

# EXPERT COMMITTEE REPORT

## Strategy for Increasing Green Cover Outside Recorded Forest Areas



Government of India  
Ministry of Environment, Forest and Climate Change  
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## Foreword

The humanity of present day is facing a growing concern, from global to local, about the depleting forest resources mainly for the fear of life threatening disasters like global warming, climate change, loss of bio-diversity, depletion of water resource or degrading air qualities. However, similar concerns are never experienced for destruction of trees from outside forests as these are intrinsically intersectoral and multipurpose. Moreover, the data available on Trees Outside Forests, being dispersed and fragmentary in nature, often escapes the attention of our planners and decision makers.

In recent time, due to increasing demands and scarcity of forest produce, Tree outside Forests (TOF) has assumed a greater importance in national economy. India is not an exception of it. In last two decades, TOF has significantly buffered the pressure on our declining forest resources and cater the burgeoning need of domestic biomass as well as escalating demands for industrial wood. According to the report of FAO, 93% of industrial wood demand is met from TOF. It has been corroborated from the successive Biannual State of Forest Reports which show increase in the Forest Cover and Tree Cover ever since 2005. Latest IFSR, 2017 has reported<sup>1</sup> Forest Cover on 70.82 M ha and Tree Cover on 9.38 M ha, which together constitutes 24.39% of total GA of the country as against 33% of vegetal cover envisaged in our National Forest Policy.

It has been realized that the country has a huge potential for increasing its TOF area, particularly through expansion of agroforestry. India, primarily being an agrarian economy needs to focus on climate resilient farming in a big way on the face of uncertainty of monsoon rains besides diversification of farming through the practice of other land-based activities like agroforestry, dairy, livestock rearing, beekeeping, pisci-culture and different livelihood alternatives, which will enable our farming community to enhance their family income. Like in many other countries, agriculture and forestry are separated institutionally in India and because of this historic separation between these two important land uses, agroforestry is increasingly emerging as a huge source of innovation in both farming and forestry. Therefore, growth of agroforestry in India is considered as a win-win situation for both agriculture sector and forestry sector.

Interestingly, nearly hundred-year-old Indian Forest Act of colonial regime which subsequently adopted by many states of independent India became the major hurdle for tree planting by

private owners. Restrictive provisions on felling and transportation of trees standing on private land have led to a general apathy of the public in tree planting on his own land. Such provision, though relevant to prevent illegal tree felling from an “open resource” like forest stretched on a vast unguarded landscape hundred year back, apparently sounds illogical in present time when technology of surveillance is far more superior.

In spite of proactive actions taken by the Ministry of Environment, Forest and Climate Change (MoEF&CC), responses from States have been rather poor or inadequate. However, a favorable change through recent landmark amendment in the definition of “bamboo” crop in Indian Forest Act, 1927 is widely appreciated by the farmers. Ministry of Agriculture & Farmer Welfare had also come out with National Agroforestry Policy, 2014, model APLM Act, 2017 and model Contract Farming Act, 2018 for the adoption of agroforestry in a large scale.

In order to formulate a strategy to increase the green cover/tree cover outside recorded forest areas (Tree Outside Forests) and particularly agroforestry, Ministry of Environment, Forest & Climate Change has constituted a high-level Committee in January 2018 under my chairmanship on identified targets. The terms of reference of the Committee are specific but at the same time exhaustive and thought provoking.

The Committee held five meetings besides one focused group meetings and several Working Group discussion meetings before finalizing the report. On several sessions, specialists/resource persons were invited for wider consultations at depth. I place on record my deep appreciation and gratitude to all the esteemed members of the Committee, namely Shri Rajkumar, Ex-PCCF & HoFF (Haryana), Dr.P.P.Bhojbaid, Ex-PCCF & HoFF (Haryana), Dr Rekha Pai, Ex-PCCF, Uttarakhand, Dr Javed Rizvi, Country Director, ICRAF, Shri Chandrabhushan, DDG, CSE, Shri Jitendra Sharma, PCCF & HoFF, Punjab, Shri RB Sinha, APCCF, MP; Shri OP Chowdhury, DDG (Extn.), ICFRE; Dr Alka Bhargava, JS, MoA&FW, Shri Suneel Pandey, VP, ITC Ltd.; Shri Sachin Raj, NCCF; Shri A.K.Mohanty, IGF (SU) and Shri Noyal Thomas, IGF (FP) & Member Secretary of the Committee. I am also immensely grateful to Shri Siddhanta Das, DGF & SS, Forest who was kind enough to be present in the first meeting and addressed the members and clarified the purpose behind the Committee. I will fail in my duty if I will not mention the name of Shri AK Bansal, Former ADG (Forests), Shri AK Srivastava, Former ADG (Forests), Dr Devendra Pandey, Ex DG, FSI, Dr Vinod Kumar, APCCF , Haryana; Dr SK Dhyani, Principal

Scientist, ICAR; Dr A K Handa, Principal Scientist, CAFRI, Jhansi and Dr. RH Rizvi, Scientist, CAFRI, Sri Rajesh Kumar, FSI, Dr.C S Jha, Group Director, NRSC & Dr. Pramod kant who joined as Resource Persons and made valuable contribution of their knowledge for enriching our report. Without the constant assistance and cooperation of Shri Jitesh Kumar, Technical Officer (Forestry), the Committee could not perform its duty smoothly. I am extremely grateful to NCCF and particularly Ms. Deepali Rautela, Asst. Director and her teammates Ms.Taruna, Ms. Abhilasha and Mr. Varun for their hard work and consistent support in preparing the report in a presentable format.

I sincerely hope the suggestions/recommendations made in the Report may be of far reaching consequences in the long run and agroforestry will be a real game changer for both agriculture and forestry sectors of India. Adoption of agroforestry in a large scale will ensure expansion of TOF and gradually India will be a country of Net Exporter in Wood and Wood Products from its present status as Net Importing Nation in Wood resulting a huge savings of our Foreign Reserve Currency.

**ABHIJIT GHOSE,**  
**Chairman & Ex-PCCF (HoFF), Raj.**

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## List of Acronyms

<b>APLM</b>	Agriculture Produce and Livestock Marketing
<b>APMC</b>	Agriculture Produce Marketing Committee
<b>AWIFS</b>	Advanced Wide field Sensor
<b>BCTMP</b>	Bleached Chemo Thermo Mechanical Pulp
<b>CAFRI</b>	Central Agro-Forestry Research Institute
<b>CAMPA</b>	Compensatory Afforestation Fund Management and Planning Authority
<b>CAMPA</b>	Compensatory Afforestation Fund Management and Planning Authority
<b>CITES</b>	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
<b>CPTs</b>	Candidate Plus Trees
<b>CSE</b>	Centre for Science and Environment
<b>CSR</b>	Corporate Social Responsibility
<b>e-NAM</b>	e- National Agriculture Market
<b>ERDAS</b>	Earth Resources Data Analysis System
<b>FAO</b>	Food and Agriculture Organization
<b>FC</b>	Forest Cover
<b>FDC</b>	Forest Development Corporations
<b>FPO</b>	Forest Producer organization
<b>FRM</b>	Forest Resource Management
<b>FSI</b>	Forest Survey of India
<b>GCF</b>	Green Climate Fund
<b>GEF</b>	Global Environmental Facility
<b>GIM</b>	Green India Mission
<b>GIS</b>	Geographic Information System
<b>ICFRE</b>	Indian Council of Forestry Research and Education
<b>IFA</b>	Indian Forest Act
<b>IFFCO</b>	Indian Farmers Fertiliser Cooperative Limited
<b>IPMA</b>	Indian Paper Manufacturers Association



<b>ISAM</b>	Integrated Scheme for Agricultural Marketing
<b>IUCN</b>	International Union for Conservation of Nature
<b>IWMP</b>	Integrated Watershed Management Program
<b>KKC</b>	Krishi Kalyan Cess
<b>KRIBHCO</b>	Krishak Bharati Cooperative Limited
<b>KVKs</b>	Krishi Vigyan Kendra
<b>LU&amp;LC</b>	Land Use & Land Cover
<b>MGNREGA</b>	Mahatma Gandhi National Rural Employment Guarantee Act
<b>MIDH</b>	Mission for Integrated Development of Horticulture
<b>MoAC&amp;FW</b>	Ministry of Agriculture Cooperation and Farmers Welfare
<b>MoEF&amp;CC</b>	The Ministry of Environment, Forest & Climate Change
<b>MoRD</b>	Ministry of Rural development
<b>MPTS</b>	Multi Purpose Tree species
<b>MSL</b>	Mean Sea level
<b>MSP</b>	Minimum Support Price
<b>NABARD</b>	National Bank For Agriculture & Rural Development
<b>NAFCC</b>	National Adaptation Fund on Climate Change
<b>NAP</b>	National Afforestation Program
<b>NARP</b>	National Agricultural Research Project
<b>NARS</b>	National Agricultural Research System
<b>NBSS&amp;LUP</b>	National Bureau of Soil Survey & Land Use Planning
<b>NDC</b>	Nationally Determined Contributions
<b>NDRF</b>	National Disaster Relief Fund
<b>NFI</b>	National Forest Inventory
<b>NFP</b>	National Forest Policy
<b>NGOs</b>	Non-Government Organization
<b>NICRA</b>	National Initiative on Climate Resilient Agriculture
<b>NMOOP</b>	National Mission on Oilseeds and Oil Palm

<b>NMSA</b>	National Mission for Sustainable Agriculture
<b>NPV</b>	Net Present Value
<b>NRSC</b>	National Remote Sensing Centre
<b>NWFP</b>	Non-Wood Forest products
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>PLPA</b>	Punjab Land Preservation Act
<b>QPM</b>	Quality Planting Material
<b>RET</b>	Rare, Endangered & Threatened
<b>RFA</b>	Recorded Forest Area
<b>RWE</b>	Round wood Equivalent
<b>SAD</b>	State Agricultural Department
<b>SAU</b>	State Agricultural Universities
<b>SFD</b>	State Forest Department
<b>SFR</b>	State Forest Report
<b>SPAs</b>	Seed Production Areas
<b>TBI</b>	Tree Based Intercropping
<b>TC</b>	Tree Cover
<b>TERI</b>	The Energy and Resources Institutes
<b>TOF</b>	Tree outside Forests
<b>ToR</b>	Terms of Reference
<b>TP</b>	Transit Permit
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>WWF</b>	World Wildlife Fund



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# Report at a Glance: Executive Summary

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## 1. Introduction

- 1.1 India has been unique in pursuing a visionary goal of having 33% of its geographical area under forest and tree cover (FTC) despite incessant pressure to part away with forest lands in the interest of developmental activities and projects. This goal has attained added significance in view of the Nationally Determined Contribution (NDC) targets of creating an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030, committed by the country under the Paris Agreement of the UNFCCC.
- 1.2 Nationally Determined Contribution provides an opportunity to fast-track the much-needed momentum to move towards the goal of 33% of FTC. Actions to achieve the NDC would require action on both forest lands and non-forest lands. On forest lands in terms of rehabilitating the degraded forests and improving other forest areas, and in respect of non-forest lands by creating additional tree cover through agroforestry, farm forestry, urban and peri-urban forests, roadside avenues, etc. Most of the experts agree that achievement of NDC will require more action on non-forest lands than the forest lands. However, to create the targeted additional CO<sub>2</sub> sink, actions on forest and non-forest lands will be equally important.
- 1.3 Action on non-forest lands will have many spin-off benefits including improving the income of the farmers. This may provide an opportunity to create viable business models for farmers to get more income from tree cropping and cultivation of NWFP and marketing the produce to get additional income and simultaneously meeting the requirement of the industry and the community. If recommendations contained in the report are followed in letter and spirit, the present trade deficit in wood and wood products in the country will be significantly reduced.

