchi, Psoralea corylifolia Linnaeus* by Arvind Kumar.

Recommendations: All the presentations were deliberated and discussed at length leading to following recommendations:

1. Traditional knowledge has an important role to play in checking soil degradation, desertification, loss of ecosystem services, erosion of biodiversity and mitigation of climate change and thus it should be utilised to achieve following objectives:
 - a. Bioremediation of degraded land.
 - b. Conservation of sustainable use of biodiversity.
 - c. Improvement of ecosystem.
 - d. Mitigation of climate change.
 - e. Human development (including health) with equity and sustainability for empowerment of forest communities.
2. The agencies like National Medicinal Plant Boards and State Medicinal Plant Boards should also come forward in identifying, preserving and utilising herbal products with the traditional knowledge available in the country.

As token of remembrance, mementos were presented to the Lead Speakers, Chairman and Co-Chairman. The session ended with the vote of thanks by Dr. Nitin Kulkarni, Scientist-F and Nodal Officer (IFC for theme Forest in Society) to the Chairman and the Co-Chairman.



THEME 2: FORESTS IN AN EXPANDING ECONOMY

Sub-themes

- 2.1 **Managing the Forests: Old and New Paradigm**
- 2.2 **Reconciling Growth with Conservation Towards Sustainable Development**
- 2.3 **Agro-forestry: Production, Opportunities and Institutional Framework**
- 2.4 **Forests Products: Management for Livelihoods**
- 2.5 **Forests Products in Industry**
- 2.6 **Forests Certification: Opportunities and Challenges**

Organizing team from AFRI, Jodhpur

Shri MK Singh, Dr. G Singh, Dr. TS Rathore, Dr. DK Mishra, Shri N Bala and Dr. Tarun Kant

Chairman: Dr. P J Dilip Kumar, DG Forests, MoEF, Govt. of India

Co-Chairman: Shri Pradeep Khanna, PCCF, Gujarat

Key-note speakers: 1. Dr. KD Singh, President, Academy of Forests and Environmental Sciences, Dehradun

2. Dr. RB Lal, Director, IIFM, Bhopal, MP

Rapporteurs 1. Shri N Bala, Scientist-E, AFRI, Jodhpur

2. Dr. Tarun Kant, Scientist-E, AFRI, Jodhpur

The session started by welcoming the dignitaries and the guests. At the onset, the Chair set the tempo for the theme by addressing the house with his inspirational words. He emphasised that the importance of sustainable forest management is even more important in today's time when our economy is expanding at a very fast pace.

The first key-note speaker, Dr. KD Singh talked about the theme '*Forests in an Expanding Economy*' describing the historical relation between forest area changes and economic development since 1900. He emphasised the trend of exponential economic growth and its positive implications on forestry in terms of reduction in deforestation rate and increased demand of forest goods and services that include NTFP and agro-forestry. He also mentioned about wide disparity between economic growth and forest fringe areas and rural and urban India. He said that agro-forestry has become even more important in present scenario particularly as a major source of industrial supplies and employment generation. Likewise, NTFP has a major role in poverty alleviation too. To exploit the full potential of NTFP and agro-forestry sub-sectors, interventions of scientific, technological and governance are necessary. These recommendations were accepted by the house.

The Chair thanked the speaker for his elaborate presentation and for sharing his in-depth understanding and insight on the subject.

Dr. RB Lal was the second keynote speaker of the day and spoke on 'Valuing the Forests for Sustainable Development'. In his talk, he discussed the status of forest resources in India. He mentioned that we have lost some dense forests, which is an alarming situation. He mentioned that forestry sector's contribution in GDP has not been properly evaluated and reflected in national accounting system. Natural resources are taken as 'free gift of nature', which results in underestimation of the true value of forests. As a consequence, it leads to low investment in forestry sector resulting in lower GDP as compared to actual GDP. He discussed at length the various reasons for decline in biodiversity of forest ecosystems. He discussed the concepts of natural capital versus man-made capital and emphasised on the concept of Sustainable Forest Management (SFM) leading to sustainable development keeping in view the balance between these two.

After both the presentations were over, the house was declared open for discussion. Dr. DN Pandey commented that the problem was not of making science available to forestry, but the problem was of linking science with forestry. It was suggested by Dr. Pyare Lal that agro-forestry has actually saved the forests and dependent industries. He emphasised the importance of quality planting stock for increased productivity and proper marketing support. Dr. JV Sharma suggested that each ecosystem has its own type of services and the evaluation study in each type of ecosystem and landscape/forest types should be carried out. The suggestions were accepted by the house.

Sub-theme 2.1: Managing the Forests: Old and New Paradigm

Chairman: Dr. PJ Dilip Kumar, DG Forests, MoEF, Govt. of India.

Co-Chairman: Shri Pradeep Khanna, PCCF, Gujarat

Lead Speaker: Shri Tasneem Ahmed, PCCF & DG, Social Forestry, Maharashtra

Rapporteurs: 1. Shri N Bala, Scientist-E, AFRI
2. Dr. Tarun Kant, Scientist-E, AFRI

Shri Tasneem Ahmad gave a talk on 'Managing Forests: Old and New Paradigm', emphasising on the need to optimise efficiency of our forests. Through his presentation, he emphasised on the need to maintain optimal growing stock to sequester carbon from the atmosphere by applying appropriate silvicultural practices. In this sequence, mature crop and dead and diseased trees must be removed and replaced with young trees of long rotation. He further emphasised that efficiency of any forest ecosystem with regard to its environmental services should be measured in terms of Current Annual Increment (CAI). However, house felt that a consensus building though public debate and scientific validation has to be taken care of.

Oral Presentations

Following oral presentations were made in this session:

1. *Economic Valuation of Forest Ecosystem (Dudhwa National Park, Lakhimpur-Kheri)* – Jitendra Vir Sharma. (This presentation was scheduled for 23/11/2011 under sub-theme 4, but on request and with due permission of chair, the paper was allowed in this present theme)
2. *Role of Youth in Sustainable Forest Management* – Akash Boaz
3. *Efficacy of Aluminium Phosphide against Wood Decaying Fungi* – Himani Pant and Sadhna Tripathi
4. *Managing Degraded Arid Sandy Salt Affected Soils with Atriplex spp. for Improved Productivity* – Ranjana Arya



5. *Traditional Wisdom and Value Addition Prospects of Arid Food for Biodiversity Conservation in Thar Desert of Rajasthan* – Sangeeta Tripathi, Ranjana Arya and Uma Lohara

Questions and Discussions

After the presentations were over, the chair declared the house open for questions and discussion. It was also suggested that the results of the research should go to the field as a package as soon as possible after taking into considerations the complete economics involved in it.

- Should be considered as a land use and in sound footing with institutional support and superior quality planting material.
- Greater emphasis should be given on economic evaluation of forests taking into consideration all tangible and intangible benefits.

Recommendations from the session

The house appreciated the speakers and their presentations and made following suggestions:

- Enabling environment (science & technology, market information and financial resources) should be provided to forest fringe villages for sustainable forest management including timber and non-timber for economic development of forest dwellers.

Sub-theme 2.2: Reconciling Growth with Conservation Towards Sustainable Development

Chairman: Dr. AK Bansal, Addl. DG (Forests), MoEF

Co-Chairman: Dr. DN Pandey, Member Secy., RSPCB, Jaipur

Rapporteurs: 1. Shri N Bala, Scientist-E, AFRI

2. Dr. Tarun Kant, Scientist-E, AFRI

Lead Speakers: 1. Dr. A Mishra, Addl. Director, National Institute of Entrepreneurship and Small Business Development
2. Dr. Ashok K Saxena, CCF, Vadodara, Gujarat

The session started by welcoming the dignitaries and the guests. The first lead speaker, Dr. Ashok K Saxena explained that the mechanism is not singly confined to the often argued and emphasized negative price loops but may extend into various other positive and negative relationships. Therefore, the role of markets would be determined by the interaction of more than one relationship. The market institution may reduce the scarcity, or may aggravate the scarcity depending upon the strength and speed of various relationships that emanates from the relationships between scarcity of resource and the price increases of the resource in the context of developing countries, particularly in India.

The second lead speaker of the session, Dr. A Mishra, talked in depth on the theme. He emphasised reduction of the dependence of tribals on forests and land by providing them education and skills for their alternative livelihood. During a study on evaluation of schemes for tribal development, it was found that while there is a positive change in terms of economic empowerment, the level of education and literacy are still low and there was a need to work on this aspect. He further suggested economic development of the people residing near the forests was as important as the management of forests. It is necessary to bring out schemes

for economic development of the people particularly tribals residing near the forests. He stressed that for sustainable forest management, the forest managers should develop their forest plan in consultation with citizens, business organizations and other interested parties in and around the forest tracts being managed. There has to be a balance between society's demands for forest products and preservation of forest health and diversity. He also emphasised that for Sustainable Development there has to be an ecosystem approach, which is a strategy for integrated management of land, water and living resources.

After both the presentations were over, house was declared open for discussion.

Oral Presentations

Following oral presentations were made in this session:

1. *Variability of *Diospyros melanoxydon roxb. Leaves as Influenced by Climate, Soil and Management* – Sanjay Singh*
2. *Effect of Growth Retardant on Mulberry* – S Nautiyal and R K Pant

Questions and Discussions

After the presentations were over the chair declared the house open for questions and discussion. Both the papers were appreciated. However, it was felt that these papers were wrongly categorized in this sub-theme.

Recommendations from the session

1. Allocation of right of land and water to people should be at place
2. Firewood should come through forest corporations and a grazing policy should be in place
3. Emphasis should be on growing more fodder and fuel wood outside forests/agroforestry

Sub-theme 2.3: Agro-forestry: Production, Opportunities and Institutional Framework

Chairman: Shri Tasneem Ahmad, PCCF & DG, Social Forestry, Govt. of Maharashtra

Co-Chairman: Dr. JC Tewari, Prnpl. Scientist, CAZRI, Jodhpur

Rapporteur: 1. Shri N Bala, Scientist-E, AFRI

2. Dr. Tarun Kant, Scientist-E, AFRI

Lead speakers: 1. Dr. DN Pandey, Secretary, RSPCB, Jaipur, Rajasthan

2. Dr. SP Singh, APCCF, Research, Ext. & Lokvaniki, Bhopal

3. Dr. J Coosje Hoogendroon, DG, INBAR

The session started by welcoming the Chair, Co-Chair, dignitaries and the guests. The first lead speaker, Dr. DN Pandey spoke on '*Multifunctional Agro-forestry Systems in India: Science-Based Policy Options*'. According to him, in order to use agro-forestry systems as an important option for livelihoods improvement, climate change mitigation and adaptation, and sustainable development in India, research, policy and practice will have to progress towards: (i) effective communication with people in order to enhance the agro-forestry practices with predominance to multifunctional values; (ii) maintenance of the traditional agro-forestry systems and strategic creation of new



systems; (iii) enhancing the size and diversity of agro-forestry systems by selectively growing trees more useful for livelihoods improvement; (iv) designing context-specific silvicultural and farming systems to optimise food production, carbon sequestration and biodiversity conservation; (v) maintaining a continuous cycle of regeneration-harvest-regeneration as well as locking the wood in non-emitting uses such as woodcarving and durable furniture; (vi) participatory domestication of useful fruit tree species currently growing in the wilderness to provide more options for livelihoods improvement; (vii) strengthening the markets for non-timber forest products, (viii) and addressing the research needs and policy for linking knowledge to action. Prevalence of a variety of traditional agroforestry systems in India offers opportunity worth reconsidering for carbon sequestration, livelihoods improvement, biodiversity conservation, soil fertility enhancement, and poverty reduction.

The second lead speaker Dr. SP Singh, talked on 'Agroforestry in Perspectives of Biophysical, Socio-economic, Ecological and Sustainable Biomass Production'. According to him, following areas have been identified to carry out systematic research in the field of agro-forestry:

- Research on tree-crop interactions under different combination patterns of tree, crop, etc.
- Research on management practices of tree species in agro-forestry system to enhance yield of agricultural crop,
- Research on quantifying N fixation ability of tree species in agro-forestry systems,

- Study on the biomass and carbon sequestration potential of trees in agro-forestry systems,
- Combination of agri-silviculture and silvi-pastoral system on varying land types to reduce human and cattle pressure on forests,
- Research on optimising economic and ecological returns by developing ecological models for difficult and problematic lands.

The third Lead Paper was by Dr. J Coosje Hoogendroon, DG, INBAR. She talked on 'Bamboo's Contribution to a Pro-Poor, Green Economy'. She presented the global scenario on commercial and economic aspects of bamboo and rattan. She discussed about poverty eradication and social improvement through an approach which involves bamboo based industry. She recommended use of bamboo as a replacement for wood. Community based industrialization involving bamboo and rattan was recommended. She emphasised on the role of bamboo in climate change mitigation (carbon sequestration) and adaptation.

After both the presentations were over, house was declared open for discussion. Dr. DN Tewari recommended that agro-forestry should get a single platform under land use.

Oral Presentations

Following oral presentations were made in this session as follows:

1. *Melia composita* – Status and Future Scope Under Agroforestry in Punjab – Charan Singh (speaker), Deepak

- Khanna and Jayshree Ardey
2. *Evaluation of Growth and Soil Fertility Status in Dalbergia sissoo – Zea mays (Silvi-Agri) agroforestry system* – R B Singh (speaker), and HN Hymavathi
 3. *Growth Parameter of Crops and Poplar Tree under an Agrisilviculture System in Northern India* – BS Mandal (speaker); YP Singh and JC Kaushik
 4. *Differential Responses of Pruning Intensity on Dalbergia sissoo Roxb. Based Agri-silviculture System under Rainfed Tropics* – Hiranmayee Nayak, LD Koshta and SD Upadhyaya
 5. *Extension Programme on Farm Forestry: A Case Study of Punjab, India* – HP Singh and Charan Singh
 6. *Evaluation of Growth Performance of Selected Bamboo Species for Farmlands of Tamil Nadu* – M Maria Dominic Savio
 7. *Soil Nutrient Budget under Plantation of Leucaena leucocephala to Reclaim the Wasteland Lands of Chhattisgarh Plain* – MN Naugraiya and AS Sisodia
 8. *Harvesting of Calotropis procera Flowers from Different Agro-climatic Zones of Rajasthan for their Medicinal Use* – Mala Rathore
 9. *Performance of different Agro-forestry systems in Semi-arid Ecosystem* – Naresh Kaushik
 10. *Impact of Lemon Grass and Dalbergia sissoo Based Agro-forestry System on Red Lateritic Wastelands in Chhattisgarh* – Sajiwan Kumar and MN Naugraiya

Recommendations from the session

1. In order to reduce pressure on forests it is imperative to provide employment opportunities and alternate energy and fuel wood resources to local people.
2. A separate mission or board may be created to take care of agro-forestry by declaring it as a land use type.
3. Scientific findings must find place in policy formulation and decision making,
4. Efforts should be made towards domestication and improvement of new species,
5. A sustainable market should be made available to the farmers involved in agro-forestry for their produce through suitable policy amendments,
6. Community based industrialisation involving bamboo and rattans needs to be explored.

Sub-theme 2.4: Forest Products: Management for Livelihoods

Chairman: Dr. CN Pandey, Director, IPIRTI

Co-Chairman: Dr. MM Yadav, Associate Prof., IIFM

Rapporteurs: 1. Dr. DK Mishra, Scientist-E, AFRI

2. Shri N Bala, Scientist-E, AFRI

Lead Speaker: Shri AK Singh, PCCF and Managing Director, CGMFP Federation

The session started by welcoming the dignitaries and the guests. The Chair introduced the sub-theme and set the tone for the session by addressing the house with his inspirational words.

The lead speaker, Shri A K Singh, described that Chhattisgarh state has 44 per cent of geographical area under forest. The tribals

constitute 32 per cent of the population and tribal sub plan area is 60 per cent of the geographical area of the state. Fourteen lakh families are engaged in MFP collection to earn their livelihood. The State Government has ensured fair price of nationalised MFPs to the poor MFP collectors and enhancement in their income by undertaking the activities of processing, packaging and marketing of non-nationalised species. The conservation and development of MFPs have also been promoted. Herbal hospitals have been developed to promote the use of the traditional knowledge for health security. The capacity building has been focal point for all the activities. Besides insurance, distribution of footwear and scholarship distribution is providing social security to the MFP collectors. Singh recommended that this type of integrated development models should be properly extended throughout the country specially in the states with the abundance of MFP with the financial support from GoI/State Government for poverty alleviation of forest dependent communities along with environmental conservation.

After the presentation, house was declared open for discussion. The house appreciated the work done in Chhattisgarh, particularly for establishing herbal hospitals. Co-Chairman cited the example of China in recognising traditional healers and emphasised to follow the same path in India too.

Oral Presentations

Following oral presentations were made in this session:

1. *Bamboo shoots: Standardisation of Harvesting Time for Obtaining Quality Produce to Augment its Utilisation* – AK Pandey and Vijayalakshmi Ojha
2. *Influence of Growth Parameters on Wood Traits in Seed Raised Trees of Dalbergia sissoo Roxb.* – Pramod Pande
3. *Potential of Neem Seed Oil for Bamboo Protection Against Degrading Agencies* – Sadhna Tripathi and Himani Pant
4. *Quality Assessment of Dalbergia sissoo by Ultrasonic Technique* – YM Dubey and V Kothiyal
5. *Utilisation of Tree Phenolics in Development of Antioxidants: A Review* – Himani Pandey and VK Varshney
6. *Chemical Constituents from Genus Picororhiza - A review* – JN Sah and VK Varshney
7. *Economic Contribution of Resin Collection in Livelihood of Forest Dwellers of Uttarakhand* – HP Singh and Sarvesh Singhal
8. *Improved Gum Production from Acacia senegal - Management for Livelihood* – Moola Ram

Questions and Discussions

After the presentations were over the chair declared the house open for questions and discussions.

Recommendations from the session

The house appreciated the speakers and made following recommendations:

- Organic production and certification of MFP under NPOP and Certification of Medicinal Plants under VCSMP should be promoted.
- A regional apex federation of the six NWFP rich states (MP, Chhattisgarh, Maharashtra, Andhra Pradesh, Odisha and Jharkhand) should be created to coordinate and promote NWFP based market network for the benefit of the tribal

community.

- GoI should make legal provisions for National Transit Permits to ensure smooth movement of forest produce throughout the country.
- NWFP board may be setup at the national level.
- A legal recognition system for traditional healers should be put in place under the Department of AYUSH, Ministry of Health, GoI.
- Science based knowledge can be exploited in utilising NTFP like bamboo shoot, Neem oil, gum production, etc.

Sub-theme 2.5: Forest Products in Industry

Chairman: Dr. DN Tewari, Ex-member, Planning Commission

Co-Chairman: Dr. Manoranjan Bhanja, APCCF (AP)

Rapporteurs: 1. Shri N Bala, Scientist-E, AFRI

2. Dr. Tarun Kant, Scientist-E, AFRI

Lead Speakers: 1. Dr. CN Pandey, Director, IPIRTI, Bangalore

2. Dr. Vimal Kothiyal, Scientist-F & Head, Forest Products Division, FRI, Dehradun

The session started by welcoming the Chair and Co-chair and the dignitaries and the guests. At the onset, the Chair addressed the house and gave a brief on the importance of the industry based on forest products and its implications on expanding economy and GDP.

The first lead speaker, Dr. CN Pandey presented statistics on the *Status and Opportunities for Development of Wood-based Industries in India*. He gave an in-depth review of past developments and informed that the industrial demand for wood (in Round wood equivalents) in India is estimated to increase from 74 million m³ in the year 2005 to 153 million m³ in the year 2020. By then more than 90 per cent of the total wood supply in the country will come from non-forest sources. At present large number of wood based industries such as sawn wood and composite panel product manufacturers face acute shortage of raw materials. The supply-demand gaps are increasing by the year in an alarming proportion. The raw material scenario in the pulp and paper industry is precarious. It is time for active and purposeful associations of farmers growing trees in form of agro/farm/plantation/social forestry or engaged in the activity of 'Trees grown outside the forests', with manufacturers of sawn wood products, wood based panel products and pulp and paper for the country as a whole. It is vital in the interest of the nation to open up the floodgates of opportunities for overall development in this field. He talked at length on trees outside forests in India. He stressed the use of bamboo as a substitute of timber. He made important suggestions for strengthening of the industry: Public-private partnership in agro-forestry, farm forestry and growing of Trees Outside Forests; setting aside of a part of the forest area for commercial high value forestry; rationalization of felling and transit permit regime; establishment of regulated timber market; legislation on certification of seeds and planting materials for forestry plantation species; tax incentives for capital investment in farm forestry; afforestation credits for direct relief for farmers and creation of National Afforestation Trust; levying cess on forest and tree products.

The second lead speaker of the session, Dr. Vimal Kothiyal,

spoke about 'Wood-based Industry in India: Past, Present and Future Prospects'. He told that significant contributions have been made in the field of forest products derived from timber, bamboo and other lignocellulosic material in the past in India. However, India's wood-based industry is still lagging behind compared to international standards. His talk was focused on the past achievements and the reasons of slow growth of industry and also on future challenges and possibilities. Some suggestions and focus areas highlighted by him for future growth of the industry were: energy and cost efficiency in wood and wood product processing processes such as seasoning, saw milling, waste reduction and adhesives technology; improved products through modification for dimensional stability/aesthetic appearance and durability by applying physical, chemical and thermal means should be given a priority; and, application of nano-particles in developing smart material/product (sensor based bio-composites), wood protection (through nano-biocide), wood coating (nano coating systems) should be taken up. Besides these, he recommended that there should be a national wood use policy.

After the presentations, house was opened for discussion.

Oral Presentations

Following oral presentations were made in this session:

1. *Utilisation of Tree Derived Carbonyl Compounds* – Prasoon Kaushik
2. *A New Approach for Licensing of Wood-based Industry - A Case Study of Northern India* – RK Sapra, Padam Prakash Bhojvaid, VRR Singh
3. *Non-timber Forest Products and Rural Livelihoods with Special Reference to the Policies & Markets in Orissa* – Tapas Kumar Sarangi
4. *Studies on Sapogenin Concentrate from Agave sisalana* – Vineet Kumar, YC Tripathi and Shipra Nagar
5. *Strategies for Growth of Wood Based Industries and Improving Tree Cover in India* – Piare Lal

Questions and Discussions

Discussions took place concurrently during and after each paper presentation. All the papers were appreciated.

Recommendations from the session

Under the chairmanship of Dr. DN Tewari, following key recommendations were made: Small, medium and large forest enterprises can be drivers of economic growth. Poverty is geographically and demographically clustered in forest areas, hence for the eradication of poverty it is desirable to increase productivity and profitability of forestry sector. Increased production of forest produce (timber and non-timber forest produce) is urgently required to bridge the gap between demand and supply of forest products to sustain the national economy. For generation of employment and incomes to the people, sustainable forest industries developments are no more an option but an imperative. Therefore, it was recommended that:

- Increasing production of forest produce in forest areas, outside forest areas, agro-forestry etc.
- More investment is required for increasing green cover through regeneration, afforestation and sustainable arrangements of forests.



- A national inventory of production potential of NTFP, including medicinal plants of the forests in different parts of the country be created.
- A need to expand the value addition through processing and marketing of forest products.
- Technology development for increasing production, processing and substitution of wood through other material are available which can easily be grown.
- Capacity building, education and training of people is urgently required.
- Policy reforms and institutional development are required to promote 'green economy' for achieving socio-economic and environmental sustainability.
- Planned approach to forestry industry should be developed.

Sub-theme 2.6: Forest Certification: Opportunities and Challenges

Chairman: Shri RK Goel, IGF, External Projects

Co-Chairman: Dr. TS Rathore

Rapporteurs: 1. Shri N Bala, Scientist-E, AFRI

2. Dr. Tarun Kant, Scientist-E, AFRI

Lead speakers: 1. Dr. AM Singh, DIG (Forests)

2. Dr. MM Yadav, Associate Professor, IIFM, Bhopal

dignitaries and the guests. The first lead speaker, Dr. AM Singh, spoke on the theme *Forest Certification: Opportunity and Challenges*. He said that Forest Certification was a market driven voluntary instrument created in 1990s as a result to check massive deforestation and forest degradation. Although it was started in early 90s, much success was achieved only in North America and Europe in certifying the forest. Less progress has been done in developing countries. There are various factors responsible for this which can be taken as challenges to fast forward the progress of Forest Certification. The challenges are different in India in the context of different types of forests, policies/Acts related to forests and land ownership, livelihood issues, dependency of local people on the forests for their needs, less demand for certified wood and forest products in domestic market, developing and implementing the standards. But against all odds, India has understood the intricacies of the mechanism of Forest Certification and moving cautiously and steadily to achieve the goal. He emphasised that focus has been on establishing standards for forest managers and developing a critical mass of certifiable timber. But the focus should be to strengthen national institutions, policies and legislation to reduce the gap between current level of forest management and certification requirement, reducing the cost of certification, better access to the markets and incentives for trade in certified forest products, combating illicit felling and illegal trade, promoting PES, linking the issues of REDD and carbon trading change in forest certification and

The session started by welcoming the Chair, Co-Chair,

increasing the effectiveness of marketing among consumers.

The second lead speaker, Dr. MM Yadav, spoke in depth on the theme and emphasised that public concern for the environment has grown remarkably in the recent past. As a result, environmental issues are beginning to take more of a centerstage in global economic and trade policies. The enhanced social awareness on the values attributed to the forests, forced global consensus and regional understandings on developing a management paradigm of forest management that ensures its sustainability. Forest certification is a voluntary and market driven mechanism. However, the trade in forest products is becoming more regulated requiring traceability of the source-of-origin of the raw wood materials. Though, India is a net importer of wood, there are niche markets for its wood products and NTFPs. However, certification of NTFPs is much more complex given the diversity in practices for their harvesting, marketing and uses. This calls for initiation of an Indian system of forest certification to address the sustainability of forest produces as well as to meet the trade requirements wood products exports. The system of verifying sustainability of forest management is called as Forest Management (FM) certification and the tracking of supply chain of timber from such forests to the customers is called as Chain-of-Custody (CoC) certification. Both the certifications together are part of product certification. It is envisaged that with the setting up of an Indian Forest Certification Scheme the pace of certification will increase and more areas will

come under sustainable management and globally recognized certification regimes for the benefit of the environment, people and the consumers.

After both the presentations were over, house was declared open for discussion.

Oral Presentations

Following oral presentations were made in this session:

1. *Response of Inorganic Fertilizers on the Production of Quality Seedlings of Sapindus mukorossi Gaertn. in Nursery* – B Sharma, S Chakravarty and AN Dey
2. *Variability in Seed Quality Parameters of Seeds of Bauhinia purpurea from Different Sources in Uttarakhand and Uttar Pradesh* – Manisha Thapliyal and Deepti Dhiman
3. *Standardisation of Mini-cutting Technique for Largescale Clonal Propagation in Eucalyptus camaldulensis Dehnh. and E. tereticornis Sm. Clones* – R Seenivasan, P Chezhan, PS Shanmugam, V Prasad, P Selvan and G Suresh Kumar
4. *Seasonal Abundance of Leaf Gall of Terminalia arjuna (Roxb.) Wight & Arnold (Arjun) in Humid Tropics of South Gujarat* – Sushil Kumar
5. *Investigation of Efficacy of Different Type of Planting Materials of Bambusa vulgaris.* – Nirakar Bohl and AK Srivastava
6. *Growth Dynamics & Biomass Stock of Mallotus albus under High Density Plantations* – Anup Chandra



Recommendations from the session

1. National policies, legislation and institutions should be streamlined to reduce the gap between current level of forest management practices and requirements of forest certification.
2. Documentation of management practices followed in agro-forestry may be taken up to facilitate forest certification of farmers' plantations which is the major source of wood supply in the country.
3. NWFPs have huge opportunity for exports and thus NWFPs specific management plans should be prepared to avail forest certification.
4. A country specific forest certification scheme may be put in place at the earliest possible to facilitate the exports of forest based high value products to the US and EU markets.

OVERALL RECOMMENDATIONS OF THEME 2

- Enabling environment (science & technology, market information and financial resources) should be provided to forest fringe villages for sustainable forest management including timber and non-timber for economic development of forestry dwellers.
- Agro-forestry should be considered as a land use and in sound footing with institutional support and superior quality planting material.
- Greater emphasis should be given on economic evaluation of forests taking into consideration all tangible and intangible benefits.
- Allocation of right of land and water to people should be at place.
- Firewood should come through forest corporations and a grazing policy should be in place.
- Emphasis should be on growing more fodder and fuel wood outside forests/agro-forestry.
- In order to reduce pressure on forests it is imperative to provide employment opportunities and alternate energy and fuel wood resources to local people.
- A separate mission or board may be created to take care of agro-forestry by declaring it as a land use type.
- Scientific findings must find place in policy formulation and decision making.
- Efforts should be made towards domestication and improvement of new species.
- A sustainable market should be made available to the farmers involved in agro-forestry for their produce through suitable policy amendments.
- Community based industrialization involving bamboo and rattans needs to be explored.
- Organic production and certification of MFP under NPOP and Certification of Medicinal Plants under VCSMP should be promoted.
- A regional apex federation of the six NWFP rich states (MP, Chhattisgarh, Maharashtra, Andhra Pradesh, Odisha, Jharkhand) should be created to coordinate and promote NWFP based market network for the benefit of the tribal community.
- GoI should make legal provisions for National Transit Permits to ensure smooth movement of forest produce throughout the country.
- NWFP board may be setup at the national level.
- A legal recognition system for traditional healers should be put in place under the Department of AYUSH, Ministry of Health, GoI.
- Science based knowledge can be exploited in utilising NTFP like bamboo shoot, Neem oil, gum production, etc.
- Increasing production of forest produce in forest areas, outside forest areas, agro-forestry, etc.
- More investment is required for increasing green cover through regeneration, afforestation and sustainable arrangements of forests.
- A national inventory of production potential of NTFP including medicinal plants of the forests of different parts of the country.
- A need to expand the value addition through processing and marketing of forest products.
- Technology development for increasing production, processing and substitution of wood through other material are available which can easily be grown.
- Capacity building, education and training of people is urgently required.
- Policy reforms and institutional development are required to promote 'green economy' for achieving socio-economic and environmental sustainability.
- Planned approach to forestry industry should be developed.
- National policies, legislations and institutions should be streamlined to reduce the gap between current level of forest management practices and requirements of forest certification.
- Documentation of management practices followed in agro-forestry may be taken up to facilitate forest certification of farmers' plantations which is the major source of wood supply in the country.
- NWFPs have huge opportunity for exports and thus NWFPs specific management plans should be prepared to avail forest certification.
- A country specific forest certification scheme may be put in place at the earliest possible to facilitate the exports of forest based high value products to the US and European Union (EU) markets.