## 2. Constitution of Expert Committee

- 2.1 Government of India in the Ministry of Environment, Forest and Climate Change (MoEF&CC) with a view to increasing the contribution of TOF in meeting the goal of

33% of FTC, achieving NDC target of additional CO<sub>2</sub> sink, improving the farmers' income and reducing the trade deficit in wood constituted an Expert Committee vide its OM dated 08/01/2018, F. No.1-1/2018-FP (Annexure 1) to recommend a strategy under the chairmanship of **Shri Abhijit Ghose**, Former PCCF & HoFF, Rajasthan. The Committee in its First Meeting held on 30-01-2018, constituted 6 Working Groups (WGs), and assigned a Convener with the overall responsibility of drafting the WG report. Constitution of the WGs is contained in the Ministry's OM dated 31-01-2018, F. No.1-1/2018-FP (Annexure 2).

Names of Conveners of the 6 WGs are

- i) Classification of Agricultural Regions into Silvi-climatic Zones- Dr Rekha Pai
- ii) Production of Certified QPM- Mr Sachin Raj Jain
- iii) Supplementing Government Finances- Mr Noyal Thomas
- iv) Rationalization of Existing Regulatory Regime- Mr Suneel Pandey
- v) Monitoring and Evaluation of Progress of TOF- Dr Javed Rizvi
- vi) Policy Interventions for Sustainable Management of TOF- Mr R. K. Sapra

### **3. Working Group Subjects**

#### **3.1 Classification of Agricultural Regions into Silvi-climatic Zones**

Highlighting the requirement of suitable tree species for respective agro-ecological zones, the WG was assigned the task of classifying or converting the agricultural regions into corresponding silvi-climatic zone. This is intended to facilitate selection of most suitable tree species to be planted on non-forest lands as a component of agroforestry, farm forestry, avenue plantation and even of city forest. The WG decided that for the purpose of tree cropping on lands outside forest areas, for example, in conjunction with agricultural crops, the agro-ecological zones were more suited than a silvi-climatic zone. Based on this premise, the WG summarized its recommendation for suitable tree species for 20 agro-ecological zones in a table, which is part of the WG report on the subject. The tabular statement mentions the names of the States, soil type, annual precipitation, availability of irrigation suiting different tree species.

### **3.2 Production of Certified QPM**

Non-availability of quality planting material (QPM) has been plaguing the Indian forestry since its inception. Although the importance of the subject was known, efforts for institutionalizing production and use of certified QPM did not succeed. Compared to the provisions of the legal requirement of seed certification in agricultural sector, there is no matching regulation in the forestry sector with the result that, in general, forest departments all over the country have been using planting stock which did not give high production.

Private sector on the contrary, like ITC, JK Paper, Mysore Paper Mills, IAPPM, West Coast Paper Mills, TNPL, BILT, WIMCO have been using high yielding clones of *poplar, eucalyptus, casuarina and Leucaena* with high yields of 20-35 cum/ha compared to the national forest average of 0.7 cum/ha. These private sector companies have achieved the high level of productivity with intensive and continuous in-house R&D on selection and development of high yielding clones and varieties. The WG building on the experience of the private sector companies and the burning need of easy availability of huge quantities of QPM has in its recommendations, *inter alia*, flagged the need for collaborative research, listing the research organizations that can contribute in this field-ICFRE and ICAR, creation of a research network by CAFRI, need for provenance and field trials in various locations, initiating a certification scheme for QPM, creation of a network of QPM registries, development of a national QPM Registry, and extension of technology of QPM production to farmers.

### **3.3 Supplementing Government Finances**

Provision of finance is essential for upscaling the relevant existing activities and undertaking new initiatives to promote TOF on non-forest lands. A large number of government and banking sector schemes are available to give a fillip to cultivation of trees outside forest areas. However, it may be necessary to develop a few business models on pilot basis to take tree cultivation out of the domain of routine project funding and make it self-sustainable like any other business model. This, however will require appropriate policy support from regulatory and taxation angles, which will include ease of transit, tax rebate, certification tagging and export promotion. Wooden and bamboo

artefacts, many plant and herbal products, modular furniture and kitchen fittings, wood and bamboo as construction material etc have huge demand in country as well as in export market. Recognized certification tag of these products will add value to their universal acceptability and make business models robust and sustainable.

The WG on the subject has listed many schemes mainly in the government sector, which can be leveraged for funding by the project entities. Areas of focus listed by the Group, *inter alia*, include production of QPM, skill development, improving transportation infrastructure in remote areas, insurance and MSP cover, and accreditation of mega QPM nurseries. The funding avenues cited by the WG include CAMPA, NAP, World Bank, JICA, CSR, GCF, NAFCC, Finance Commission Award, NMSA, NBM, NICRA, ISAM, NSDC, MGNREGA, and NABARD. Appropriate PPP models and Green Bonds are also mentioned as innovative funding approaches requiring more finesse.

### **3.4 Rationalization of Existing Regulatory Regime**

Initiatives get dampened and business models fail if the regulatory and policy reforms do not keep pace with changing socio-economic developments. A favorable policy and regulatory regime is responsible for high level of acceptability of TOF in shape of agroforestry in Punjab, Haryana, Andhra Pradesh and Uttar Pradesh. The most basic reform in this regard has been in felling and transit rules. All the States that are leaders in agroforestry have exempted many tree species mostly cultivated on non-forest lands from operation of felling and transit rules. The National Agroforestry Policy, 2014 requires the States to rationalize transit rules as a prerequisite for receiving funding support under the Sub-Mission on Agroforestry of the Ministry of Agriculture & Farmers' Welfare.

The WG in its deliberations agreed that changes in relevant sections of the Indian Forest Act (IFA), 1927 were required to exempt the agroforestry produce from being listed as a forest produce. Such restrictions, however, could continue in case of Rare, Endangered and Threatened (RET) species. Simultaneously the Group noted that many RET species of economic importance and with export potential needed to be encouraged for cultivation outside forest areas by farmers as this will have the twin benefit of ensuring the conservation of these species in their natural habitat, and also at the same time improve livelihoods of the local communities. Hassle free transportation of RET products

all over India may also require amendment in the IFA to facilitate issuance of a Pan-India Transit Pass. WG strongly advocates the use of Information Technology (IT) and digital technology for monitoring and surveillance of agroforestry and forestry products in transit, including digital linking of check posts and barriers on national highways. PPP models are also suggested by the WG centering around forest corporations for raising high yielding plantations. Certification and accreditation of QPM nurseries is strongly suggested as a game changer in increasing productivity of forestry and agroforestry plantations.

### **3.5 Monitoring and Evaluation of Progress of TOF**

It is important that a careful eye is kept on the expansion of TOF to ensure that the actions on ground are in tandem with the expenses being incurred and progress reports being presented from time to time. FSI with its experience and expertise of producing the data related to TOF as part of its biennial State of Forest Report can contribute in monitoring and mapping the TOF areas. CAFRI and IRSC who have worked on projects for mapping of TOF in the past can also contribute significantly in this exercise of monitoring and mapping the progress of TOF on the ground. ICRAF can bring in experience of other countries working in this field. Main idea is to develop a synergy amongst FSI, CAFRI, NRSC and ICRAF to supplement and complement the work of each other with maximum output in minimum cost and time rather than working in isolation resulting in avoidable overlapping of actions.

In tune with the aforesaid, the WG has recommended to form a consortium of FSI, CAFRI, NRSC and ICRAF to work in tandem sharing the expertise and capacity available with each organization to map the TOF with different tree species in different regions of the country. Remote sensing technology with finest resolution coupled with ground truthing will be the key element of the procedures followed by the consortium to produce at regular intervals the geotagged maps of the TOF. The Group has recommended financial support to the CAFRI to upgrade its capability to produce wall-to-wall maps of the agroforestry areas of the country. The Group feels that to succinctly capture the TOF in satellite imageries the periodicity of 2 years as is being followed by FSI for estimation of Forest & Tree Cover (FTC) at present may be short, and it



therefore, recommends a periodicity of 5 years to map the agroforestry lands. This, however, may lead to delay in corrective actions when any discrepancy is flagged as a result of the 5-year mapping cycle.

### **3.6 Sustainable Management of TOF**

Accelerating the pace to meet the forest policy goal of bringing 33% of geographical area under FTC and meeting the NDC target of additional CO<sub>2</sub> sink by 2030 are expected to give an unprecedented boost to the expansion of TOF. This is likely to result in large scale changes in cropping practices associated with emerging markets across the country. Such fast changes in the socio-cultural and economic fabric of the rural landscape will require a close watch by the government and other relevant agencies to ensure that the tempo of TOF is maintained. This can be ensured by continuous evaluation of the trend of production from agroforestry landscapes, and of the associated emerging markets.