THEME 3: EXPANDING FRONTIERS IN FORESTRY SCIENCES

Sub-themes

- 3.1 Geomatics: Applications and Opportunities**
- 3.2 Managing Forest Resources: Scientific Base**
- 3.3 Forest Genetics and Biotechnology**
- 3.4 Forest Survey and Inventory**
- 3.5 Information Technology as a Tool in Forestry Management**

Presentations were made by 1 invited and 9 lead speakers. In addition to Lead Presentation, 56 oral papers were presented in this theme.

The summary of presentations by Invited/Lead speakers is as follows:

Invited Speaker: Dr. CTS Nair

Chairman: Shri Ajay Kumar Singh, PCCF, Chhattisgarh

Dr. CTS Nair in his talk on 'Expanding frontiers of Forestry Science: Meeting the Future Challenges of Forestry in India' presented an overview of the development of forest science in the context of Indian forestry. His presentation provided also provided an overview of the challenges facing forestry science and technology in meeting the emerging challenges of sustainable forest management in India. While outlining science and technology developments in key areas, he emphasised some of the developments in frontier areas of science and the issues in their wider application in Indian forestry. The technological

developments in key areas like resource assessment, management planning, management of natural forests and plantations, agro-forestry, production and processing of non-wood forest products and wood processing, specifically indicating emerging trends and the challenges in science and technology were discussed. Climate change concerns will lead to increased use of wood, including that for energy as also for production of a wide array of green products. Increasing environmental concerns, especially in the context of climate change, would require strengthening the knowledge base relating to the provision of ecological services. The presentation also outlined the key challenges relating to Indian forestry science, including the need to pay more attention to provide a better understanding of the complexities of the forest ecosystems, addressing the technology divide and dealing with the institutional problems.

Dr. Nair emphasised there are number of key developments in science and technology, including information and communication technologies, biotechnology and ongoing efforts in nanotechnology and bio-refineries. While a whole spectrum of technologies exists and more are being developed, there are several challenges in their application, including their relevance and appropriateness to the social, economic and environmental context. Particular thrust needs to be given to addressing the barriers in the application of innovations. As such diffusion and application of innovation is extremely slow due to a wide array of problems, in particular deficiencies in the institutional arrangements. Accountability of R&D institutions should be defined better and there is a need to create a more congenial environment for innovation to flourish. Striking the right balance as regards scientific freedom and social accountability will be a major challenge.

Sub-theme 3.1: Geomatics – Applications and Opportunities

Chairman: Shri Ajay Kumar Singh, PCCF, Chhattisgarh

The lead speaker, Dr. Devendra Pandey, gave an overview on 'Geomatics in Sustainable Management of Forests'. He presented details of geospatial technologies encompassing use of computer, remote sensing, Geographic Information System (GIS) and Global Positioning System (GPS). Some of the advantages of Remote Sensing (RS) technologies are: large area coverage, high frequency observations and real-time images availability on multiple scales i.e., crown density mapping, forest regeneration mapping, monitoring of Lantana in open and degraded forest, wildlife habitat evaluation, biodiversity assessment and rate of deforestation. Applications of remote sensing for sustainable forest management in India include nation-wide forest cover mapping on a two-year cycle, assessment of trees outside forests, forest fire monitoring, forest type mapping of the country's forests, assessment of encroachments and damages due to disasters, preparation of forest management plan for local level operational, stratification for forest inventory, assessment of carbon in India's forests, wildlife census and management of national parks and other protected areas. Potential applications of GIS in forestry are: forest cover assessment and change analysis, assessment of trees outside forests, preparation of management plan of forests, forest fire risk zonation, site suitability for setting up water harvesting (watershed analysis) and mapping ecotourism sites, establishing patrolling camps and mapping road network for protection, wildlife habitat mapping and biodiversity characterisation, mapping of the non-wood forest resource, site suitability for plantations and online nursery information system as well as assessment of plantation areas.

Dr. Pandey brought out the issues facing the implementation of the geomatic technologies in India, like the lack of skilled human resource and lack of appreciation of the technologies. He stated that Government Map policy does not allow digitisation of maps by other than a few designated government agencies and standards and protocols are yet to be setup for interoperability of the digital maps. The technology to be made cheaper and customized for easy operability and should be user friendly.

The second lead speaker, Dr. SPS Kushwaha, presented the topic 'Geomatics: Applications and Opportunities' highlighting the use of remote sensing, GIS and GPS technologies in Forestry sector with plenty of case studies carried out by Indian Institute of Remote Sensing. He discussed the application of geomatics in monitoring land-use pattern changes, forest fires, shifting cultivation, avenue tree mapping and biodiversity characterisation. He outlined the utility of GIS in predictive and backward modeling as a tool for forest management. The development of an institutional mechanism for integrating and disseminating recent developments and generated knowledge to the large section of end-users was discussed. He highlighted some of the advantages of RS technologies: large area coverage, high frequency of observations and real-time image availability on multiple scales i.e., crown density mapping, forest regeneration mapping, monitoring of Lantana in open and degraded forest, wildlife habitat evaluation, biodiversity assessment and rate of

deforestation. It is perhaps the only technology which allows retrospective evaluation of the forest resources and effective environmental impact assessment. He highlighted the importance of the emerging technologies like LiDAR (Light Detection and Ranging) for high resolution assessment of tree cover, crown shapes and sizes, NTFP, watershed and wildlife. He also discussed the constraints of GIS technologies like species identification in mixed forests.

The two lead presentations of Sub Theme 1 were followed by following two Voluntary paper presentations:

1. *Cost Effective Microsatellite Genotyping of Eucalyptus Mapping Population – A Subashini*
2. *Potential Use of Plants Extracts Against Wood Rotting Fungi Coriolus versicolor - Surender Bhardwaj*

Sub-theme 3.2: Managing Forest Resources: Scientific Base

Chairman: 1. Dr. RD Jakati, Director, IGNFA, Dehradun
2. Shri SC Joshi, Director, IWST, Bangalore

The lead speaker, Dr. G Kumarvelu, deliberating on the topic 'Nature is our Future' emphasised on maintaining an ecological balance in the forests considering the functioning of different aspects of forest ecosystem. Presentation was focused on the topics like carbon footprint and water footprint, quantification of the ecosystem services, carbon sequestration potential of the forest to be evaluated, studies on soil micro organisms and their role on enhancing soil health and productivity, identifying and planting more multi-purpose indigenous tree species yielding food for pollinator and seed dispersers, the role of pollinators/seed dispersers (birds, insects, bats) in forest ecosystem. Environmentally friendly technologies like VAM, azolla and vermicasting production, biochar, biocoal and activated charcoal, hydrological auditing of natural forest ecosystem should be developed and implemented. He concluded with the message that we should serve nature, to bring back our culture and to ensure our future.

The second lead speaker, Dr. Manoranjan Bhanja, presented on 'Natural Forest Management – Issues and Approaches' and suggested few areas of research which need to be considered for expanding the frontiers of forest science and suggested following areas for future attention: forest has been managed through working plans for a long period but in reality it is not managed as prescribed by these working plans. There is a need to revisit or strengthen the working plan. There should also be continuous monitoring of sustainable forestry through development of criteria and indicators. The yield, harvest and sustainability of NWFPs should be regulated. A multipurpose management model for wood and non-wood forest products should be developed. He highlighted that there is no data on exact growing stock at state level and also on forest products, NTFPs, biodiversity, ecotourism and predictive growth yield models. He recommended that studies should be made on silviculture and management, promotion of fast growing species like *Melia dubia*, maintaining seed stands, marrying conservation with commercialisation to create an economic stake in conservation and ensure livelihood security and ecological

security. Also there is a need for effective appropriate low-cost management intervention in natural forests which may reverse the succession stage of degraded forest and thereby increase the quality and value of growing stock.

The two lead presentations of sub-theme 3.2 were followed by following 13 Voluntary paper presentations:

1. *The Fractionation of Pectin for the Period of Fruit-Ripening in Diospyros peregrina* – Deepika Chauhan
2. *National Bureau of Forest Genetic Resources For Economic Prosperity and Ecological Security* – Krishna Kumar Narayanan
3. *Addition of New Host Records to Larval Parasitoids Apanteles spp. and Their Role in Management of Teak Leaf Skeletonizer, Eutectona machaeralis (Walker) in India* – Mohd Yousuf
4. *Present Status of Indian Species of Trichogramma and their Application in Biological Control of Forest Insect Pests* – Mohd. Yousuf
5. *Laboratory Anti-fungal Guided Identification of Foliar Chemical Constituents from the Hybrid Bred from Eucalyptus citriodora x E. torelliana and its Parental Taxa Conferring Resistance to Cylindrocladium quinquesepatum* – VK Varshney
6. *Biopesticidal Properties of A. Marmelos Against Hyblaea purea and Spodoptera litura* – Senthilkumar
7. *Forests Seed Certification: Problems, Limitations and Needs* – Nawa Bahar
8. *Screening for Resistance Against some Common Diseases in Dalbergia sissoo* – NSK Harsh
9. *Interaction between Ganoderma lucidum and Fusarium solani -Two Serious Root Pathogens of Dalbergia sissoo Mortality* – Pallavi Bhatia
10. *Conservation Strategies for Guggul (Commiphora wightii Arn) – an Endangered High Valued Medicinal Plant in Arid Rajasthan* – Bindu Nirwan
11. *Descriptors for Casuarinas for Registration of New Varieties* – Rekha Warrior
12. *Management Option for Flowering in Bambusa tulda roxb. – A Case Study under Chotanagpur Agro-climatic Zone* – Sabhapati Nath
13. *Stem and Branch Wood Volume Equations and Variable Density Yield Model for Dalbergia sissoo Plantations in IGNP Area of Rajasthan* – VP Tewari

Sub-theme 3.3: Forest Genetics and Biotechnology

- Chairmen:** 1. Shri PK Sharma, Addl. PCCF, Andhra Pradesh
2. Shri AN Prasad, CVO, NPCC
3. Shri SC Joshi, Director, IWST, Bangalore

The session started with the presentation by two lead speakers.

The first lead speaker, Dr. Krishna Kumar, Director, IFGTB, presented an overview of the 'Expanding Frontiers in Forest Genetics and Biotechnology'. He deliberated on the traditional tree improvement programmes and also on emerging technologies like genomics, whole genome sequencing, metabolomics, accelerated breeding programmes, transgenics, forensic science and biotechnological tools in conservation. He highlighted the work carried out by IFGTB in the field of tree improvement, genetics and biotechnology. He emphasised that the national goal

of biomass production can be achieved by using biotechnological tools. Breeding programmes should pertain to specific traits and end use, and should also encompass reproductive biology. He suggested that genetic improvement of indigenous trees species should be taken on priority. He was of the opinion that forest genetic resource management network should be created and tissue culture protocols for different species should be upscaled for mass-scale production. He concluded that future lies in strong networking and harnessing the advantages of genetics and tree breeding and enhanced scientific inventions using genetic material and biotechnology. he highlighted following action points which need attention:

- To achieve the national goal of achieving a growth of 3 to 4 cubic meters of biomass per hectare per year, there is a need for enhanced scientific intervention using available genetic material and biotechnologies.
- To translate available results, there is a need for networking among stakeholders and decentralising the planting stock production through concepts like Community Seed Orchards.
- High-end technologies should be taken up for solving the most pressing issues of the rural society for which benefits will be beyond what the current technologies would be envisaged to provide.
- Mission mode approach for these pressing problems.
- Investment in understanding fundamental pathways governing these desired traits.
- Funding concerted cross-institutional research and breaking transnational boundaries for bringing together domain experts.

The second lead speaker, Dr. HS Ginwal, presented talk on 'Forest Genetic Resource Conservation and Improvement: Aspects and Prospects'. He presented work carried out in ICFRE and breeding strategies of different species. He discussed the new clones and varieties developed by different ICFRE institutes. He also highlighted the limitations of these tree improvement programmes. He deliberated on origin and progressive improvement works in the field of forest genetics by various Government and private organizations. He identified the key gaps and possible way forward in this vital area of forest science. There is a need to develop new varieties and clones on a continuous basis, while preserving the genetic base at the same time. Priorities should be focused on issues of strengthening research institutions, networking among institutions, germplasm exchange, continuous financial support of research organizations, timber forensics, etc. Regional and national action plan for priority species, institutional capacity building, guidelines and strategies for tree breeding and FGR conservation, exchange of genetic material, intervention of biotechnology, evaluation, characterisation and documentation of FGR are some of the key issues.

Following points were discussed specifically after the presentations by the two lead speakers:

- Eucalyptus gall problem; availability of parasitoids for their control.
- Continuous process of clone development to replace the existing clones.
- Implementation of recommendations that emerge from seminars like the Indian Forest Congress.



- Mission mode research in FGR and genomics.
- Strengthening of research organizations and networking among them.
- Change in strategy by identifying partners to use tissue culture protocols developed by research organizations.
- Gap between demand and supply; our research has to play major role in meeting the demand; scaling up by adding more number of partners for our research.

This was followed by 39 voluntary paper presentations.

1. *Evaluation of the Gum of Anogeissus latifolia (Roxb.) Wall ex. Bedd. for Authentic Characteristic Identification* – Abha Rani
2. *Species improvement programme of Dipterocarpus retusus Bl. syn. D. macrocarpus Vesque: Progeny analysis after seven years* – Ajay Thakur
3. *Efficacy of IDS Technique on Improving the Quality of Jatropha curcas Seed-lot* – Anandalakshmi
4. *Descriptors for Registration of Eucalyptus Clones for IPR Rights in India* – Anandalakshmi
5. *Evaluation of Plus Trees of Pongamia pinnata (L.) Pierre for Oil Content and Germination Pattern* – Anee Bora
6. *Characterisation of Different Species of Bamboo Through ISSR Molecular Marker* – Santan Barthwal
7. *Molecular Characterization of High and Low Resin Yielding Genotypes of Pinus roxburghii Sarg. using Microsatellite Markers* – Anita Rawat
8. *Establishment of Nodulation and Nitrogen Fixation in Casuarina junghuniana Miq. Rooted Stem Cuttings with Frankia under Aseptic Conditions* – Arumugam Karthikeyan
9. *Genotype x Environmental Analysis for Different Clones of Dalbergia sissoo roxb.* - Ashok Kumar
10. *In Vitro Clonal Propagation of Commiphora wightii (guggal) a Medicinally Important Tree Species of Arid Region* – Ashok Parmar
11. *In Vitro Propagation of Dendrobium Bensoniae Rchb.f. an Important Orchid of North Eastern India* – Babita Rani
12. *Utilisation of Tissue Culture Technique for Propagation of Melia dubia* – Bhimi Ram
13. *Growth Performance of Industrially Important Micropropagated Bamboo Species in Two Different Agro Climatic Conditions* – Chethan Kumkar
14. *Clonal Propagation of an Economically Important Woody Tree of the Arid Zone - Tecomella undulata (Sm.) Seem.* – Hemshikha Tyagi
15. *Tissue Culture Method for Multiplication of FRI Hybrids of Eucalyptus and Their Field Trials* – ID Arya
16. *Stability Analysis in Clones of Casuarina equisetifolia* Kannan – CS Warriar
17. *Differential Expression of Cellulose Synthase Gene families in Eucalyptus tereticornis* – Sundari B
18. *Characterisation of Commercially Important Eucalyptus Germplasm using Molecular Markers for Identification of*

- Redundant Accessions and Prediction of Susceptibility to *Leptocybe Invasa* Infestation – Mathish Nambiar
19. Effect of Donor Age and Genotype on Coppicing and Rooting Ability in *Dalbergia sissoo* (Roxb.) – Meena Bakshi
 20. Monitoring Genetic Fidelity of Somatic Embryo Regenerated Plants of *Bambusa bambos* by RAPD and ISSR Markers – Muyeed Ahmed
 21. Regeneration of Khasi Pine (*Pinus kesiya* Royle ex. Gordon) in Meghalaya – Nawa Bahar
 22. Screening of Teak (*Tectona Grandis* L.) Clones vis-à-vis Defoliator (*Hyblaea pueri*) in Gujarat – VM Prajapati
 23. Analysis of Epigenetic Changes in *Jatropha* using Methylation Sensitive AFLP – Pratima Sinha
 24. Cross-species Amplification of *Pinus* Microsatellite Markers in *Aesculus assamica*, *Artocarpus heterophyllus*, *Dalbergia sissoo* and *Bauhinia variegata* - Priti Chauhan
 25. In Vitro Regeneration of *Acacia mangium* Willd. – Rajveer Singh Chauhan



26. Biopiracy – Threats to Biodiversity – Sangram Chavan
27. Studies on Molecular Marker Development for Oleoresin Production in *Pinus roxburghii* Sarg. – Santan Barthwal
28. Identification of Sodium Transporter Gene Homologues from Salt Tolerant Tree Species – RK Selvakesavan
29. Evaluation of Clonal Divergence in *Dalbergia sissoo roxb.* for Developing Production Populations – Shivani Dobhal
30. Optimisation of DNA extraction Protocol of *Pongamia pinnata* Linn. – Shruti Sharma
31. *Eucalyptus* Improvement in Southern India – V Sivakumar
32. Development of Genetic Linkage Map in *Eucalyptus camaldulensis* X *E. tereticornis* using Microsatellite Markers – Subashini V
33. Influence of Time of Collection on Cone Characteristics in Blue Pines – SK Lavania
34. Effect of Salt Stress on Growth and Proline Levels in Tolerant and Susceptible Clones of *Casuarina equisetifolia* – Mathish Nambiar
35. Reproductive Biology of *Aquilaria malaccensis* Lamk., A Critically Endangered Species of North-East India –

- TN Manohara
36. A Complete Protocol for the Biodiesel Plant Using Low Cost Alternatives for Development of High Frequency Micropropagation of *Pongamia pinnata* – Vineeta Shrivastava
 37. Effect of Crown Position on Cone, Seed and Germination Characteristics in Himalayan Cedar (*Cedrus deodara* Royle ex D. Don) – Virendra Singh
 38. Use of Most Common Alleles for Species Discrimination in *Eucalyptus camaldulensis* and *Eucalyptus tereticornis* – Yasodha R
 39. Effect of Potential Isolates of Ectomycorrhizal Fungi on Growth Improvement of Commercially Important Plantation Species, *Casuarina equisetifolia* and *C. junghuhniana* Seedlings – V Mohan

Sub-theme 3.4: Forest Survey and Inventory

Chairman: Dr. Devendra Pandey, Ex Director, FSI

This session was chaired by Dr. Devendra Pandey, Ex-Director of FSI. The session started with the presentation by the lead speaker Shri Rajesh Kumar on 'National Forest Inventory – Indian Experience'. He deliberated on sampling design; limitations of present inventory design, GIS based inventory design and making existing data compatible with GIS mode. He deliberated on the methodology and approaches adopted for national level inventory of trees inside and outside the forest areas. He also discussed preliminary results of national forestry inventory on intensity of regeneration, incidence of fire, grazing, humus, plantation potential, growing stock of top five species i.e., *Shorea robusta*, *Tectona grandis*, *Pinus roxburghii*, *Terminalia crenulata*, *Anogeissus latifolia*.

This was followed by one voluntary paper presentation: 'Estimation of Location and Scale Parameters of lognormal Distribution using Ranked Set Sampling' – Shri Girish Chandra

Sub-theme 3.5: Information Technology as a Tool in Forestry Management

Chairman: Dr. Devendra Pandey, Ex Director, FSI

The lead speaker, Shri Anil Oberoi, in his presentation on 'm-Mantra for Forest & Wild Life Management' highlighted the role of ICT in planning, implantation and monitoring and its various applications in forestry. He emphasised the importance of real time database for decision making in forestry governance. In good governance judicious use of ICT improves transparency and accountability. For its implementation strong data centre and improving the capacity of man power is essential.

This technology can be applied to all the fields of forestry ranging from forest protection, forest fire, offence management, wildlife management, forest planning & geo-mapping, forest financial management, etc. He further explained by showing the MP forest department website and explained the application of ICT in managing forest and its resources in MP. Real time monitoring of key programmes and access of information to all stake holders is the mantra for good governance. It is very well followed by MP forest department and can be replicated by

other state forest departments also. ICT promotes transparency, accountability, responsiveness and efficiency of the forest department.

Applications include the forest dwellers survey system. Oberoi stated that what started as a small humble innovative and stand alone effort in year 2008 in the form of an application named Fire Alert & Messaging System, has today become a distinctly unique monitoring system from m-mantra for Forest and Wild life management to m-Mantra for Good Governance. This unique concept of real time temporal and spatial monitoring system has attracted national attention.

The second lead speaker, Shri P Raghuvver, discussed about '*IT as a tool in Forestry Management*'. He discussed about the development of a framework for a Forest Resource Management Information System. He raised certain issues pertaining to what is ailing in forestry sector in implementation of IT and why FMIS has not worked in India? He cautioned against automating existing manual processes. He strongly recommended switching from Management information system (MIS) to Decision support system (DSS). The technology should be useful in making right choices at real time for right decision making. He explained that DSS increases managerial effectiveness in semi structured situations and brings administrative efficiency and cost effectiveness.

Change in basic information system is required for FMIS to work in forestry sector. He discussed about the opportunities and advantages of FMIS. FMIS has failed because data are not collected by skilled person for specific requirements, the information needed at various levels are different and therefore it should be specific for different levels of resource managers; out of box thinking is not encouraged, large volume data should be collected, and insufficient understanding of recent and upcoming technologies.

The lead speaker's presentations were followed by one voluntary paper presentation:

A New Paradigm - The Need for Information and Communication Technology based Intervention in Forestry – Vivekanandan Ramanathan

GENERAL RECOMMENDATIONS OF THEME 3

- It is very important to maintain ecological balance in the forests considering functioning of different aspects of forest ecosystem. Environmentally friendly technologies like VAM,

azolla and vermicasting production, biochar, biocoal and activated charcoal, hydrological auditing of natural forest ecosystem should be developed and implemented.

- There is a need to revisit or strengthen the working plan. The yield, harvest and sustainability of NWFPs should be regulated.
- There is need to generate data on exact growing stock at state level and also on forest products, NTFPs, biodiversity, ecotourism and predictive growth yield models. A multipurpose management model for wood and non-wood forest products should be developed.
- To achieve enhanced productivity, there is a need for increased scientific intervention using available genetic material and biotechnologies coupled with introduction of plantation models involving high-input-high-output strategy.
- Also there is a need for effective appropriate low-cost management intervention in natural forest which may reverse the succession stage of degraded forest and thereby increase the quality and value of growing stock.
- Marry conservation with commercialisation to create an economic stake in conservation and ensure livelihood security and ecological security.
- Research has to play major role to bridge the gap between demand and supply. There is a dire need to develop new varieties and clones on a continuous basis while preserving genetic base at the same time.
- Issues of strengthening research institutions, networking among institutions, germplasm exchange, continuous financial support of research organizations, timber forensics etc require priority attention. Mission mode research in FGR and genomics is the need of the hour.
- To implement the effective use of information technology, vision plan of ministry should be developed in connotation with the priorities of forestry sector. The MP model of real time monitoring has to be adopted nation wide.
- Molecular assisted selection (MAS) needs to be developed in conjunction with morphological parameters to screen out susceptible clones to various diseases and pests.
- Database should be focused on stakeholders' needs. There is a need to switch over to Decision Support System (DSS) from Management Information System (MIS). The technology should be useful in making right choices at real time for right decision making.



THEME 4: FOREST BIODIVERSITY AND LANDSCAPES

Sub-themes

- 4.1 **Forest Ecosystem and Biodiversity Management**
- 4.2 **Protected Area Management: New Paradigm**
- 4.3 **Man-Animal Interface**
- 4.4 **Ecosystem Goods and Services and Forest Resource Accounting**
- 4.5 **Eco-tourism**
- 4.6 **Wildlife Crime Control & Enforcement of CITES**

The fourth theme, *Forest Biodiversity and Landscapes*, was organized by Rain Forest Research Institute, Jorhat, at Committee Room I, National Academy of Sciences Complex (NASC). The event was successfully conducted in six technical sessions for various sub-themes. The theme presentation was initiated by the two renowned invited speakers and each sub-theme was lead by nine lead speakers of respective areas. A total of 30 oral presentations and 7 posters were also presented during the event. Ms. Imtiena Ao, Director, ARCB, Aizawl, Mizoram, Dr. AP Singh (Nodal officer), Shri Pawan K Kaushik, Dr. Vikas Rana, Shri Alok Yadav and Dr. Praveen Kumar Verma participated from Rain Forest Research Institute, Jorhat, to organize the theme events successfully.

Sub-theme 4.1: Forest Ecosystem and Biodiversity Management

Chairman: Dr. VK Bahuguna, Director General, ICFRE.

Co-Chairman: Dr. VB Mathur, Dean, Wildlife Institute of India

Invited Speakers: 1. Padmashree PK Sen

2. **Shri** PR Sinha, Director, Wildlife Institute of India.

Lead Speakers: 1. Shri VB Sawarkar, Ex. Director WII, Dehradun

2. Dr. AJT Johnsingh, Nature Conservation Foundation, Mysore, & WWF India

3. Dr. VB Mathur, Dean, Wildlife Institute of India, Dehradun

Ms. Imtiena Ao, Director, ARCB, Aizawl welcomed the expert delegates and the representatives from State Forest Departments (SFD's), forest-based industry and farming community. The first technical session of IFC -2011 on the theme '*Forest Biodiversity and Landscapes*' was chaired by Dr. VK Bahuguna, DG, ICFRE, with Dr. VB Mathur, the Dean of the Wildlife Institute of India as the Co-Chairman.

After the welcome address of the Chairman, the session started with presentations by invited speakers Padmashree PK Sen, renowned forester and wildlife expert, and Shri PR Sinha, Director WII, Dehradun, on the sub-theme 'Forest Ecosystem and Biodiversity Management'.

Shri PK Sen stressed on the biodiversity of natural forests and its conservation for sustaining the ecosystem services emphasising on the hydrological cycle on which the survival of mankind depends upon.

Shri PR Sinha in his address pointed out the lack of scientific data and authentic information on many life forms, which poses a serious problem in policy making and conservation planning. He also voiced his concern over alarming decline of global biodiversity in the recent past, the threat posed by practice of monoculture and the need for periodic assessment of species diversity.

This was followed by presentations by three lead speakers namely, Shri VB Sawarkar, Ex Director, WII, Dehradun, Dr. AJT Johnsingh, noted naturalist, Nature Conservation Foundation,

Mysore; and Dr. VB Mathur, Dean, WII.

Shri Sawarkar spoke on conservation of biological diversity in the wild at multiple scales. Revisiting the National Working Plan Code for the necessary revision/adding a guide as an adjunct to it and coordination among all agencies working at various levels to reorder and synergise their work to accord a common frame of reference that addresses the integrity of natural ecosystems.

Dr. AJT Johnsingh, while stressing the need of conserving tigers and other wildlife, suggested developing a knowledge-based participatory land-use policy framework involving all categories of rights holders. He highlighted practice of shifting cultivation, large-scale encroachment, spread of invasive weeds and firewood cutting as major threats to biological diversity.

Dr. VB Mathur delivered a talk on the linkages between comprehensive, resilient, effectively managed and financially secure protected areas on the one hand and the economic and social well-being of countries, communities and individuals on the other. These linkages, though not fully appreciated, are a reality. Dr. Mathur called for the management of protected areas not as 'islands of biodiversity' but as the 'building blocks of regional networks' that will sustain ecological processes over time and space.

This was followed by 6 oral presentations on the sub-theme from the scientists all over the country. Finally DG, ICFRE, and the Chairman summarised the proceedings of the day.

Sub-theme 4.1: Forests Ecosystem and Biodiversity Management

Chairman: Dr. RL Srivastava, PCCF, Tripura Forest Department

Co-Chairman: Dr. AJT Johnsingh, Nature Conservation Foundation, Mysore, and WWF India

The session reflected on the changing trends on forestry and a clear shift from commercial species to other lesser known miscellaneous species of multiple livelihoods, cultural and medicinal values to local communities and highlighting the decline in the population of these tree species due to varied reasons ranging from over exploitation and problems of seed setting, viability and germination to the impact of environmental factors leading to low natural regeneration.

For the conservation, regeneration and sustainable management of these species, there is a need for more scientific inputs and better coordination between 'Lab scientists' and 'Land scientists' so that science can be taken to the people in a more meaningful manner.

The session also had presentations on the mangrove diversity after the Tsunami and the Sustainable Land and Ecosystem Management efforts in the country.

Recommendations

- Research focus should shift from commercial species to other lesser known miscellaneous species of multiple livelihoods, cultural and medicinal values to local communities whose population is fast declining due to varied reasons ranging from over exploitation, problems of seed setting, viability and germination to the impact of environmental factors leading to low natural regeneration.