The WG advocated proper accounting of agroforestry products in contribution to the country's GDP, which essentially will require generation, collation and analysis of the relevant data of products, like wood, NWFP, fuelwood, herbal medicines and preparations coming from TOF landscapes. Liberal policy support has transformed the Punjab and Haryana States from being wood deficit states into wood surplus states in a span of 2-3 decades. The Group recommends that since agroforestry systems of TOF cater to the need of the wood and pulp industry, short rotation crops are more suitable for the farmers to grow allowing them to reap the benefit of wood harvests at shorter period. As against this, long duration wood production from forest areas would suit more the forest departments and more precisely to Forest Development Corporations. Acknowledging the dire need of coordination amongst the policies and actions of the relevant Ministries and Departments, the Group strongly advocates establishment of a coordination mechanism at the highest level in the MoEF&CC preferably headed by an IG Forests. The Group summarized its recommendations under 3 categories, *viz*, Policy Intervention, Institutional Mechanism and Sustained Funding.

## **4. Salient Recommendations**

Detailed recommendations are given at the end of each subject chapters pertaining to various ToRs of the Report. Same may please be referred to for a detailed insight into the background and recommendations by each WG on the assigned subject.

Important recommendations as culled out from the text of the 6 WG Reports are appended below:

**4.1 *To analyses and classify the agricultural regions into silvi-climatic zones and suggest zone-wise tree species***

4.1.1 R&D to develop additional combinations of trees and agricultural crops suitable to the climatic condition, soil profile, socio-cultural acceptability and with a favorable Cost-Benefit Analysis.

4.1.2 Identification through diagnostic research, suitable tree species for each agro-ecological zone distributed in the States/UTs of the country.

4.1.3 Presenting a bouquet of agroforestry models to farming community of a region allowing them the option to choose the best combination.

4.1.4 Ensuring availability of certified QPM for increasing productivity of cropping systems

4.1.5 Local government to identify suitable species for incorporating in agroforestry systems in consultation with the local community

**4.2 *To develop strategy for research and production of certified QPM accessible to farmers through a network of identified organizations and industries, extension of technical knowledge and marketing of the produce***

4.2.1 Initiating collaborative research with ICAR, ICFRE, SAUs and wood-based industry as partners focusing on genetic improvement of planting stock of most used tree species in agroforestry practices of different agro-ecological zones

4.2.2 Creation of an agroforestry research network joining organizations and farmers' bodies

4.2.3 Rejuvenating the tree improvement program with continuous work on selection of candidate plus trees and establishment of seed production areas

- 4.2.4 Provenance and other field trials of QPM in different agro-ecological zones on farmers' field besides setting up of Demonstration Plots.
- 4.2.5 Development of a certification scheme for QPM with provision for tagging or stamping of certification marking in line with that of horticulture.
- 4.2.6 Development of a national QPM registry, and system for accreditation of QPM nurseries.
- 4.2.7 Training and awareness of farmers on benefits of using QPM in farming practices through different modes of communication- radio, TV, pamphlets and brochures in local language, seminars, village meetings and campaigns.
- 4.2.8 Quick sharing of wood and NWFP market information through digital platforms.

**4.3 *To suggest ways and means to access funding mechanisms to give further boost to the efforts of the government***

- 4.3.1 Leveraging of funding support from the ongoing schemes and programmes of the government in various ministries and departments and banking sector, including external funding, like CAMPA, NAP, NAFCC, CSR, Finance Commission Award, NMSA, NBM, MIDH, Sub-Mission on Agroforestry, ISAM, NSDC, MGNREGA, NABARD, NMOOP, World Bank, GEF, JICA and GCF.
- 4.3.2 Development of business models of tree cultivation on pilot basis to wean the practice away from project funding to create self-sustaining market models.
- 4.3.3 Evolving business models for tree cultivation to be supported by rationalized policy and regulatory regime, including those of felling and transit, insurance and MSP coverage, accreditation of QPM nurseries, and mandatory use of certified QPM.
- 4.3.4 Development of appropriate PPP models involving private sector and forest corporations and issuance of Green Bonds.
- 4.3.5 Fixed proportion of national highways and expressways projects to be set aside for greening roadsides by responsible agencies,
- 4.3.6 Innovative ways of generating financial incentives, for example, by developing and establishing a Carbon Registry.

4.3.7 Certification tagging of wooden and bamboo artifacts, plant and herbal products, modular furniture and kitchen fittings, wood and bamboo as construction material with huge in country and export market to create business models.

**4.4 *To evaluate the present regulatory regime impeding adoption of tree planting in the form of agroforestry and farm forestry by farming community and suggest appropriate reforms for their rationalization***

4.4.1 Rationalization and easing out of felling and transit prescriptions on wood and wood products coming from agroforestry, farm forestry and tree cropping areas.

4.4.2 Notifying wood, wood products and NWFP grown on non-forest lands as agricultural produce so as to be brought under the progressive agri-market reforms and e-NAM.

4.4.3 RET species with in-country and export market to be encouraged for cultivation on non-forest lands with strict supervision and regulations with spin-off benefits of ensuring conservation of RETs in natural habitats.

4.4.4 IFA to be amended for revisiting the definition of Forest Produce under Sec 2(4) and issuance of a Pan-India Transit Pass for agroforestry produce under Sec 41.

4.4.5 Use of IT and digital technology for monitoring and surveillance of agroforestry and forestry products in transit by, *inter alia*, digital linking of check posts and barriers on national highways.

4.4.6 PPP models for high yielding plantations by forging collaboration between FDC and private sector.

4.4.7 Rejuvenating agroforestry, farm forestry and social forestry in States deficit in wood and wood products.

4.4.8 Promotion of in-country manufacturing of face veneers from the hardwood species of India and dis-incentivizing import of hardwood face veneers.

4.4.9 Insurance and MSP coverage for agroforestry and farm forestry wood, wood products and NWFP.

4.4.10 Facilitating creation of a Carbon Registry to provide a listing, trading and tracking platform for carbon credits to stakeholders including industry with overarching objective of meeting the NDC commitment of the country under Paris Agreement of UNFCCC.

**4.5 *To suggest centralized database system and mechanism for monitoring the progress of coverage under TOF in the country***

4.5.1 Forming a consortium of CAFRI, FSI, NRSC, and ICRAF to map distribution pattern of tree species in agroforestry systems in different regions of the country using high resolution remote sensing technology and global experience brought in by ICRAF

4.5.2 FSI to collaborate and share its grid-based information on field inventory of TOF with CAFRI to let the latter validate agroforestry maps.

4.5.3 Funding support for strengthening of infrastructure of CAFRI comprising equipment and skilled manpower for wall to wall mapping of agroforestry areas to closely monitor the coverage of TOF

4.5.4 Proposing periodicity of 5 years for monitoring and mapping of TOF progress instead of 2 years as followed by FSI for preparing State of Forest Report. This, however, needs a careful consideration as a 5 year cycle of monitoring may lead to missing of mid-course correction at the appropriate time.

4.5.5 Connecting wood and NWFP markets on a digital platform with farmers' associations, timber industry, private nurseries, timber traders, etc. for establishing a stable market

**4.6 *To suggest policy intervention for sustainable management for TOF***

4.6.1 Creation of National/State Forest Seeds Corporations.

4.6.2 Leveraging GCF and GEF support for combating desertification in Rajasthan, Gujarat and Trans-Himalayan reaches of Jammu and Kashmir and Himachal Pradesh.

4.6.3 Ensuring availability of CAMPA Fund for sustained R&D support in tree improvement and tree breeding program.

4.6.4 Leasing of wasteland to corporate sector for re-greening following proper safeguards for local communities and wildlife.

- 4.6.5 Extending tax benefits to wood and NWFP based industries under Make in India Program.
- 4.6.6 Skill development of local youth in carpentry, wood carving, furniture making, QPM nursery, plantations, bamboo and cane artifacts, organic farming, etc. within NSQF
- 4.6.7 Creation of a high level inter-ministerial coordination mechanism in the MoEF&CC headed by an IG Forests.
- 4.6.8 Facility to incentivize carbon capture by TOF by providing a platform for carbon trading in shape of a Carbon Registry.
- 4.6.9 Setting aside a fixed percentage of national highways, expressways and corridors including Railway projects for creation and management of green corridors.
- 4.6.10 Appointing of targets of TOF amongst States for development and implementation of a focused strategy by each State to achieve the target.

# CHAPTER-I

## Significance of Trees Outside Forests

### 1. Introduction

- 1.1 Trees occur as an integral part of any natural landscape. However, their density and varieties vary from one landscape to another. In areas of good rainfall, usually trees per unit area are higher and diversities in their composition are also large, where as in lower rainfall zones, trees are very less per unit area and diversities are also less. Tree densities vary also depending on the type of soils. Fertile deep soils support more number of trees but shallow soils on rocky terrain or soils on impervious beds trees are found in less numbers. Height of trees is also affected according to soil depth. Both climate and soil are important parameters in determining density and composition of trees in the landscape and known as edapho-climatic condition. Biotic factors also play a dominant role in vegetation type. When we talk of vegetation we mean entire plant communities comprising of trees, shrubs, herbs, climbers etc. With the increasing pressure on land by human beings as well as their domesticated animals, vegetation gets declined and trees are threatened. Vanishing trees is always an invitation for natural disasters like flood and drought. Besides, its impacts on global and local level always remain far reaching.
- 1.2 Globally, trees are often recognized as “lungs of the world” because they exchange Oxygen and Carbon-di-Oxide with the atmosphere. If we compare with a human body system, trees can also be called as kidneys of the world as they regulate flow and use of water by intercepting precipitation and then releasing it slowly to the ground where it can either run-off in to river or recharge the ground water. Plants can then absorb it for use in photo-synthesis. The absorbed water is then transpired back to atmosphere and being blown by the wind cause rains at somewhere-else.
- 1.3 Trees function like the skin of the body too, being the interface between the vegetation and the atmosphere for the exchange of gases and water. It will be no exaggeration to say trees are like the intestines of the world exchanging nutrients between the soil and the vegetation, fueling the nutrient and the carbon cycle. Finally, they are like the heart of the world, as they drive the eco-systems that make the world healthy and function properly.

They do this by providing large number of niches for other organisms to inhabit both above and below ground. Recent evidence has reported 2.3 million organisms on a single tree-mostly microbes-but also numerous insects and even bigger animals like mammals and avi-faunas. Others also live in the soil or, due to the micro-climates created by the physical stature, of the tree on the associated herbs and bushes. It is all these organisms that provide the ecological services of soil formation and the nutrient recycling, feeding off each other and creating an intricate web of food chains.