- There should be a periodic assessment of species diversity as scientific data and authentic information on many life forms is lacking which is a serious problem in policy making and conservation planning.
- Revisiting the National Working Plan Code for the necessary revision.
- GDP to reflect the priceless contribution of the natural ecosystem.
- Develop a knowledge-based participatory land-use policy framework involving all categories of rights holders and settle land and property rights across the country.
- Take science closer to the people through better coordination between 'Lab scientists' and 'Land scientists'

Sub-theme 4.2: Protected Area Management: New Paradigm

Chairman: Dr. Promode Kant, Director, Institute of Green Economy, New Delhi

Co-Chairman: Dr. YC Tripathi, Scientist-E & Head, Chemistry Division, FRI

Lead Speaker: Shri DVS Khati, Chief Conservator of Forest, Garhwal (Uttarakhand)

Shri DVS Khati, while accepting the fact that wildlife and human beings cannot be mutually exclusive, stressed on the importance of maintaining the genetic diversity of wildlife and taking the landscape approach for their management rather than conservation in isolated inviolate islands. He also pointed out the need to create and maintain wildlife corridors irrespective of national and international borders and opening up those obstructed by manmade structures and also bringing wildlife rich areas under a unified command of administration and management.

The session had several oral presentations from forestry professionals, scientists and researchers deliberating on the paradigm shifts taking place in different parts of the country.

Recommendations

- Recognise linkages between comprehensive, resilient, effectively managed and financially secure protected areas on the one hand and the economic and social well-being of countries, communities and individuals on the other hand.
- Management of protected areas not as 'islands of biodiversity', but as the 'building blocks of regional networks that will sustain ecological processes over time and space.
- Create and maintain wildlife corridors irrespective of national and international borders and open up those obstructed by manmade structures and also bringing wildlife rich areas under a unified command of administration and management.
- Wildlife and human beings cannot be mutually exclusive, hence it is important to maintain the genetic diversity of wildlife and follow the landscape approach for their management, rather than conservation in isolated inviolate islands.

Sub-theme 4.3: Man-Animal Interface

Chairman: Dr. AK Bhattacharya, CEO, MP Eco-Tourism

Development Board

Co-Chairman: Dr. Madhu Verma, IIFM, Bhopal

Lead Speakers: 1. Shri Vivek Menon, CEO, Wildlife Trust of India

2. Dr. M.D. Madhusudan, Nature Conservation Foundation, Mysore

The first lead speaker, Shri Vivek Menon, pointed out the many aspects of life and livelihood that man and animals share and how thinking out of the box and innovative schemes for relief and compensations could help in managing conflicts situations.

Dr. M. D. Madhusudan, NCF, Mysore, pointed out the hardening of edges between protected and production landscapes and how these two are tightly interwoven systems. He suggested that a functional understanding of the pathways that bind wildlife in protected areas to people in production areas may help not only to alleviate conflict but also to advance both wildlife conservation and human well being.

Recommendations

- Think out of the box approach and evolve innovative schemes like the successfully tried ‘Grain for Grain’ scheme for compensating loss of crops due to raids by wild animals.
- Speed of relief more important than the quantum of relief. Hence speedy relief and compensation measures important to help manage conflicts situations.
- The hardening of edges between Protected Areas (Ecological systems) and Production Areas (Economic system) should be blurred as these two landscapes are tightly interwoven systems. Work out ways for a functional understanding of the pathways that bind wildlife in protected areas to people in

production areas to not only to alleviate conflict but also to advance both wild life conservation and human well being.

- The word ‘Conflict’ denotes an antagonistic relationship, hence should be replaced by the word ‘Interface’ as man and animal share many aspects of life and livelihood.
- In cases of loss of life in conflict situations. the word ‘Compensation’ should be replaced by ‘Relief’ as human life cannot be ‘compensated’ or valued in terms of cash or kind.

Sub-theme 4.4: Ecosystem Goods and Services and Forest Resources Accounting

Chairman: Dr. RK Srivastava, Addl. PCCF, Manipur Forest Department

Co-Chairman: Dr. B Shivaraju, Addl. PCCF, Kerala Forest Department

Lead Speaker: Dr. Madhu Verma, IIFM, Bhopal

The lead speaker of the theme, Dr. Madhu Verma, from IIFM Bhopal, stressed on the need to utilise economic values for conservation through payments for ecosystem services and also suggested fiscal policy reforms and economic instruments as a catalyst for greening the forest sectors.

The lead speakers were followed by several oral presentations from forestry professionals, scientists and researchers.

Recommendations

- Identify and quantify Forest Ecosystem Services; identify key beneficiaries and utilise economic values for conservation through payments for ecosystem services with investment in conservation being proportional to the returns from packaged





- value of ecosystem services.
- Fiscal policy reforms (Environmental Fiscal Federalism) and economic instruments as a catalyst for greening the forest sectors.
- Evolve an effective market mechanism for ecosystem services and bring it under an apex administrative body at the national level like a Forest Ecosystem Service Regulation Authority.

Sub-theme 4.5: Eco-tourism

Chairman: Dr. RK Srivastava, Addl. PCCF, Manipur Forest Department

Co-Chairman: Dr UK Tomar, Scientist-E, Arid Forest Research Institute, Jodhpur

Lead speaker: Dr. AK Bhattacharya, CEO, MP Eco-tourism Development Board.

The lead speaker, Dr. AK Bhattacharya, said that Eco-tourism is one of the most effective way to ensure development, hand-in-hand with conservation bringing economic and social benefits to the local communities. He said Eco-tourism should be people-centered, dynamic, responsive, participatory, multi-level and sustainable.

Recommendations

- Evolve an Eco-tourism certification mechanism at the National level and Eco Ranking of tourism facilities like Resorts, Camps, etc.
- Make Eco-tourism people-centred, dynamic, responsive,

- participatory, multi-level and sustainable.
- Every state should prepare a vision document and roadmap for sustainable management of Eco-tourism activities so that the primacy of conservation is not lost.

Sub-theme 4.6: Wildlife Crime Control & Enforcement of CITES

Lead Speaker: Shri Samir Sinha, Head, TRAFFIC India

Shri Samir Sinha, Head, TRAFFIC India, said that illegal trade in wildlife is a soft source of money threatening the ecological and environmental security of the country. He pointed out the need to address the inadequacies in the Wildlife Act regarding the floral diversity and the need for a multi agency engagement to combat wildlife crime.

Recommendations

- Revisit the Wildlife Laws in order to address the inadequacies with respect to the floral diversity.
- Acknowledge the seriousness of the problem in illegal trade in wildlife and have better coordination among enforcement agencies like the forest and wildlife department, police, customs and other intelligence agencies. Need for multi agency engagement to combat wildlife crime.
- The existing capital misallocation of capital to this sector should be addressed.

All technical sessions ended with vote of thanks by Ms. Imtiena A, Director, ARCBR, Aizawl, Mizoram.



THEME 5: FORESTS AND CLIMATE CHANGE

Sub-themes

- 5.1 **Green India Mission: Opportunities and Challenges**
- 5.2 **Mitigation/Adaptations and Challenges**
- 5.3 **Ecosystem Resilience and Forest Biodiversity**
- 5.4 **Climate Change Models/Forests and Carbon Fluxes**
- 5.5 **Carbon Balances: Policy Instruments**
- 5.6 **India and REDD**

Detailed deliberations were held on the theme on 'Forests and Climate Change' on November 22-23, 2011, in the Training Hall, NASC Complex, as the part of First Indian Forest Congress Workshop, 2011. In all, 23 presentations were made by the experts on the theme and sub-themes.

The following invited and lead speakers made their presentations:

1. Shri Jagdish Kishwan, IFS, ADG (Wildlife), Ministry of Environment & Forests, Government of India, Paryawaran Bhawan, CGO Complex, Lodhi Road, New Delhi
2. Prof. NH Ravindranath, Chairman, Centre for Sustainable Technologies (CST), Indian Institute of Science, Bangalore

3. Shri BMS Rathore, Joint Secretary, MoEF, New Delhi
4. Prof. Anatoly Shvidenko, IIASA, Austria, Acting Programme Leader Ecosystem Services and Management Programme, International Institute for Applied System Analysis (IIASA), Schlossplatz-1, A-2361, Laxenburg, Austria
5. Prof. Hannes Boettechar, Research Scholar, IIASA, Austria, Acting Programme Leader Ecosystem Services and Management Programme, International Institute for Applied System Analysis (IIASA), Schlossplatz-1, A-2361, Laxenburg, Austria
6. Dr. Promode Kant, Director, Indian Institute of Green Technology, New Delhi
7. Dr. S Balaji, Director, Tamil Nadu Forest Academy, Coimbatore (Tamil Nadu)
8. Dr. Renu Singh, ADG, Biodiversity & Climate Change Division, ICFRE, Dehradun
9. Dr. MSR Murthy, National Remote Sensing Agency, Hyderabad (Andhra Pradesh)

Recommendations

1. Green India Mission (GIM)

The mission under National Action Plan on Climate Change (NAPCC) aims at sequestration of 43 million tonnes of CO₂ annually and generation of forest based livelihood for 3 million households. However, in the present scenario, forests in India are inadequate from an ecological, economical, protection,

production and environment point of view and accordingly, a combination of adaptation and mitigation measures, surveillance and monitoring at various levels, including social auditing, are essentially required under this programme.

It is, therefore, proposed that not just the carbon aspect but a full range of ecosystem services benefits be analyzed and a suitable combination of production, conservation and rural development forestry be put in place after complete analysis of all the aspects related to forest ecosystem.

2. Mitigation and Adaptation

Greater potential of mitigation and adaptation lies in Intensive Forest Management with high investment for production of quality planting stock, good governance, research input and sustainable forest management. These programmes are required to be designed differently from the normal developmental works and trees outside forests (TOF) including agroforestry can provide enormous avenues in such programmes.

It is, therefore, proposed that systematic studies on potential of TOF including agroforestry systems depending on agro-ecological zones, crop combinations and level of investment for mitigation and adaptation of climate change are required to be put in place.

3. India and REDD++

India is one of the mega-biodiversity centre, where forests and tree cover spreads over an area of about 23.68 per cent of the total geographical area and has nearly 1,73,000 villages classified as forest fringe villages, clearly reflecting the dependence of village communities on forest resources. The issue certainly requires further enhancement in sequestration of forest carbon stock through rehabilitation of degraded and deforested areas for enhancing the quantum of forest ecosystem services that flow to the local communities.

Thus, there is a strong need to develop National level network between the line departments, through various programme like JFM, CAT, FDA, Microcredit Policy, SHG, VFC and VFDC, etc. and the research institutions so as to take maximum advantage through the implementation of REDD++ activities in the country.

4. Community Participation

A large number of people, especially rural communities, are dependent on forests for their livelihood needs like fuel wood, fodder, food supplement and medicinal herbs, etc. Anthropogenic view supports that ecosystem services are the conditions and processes through which natural ecosystems and the species, which make them up, sustain and fulfil human life. In fact, majority of these communities have poor appreciation about the mitigation potentials of forests in India. They are able to appreciate mainly the ecosystem goods and services the forests provide.

Therefore, for long-term benefits, the capacity building of local communities should be given priority by involving them in management of forests.

5. Ecosystem Resilience and Forest Biodiversity

There are a number of biodiversity hotspots all across India, which house several species of medicinal and aromatic plants

including many rare and endemic species that are highly valued socially, ecologically and economically. Threatened by both anthropogenic impacts and climate change, the species are required to be prioritized for conservation action, after seeking the involvement of local communities.

Therefore, there is a strong and urgent need to carry out studies on the assessment of status of biodiversity, their long term ecological monitoring including other related issues in various ecosystems all across India.

6. Promotion of Integrated Pest Management Programme in Forest Ecosystem for Adaptation to Climate Change

With the change in climate, forest health is another matter of serious concern, which has also been predicted by IPCC. Little statistics are available pertaining to the area of infestation by insects, pests and disease-causing organisms in India.

Therefore, there is an urgent need to make and highlight the quantitative assessment towards the impact of pests and diseases in forest ecosystems including assessment of their significance through economic analysis. Research in support of Insect Pest and Disease Management should also be the priority area under changing environmental conditions.

7. Conservation of Water

Forest systems are associated with the regulation of 57 per cent of total water runoff and about 4.6 billion people depend for all or some of their water requirement on supplies from forest systems. The capacity of forest ecosystems for the production and regulation of water is undergoing drastic modification due to changing climate factors.

Therefore, there is an emerging need to improve and restore the water holding capacity of forests in India. In the context of rising demand and uncertain rainfall changes, technical knowhow to stop and conserve water through forests and grasslands are the prerequisite for improving water holding capacity of forest ecosystem.

8. Carbon Estimations

The increasing atmospheric loading of carbon dioxide and other green house gases and consequent increase in global temperatures has focused the interest in carbon stocks and carbon sequestration in forestry ecosystem. Forests dominate the terrestrial bio-spherical carbon cycle due to their large pools and fluxes. The Kyoto protocol recognizes the potential role of forests and forestry in sequestering carbon to reduce the buildup of carbon dioxide in the atmosphere. Carbon cycle can be studied well within various combinations of both pools and fluxes based approach followed by Verified Full Carbon Account (FCA). This emphasises the importance of conservation of carbon estimations.

Therefore, research on methodologies in terms of carbon assessments needs to be standardised for use by various agencies, including the Forest Department. Assessment of carbon should form an integral part of Working Plans being prepared by the Forest Departments.

The research on biomass productivity enhancement and wood replacement must also be taken up more vigorously by ICFRE, especially with reference to the climate change.



9. Sustaining of Himalayan Ecosystem

Forest Ecosystem has an inherent capacity to withstand incremental changes in climate and landscape, leading to a natural carrying capacity of ecosystem. When this capacity is exceeded, the ecosystem features get changed in ways that become socially and environmentally unacceptable. Among others, this could well lead to loss of biodiversity of rare or endangered species, migration of species, and shifting of habitats.

Therefore, there is an imperative need to put in place a sound coordination mechanism, both by the central and state governments, for ensuring cooperative and cohesive actions in the Indian Himalayan region for sustaining the Himalayan ecosystem. Forests in the Himalayas should continue to remain the primary land use and be fully compensated when diverted.

10. Institutional Arrangements for Project Formulation and Implementation

A dedicated professional group keeping in view the agro-climatic zone in which they are working and the subject matter in which they specialize, for implementing the projects in the regional institutes may be constituted under ICFRE. A specific fund can be earmarked for supporting the work elements and enhancing the capability of the human resources.

Therefore, there is an urgent need to institutionalize the approach, such as through a 'Task Force' of experts, drawn from different knowledge domains (natural and geological wealth, water, glaciers, forest resources and plant diversity, micro flora, fauna, wildlife and traditional knowledge systems) to critically examine and prioritise the research needs and direct the research

efforts in an holistic manner.

11. Information Communication Technology (ICT)

Consumption of electricity globally in ICT may increase from 4 per cent to 40 per cent in 2030 and it may be among the biggest GHG emitter by 2020. There is need to develop eco-friendly Green Computing Strategy.

In addition to the above main recommendations, the following issues related to Forest and Climate change may also be addressed by the research organizations and other development departments at the national level.