- 1.4 All this is important for the maintenance of nature's balance that prevents weed, pest and disease explosions. They also provide services like pollination, essential for regeneration of most plants, not to mention the very topical regulation of carbon storage for climate control.
- 1.5 At the local level, in addition to these "human body functions"; trees produce a wide range of products useful to us and often traded in local markets. There are literally tens of thousands of trees that produce edible/ or useful products-sources of items of day to day importance for us. So we can also think of trees as shops, civic services and industries. Thinking in this way, a treed landscape becomes similar to a town made of supermarkets with articles full of everyday needs, a bank providing annual interests on invested capital, a drug store or health clinic for patients, a sanatorium for healthy life, a water tower, an art gallery, a zoo full of wildlife, a guardian of culture like a museum, a hotel providing rest for migrants, a tourist centre for over-wintering or summer breeding habitat, a night club for nocturnal creatures, factories for fertilizers, pesticides and fungicides, an energy provider and even a skyscraper affecting the flow of wind around the other buildings.
- 1.6 Using this analogy, we can see that by destroying trees we destroy facilities and functions, which are important for life. Conversely, by planting trees we can multiply the products and services, we need for good quality life in many different ways. Monoculture plantations are replicating the concept of a housing estate or industrial complex. This can be called "productive" but not necessarily good for environment. Alternatively, they can be grown in different densities and with different species configurations and for different products in association with food crops, livestock and cash crops.



- 1.7 Trees of the landscape, on the basis of land-use, can broadly be divided as “forests” and “non-forests” or “Tree Outside Forest”, abbreviated as TOF. Forests are usually a large patches of tree-lands with continuous canopy occurring in single tier or in multi-tiers plant communities represented by tree, shrub and herb in different densities. Mostly trees being close, crowns compete for sun light and roots compete for nutrients. Forest lands are usually demarcated and boundaries are legally defined. Though forest lands are generally found in large habitats, due to various economic development activities now-a-days these habitats are fragmented and broken. Since forests are being managed scientifically, their management and administration are assigned to an ‘organized forest service’, which functions under defined policy, laws and rules. Therefore, the forest areas are strictly under constant surveillances and well accounted for.
- 1.8 Apart from forest, any landscape is also interspersed and dotted with tree crops which are under public, private and community ownership. These “trees outside forests”, being in custody of various ownerships are not put under a uniform management system. Moreover, these resources being scattered unlike compact forests are difficult to be assessed and even-if they are found in a compact block of relatively smaller areas, ownership pattern varies. These compact blocks are named as orchards, tree grooves, village woodlots, sacred grooves etc. depending on their purpose of establishment. TOF are also found in linear pattern along roadsides, canal banks and railway tracks.
- 1.9 On farmers’ fields, occurrence of trees is found in linear pattern on farm boundaries to act as “wind-brake” or “shelter belt” plantations. Scattered tree crops in savanna pattern on agricultural cropland are termed as “agro-forestry” or “agro-horticulture” depending on kind of tree species. Grazing land with scattered tree crops are called as Silvi-pastoral plantation. In rural areas, people also grow trees, bamboo and other plants in their home-steads for their own use. Sacred groves around religious places are maintained and people do not harvest any trees from these woodlots, whereas Community Woodlots of rural areas on common lands meet their needs for firewood, fodder, fruits, small timber and timbers. In urban landscape, trees are found along roads, parks and other facility areas for shades or bio-aesthetic purposes or recreational reasons. In spite of constraints of land, many public and private institutions of urban areas, having sizable chunk of land in their

premises, often plants shady and ornamental trees. Urban people also like to plant varieties of trees in their home gardens besides flowering annuals depending upon availability of lands.

- 1.10 Ever since the looming environmental threats like Global Warming and Climate Change, Desertification, Drinking Water Crisis, Air and Water pollution, Loss of Bio-diversity etc. have assumed enormous proportion and existence of human civilization is under peril, priorities of National Governments have shifted to conserve their forests for ecological security and preserving bio-diversity rather to harvest timber and other products for meeting various needs of growing population. Efforts are also made at the country level to minimize the rate of deforestation and at the same time increase afforestation/reforestation yearly, so that at least a net increase of forest area can be achieved.
- 1.11 When flow of various forest produce, particularly timber and small timber declined from forest areas, perhaps in mid-nineties of last millennium world attention was diverted towards trees outside forest resource and it was considered to be a reliable source of wood to turn back. Here it will not be an out of place to mention that from the vantage point of the new millennium, a fresh opportunity to reflect on the contemporary situation of our planet's forest resources had arisen. The Global Forest Resources Assessment 2000 (FRA 2000) provides such a perspective on the world's forests through an appraisal of their state in the year 2000, and changes since the 1980s. The assessment is a key source of factual information on forests for use by national institutions and international fora such as the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change and the Convention to Combat Desertification in seeking solutions to environmental concerns.
- 1.12 FRA 2000 was the most comprehensive and technologically advanced assessment in FAO's 50-year history. It relied on the active participation of partners and nearly 160 member countries around the world. The thematic content of it is broader than ever before, covering forest area status and change, biological diversity, timber volume and forest biomass, non-wood forest products, trees outside the forest, forest fires and other topical issues. For the first time, comparable trend information on tropical deforestation

from two successive assessment periods has been obtained through the use of statistical sampling and satellite remote sensing. The assessment employed state-of-the-art information management systems- Internet technology and geographic information systems. One tangible benefit from their use has been the ability of FAO to release a large body of information to the general public as soon as it became available. In fact, more information is now available on the FAO Web site than could conceivably be published in the main report. But the assessment was not driven by technology. Instead, the technology was applied selectively as a complement to more conventional data gathering means.

## **2. Indian Context**

- 2.1 India is one of the leading countries in the world, where the scientific management of forests was rooted as back as in 1864 during colonial regime and the tradition has been strengthened over the years. In independent India, the first colonial forest policy declared in 1894, was amended after independence and the National Forest Policy of 1952 was enunciated. However, after three decades, it was again revisited and keeping in view the contemporary developments in forestry sector, National Forest Policy of 1988 was promulgated. The national goal of minimum 33% of the land area under forest or tree cover is targeted in this policy. Accordingly, as a strategy along with enrichment of forest areas, afforestation and tree planting contemplated on all degraded and denuded lands in the country outside of forest boundary under Social Forestry and Farm Forestry.
- 2.2 For the first time, it was mandated to plant linear plantation along roads, railway lines, rivers/streams/canals; green belts around urban/industrial areas as well as in arid tracts. Similarly, vacant institutional lands under State/Corporate and Private ownerships were supposed to be planted. All community lands and village common lands, wherever available need to be planted. Government is supposed to provide all inputs and technical assistances. Revenue generated through plantation when harvested vest with Panchayats if the land belongs to them, in all other cases the benefit is shared with local community as an incentive for giving protection from planting to harvesting. Even it is suggested to provide usufruct right of trees can be given to weaker section and economically disadvantaged groups. Further, to facilitate and motivate individuals to undertake tree

farming and growing fodder, grasses and legumes on their own lands, suggestions were given to modify land laws suitably. Degraded revenue land may be allotted on lease basis or on tree-patta basis to individuals to encourage them to plant more and more trees. Thus a conscious attempt was made to increase tree outside forest in the current policy whereas forests are to be maintained for the ecological security and environmental balance, and at the same time ensure supply of wood. In order to reduce the demand of wood, the policy advocated for promoting wood substitutes and use of wood saving devices for ensuring fuel efficiency. Simultaneously, import of wood has been liberalized to balance the equation of demand and supply.

2.3 Further, in order to ensure sustained supply of raw materials to wood based industries the policy intends that the industries can establish direct relationship with individuals who can grow raw materials and industries will facilitate them with inputs including credit, constant technical advice and finally harvesting and transport services.

- No forest based enterprises, except that at the village or cottage level, should be permitted in future unless it has been first cleared after a careful scrutiny with regard to assured availability of raw material.
- Forest based industries must not only provide employment to local people on priority but also involve them fully in raising trees and raw-material and even processed primary products.
- Natural forests serve as a gene pool resource and help to maintain ecological balance. Such forests will not, therefore, be made available to industries for undertaking plantation and for any other activities.
- Farmers, particularly small and marginal farmers would be encouraged and incentivized to grow, on bunds and marginal/degraded lands available with them, wood species required for industries. These may also be grown along with fuel and fodder species on community lands, not required for pasture purposes, and by Forest department/corporations on degraded forests, not earmarked for natural regeneration.

- The practice of supply of forest produce to industry at concessional prices should cease, Industry should be encouraged to use alternative raw materials. Imports of wood and wood product should be liberalized.
- The above considerations will however, be subject to the current policy relating to land ceiling and land laws.

2.4 Having emphatically focused on Social Forestry to grow wood for meeting the demand of domestic market and further clarifying the role of wood based industries to grow wood outside of natural forests, the policy also laid down research priorities in the NFP, 1988 as follows:

- (i) Re-vegetation of barren/marginal/waste/mined lands and watershed areas
- (ii) Research related to social forestry for rural/tribal development
- (iii) Development of substitutes including bamboo and other crop residue based products to replace wood and wood products

### **3. Policy Implication**

3.1 Since 1987, an independent agency, Forest Survey of India (FSI) has started assessment of India's Forest Cover systematically in a cycle of 2 years on the basis of interpretation of Satellite imageries. In 1987, India had a forest cover of 19.49% of the Geographic Area (GA) of the country. However, updating of technology towards better resolution periodically enabled better assessment and till Assessment in 2003, forest cover estimation was stabilized between 19.5% to 20.5% of GA over last two decades. Though some attempts were made to assess Tree Cover from 1991 to 2003, for the first time in 2005, forest cover estimation was made along with tree cover estimation. In last one decade, due to afforestation drive in states and also technological upgradation of assessment, the forest cover has reached 21.5% of GA whereas tree cover remained around 2.8% of GA. In the latest FSI Report of 2017, released in last month, the forest cover and tree cover found as 21.54% and 2.85% of GA respectively. Thus, the combined Green Cover of the country reached 24.39% as against the policy goal of NFP, 1988 as 33%.