Research Issues:

1. Inherent uncertainty due to fragmentary knowledge on CC and lack of proper validation approach need to be addressed/ answered.
2. Vulnerability assessment of critical ecosystem and of key species of flora and fauna.
3. Consolidation of baseline/ fragmentary data on area, biomass, carbon stock and forest degradation, etc.
4. Enhancement of modeling capacity.
5. Capacity Building of research organizations, researchers and administration.

Policy Issues:

1. Sharing of carbon revenue among various stakeholders.
2. Adaptation to landscape changes.

1st Indian Forest Congress

JFM Conclave 2011 (24th November)

Joint Forest Management (JFM) Conclave, a full-day event was organized on November 24, 2011, as part of the agenda of the 1st Indian Forest Congress. Dr. SS Negi, Director, FRI, formally welcomed the delegates of the conclave. Dr. VK Bahuguna, DG, ICFRE, in his opening address emphasised the need and necessity of JFM in the country. Dr. PJ Dilip Kumar, DGF & SS and Chairman of the conclave, stressed on the present scenario of challenges being faced in forestry sector and the need for empowering and capacity building of the JFM committees. It has been pointed out that despite those challenges the Forest Department along with JFM communities have been successful in stabilising the forest cover from further depletion and in securing the country's wildlife to a great extent. Ms. Amrinder Kaur, APCCF, Haryana Forest Department facilitated the JFM conclave. Shri DK Sharma, DIG, NAEB, addressing the participants said that the researchers

from ICFRE have to work towards addressing problems of forest areas under JFM. It was emphasised in the conclave that the Forest Department should be more collaborative and consultative and more open to outside world, like environmentalists and administrators. A total of 202 participants involved in JFMC activities attended the JFM conclave presenting the various activities being undertaken by them.

The Joint Forest Management programme has clearly established its potential with proven facts that it is not only a sustainable forest management tool but also an agent of overall socio-economic development of poor forest dependent communities as has been shown in many states like Chhattisgarh. Forestry should be considered as part and parcel of development plan of the country. The most absorbing feature of this congress was the active involvement and participation of grassroots level







S. No	State	No. of Participants	
		JFMC Members	JFMC Team Leaders & Staff
1	Assam	2	0
2	Chhattisgarh	9	2
3	Gujarat	10	5
4	Haryana	45	2
5	Himachal Pradesh	3	1
6	Karnataka	5	1
7	Kerala	12	1
8	Madhya Pradesh	2	2
9	Maharashtra	6	2
10	Meghalaya	3	1
11	Mizoram	3	1
12	Nagaland	5	1
13	Orissa	14	7
14	Punjab	6	4
15	Tamil Nadu	2	14
16	Tripura	2	1
17	Uttarakhand	0	5
18	Uttar Pradesh	14	2
19	West Bengal	6	1
		149	53

The JFM conclave was attended by more than 200 JFMC members, self help groups and representative of the forest departments from 19 states of the country. The state wise breakup of the participants of JFMC members is as follows:



entities of JFM concept. Their contribution to IFC 2011 was not only limited to sharing of their JFM experiences but also was exhibited by showcasing the end products of JFM activities, through the stalls of exhibition cum sale at the Forest Congress right through the four day long mega event.

The Bundelkhand package has evolved as a role model for inclusive development. However, community based management systems need to be put in place with innovative scientific inputs for better productivity and ecological sustainability. The Chhattisgarh model is a case in point for replication for overall socio-economic and ecological rejuvenation.

Ms. Moroni Das who hails from Tripura attended the conclave to showcase Natural Resource Crafts of Tripura which was appreciated by large number of people. Chhattisgarh and Gujarat JFM models emerged as countrywide replicable model for poverty alleviation, where benefits are reinvested on community basis, leading to huge increase in the productivity and livelihood.

Shri US Anees from Neyyar Peoora JFM/FDA, Kerala, while sharing his success story, voiced for retaining the separate identity of the JFM in the changed context of JFM mechanism.

Chhattisgarh shows the way in successful JFM, not only in forest protection but also in increasing the productivity of agriculture in the fringe villages due to the joint efforts of forest department and JFM committee members. From the JFM fund 19,538 ha of land was brought under irrigation. For example, in

Arjuni range of Raipur Forest Division, as compared to 2005, the production of paddy increased from 3473 qtls to 16109 qtls in 2011 with corresponding gain in value from Rs 4.41 million to Rs 20.04 million. The treatment of forest area is proving a boon for the socio-economic status of forest dependent communities.

Some of the key voices echoed the demand of JFM committee members from across the country for retaining their separate identity within the ambit of gramsabha, as their primary duty is forest protection. They feared if the common fund is given in the Panchayat hand, as experienced in many cases, it is not ploughed back to items which are prioritised by the JFM committee members and is decided on the whims of Gram Pradhan. The usufruct sharing also becomes open to those people, who have no stake for forest conservation.

Now the time is ripe for second generation reforms in JFM. An expert group should be constituted for this purpose for developing the roadmap for reforms. JFM committees need to be adequately empowered to manage the forest resources, their capacity built up and legal backing given to them to be successful. For the institutional strengthening of the JFMCs, local youth should be engaged to act as facilitators for better communication between forest departments, JFMCs and Panchayats. A national institute for research & training on JFM and forest-based livelihoods should be set up for capacity building and technical support to the JFMCs. A federation of JFM Committees should be created under the Union Minister of Environment & Forests for better coordination and policy inputs. The JFMCs should be legally empowered and maintained as a separate entity. Independent auditing of JFMCs should be introduced.

The participatory management of plantation activities, the collaborative harvesting of forest produce including NTFP by JFMCs and the pattern of sharing of benefits thereof, the

processing and value addition activities related to NTFPs and the marketing of such products are some of the issues that were widely addressed by the participating JFMC members. Poverty alleviation programmes such as distributions of blankets, LPG connections, pressure cookers, fuel saving utensils and techniques were also spelt out at the conclave focusing the importance of reduction of pressure on forests for fuel wood. JFMCs have also reported to have acquired landed property in the name of JFMC to carry out and strengthen the activities of JFMC. Focus was also laid on the issue of legal status of JFM committees. Few states like UP and Karnataka have already given legal backup to JFM under relevant Forest Acts.

The JFM conclave was concluded with the following recommendations:

1. It was decided in the conclave that legal status should be given to the VFC, independent of Panchayat by creating a provision to maintain the VFC as a separate entity.
2. National level JFM Committees should be constituted and meetings be held annually so as to discuss new emerging trends and policy initiatives to address those issues.
3. It was decided that the dependency of forest communities be reduced on forests by providing alternative opportunities to ensure sustainability.
4. It was decided that the convergence at the grassroots level be encouraged to meet needs and aspirations of people.
5. It was also resolved that liberalisation of laws be ensured to encourage plantations on private and common lands.
6. It was also decided that the JFM is to be considered as an approach and tool to achieve various objectives so that it becomes a gradual and continuous process in which innovations from committees and as well as staff stands encouraged.





Images from the Exhibition





Forest Fringe Villages

November 24, 2011

SESSION - I

The first session of the workshop was chaired by Dr. JS Samra, CEO, National Rainfed Area Authority along with Shri Mohinder Pal, Director, Himalayan Forest Research Institute, Shimla, as the Co-Chairman in the presence of Dr. VK Bahuguna, DG, ICFRE.

After the welcome address and a briefing on the session by the DG, ICFRE, the session started with the presentation by Shri Hilaluddin, Chief Consultant, NRAA on 'Development of Fringe Forests'. He presented the status of fringe forests, the challenges faced by the area and the possible solutions. The policy decisions taken by NRAA and the schemes under execution for improvement of the fringe forests and adjoining community, revenue and private lands were also presented.

Dr. SD Sharma, Scientist, FRI, Dehradun, made a presentation on 'Identification of Forest Fringe Villages Using Remote Sensing & GIS Tools'. He presented the technique to identify forest fringe villages by using toposheets, digital village boundaries, digital forest cover maps and satellite data with the help of special software of remote sensing and GIS. A case study of socio-

economic status of forest fringe villages of Dehradun district was also included in the presentation. He also shared his views on the future strategies for identification of fringe villages and assessment of their socio-economic status.

Shri PK Kaushik, Scientist, RFRI, Jorhat presented 'Participatory Approach for Sustainable Livelihood Development in Fringe Villages of Gibbon Wildlife Sanctuary in Assam'. He shared the experiences on community approach and its impacts in reference to forest fringe development under the RFRI-Demo Village Programme. He also suggested many potential ideas to be incorporated while implementing the NRAA project on forest fringe villages.

After a detailed discussion on the three presentations, the chairman appreciated the application of advanced technologies in planning the developmental initiatives in forest fringe villages. He emphasised the participation of local people in all the programmes implemented in the 1.7 lakh forest fringe villages of the country. The Chairman also apprised the Director General, ICFRE, of the various recommendations made by the speakers.

The session ended with the vote of thanks by Shri Neelesh Yadav, Scientist, FRI, Dehradun.





SESSION II

This session was chaired by Dr. AK Sikka, Technical Expert, Watershed Development, National Rainfed Area Authority and co-chaired by Shashikar Samanta, Head, Forest Informatics Division, FRI. Dr. HB Vashishtha, Scientist, FRI, Dehradun, presented the methodology for 'Ecological Studies of Forest Land in Forest Fringe Villages of Dehradun District' for qualitative and quantitative assessment of the fringe forestlands and their productive status. The kind of data required, the procedure to collect data in the field and calculations for assessment of productivity status of forest was presented.

Shri Alok Yadav, Scientist, RFRI, Jorhat, presented paper on 'Ecological Assessment of Medicinal Plants and its Socio-economic Impact on Forest Fringe Villages'. The presentation included a case study of Nambor Reserve Forest which covers Karbi-Anglong and Golaghat districts of Assam. On the basis of the socio-economic survey, market survey and ecological studies, the impact of

medicinal plants on economic status of forest fringe villages was evaluated.

Dr. AK Pandey, Scientist, Tropical Forest Research Institute, Jabalpur, made a presentation on 'Forest Fringe Areas in Central India'. He said that three Indian states, Madhya Pradesh, Chhattisgarh and Maharashtra which lie in the jurisdiction of TFRI, Jabalpur, have large number of forest fringe villages and the NTFPs are very important for the livelihood of these people. The TFRI is carrying out research and helping in management of forest fringe areas for NTFPs, water and soil. The collection, processing, value addition and marketing of NTFPs and the capacity building of all stakeholders in this regard is being implemented by the Institute. He was of strong opinion that participation of community is very important for successful implementation of developmental programmes.

The chairman summarised the presentations made in this session. He recommended that Participatory Rural Appraisal should be conducted for accurate assessment of the socio-economic status of the forest fringe villagers and their participation in project activities. The session ended with the vote of thanks by Dr. SD Sharma, Scientist, FRI, Dehradun.

RECOMMENDATIONS

The following recommendations emerged from the presentation, discussion and comments of the chairman and co-chairman.

1. Consequent upon implementation of forest right acts, the development of undisputed, geo-referenced and accurate maps of fringe forest areas are essentially required in order to avoid any subsequent dispute and encroachment.
2. The issues and species more relevant to the utility and livelihood of forest fringe villages should be flagged and identified while carrying out socio-economic studies.
3. Soil and water conservation measures should be executed in forest fringe areas.
4. The methodology adopted for ecological studies should be internationally acceptable, uniform and convenient to apply.



UKFC-ICFRE FLR Workshop

November 24, 2011

The workshop on the Joint UKFC-ICFRE, Forest Landscape Restoration (FLR) Project was held on November 24, 2011. The workshop was chaired by Dr. CTS Nair and co-chaired by Shri Sandeep Tripathi, Director (P&IC), ICFRE, Dehradun. The opening remarks were given by Shri Sandeep Tripathi and these were followed by other presentations. Dr. Ajay Kumar Mahapatra, CCF, Odisha, Dr. Gopa Pandey, CCF, Madhya Pradesh, Shri DVS Khati, CCF, Uttarakhand, gave presentations on the Forest Landscape Restoration status in their States. A presentation on '*GIM Forest Landscape – Identification and Guidelines*' was given by Shri AM Singh (SU), MoEF. Dr. AS Negi (Retd), PCCE, Uttarakhand, made a presentation on the status of Forest Landscape Restoration in the country. A presentation on the future prospects of the GPFLR and UKFC-ICFRE Project was given by Mr. Mike Smith, UKFC, Edinburgh.

RECOMMENDATIONS

- (i) The proposed initiative of FLR, promoting benefits to local communities as well as to nature, improved ecosystem services, biodiversity and ecological integrity of ecosystem is a welcome one and needs to be promoted.
- (ii) The ongoing work of FLR project in three States of Odisha, MP and Uttarakhand, needs to be upscaled encompassing other representative states of the country for experience gathering and linkages with international initiative of GPFLR (Global Partnership on Forest

- Landscape Restoration).
- (iii) MoEF may facilitate development of a long term (3-5 years) UKFC-ICFRE umbrella project on FLR with DFID funding incorporating all elements identified in first phase along with establishment of an International Centre for Policy Research at New Delhi.
 - (iv) There is a need to integrate the objective of GIM, wherein the restoration of 10 million ha of forest land is based on forest landscape restoration principles. A mechanism should be evolved to have adequate synergy on implementation strategies and research inputs by both GIM and UKFC FLR Project to cater to micro-macro policy.
 - (v) Wider stakeholder consultations for evolving FLR policy options may be undertaken for Phase II to adequately address the research gaps and other concerns.
 - (vi) The issue of ecosystem service and carbon benefits also be addressed in the second phase of UKFC-ICFRE FLR initiative.
 - (vii) The established linkage and networking between UKFC and ICFRE further be augmented and cemented by organizing exchange programme of scientists of ICFRE and UKFC particularly in the area of ecosystem services, RS & GIS, climate change and modelling, tree improvement/genetic breeding, ecology and environmental management, etc.
 - (viii) The experience learnt in the Phase I may be linked up with GPFLR for its replication and knowledge sharing.



Forum for Forest Services

'Discussion Forum for Forest Services' was held on November 24, 2011, during the Indian Forest Congress at New Delhi.

The event was chaired by Dr. P.J. Dilip Kumar, Director General of Forests & Special Secretary, Government of India, Ministry of Environment & Forests, and co-chaired by Shri MS Swaminath, Additional Principal Chief Conservator of Forests, Karnataka. About 30 participants, including senior forest officers, attended the event.

During the side event, three presentations were made:

1. Cadre Management and Recruitment Policy for Front Line Staff in Forest Department by Dr. S Balaji, IFS, APCCF & Director, Tamil Nadu Forest Academy, Coimbatore.
2. Cadre Management of SFS officers and ROs by Dr. Rajendra Singh, CF, Western Circle, Uttarakhand, Nainital.
3. Welfare and Recognition issues in Forestry Sector Section in India by Shri Jitendra Sharma, CCF Hills, Punjab.

Shri Vivek Saxena, Director (IFS Division), MoEF, could not make his presentation in the event due to his preoccupation elsewhere. However, a hard copy of his presentation on IFS Cadre Management was attached along with other presentations.