3.2 In spite of the consistent efforts made by states to rehabilitate the degraded forest areas coupled with intensive soil and moisture conservation and similar strategies of

afforestation/reforestation in blank areas, forest cover can be improved but it is realized that in all the maximum limit of Recorded Forest Area is to the tune of 76.74 million ha, which is 23.34% of the total Geographic Area of the country. ,

- 3.3 On the contrary, there is a vast scope of increasing Tree Outside Forests for which Social Forestry was advocated for the first time in the report of National Commission on Agriculture in 1976 and subsequently in the National Forest Policy, 1988. In last two decades of last Millennium, a surge of Donor Assisted Projects were observed almost in all the major states of the country but soon after the World Bank's Sector Review in 1993, slowly the world bank and other donors have withdrawn themselves from the Forestry Sector of the country except JICA (Japan International Co-operation Agency) which through its projects promoting participation of the local people under Joint Forest Management program in the country. Ever since National Wasteland Development Board (NWDB), was taken out from the umbrella of MoEF, the afforestation on wastelands have assumed low priority. After launching of *MGNREGA*, as flagship program by the Ministry of Rural Development, the other programs like DDP, DPAP, IWDP etc. which were promoting large scale plantations outside the forest, mainly on Government and Community lands are either discontinued completely or drastically reduced in scale. Rather in name of massive infrastructure Development, during expansion of National, State and District Highways and Railway lines conversion from MG to BG etc., many successful and established plantations were sacrificed.
- 3.4 The India State of Forest Report, 2017 shows the maximum Tree Cover has reported from the state of Maharashtra, followed by Rajasthan, Madhya Pradesh and Gujarat. Probably in Maharashtra, a special Directorate of Social Forestry is engaged to promote planting tree outside the forest till date funded by the State Government. In Rajasthan, an ambitious tree planting program has been initiated with a mission approach under the banner of "Mukhya-Mantri Jal Swabalambi Yojana" to make water sources in villages. Similarly, in Gujarat, tree planting extensively carried out in forest deficit districts in irrigated condition, thanks to Narmada Canal. But the growth in tree cover as a whole has not significantly grown as per State of Forest Report. In 2005, it was estimated as 2.79%

of GA where as in 2017, it is estimated as 2.85% of GA. In this rate it is very difficult to make a head way within a short time frame.

- 3.5 Some states, like Haryana and Punjab have set up remarkable examples by pulling them out from the category of “wood deficit” states to “wood surplus” states, when particularly these states have negligible forest areas. The phenomenal growth has been possible through agro-forestry by providing enabling environment to farmers to grow tree crops along with agriculture crops. Incidentally, these two states are leading in food production and considered as Food baskets of the country. Few fast-growing tree crops like Eucalyptus, Poplar, *Ailanthus excelsa* (Ardu), deshi Babul, Sisham are extensively planted by progressive farmers with their regular food crops to ensure food and wood both. Besides, agro-forestry has been widely recognized today as “Climate resilient Farming” when global warming and climate change is considered to be potential threat on our agriculture production. Particularly, in drier zones, presence of trees on agriculture lands help to create a Micro-climate by reducing the adverse effects of dry desiccating winds and maintaining humidity in air.

#### **4. Current Extent & Potential of Agro-Forestry in India**

- 4.1 Agro-forestry can be defined as the inclusion of trees in farming systems and their management in rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability. It is practiced in India traditionally over thousands of years. It embraces both disciplines like “agriculture” and “forestry”. But agriculture and forestry have been institutionally separated in most countries and only recently some attempts have been made to bridge the gap and develop policies for agroforestry. Because of this historic separation between these two important land uses, agroforestry is increasingly seen as a bridge and a leader of innovation in both farming and forestry.
- 4.2 At present no authenticate data is available either with the Ministry of Agriculture and Farmers’ Welfare or the MoEF&CC to give the extent of Agro-Forestry area now. Mapping of agro-forestry area has taken up by Central Agro-Forestry Research Institute, Jhansi using Remote Sensing IRS-1D LISS III data of satellite imageries after a pilot project under DST funding conducted in two pilot districts namely, Yamuna Nagar (Haryana) and Saharanpur (UP). As a guestimate, for all 15 agro-climatic zones, total

area involved may be between 24 to 25 m ha. An article in Current Science, Vol 107, No.1, July 2014 reported 25.32 m ha. under agro-forestry quoting an article by Dhyani S.K., Honda A, K. and Uma in Indian Journal of Agro-Forestry, 2013, 15 (1), 1-11. This includes around 20 m ha of cultivable land and 5.32 m ha in other areas. The accurate estimation of agro-forestry area can be done through geo-spatial technology which is an integration of GIS, Remote Sensing and GPS and three are used for different purposes- GIS used for geo-referencing, masking of area and for area estimation, GPS data used for collecting locations of agro-forestry from the ground and Remote Sensing data to create Land Use & Land Cover map and delineation of other features.

4.3 Forest Survey of India in their biannual report only provide Forest Cover area which is more than 1 ha land on the ground having more than 10% crown density irrespective of such areas occur in forest or outside forest. According to the latest report of SFR-2017, the estimated Forest Cover is 70.82 m ha which include both forest and non-forest area. Out of total Recorded Forest Area of 76.74 m ha, it can be safely assumed that 40% of recorded forest area is degraded or barren. Hence out of 70.82 m ha forest cover, 20 m ha forest cover will be outside forest certainly and may be in the category of Community Forest, Sacred Groves, Miscellaneous tree crops and groves and even agro-forestry or agro-horticulture. Forest Survey of India has also estimated 9.38 m ha tree cover outside forest. Hence the estimated agro-forestry area as above is more or less corroborated and in absence of any other realistic estimate can be presumed between 20-25 m ha.

4.4 Dhyani et al. in Indian Journal of Agro-Forestry, 2013, 15 (1 ), 1-11, assumed that in 2050, due to shortage of water, irrigated cultivable areas will decrease and so also rainfed areas will be decreased. These reduced areas will be put up in to agro-forestry purposes. Similarly, more areas of present fallows, wasteland and barren lands will be under Agro-forestry. Authors have projected area of agro-forestry in 2050 as 54 m ha. Even if the projected area of Agro-Forestry after 30 years also considered at 33% of present combined cultivable area, current and old fallow land appears to be grossly underestimated, with proper extension methodologies and relaxation of regulatory regime, Agro-Forestry will be practiced over 70 m ha in next 20 years as only climate resilient farming option.



## **5. Present constraints in the growth of Agro-Forestry are as follows**

- Inhibition among farmers, especially small and marginal farmers, regarding shade of tree canopies, root competition, birds damage leading to reduced crop production
- Trees as obstacle in mechanized farming
- Undue harassment to farmer for obtaining felling permit from competent authorities
- Complex procedure for obtaining Transit Pass
- Non-availabilities of organized trade in wood
- Absence of wood processing units in the neighborhood
- Lack of proper agro-forestry extension
- Getting Quality Planting Material
- Inadequate network of Forest Nurseries in the region
- Vulnerability of tree saplings from grazing and browsing by stray animals, particularly after crop-harvesting period
- Low survival in tree crops due to pests and diseases
- Absence of Market Information System
- Predominant Buyers' Market
- Lack of proper agro-economic model and their proper Demonstration
- No buy back guarantee from wood based Industries
- Lack of entrepreneurship among farmers and their tendency of risk-avoidance
- Heavily dependent on Government subsidies

## **6. Potential Benefits from Agro-Forestry in India**

- 6.1 Traditional agro-forestry system is usually combination of tree crop, food crop, livestock rearing along with land based livelihood practices like bee keeping, pisci-culture in farm ponds, vermi-composting, organic farming of vegetables etc. which a farmer can manage with his family members. Such agro forestry system not only gives a stability to farm income but also enhances it due to cash flow from multiple streams. In such an integrated

system, if food crop which is vulnerable to climate get affected, farmers can get assured income from other sources. Income from trees may come after final harvest at the end of rotation age, but its annuity value of each year cannot be denied. Other livestock rearing or livelihood means can give him some assured farm income.

6.2 In India, more than 50% land of its Geographic Area is under cultivation. Though Social Forestry could be undertaken on the public and community lands, Farm Forestry or Agro-Forestry is considered as the real game changer when the question of expanding tree outside forests (TOF) is raised. In other words, Agro-Forestry/Farm Forestry, which is a sub set of TOF, has the maximum potential in extension of green cover.

## **7. A New Look for a Way Forward**

7.1 Realizing the importance of the Agro-forestry, the Ministry of Agriculture and Farmers' Welfare has come out with the National Agro-forestry Policy, 2014. Prior to this the Ministry of Environment, Forest & Climate Change has also constituted a committee in 2012 to look in to the relaxation of Regulatory Framework of felling and transit of tree species grown on non-forest/private lands and subsequent transit permits to remove the uncertainty faced by the private tree growers before planting. Similarly, the MoEF&CC has come out with its land mark decision by amending the section 2(7) of the Indian Forest Act, 1927 by omission of word "bamboos" from the definition of "tree". Though bamboo is considered as a "poor man's timber" and planted extensively by farmers of this country, they faced immense problem for harvesting and transporting it to market with valid permits. Several advisory notes have been issued to states for relaxing felling permit as well as transit permits to ease out troubles faced by farmers for agro-forestry products including bamboo as a follow up action.

7.2 The list of members of the Expert Committee is placed as Annexure 3. The Expert Committee held its first meeting on 29<sup>th</sup> January followed by meeting on 15-16<sup>th</sup> February; 8<sup>th</sup> -9<sup>th</sup> March and 15<sup>th</sup> March 2018, the proceedings of which are placed as Annexure 4.

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# Chapters related to ToRs

## CHAPTER-II

### **Classification of Agricultural regions under Silvi-climatic Zones**

*(To analyses and classify the agricultural regions into silvi-climatic zones and suggest zone-wise tree species.)*

#### **1. Introduction**

- 1.1 Almost all forms of agroforestry systems exist across India in eco-zones ranging from humid tropical lowlands to high-altitude temperate biomes and humid rainforest zones to parched drylands. In order to maximize the production from the available limited resources and prevailing climatic conditions, a need-based, location specific agro-forestry models need to be developed. Delineation of agro-climatic zones based on soil, water, rainfall, temperature etc. is the first essential step for sustainable production since climatic, edaphic and biotic factors play major role for determination of vegetation type in various physiographic areas. Such scientific interventions in the traditional agro-forestry practices can enhance productivity and diversify the output under agro-forestry systems.
- 1.2 Working Group, as per ToR, has aimed for a new classification of the country into suitable silvi-climatic zones and there by proposing the suitable tree species for each zones. For the purpose of agro-forestry, where woody perennials like tree crops are mixed with annuals like agriculture crops, existing agro-ecological zones appear to be more relevant and it is considered that silvi-climatic zone can always be considered as a sub-set of ecological zone which is much broader as it can best describes not only annual/perennial vegetation but also other living beings and abiotic components. Further, it can go with different kinds of land-use like agriculture as well as non-agriculture areas like TOF based on climatic, edaphic (soil) and biotic factors. Working Group, therefore, decided to adopt the classification of agricultural regions as identified by the National Bureau of Soil Survey and Land-use Planning and ratified by the Expert Committee.