Following presentations by officers, detailed discussions were held mainly to find ways and means to improve the conditions of forest service in the country. The main recommendations given in the side event are listed as below:

1. Strengthening Welfare and Recognition Issues in Forestry Sector:

- Introduce reward and recognition at various levels in forest service.
- Institute welfare funds for employees in the forestry sector. Introduce employee welfare schemes on the lines of police service.
- Introduce Forest medals for meritorious service on the pattern of Police medals.
- Provide timber voucher at concessional rates to forestry staff as this practice is prevalent in other departments like railways.
- Create a wing at the Ministry/State Forest Departments to look after welfare of employees. Staff welfare measures to find a place in the rules of business in the government.
- Training institutes to introduce welfare issues in their curriculum.
- Ensure basic facilities for frontline staff including:
 - ✓ Supply of uniform, raincoats, shoes, etc.
 - ✓ Supply of field kits with binocular, digital camera, GPS etc.
 - ✓ Providing lunch rooms, wash rooms in Office for staff

coming from outside and for staff working in the office.

- ✓ Providing power backup facilities.

- Personal welfare and Career Development:

- ✓ Health checkup for all staff above 40 years of age.
- ✓ Providing scholarship and prizes to the children of the staff who excel in studies.
- ✓ Provide hostel facilities at district headquarter level to children of forest staff posted in remote areas.
- ✓ Medals for outstanding work done by the forest personnel.
- ✓ Imparting promotion linked training to forest personnel.
- ✓ Conducting regular grievance redressal day every month at Range / Division level to resolve the pending grievances of the staff.
- ✓ Providing computers to all sections.
- ✓ Introducing Human Resource Information System to take care of various functional and management activities of the department.
- ✓ Introducing video conferencing in head office and circle offices.

- Motivating Forest Personnel:

- ✓ In order to improve the morale of the staff working in difficult terrain and exacting circumstances, they may be provided suitable incentives.
- ✓ Forest Range Officer may be provided with vehicle to negotiate difficult terrain as already being implemented in Tamil Nadu and Andhra Pradesh.
- ✓ Provide subsidised ration to low paid employees posted in remote areas.
- ✓ Cell phone to field employees as done in MP and AP
- ✓ Protection under IPC Section 198.

- Forest Housing and Infrastructure Corporation:

- ✓ A Forest Housing and Infrastructure Corporation may be constituted in each State to take care of housing requirements of the uniformed staff and other employees.

- Awards:

- ✓ Forest officers may be given due recognition at the state level and national level by instituting suitable awards to be distributed at the time of Independence Day/Republic Day.



2. Cadre Management of SFS Officers, FROs and Front Line Staff:

- Human Resource Management and Development:
- Filling up of vacancies in state front line staff. Time bound recruitment to fill up existing vacancies at all levels.
- Recruitment (Both SFS and FROs) on regular basis and not at one go against accumulated vacancies.
- Regular in-service training of frontline staff including RO and SFS officers on patterns of IFS (MCT and refresher courses on annual basis). Syllabus/Training pattern to be reviewed and revised from time to time.
- One week in-service compulsory trainings on annual basis by the states (Training calendars of identified training institutes to be provided in advance to the states and the officers).
- Rationalisation of area of jurisdiction at Beat, Section, Range and Division level, duly taking into account multiple tasks that are required to be performed by a Forester and the increased biotic pressure on the forest ecosystems.
- Timely Cadre Reviews to address sudden shortage of staff at key levels.
- Selection for deputation to ease out stagnation in the State Forest Departments (SFDs). Enhancement in the number of deputation posts.
- Increased empanelment of Indian Forest Service Officers at JS and above levels in the Government of India.
- Timely promotion at least in terms of pay band/grade pay/ACP (10th,18th and 26th year).
- Job description needs to be better structured to foster innovation, responsibility and recognition [Government of India has a persuasive role]. These are the feeder services for Indian Forest Service also.
- Financial/Administrative powers to be decentralised/divested at the levels of Range Officers and Assistant Conservator of Forests.
- ACR formats to be redesigned and be made more objective.
- More thrust is needed to enable the forest personnel at all levels to develop specialisation in various aspects of forest and wildlife management. There was a detailed discussion on the issue of forest departments becoming top heavy without adequate workload. The department to create an enabling working environment to nurture creativity and innovation. A significant number of the Indian Forest Service Officers in the country are doctorates and have excellent analytical skills, apart from practical exposure to forest resource management. There is a tremendous potential in enhancing the productivity of forest land as well increasing the livelihoods of forest dependent communities. For example, the value-addition and marketing of different NTFP species can be taken up as a thrust area.

Recommendation of the Side Event on 'Discussion Forum for Forestry Science/ Scientists'

Organized by the Institute of Forest Genetics and Tree Breeding, Coimbatore for the IFC-2011

Chairman: Dr. N Krishna Kumar, Director, IFGTB

Co-Chairman: Dr. A Balu, IFGTB

The side event commenced with the welcome address by Dr. N Krishna Kumar, Director, IFGTB. He said that Forestry scientists have contributed significantly to solving the issues pertaining to the forestry sector and stakeholders. He emphasised the need for increasing scientific manpower, infrastructure, stronger extension, better recognition of scientists by acceptance of their findings by users, need for all India coordinated projects, international linkages, better publications and fund flow and clear cut forest research policy for the country to meet the complex challenges of forest sector.

Dr. VK Bahuguna, Director General, ICFRE, was concerned that science is losing its importance in forestry. He felt the need for more science in forest management, especially in the area of people-centric forestry, as new solutions would emerge for millions of people who are dependent on forests only through science interventions. He emphasised the need for inputs for making the degraded forests more productive and expressed that the discussions would provide solutions for management of Forestry Research. He urged for a strong HRD policy for strengthening science and also felt the need to identify the nature of innovations in different thrust areas of forestry. He observed that the term 'Forest Scientists' be redefined to include forest researchers and forest managers.

This was followed by invited talks by Dr. Balaji, IFS, Director, TNFA, Coimbatore, Dr. VV Ramamurthy, Principal Scientist, IARI, New Delhi, Dr. KD Singh, Dr. AJT Singh, Retd. Scientist, WII, Dr. Piarelal, IFS (Retd), following which, views on these issues were elicited from the participants of the side event, including Dr. Ashok Kumar, Shri Ajay Sharma, Dr. Ajay Thakur, Dr. Rama Devi, Dr. BP Tiwari, Dr. R Yasodha and Dr. Sekar.

RECOMMENDATIONS

1. The need for theme-based coordinated research projects.
2. The need for species-oriented research centres.
3. Research on urban agro-forestry in light of its increasing relevance in the future.
4. Enhanced partnership with the private sector.
5. Enhanced research support for production of new clones of indigenous species, modern nursery techniques, ecological/biodiversity, climate change, economic analysis, recreation forestry and eco-tourism.
6. Long term and shared vision among foresters and scientists on research themes along with fixed deliverables.
7. Mission mode approach with networked partners on the themes identified.
8. The need for Technology Mission projects.
9. Need for integration within ICFRE institutes and movement of scientists from one institute to another for experience sharing.
10. Need for working in frontier areas of science like molecular biology and nanotechnology to enhance impact factor in publications.
11. Developing geographical indicators for trees species like Nilambur teak.
12. Extension science support for community participation.
13. Decision support system for ICFRE.
14. Refresher courses on scientific aspects of forestry for forest managers.
15. Development of permanent retrievable database of research results
16. Extension division manned by specialist and Van Vigyan Kendras to enable greater penetration of scientific findings to the end users.
17. Research on lack of regeneration, invasive weeds, grazing and firewood, climate change, plantation forests, fires, herbivores, phenology, palatability of fodder, seed dispersal by wildlife, ethanobotany and mapping of forest areas.
18. Utilisation of existing scientific knowledge available with ICFRE and forest department.
19. Use of mass media for extension of research results.
20. Science to be cultivated and not to be controlled.
21. Specialisations to be developed in different areas and recruitment of appropriate specialists.
22. Structured training programme for new scientist recruits.
23. Mechanism for solving of forest problems by forest



managers during deputation at ICFRE.

24. Issue/theme-oriented research rather than species-oriented research.
25. Harnessing IT tools, and research on bio-energy.
26. Bringing about tree revolution like the green revolution.
27. Foresters as collaborators in claiming carbon credits.
28. All India coordinated projects.
29. Human resource development.
30. Periodic training programmes for scientists to gain experience from other organizations like CSIR and ICAR.
31. ICFRE to have pacts with agencies like DAAD, USDA, IRD and INRA for bilateral exchanges.
32. Accountability and responsibility to stakeholder demands and end user needs.
33. Scientific findings in terms of products and process should be put to full use by stakeholders.

The Chairman emphasised that all involved in forestry science should work like a family in order to enable the forest sector to contribute substantially to meet the expectations of the society. The side event concluded with a vote of thanks by Dr. R Yasodha.

The delegates of the Side Event on Discussion Forum for Forest Science/Scientist recommended the following point to the 'Forest Charter 2011'.

1. ICFRE should initiate mission mode co-ordinated research encompassing species specific programs, development of Urban and Agroforestry systems, management of invasives and application of cutting edge technologies for trait specific tree breeding.
2. Enhanced research support is needed for production of new clones of indigenous species, modern nursery techniques, ecological/biodiversity, climate change, economic analysis, recreation forestry and ecotourism, decision support system, development of retrievable database of research results and utilisation of mass media for extension of research results.
3. More emphasis may be given for research on emerging areas like climate change, nanotechnology, bio-energy and carbon credit so as to catch up with the emerging global environmental issues.
4. ICFRE should draw a sustained HRD policy in capacity building of its researchers through national and international training programmes/exchange programmes with international universities and research organizations/short-term course/provision for study visits for handling frontline technologies.

Snapshots



Snapshots



List of Presentations

THEME 1

1.1 – Forests and Land Use Policy

- Rajendra Singh Forests in Society
- A K Jha Forests and Land use Policy ...A perspective
- Dr. Bransdon Corrie. *Taking forestry in India to new levels*
- Shri R.C. Dhiman. *Need for a separate policy and institutional framework for production forestry on non-forest areas*

1.2 – Forests in Urban Landscape

- Shri Subhash Chandra “Expanding Urban Forestry in India: Present Scenario- Issues, Challenges and Opportunities ”
- Ms. Kavita Bhambani and N.S.K. Harsh *Assessment of tree health along Trevor Road, New Forest, Dehradun:A case study*
- Kshitij Malhotra, Dinesh Kumar and V.R.R. Singh. *Air layering – A technique for creating urban landscape*

1.3 – Forest Governance and Institutional Reforms

- Dr. Arvind Boaz *Forest Sector Challenges Need for Forestry Institutions to Adapt*

1.4 – Forests and Community: Forging Partnerships

- Shri Kartikeyan Sarabhai Forests and Communities Forging Partnerships

1.5 – Forests and Traditional Knowledge

- Dr. D.K. Ved Interpreting medicinal plants in indian traditions for setting conservation priorities
- Shri B.S. Sajwan Forests and Traditional Knowledge with particular reference to Medicinal Plants
- Ranjan Chatterjee Forests and community: Forests and Society: Forging partnerships

THEME 2

2.1 – Managing the forests: old and new paradigm

- Akash Boaz Role of Youth in Sustainable Forest Management
- Himani Pant and Sadhna Tripathi Efficacy of aluminium phosphide against wood decaying fungi
- Ranjana Arya Managing degraded arid sandy salt affected soils with Atriplex spp for improved productivity
- JV Sharma Economic value of forest ecosystem (dudhwa national park , lakhimpurkheri)

2.2 – Reconciling growth with conservation towards sustainable development

- Sanjay Singh Variability of *Diospyros melanoxylon* roxb. Leaves as influenced by climate, soil and management
- S. Nautiyal and R. K. Pant Effect of Growth Retardant on Mulberry (*Morus alba* L. S₁₄₆ Genotype) Foliage for Improvement

2.3 – Agroforestry: production, opportunities and institutional framework

- Charan Singh, Deepak Khanna* and Jayshree Ardey *Melia composita* – Status and future scope under agroforestry in Punjab
- R. B. Singh (speaker), and H.N. Hymavathi Evaluation of growth and soil fertility status in *Dalbergia sissoo* – *Zea Mays* (Silvi-Agri) agroforestry system
- B.S. Mandal(Speaker); Y.P. Singh* and J.C. Kaushik Growth Parameter of Crops and Poplar Tree Under an Agrisilviculture System in Northern India
- Hiranmayee Nayak, L. D. Koshta and S.D. Upadhyaya Diefferential responses of pruning intensity on *dalbergia sissoo roxb.* Based agrisilviculture system under rainfed tropics
- H. P. Singh* and Charan Singh Extension programme on farm forestry : A case study of Punjab, India
- M. Maria Dominic Savio Evaluation of growth performance of selected bamboo species for farmlands of Tamil nadu.
- Mala Rathore Harvesting of *Calotropis procera* flowers from different agro-climatic zones of Rajasthan for their medicinal use
- Naresh Kaushik Performance of different agroforestry systems in semi-arid ecosystem
- Sajiwan Kumar and M. N. Naugraiya Impact of Lemon grass and *Dalbergia sissoo* based agroforestry system on Red lateritic wastelands in Chhattisgarh

2.4 – Forest Products: Management for livelihoods

- Sh A.K. Singh Minor Forest Produce for Livelihood in Chhattisgarh and National Perspective
- A.K. Pandey and Vijayalakshmi Ojha Bamboo shoots: Standardization of harvesting time for obtaining quality produce to augment its utilization
- Pramod Pande Influence of growth parameters on wood traits in seed raised trees of *Dalbergia sissoo* Roxb
- Sadhna Tripathi and Himani Pant Potential of Neem seed oil for Bamboo protection against degrading agencies
- Y.M. Dubey and V. Kothiyal “Quality assessment of *Dalbergia sissoo* by ultrasonic technique ”
- J.N. Sah and V.K. Varshney Chemical constituents from genus *Picrorhiza* - a review
- H.P. Singh and Sarvesh Singhal Economic Contribution of resin collection in livelihood of forest dwellers of Uttarakhand
- Moola Ram & JC Tewari Improved Gum Production from *Acacia senegal*: Management for Livelihood

2.5 – Forest Products in industry

- Dr. Vimal Kotiyal Wood based industry in India: past, present and future prospects
- Prasoon Kaushik Utilization of tree derived carbonyl compounds as Schiff bases for fragrance and flavor composition: a literature appraisal
- R.K. Sapra, Padam Prakash Bhojvaid,* V.R.R. Singh A new Approach for Licensing of Wood-based Industry - a case study from northern India
- Tapas Kumar Sarangi Non-Timber Forest Products and Rural Livelihoods with special reference to the policies & markets in Orrisa

Theme 3 – Expanding Frontiers in Forestry Sciences

3.1 – Geomatics - Applications and opportunities:

- Dr. Devendra Pandey Geomatics in Sustainable Management of Forests
- Dr. SPS Kushawaha Geomatics: Applications and Opportunities
- Subashini, A. Cost effective microsatellite genotyping of eucalyptus mapping population
- Surender Bhardwaj Potential Use of Some Plants Extracts Against Wood Rotting Fungi *Coriolus versicolor*

3.2 – Managing forest resources: scientific base

- Dr. G. Kumarvelu Forest resource management on scientific basis
- Dr. Manoranjan Bhanja Natural forest management – *Issues & Approaches*
- Deepika Chauhan The Fractionation of Pectin for the period of fruit-ripening in *Diospyros peregrina*
- Krishna Kumar Narayanan National Bureau of Forest Genetic Resources for Economic and Ecological security
- Mohd Yousuf Addition of new host records to larval parasitoids: *apanteles* spp. And their role in management of teak leaf skeletonizer, *euteuctona Machaeralis* (walker) in india
- Mohd. Yousuf Present status of indian species of *Trichogramma* and their application in biological control of forest insect pests
- V.K. Varshney Managing forest resources: Scientific base
- Senthilkumar Biopesticidal properties of *a.Marmelos* against *hyblaea purea* and *spodoptera litura*
- Nawa Bahar Forests seed certification: Problems, Limitations and Needs
- N. S. K. Harsh Screening for resistance against some common diseases in some common diseases in *Dalbergia sissoo*
- Pallavi Bhatia Interaction between *Ganoderma lucidum* and *Fusarium solani* – two serious root pathogens of *Dalbergia sissoo* mortality
- Rekha Warriar Descriptors of casuarinas for registration of new varieties
- Sabhapati Nath Management option for flowering in *Bambusa tulda* Roxb. - A Case Study Under Chhotanagpur Agro- Climatic Zone
- V.P. Tewari Stem & branch wood volume equations and variable density yield model for *Dalbergiasissoo* plantations in IGP area of Rajasthan

3.3 – Forest genetics and biotechnology

- Dr. Krishna Kumar Expanding Frontiers of Forest Genetics and Biotechnology
- Dr. H.S. Ginwal Forest Genetic Resource Conservation and Improvement: Aspects & Prospects
- Abha Rani Evaluation of *Anogeissus latifolia* (Roxb.) Wall ex. Bedd. gum for authentic characteristic identification
- Ajay Thakur Species improvement programme of *Dipterocarpus retusus* Bl. syn. *D. macrocarpus* Vesque: Progeny analysis after seven years
- Anandalakshmi Efficacy of ids technique on improving the quality of *Jatropha curcas* seedlot
- Anandalakshmi Descriptors for Registration of Eucalyptus Clones for IPR Rights in India
- Anee Bora Evaluation of plus trees of *Pongamia pinnata* (L.) Pierre for oil content and germination pattern
- Santan Barthwal Characterization of different species of bamboo through issr molecular marker

- Anita Rawat Molecular characterization of high and low resin yielding genotypes of *pinus roxburghii* sarg. Using microsatellite markers
- Arumugam Karthikeyan Establishment of nodulation and Nitrogen fixation in *Casuarina junghuhniana* Miq. rooted stem cuttings with *Frankia* under aseptic conditions
- Ashok kumar Genotype x environmental analysis for different clones of *dalbergia sissoo roxb.*
- Ashok Parmar *In vitro* clonal propagation of *commiphora wightii* (guggal) – a medicinally important tree species of the arid region
- Babita Rani *In vitro* propagation of *Dendrobium bensoniae* Rchb.f. an important orchid of North Eastern India.
- Bhimi Ram Utilization of Tissue Culture Technique for propagation of *Melia dubia* Cav
- Chethan Kumkar Growth performance of industrially important bamboo species in two different agro climatic conditions
- Hemshikha Tyagi Clonal propagation of an economically important woody tree of the arid zone-*Tecomella undulata* (Sm.) Seem
- I.D. Arya Tissue culture method for multiplication of fri hybrids of Eucalyptus and their field trials
- Kannan C.S. Warriar Stability Analysis in Clones of *Casuarina equisetifolia*
- Sundari B Differential Expression of Cellulose Synthase Gene Families in *Eucalyptus tereticornis*
- Mathish Nambiar Characterisation using of commercially important eucalyptus germplasm molecular markers for identification of redundant accessions and prediction of susceptibility to *Leptocybe invasa* infestation
- Meena Bakshi Effect of Donor age and genotype on coppicing and rooting ability in *Dalbergia sissoo* Roxb.
- Muyeed Ahmed Monitoring genetic fidelity of somatic embryo regenerated plants of *Bambusa bambos* by RAPD and ISSR markers
- Nawa Bahar Regeneration status of Khasi pine in Meghalaya
- V.M. Prajapati Screening of Teak (*Tectona grandis* L.) clones *vis-à-vis* defoliator (*Hyblaea puera*) in Gujarat
- Pratima Sinha Analysis of epigenetic changes in *Jatropha* using methylation sensitive AFLP
- Priti Chauhan Identification of chloroplast & nuclear microsatellite markers in *Pinus roxburghii*, *Pinus kesiya*, *Pinus wallichiana* and *Pinus gerardiana* through cross-species amplification
- Rajveer Singh Chauhan *In vitro* regeneration of *acacia mangium willd*
- Sangram Chavan Biopiracy- threats to biodiversity
- Santan Barthwal Studies on Molecular Marker Development for Oleoresin Production in *Pinus roxburghii*
- R.K. Selvakesavan Identification of Sodium Transporter Gene Homologues from Salt Tolerant Tree Species
- Shivani Dobhal Evaluation of clonal divergence in *Dalbergia sissoo* Roxb. for developing production populations
- Shruti Sharma Optimization of DNA extraction protocol of *Pongamia pinnata* Linn.
- V. Sivakumar Eucalyptus improvement in Southern India
- Subashini V Development of genetic linkage map in *Eucalyptus camaldulensis* X *E. tereticornis* using microsatellite markers
- S. K. Lavania Influence of time of cone collection on cone characteristics in blue pine
- Mathish Nambiar Effect of salt stress on growth and proline levels in tolerant and susceptible clones of *Casuarina equisetifolia*
- T. N. Manohara “Reproductive biology of *Aquilaria malaccensis* Lamk. a critically endangered species of North East India”

- Vineeta Shrivastava A Complete Protocol for The Native Biodiesel Plant – *Pongamia Pinnata* Using Low Cost Alternatives For Development Of High Frequency Micropropagation
- Virendra Singh Effect of crown position on cone, seed and germination characteristics in himalayan cedar (*cedrus deodara* royle ex d. Don)
- Yasodha R Use of most common alleles for species discrimination in *Eucalyptus camaldulensis* and *Eucalyptus tereticornis*
- V. Mohan Effect of potential isolates of ectomycorrhizal fungi on growth improvement of commercially important plantation species, *casuarina equisetifolia* and *c. Junghuhniana* seedlings

Theme 4: Forest Biodiversity and Landscapes

4.1 Forest Ecosystem and Biodiversity Management

- Shri P. K. Sen Bio diversity in India
- Shri V. B. Sawarkar. Conservation of Biological Diversity in the Wild at Multiple Scales
- Dr. A. J. T. Johnsingh, Forests and biodiversity conservation in India
- Nafeesh Ahamed AN ANGIOSPERMIC DIVERSITY OF DISTRICT HARIDWAR UTTARAKHAND, INDIA
- Dr. Nawa Bahar *Diploknema butyracea* a potential source of livelihood improvement
- Panchagnula Hareesh Chandra Dry Season Blooming Tree species, *Boswellia ovalifoliolata* (Burseraceae) and *Terminalia pallida* (Combretaceae) as key food plants for sects/Sunbirds during Dry Season in Southern Eastern Ghats of Andhra Pradesh
- Pardeep Singh Phytosociological Study and Resource Analysis of Medicinal Herbs of Padder Valley in J&K
- Gogate P. P Seed characteristics and germination behaviour of undehisced fruits in *Aphanamixis polystachya*: Implications for reducing seed harvest cycles
- Ragavan. P Mangrove diversity in Andaman and Nicobar Islands (India) with special references to natural hybrids of genus *Rhizophora*
- S K Sharma Biodiversity conservation: *in context to sustainable land and ecosystem management (slem) mainstreaming and upscaling*
- Swati Chandra Introduction of Agroforestry in Rice Cultivation for Conservation of Rice Varieties of the Apatani Tribe
- Akhlaq A. Wani Ecological studies of Shrub species in Chaupal Forest Division of Himachal Pradesh
- Jagdish Chander Studies on the seed germination, seed viability and propagation of endangered Jaal (*Salvadora oleoides*) Decne. : Haryana Experience

4.2 Protected Area management: New Paradigm

- Dr. V. B. Mathur Protected Area Management: *New Paradigm for Conservation*
- Shri. D. V. S. Khati Landscape management: A hope for Wildlife
- Dr. Bhavana Dixit A Study of Floristic Diversity of Sal Forest of Achanakmar – Amarkantak Biosphere Reserve
- Brajaraja Mishra Protected Areas Management in Odisha-An Institutional Approach
- Debajit Rabha Tree species composition of natural forest and pan jhum ecosystem in Badsahitila Reserve Forest, Karimganj District, Assam

4.3 Man and animal interface

- Dr Vivek Menon Man animal interface – Thinking and Getting out of the conflict box

4.3.1

- Aparna Shri Chemical control of adults of *Leptocybe invasa* Fisher & LaSalle (Hymenoptera: Eulophidae), an invasive gall inducer on Eucalyptus, in the Laboratory

4.4 Ecosystem goods and services and forest resources accountings

- Dr. Madhu Verma Valuation of Forest Biodiversity – A prerequisite for better financial devolution & developing markets for forest ecosystem goods and services
- Arti Gaur Morphological, Biochemical and Genetic Variability in *Commiphora wightii* (Arn.) Bhandari in western India
- Pardeep Singh Medicinal Plants of Padder Valley, Jammu & Kashmir A Quantitative Study
- Dr. Dvijendra K. Sharma Constitution of Forest Ecosystem Services Regulatory Authority for developing Effective Market Mechanism for the Ecosystem Services provided by Forests
- G. Singh Rainwater harvesting enhances restoration process and carbon storage in degraded hills in southwestern Rajasthan
- Jawaid Ashraf Population estimation of some important tree species of Asola Bhatti Wildlife Sanctuary
- Neelesh Yadav Biodiversity Informatics

4.5 Eco-tourism

- Dr. A. K. Bhattacharya Ecotourism: An approach to sustainable livelihoods
- Dr. Veena Chandra Exploration of Edible Plant Diversity based on Indigenous knowledge from Jaunsar-Bawar region in Uttarakhand
- O. K. Remadevi Role of fallen logs in the conservation of xylophagous insects - a study based on Nilgiri Biosphere Reserve
- Rajdeep Eco-restoration of an Urban Landscape to Develop a Garden with the Concept of Biodiversity Conservation and Eco-tourism

THEME – 5: FORESTS AND CLIMATE CHANGE

- Jagdish Kishwan Planning Strategy for REDD+: India
- Prof N.H. Ravinderanath Climate Change & Forests; Status of Science , policy & Research
- Shri B.M.S. Rathore National mission for a green India – *Under the National Action Plan on Climate Change*
- Prof. Anatoly Shvidenko Understanding present and future carbon cycling of forests: Some methodological problems
- Dr. Promode Kant The Possible Contours of Mitigation and Adaptation in Forestry Sector in India in the Coming Decade
- Dr. S. Balaji Eco systems resilience and forest biodiversity enhancement through joint forest management – Tamil Nadu experience
- Dr. Renu Singh India and REDD+: Opportunities and Challenges of Implementation
- Dr. M.S.R. Murthy Indian Forest Carbon Cycle Assessment
- MK Gupta and SD Sharma Carbon Sequestration: Organic Carbon Store in the Soils under Chir (*Pinus roxburghii*) Forests at Different Altitudes in Uttarakhand State of India

- Sparsh Kala Carbon stock of trees outside forests (2005-2009)
- SL Swamy Tree growth, c sequestration and n allocation in *Gmelina arborea* roxb. Stands grown in monocultures and agrisilviculture
- Atanu Kumar Raha Sundarban and Global Warming – where lies the threat
- Dr Shamilla Climate change and its impact on the forest insect pests
- Dharmendra Verma Challenges of Joint Forest Management and Green India Mission
- Dinesh Kumar Silvicultural Challenges and Opportunities for Green India Mission
- R Vivekanandan Going Green Computing – An ecological perspective to reduce carbon footprint in forestry organizations
- Bilal Khaki Carbon Sequestration Potential of Biomass under different agroforestry land use systems in Poanta area of Himachal Pradesh
- MV Durai A study on growth performance of selected tree species in vermicomposted coal mine soils in Jharkhand, India
- PP Bhojvaid A Cost effective strategy for forestry based climate change mitigation in India: CDM program of Activities with TOF
- Shenthil kumar Impact of insect disturbance on forest carbon sequestration
- S. Saravanan, Karthik Elevated CO₂ effect on Photosynthetic behavior and Biochemical changes in *Ocimum sanctum* Linn. an Medicinal herb

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Shri RK Soni, RA-II, ICFRE
Ms. Rekha Rani, OS, Silviculture Division
Ms. Asha Khatri, RA-II
Shri Mam Chand, LDC, Silviculture Division, FRI
Shri JS Rana, Pharmacist, NFH, FRI
Shri TR Kakkar, RA-II, Extension Division, FRI
Shri VS Rawat, RA-II, Extension Division
Shri Dinesh Kumar, Driver, DG Office
Shri HP Singh, Driver, DG Office
Shri Bakshi Ram, DG Office, ICFRE
Shri Jatinder Bhandari, DG Office, ICFRE
Shri Pankaj Saklani, DG Office, ICFRE
Shri P Tamta, PS to Director, FRI
Shri Manohar Lal, RA-II, FRI
Shri Kiratmani, LDC, FRI
Shri AK Gulati, OS, Account Section
Shri LR Joshi, OS, Account Section
Shri Jawahar Singh, Head Clerk, Account Section
Shri Sardar Singh, LDC, Account Section
Shri Begah Raj, LDC, Account Section
Shri Yaqub Ali, Driver, Silviculture Division FRI
Shri AS Negi, Director Office, FRI
Shri Arjun Chetri, FRI
Shri Manoj Kumar, Van Vigyan Bhawan, New Delhi
Shri Jayant Kumar, Van Vigyan Bhawan, New Delhi
Shri Umesh Kumar, Van Vigyan Bhawan, New Delhi
Shri Tika Ram, Van Vigyan Bhawan, New Delhi
Shri Surendra Singh, Driver
Shri Rajender Singh Rawat, Driver
Shri Kishori Lal, Silviculture Division
Shri Krishan Kumar, Silviculture Division
Shri Surender Singh, Silviculture Division
Shri Ram Avtar, Silviculture Division
Shri Maqsood Ali, Silviculture Division
Shri Altaf S Sofi, RA, Silviculture Division
Shri Rayees Afzal Meer, RA, Silviculture Division
Ms. Nutan Gupta, RA, Silviculture Division
Shri Rajdeep, RA, Silviculture Division
Ms. Seema, RA, Silviculture Division
Ms. Monika Bhatt, Silviculture Division
Shri Ramanand, Account Section (Project Account)
Shri Pitamber, Account Section (Project Account)
Shri Vikas, Silviculture Division