## **2. Importance of the Study**

2.1 NFP 1988 has aimed for 33% green cover. Expansion of forest cover and tree outside forest can help in achieving the stated target. In India forests are legally notified reserved land area meant for the biodiversity conservation, owing to growing population pressure and pre-colonial forest policy. The Forests are managed by Government through dedicated forest department and bureaucrats of specialized field. Felling under applied silvicultural systems is strictly regulated and permitted unless the tree is already dead and deceased. In Forest, extension is possible through reforestation of degraded forest. Herein TOF presents an appropriate scenario to work upon. Reclamation of degraded lands namely fallow lands, uncultivable lands, waste lands etc. through afforestation and reforestation can help in achieving the proposed target of green cover on one third of geographical area. Reclaiming such land sites through forestry tree species has the potential to convert such non-cultivable lands into cultivable areas. Succession through hardy species can give a way for the establishment of desirable tree species on the modified edaphic and biotic factors.

2.2 Canal plantation, avenue plantation, shelter belt and wind break plantation, recreational forestry in peri-urban and urban landscapes and agroforestry and agroforestry as well as farm forestry on private lands, can help for enhancing tree cover outside forests. Species with peculiar features like edible fruits, ability to provide good quality timber and small timber, fodder etc and multi-purpose indigenous tree species are preferred in agroforestry models.

## **3. Discussion**

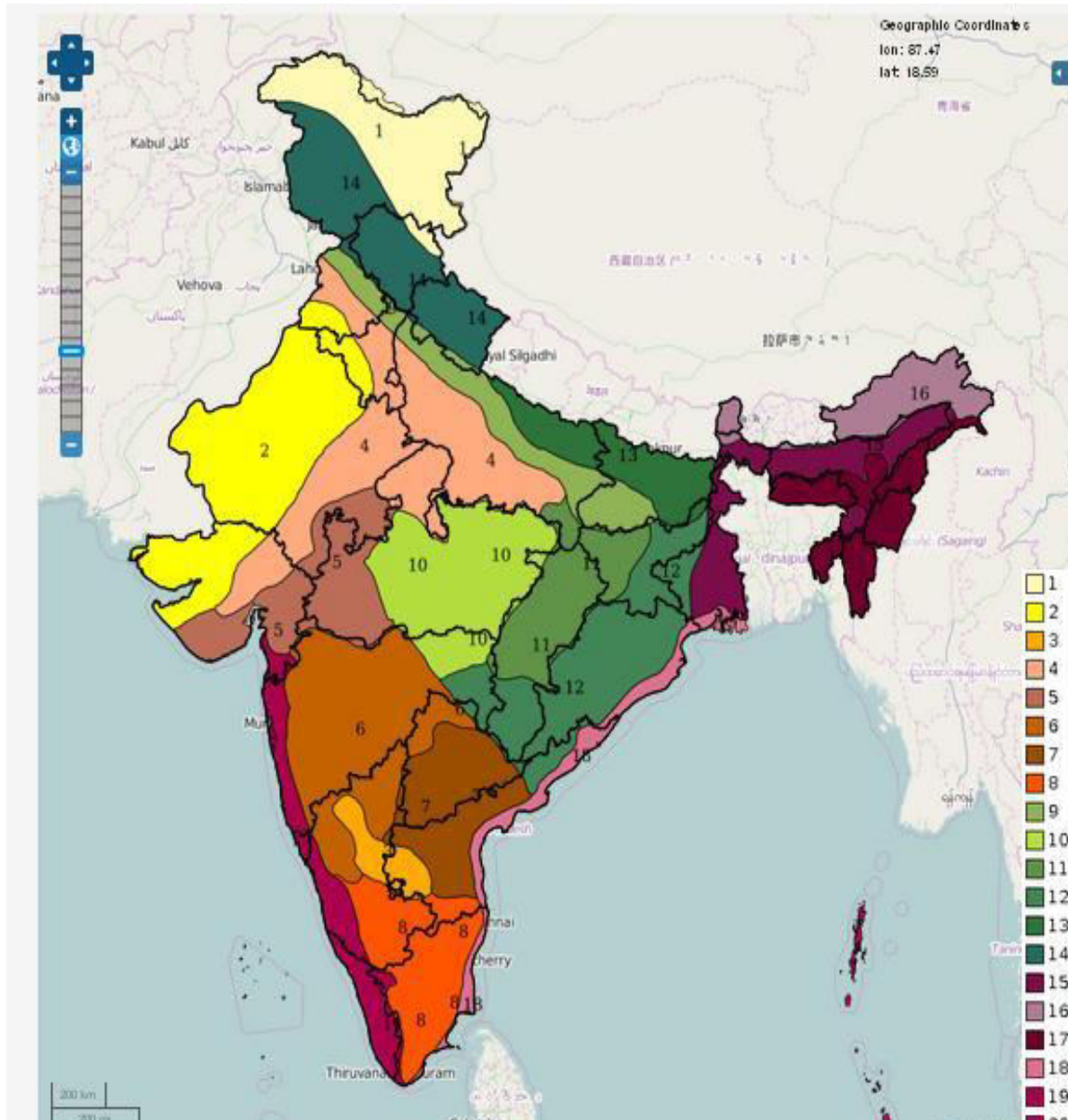
3.1 Agro-climatic zone is a land unit with peculiar agro-climate conditions that is suitable for certain range of crops and cultivars. Agro-climatic conditions mainly refer to rainfall, temperature, water availability and edaphic factors which influence the type of vegetations. An agro-ecological zone is the land unit carved out of agro-climatic zone superimposed on landform which acts as modifier to climate and length of growing period. Such classification and comparative assessment of prevalent agroforestry models in different zones can introduce scientific management of traditional agroforestry models without hampering the status of natural resources and environment.

3.2 Several attempts have been made to delineate major agro-ecological regions in respect to soils, climate, physiographic and natural vegetation for macro-level planning on a more scientific basis. Some of these classifications are as follows:

- Agro-climatic regions classified by the Planning Commission
- Agro-climatic zones have been identified under National Agricultural Research Project (NARP)
- Agro-ecological regions identified by the National Bureau of Soil Survey & Land Use Planning (NBSS&LUP)
- Forests have been classified in to 16 major types (Champion and Seth, 1968)
- As per the Forest Survey of India, Country has been divided into 14 physiographic zones.

3.3 Keeping in view the facts stated in the introductory para, 20 agro-ecological regions suggested by the National Bureau of Soil Survey & Land Use Planning have been adopted as these are based on the integrated criteria of effective rainfall, soil groups with delineated boundaries adjusted to district boundaries with a minimal number of regions. These 20 Agro-ecological zones are further sub- divided into 60 sub-zones.





1. Western Himalayas
2. Western Plain, Kachchh, and part of Kathiawar Peninsula
3. Deccan Plateau
4. Northern Plain and Central Highlands including Aravalis
5. Central Malwa Highlands, Gujarat Plains, and Kathiawar Peninsula
6. Deccan Plateau, hot semi-arid eco-region
7. Deccan (Telengana) Plateau and Eastern Ghats
8. Eastern Ghats, Tamil Nadu Plateau and Deccan (Karnataka)
9. Northern Plain, hot sub-humid (dry) eco-region
10. Central Highlands (Malwas, Budelkhand, and Eastern Satpura)
11. Eastern Plateau (Chattisgarh), hot sub-humid ecoregion
12. Eastern (Chotanagpur) Plateau and Eastern Ghats
13. Eastern Plain
14. Western Himalayas
15. Bengal and Assam plains
16. Eastern Himalayas
17. North Eastern Hills (Purvanchal)
18. Eastern Coastal Plain
19. Western Ghats and Coastal Plain
20. Island of Andaman Nicobar and Lakshadweep

Figure 1. Map of India showing Agro-ecological zones





3.4 In every agro-ecological zone, there is scope of introducing many kinds of trees found in that climate and soil, but in a particular agroforestry system, suitability of tree species is considered from various objectives and their compatibility with other crops. Agroforestry system is being practiced for variety of reasons by planting tree species for enriching soil, helping in land regeneration, enabling food security, generating fuel and fodder, fruit and cash, bio-energy plantations and providing NWFP (silk, lacquer, honey, Tendu leaves), biodiversity conservation, carbon sequestration and overall maximizing economic return per unit area. The agroforestry concept implies that these systems:

- involves two or more species of plants (or animals and plants), with integration of species from the native vegetation
- always have two or more outputs
- have cycles longer than one year
- are ecologically more complex than monocultures
- these systems have the potential to support ecological niche of native species
- integration of agro forest areas into a diversified farm
- each farm is designed to satisfy the necessities of a family, independent of land-use patterns of the local community

3.5 In Agri-silvipastoral system, fodder trees are preferred (*Prosopis* & *Acacia* spp., *Ailanthus*); in Agri-horticultural system fruit trees (Mango, Aonla, Jack fruits etc.) are considered, in Silvi-horti-pastoral system along with trees and pasture lands, cash crops, vegetables, fruits and organic farming are preferred. Aqua-forestry and livestock farmlands can also be included for diversification of systems. While identifying the suitable system due consideration should be paid to intangible ecological services, species can offer for preserving and augmenting the resilience of existing ecosystem. A good agro-forestry system can be judged based on the three criteria viz., higher Productivity, sustainability and adoptability of agro-forestry systems to the local conditions. Suitable agroforestry systems for different conditions are listed below:

Table 1. Agroforestry systems

	Agroforestry systems		
Tropical Soil Productivity	Permanent Inter-cropping with N fixing Trees	Alley cropping	Trees for soil conservation
Farm incomes	Multi-storey cropping	Agri-horti-silvicultural system	Alley cropping
Arid lands	Agri- Silvi & Agri-silvi-pastoral system	Block plantation of fuel wood	Shelter belts & wind break
Hilly region	Silvi-horticultural or system	Agri-silvicultural or Agri-horticulture system	Silvi-pastoral system
Wetlands	Aqua-forestry	Agri-silvi-aqui-pastoral system	Agri-silvi-aquaculture
Energy Plantation	Pyrolytic conversion for production of charcoal, oil, gas	Methanol through destructive distillation of wood.	Ethanol: Fermentation of fruits containing high carbohydrates

Multipurpose tree species are most preferred in agroforestry in India.

- (i) Trees with light crown (*Eucalyptus*) or trees which remain deciduous particularly in winter (like *Poplar* spp.) are liked by farmers as Agri-crops are least affected by sheds of trees.
- (ii) Similarly, leguminous plants are better preferred as these species enrich the soil.
- (iii) Trees of deep roots are also preferred by farmers in agroforestry to avoid root competition with Agri-crops.
- (iv) Trees take longer time for maturing. Hence short rotation crops are usually preferred by farmers in combination with long rotation tree crops purely for economic reason.

3.6 Trees like *Eucalyptus* and *Populus* spp. are also grown in agricultural fields or on field bunds often on farm boundaries in Punjab and Haryana. Shifting cultivation in the Northeast India and Taungya cultivation in Kerala, West Bengal, and Uttar Pradesh and

to a limited extent in Tamil Nadu, Andhra Pradesh, Orissa, Karnataka, as well as in the Northeast hill regions are examples of traditional Indian agroforestry systems. Besides, home gardens, wood lots, large cardamom plantations of Eastern Himalayas and plantations elsewhere are other kinds of traditional agroforestry systems.

- 3.7 Plantation geometry is also very important factor. Trees are usually planted in the east-west direction to have least shed effect on agri-crops. In arid and semi-arid areas, trees are planted in rows perpendicular to the wind direction, so as to provide shelter to crops in the leeward side. Trees are planted sometimes on the boundary of the field and in alley pattern in rows. Trees are also planted in regular geometric pattern with particular spacing between rows and columns. Tree species of rainfed areas are different from irrigated areas. Though generally agroforestry goes with food crops like rice, wheat, maize, cereals or other cash crops; grass, medicinal herbs and shrubs, vegetables, flowers are also used.
- 3.8 Normally farmers will not be motivated to establish a Tree Based Intercropping (TBI) agroforestry system on their farm without better knowledge of the economic benefits of this system. Trees planted with annual crops can help to increase economic benefits, as cash income is generated from the sale of tree products. However, with trees there is a long-time lag between planting and harvesting. Farmers have many questions about agroforestry systems, such as: (i) which tree species by annual crop combination works best for their area? (ii) what is the optimal row width and time period for optimizing resource production in an agroforestry system? and (iii) what is the optimal tree rotation time? To answer these questions, an economic model will be used to evaluate the Net Present Value (NPV) of returns considering annual crop yields and revenues, establishment and production costs, and wood yield and prices. Considering these parameters, following table enlists suitable trees species for different Agro-climatic zones:

Table 2. Agroforestry tree species in various Agro-climatic regions of India

Agro-ecological zones	States	Rainfall/precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>Arid ecosystem</b>						
<b>1) Western Himalaya (Cold Arid)</b>	J&K and Himachal Pradesh	< 150 mm	Shallow skeletal soils	<i>Ulmus wallichiana</i> , <i>Hippophae</i> , <i>Betula</i> ,	Poplar species, <i>Salix</i>	Apple, Apricot, almond, Pistachio nut, peaches, pears, cherry, almond, walnut
<b>2) Western Plain, Kutch and Part of Kathiwar peninsula (Hot arid)</b>	Gujarat, Rajasthan, Haryana, Punjab	< 400 mm	Desert & saline soils	<i>Prosopis cineraria</i> , <i>Dalbergia sissoo</i> , <i>Tecomella undulata</i> , <i>Acacia tortilis</i>	<i>Poplar</i> hybrid, <i>Eucalyptus camaldulensis</i> , <i>Melia</i> , <i>Ailanthus excelsa</i> , <i>Acacia nilotica</i>	Neem ( <i>Azadirachta indica</i> ), Ber, Guava ( <i>Psidium gujava</i> ), Kinnow, Aonla ( <i>Emblica officinalis</i> ), Phoenix spp.

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>Semi Arid</b>						
<b>3) Deccan Plateau</b>	Andhra Pradesh, Telangana and Karnataka	400-500 mm	Red & black soils	<i>Acacia nilotica</i> , <i>Leucaena leucocephala</i> , <i>Ailanthus excelsa</i>	<i>Eucalyptus</i> hybrid, <i>Melia</i> , <i>Tectona grandis</i>	Neem, Ber, Mango, Aonla
<b>4) Northern Plains and Central Highlands including Arvallis</b>	Gujarat, Rajasthan, UP, MP, Haryana and Punjab	500-1000 mm	Alluvium derived soils	<i>Acacia nilotica</i> , <i>Hardwickia binnata</i> , <i>Acacia nilotica</i> , <i>Azadirachta indica</i>	<i>Populus deltoides</i> , <i>Ailanthus excelsa</i> , <i>Eucalyptus</i> hybrid, Subabul	Ber ( <i>Zizyphus mauritiana</i> ), <i>Acacia catechu</i> , <i>Dendrocalamus strictus</i> , Aonla, <i>Karanj</i>

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>5) Central Highlands (Malwa), Gujarat plains and Kathiwar Peninsula</b>	Gujarat and MP	500-1000 mm	Medium & deep black soils	<i>Acacia nilotica</i> , <i>Dalbergia sissoo</i> , <i>Millettia pinnata</i>	<i>Tectona grandis</i> , <i>Gliricidia sepium</i>	Neem,
<b>6) Deccan Plateau</b>	Karnataka, Andhra Pradesh, Maharashtra Madhya Pradesh	600-1000 mm	Shallow and medium (with inclusion of deep) black soils	<i>Eucalyptus tereticornis</i> and <i>Bambusa</i> spp.		<i>Acacia catechu</i> , Aonla ( <i>Embllica officinalis</i> ), Ber, Mango
<b>7) Deccan Plateau and Eastern Ghat</b>	Telangana & Andhra Pradesh	600-1100 mm	Red & black soils	<i>Leucaena leucocephala</i> , <i>Millettia pinnata</i>	<i>Tectona grandis</i> , <i>Eucalyptus</i> hybrid	Neem, Moringa ( <i>Moringa oleifera</i> )Tamarind, Cashew, Coconut

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>8) Eastern Ghat, TN uplands and Deccan Plateau</b>	Karnataka, Tamil Nadu, Kerala	600-1000 mm	Red loamy soils	<i>Ceiba pentandra</i> , <i>Acacia leucocephala</i>	<i>Casuarina equisetifolia</i> , <i>Melia</i> , <i>Eucalyptus</i> hybrid	Neem, Moringa, Tamarind, Cashew, Coconut, Areca nut
<b>Sub-Humid</b>						
<b>9) Northern Plains</b>	Bihar, Uttar Pradesh and Punjab	1000-1200 mm	Alluvium derived soils	<i>Dalbergia sissoo</i> , <i>Melia composita</i> , <i>Bamboo</i> , <i>Millettia pinnata</i>	<i>Populus deltoides</i> , <i>Eucalyptus tereticornis</i>	Aonla, Ber, Mango



Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>10) Central Highlands (Malwa, Bundelkhand and Eastern Satpura)</b>	Madhya Pradesh and Maharashtra	1000-1500 mm	Black and red soils	<i>Leucaena leucocephala</i> , , <i>Dalbergia sissoo</i> , <i>Acacia nilotica</i> , <i>Hardwickia binata</i> , <i>Cordia rothii</i> , <i>Bambusa</i> spp.	<i>Tectona grandis</i>	<i>Butea monosperma</i> , Aonla, Bael ( <i>Aegle marmelos</i> ), Ber, <i>Sesbania sesban</i> , <i>Madhuca longifolia</i>
<b>11) Eastern Plateau</b>	Chhattisgarh	1200- 1600 mm	Red & Yellow soils	<i>Terminalia</i> spp., <i>Beutea monosperma</i> , <i>Albizia procera</i> , bamboo  <i>Acacia nilotica</i>	<i>Gmelina arborea</i> ,	Mango,Jackfruit, Guava, Moringa, <i>Annona reticulata</i>

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>12) Eastern (Chhota Nagpur) Plateau and Eastern Ghat</b>	Orissa, West Bengal, Bihar, Chattisgarh, Madhya Pradesh and Maharashtra	1000-1600 mm	Red & lateritic soils	<i>Ceiba pentendra</i> , <i>Eucalyptus</i> hybrid	<i>Gmelina arborea</i> , <i>Casuarina equisetifolia</i> ,	<i>Butea monosperma</i> , <i>Pongamia pinnata</i> , <i>Madhuca longifolia</i> , <i>Terminalia arjuna</i> , Mango
<b>13) Eastern Plains</b>	Uttar Pradesh and Bihar	1400-1800 mm	Alluvium derived soils	<i>Dalbergia sissoo</i> , <i>D. latifolia</i>		Mango, Litchi, Mulberry ( <i>Morus alba</i> )

Agro-ecological zones	States	Rainfall/precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>14) Western Himalaya</b>	J&K, Himachal Pradesh and Uttarakhand	1000-2000 mm	Brown forest and podzolic soils	<i>Grewia optiva</i> , <i>Eucalyptus</i> hybrid, <i>Celtis australis</i>	<i>Populus deltoides</i> , <i>Salix</i> spp.,	Mulberry, <i>Melia azedarach</i>
<b>Humid per-humid</b>						
<b>15) Bengal and Assam Plains</b>	West Bengal and Assam	1400-1600 mm in Ganga Plain ranges and 1800-2000 mm in Barak Basin (Tripura Plain) and the Teesta-Brahmaputra plains	Alluvium derived soils	<i>Bombax ceiba</i> , <i>Eucalyptus</i> , <i>Lagerstromia speciosa</i> ,	<i>Anthocephalus cadamba</i> , <i>Tectona grandis</i>	Mango, Areca nut ( <i>Areca catechu</i> ), Agar ( <i>Aquillaria agalocha</i> ), <i>Acacia auriculiformis</i> ,

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>16) Eastern Himalaya</b>	Arunachal Pradesh, Sikkim, west Bengal	2000 mm	Brown and red hill soils	<i>Alnus nepalensis</i> , Bamboo, <i>Anthocephalus cadamba</i>		<i>Flemingia macrophylla</i> , <i>Indigofera tinctoria</i>
<b>17) North Eastern Hills (Purvanchal)</b>	Tripura, Mizoram and Meghalaya	2000 - 3000 mm	Red and lateritic soils	<i>Alnus nepalensis</i> , <i>Albizia lebbeck</i> , <i>Lagerstromia speciosa</i> , <i>Bombax ceiba</i>	<i>Gmelina arborea</i> , Bamboo,	Spices and <i>Ammomum subulatum</i> ,

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>Coastal</b>						
<b>18) Eastern Coastal Plains</b>	Tamil Nadu, Puducherry, Andhra Pradesh, Odisha and West Bengal	900-1100 mm	Coastal alluvium derived soils	<i>Borassus flabellifer</i> , <i>Ceiba pentendra</i> , <i>Erythrina indica</i>	<i>Casuarina equisetifolia</i> , <i>Acacia mangium</i> ,	Coconut
<b>19) Western Ghats and Coastal Plains</b>	Gujarat, Diu & Daman, Maharashtra, Goa, Karnataka, Kerala	> 2000 mm	Red, lateritic and alluvium-derived soils	<i>Terminalia</i> spp., <i>Grevellia robusta</i> , <i>Erythrina indica</i>	Bamboo, <i>Tectona grandis</i> ,	Spices and coconut, Mango (Alphonso), Jack Fruit, Areca nut

Agro-ecological zones	States	Rainfall/ precipitation	Soil type	Agroforestry species		Other (fruit, medicinal etc.)
				Rainfed	Irrigated	
<b>Island</b>						
<b>20) Andaman, Nicobar and Lakshadweep</b>	Andaman, Nicobar and Lakshadweep	in Andaman and Nicobar 3000 mm, in Lakshadweep Islands 1600 mm	Red loamy and sandy soils	<i>Erythrina indica</i> , <i>Ceiba petandra</i> , <i>Albizia lebbeck</i> ,	<i>Pterocarpus dalbergioides</i> , <i>Tectona grandis</i>	Mango, Jackfruit, Jamun ( <i>Syzygium cumini</i> ), <i>Gliricidia sepium</i> , Arecanut

The All India Coordinated Research Project on Agroforestry initiated by ICAR in 1983 is one of the largest network projects under NARS. It has developed 35 agroforestry system models for various agro-climatic zones enlisted in Table 3 below. This information is based on survey of existing agroforestry systems and farmers' preferences; evaluation of MPTS, role of agroforestry to meet environment challenges, value addition and application of modern tools and technologies in agro-forestry research. The agroforestry models and technologies including economic returns are documented in the form of a bulletin which is available on website of CAFRI.

Table 3. Agroforestry Models for different agro-climatic zones

	Region	Agro-forestry System	Crop combination
<b>Himalayan Region</b>			
<b>Himachal Pradesh</b>	Sub-temperate rainfed regions	Agri-silviculture system	Melia composita with vegetable crops viz., cauliflower, pea, tomato and capsicum.
<b>J&amp;K</b>	Kashmir valley	Alley Cropping	Elms ( <i>Ulmus wallichiana</i> ) with Kharif and Rabi crops
	Temperate Kashmir	Horti-agri-pasture system	Apple with beans & peas, aromatic crops ARETmesia followed by Lucerne ( <i>Medicago sativa</i> ).
<b>Assam</b>	Eastern Himalayas	Horti-agri-system	Coconut with rice seedlings, fodder maize, nuts.
		Agro-forestry system	Coconut with intercropping of turmeric
		Agro-forestry system	Gmelina arborea with intercropping of turmeric.
		Agro-forestry system	Jackfruit with sesame & rapeseed
		Agri-silviculture	Acaia mangium with hybrid Napier grass.
	<b>Region</b>	<b>Agro-forestry System</b>	<b>Crop combination</b>

<b>Himachal Pradesh</b>	Mid-hills of North western Himalayas	Silvi-Pastoral system	Morus alba with intercropping of Napier grass
<b>Indo Gangetic Region</b>			
<b>Punjab</b>		Agro-forestry System	Poplar with summer & winter intercrops; Clonal Eucalyptus plantation with winter intercrops at younger stage
<b>Uttarakhand</b>	Tarai and NW Himalaya	Agri-silviculture system	Bamboo species viz. <i>Bambusa balcooa</i> , <i>B. tulda</i> , <i>B nutan</i> , <i>D. asper</i> , with intercrops like wheat, soybean, rapeseed, bean, mustard ; Poplar based with intercrops sugarcane, soybean and wheat at initial and later years of years and turmeric in later years.; Block & boundary plantation of Eucalyptus
	NW plain zone	Plantation	High density short rotation plantation of Poplar and eucalyptus, with wheat as intercrop.
<b>Bihar</b>	NW alluvial plain of Bihar	Agro-forestry	Poplar based agro-forestry system with wheat crop
		Agri-horticultural system	Aonla plantation with Intercropping of turmeric, ginger & colacasia etc.
		Agri-horticultural system	Litchi with intercropping of turmeric, ginger & elephant foot yam
	<b>Region</b>	<b>Agro-forestry System</b>	<b>Crop combination</b>
<b>Uttar Pradesh</b>	Sodic lands of Eastern UP	Agri-horti-silviculture system	Casurina equisitifolia with guava & turmeric.



		Agri-silviculture system	Casurina equisitifolia with Dalbergia sissoo.
		Silvi-pastoral	Dalbergia sissoo with Intercrops like <i>Pennisetum purpurium</i> , <i>Brachiara mutica</i> and <i>Panicum maximum</i>
<b>Humid &amp; Sub-humid region</b>			
<b>West Bengal</b>	Red & laterite soil region	Agri-horti-silvi system	Mango with Eucalyptus Mango/Gauva/ber with suitable intercrops Mango with Gmelina arborea
	Alluvial soil	Agri-horti-silvi system	Mango with Dysoxylum spp. and Kadamb ( <i>Anthocephalus cadamba</i> )
		Agri-horti system	Gauva/Ber/mango with suitable intercrops
		Agri-silvi system	Kadamb with paddy & oil seed crop rotation
		Home stead agro-forestry	Fruit trees with Kitchen Garden
<b>Odisha</b>		Agri-silvicultural system	Acacia mangium with intercrop of Sesame
<b>Jharkhand</b>			Gmelina with groundnut. Subabool with colacassia as intercrop Bamboo with intercrop of turmeric
	<b>Region</b>	<b>Agro-forestry System</b>	<b>Crop combination</b>
<b>Arid &amp; Semi- Arid region</b>			
<b>Gujarat</b>	Rainfed North	with moisture conservation	Ailanthus excelsa with intercrop of Green gram, Cluster bean, Cowpea and Til etc. Aonla with green gram cluster bean in rotation
	Rainfed Trees	Multi-purpose trees	MPTS Neem ( <i>Azadirachta indica</i> ), Ardu ( <i>Ailanthus excelsa</i> )

	Arid & semi-arid	Bio-fence	Acacia Senegal as bio-fence of arid fields.
	Degraded wasteland	Silvi-pasture model	Dichrostachys cinereal (nutans) with grass of Cenchrus ciliaris.
<b>Haryana</b>	Haryana	Agro-forestry system	Poplar with Agri-culture crops
<b>Maharashtra</b>	Shallow soils,	Plantation	<i>Azadirachta indica, Eucalyptus camaldulensis, Melia azadirachta, Tectona grandis, Hardwickia binnata, Acacia nilotica and Zizyphus mauritina</i> )
	Nagpur, MH	Agro-forestry	Teak based plantation with Black gram as inter-crop One ; Gabion dam with clay blanketing and one counter dam Teak plantation on vegetative counter bunds
<b>Hyderabad</b>	Semi-arid	Plantation	Neem Plantations
		Agri-horticulture system	Tamarind with suitable intercropping of red-gram & henna.
		Silvi-medicinal system	Medicinal Trees Terminalia bellirica & Amla with intercropping of medicinal herbs
		Agri-silviculture system	Rainfed castor with Pongamia plantation
	<b>Region</b>	<b>Agro-forestry System</b>	<b>Crop combination</b>
<b>Telangana</b>	Red-sandy loam soil-S Telangana	Agri-silviculture system	Rabi-sweet sorghum with Pangamia trees
	Marginal Lands	Agri-silviculture system	Nutrient Management “Panagmia with Pearl millet” Finger Millet with Melia spp.
<b>Madhya Pradesh</b>	Jabalpur	Agri-silviculture system	Eucalyptus with suitable crops wheat, soyabean, mustard, gram, chilli etc.
	Kymore Platueau, central India	Agri-horticultural system	Gauava with wheat & mustard crop as intercropping.
		Horti-medicinal system	Amla with turmeric as intercrop.

		Agri-silviculture system	Dalbergia sissoo with paddy-wheat
<b>Tropical Region</b>			
<b>Karnataka</b>	Hill zone	Agro-forestry system	Sapota, Teak & filed crop. Teak with Sorghum & groundnut as intercropping.
	Degraded soils	Horti-silvi-pastural system	Eucalyptus with Sapota. Melia azedarach with soybean as intercrop.
<b>Tamil Nadu</b>	Western agro-climatic zone	Multifunctional agro-forestry system	<i>Melia dubia</i> + Banana
	NE-Degraded lands	Horti-pasture	Coconut/Guava/Mango with fodder crops.
	NE-Degraded Calcareous wasteland	Silvi-pasture	silvipasture with <i>Leucaena leucocephala</i> , <i>Gliricidia sepium</i> , <i>Inga dulces</i> , <i>Erythrina indica</i> , <i>Albizia lebbeck</i>
	<b>Region</b>	<b>Agro-forestry System</b>	<b>Crop combination</b>
<b>Kerala</b>	Humid Tropics	Multipurpose trees	Black pepper ( <i>Piper nigrum</i> ) cultivation with support tress (e.g. Erythrina, Moringa, Ceiba, Ailanthus etc.).
		Silvi-pasture system	Napier Grass + trees (mulberry etc.) + Calliandra spp.
		Hedge-row fodder	Mulberry and calliandra in mature coconut gardens
<b>Maharashtra</b>	Konkan Region	Horti-agri system	Mango based with suitable intercrop.
			Cashew Based with agricultural intercrops.

Source: Agroforestry Technologies for Different Agro-climatic Zones of Country, ICAR-CAFRI, Jhansi

#### **4. Recommendations**

1. Comparative assessment of existing models in different agro-climatic zones should be carried out along with cost-benefit analysis to find-out best fit for combination of various species, with different spacing & arrangement patterns.
2. Diversification of suitable agro-forestry models is in need for further R&D, so that farmers should have viable options of choosing apt model, complementary to his existing practices and thereby avoiding high input cost.
3. Research on suitable decision support system for selection as well as arrangement of crops.
4. Wasteland, fallow lands & other forms of degraded lands should be focus area of afforestation activities. These lands can be reclaimed with joint initiatives of forest department and community participation. Community lands or wastelands can be provided on lease or patta-land holding for community management in association or under supervision of forest officials.
5. While identifying the suitable tree species, due attention should be paid to social, environment & economic benefits. Cropping pattern and tree species/horticulture species should facilitate the ecological niche of native species both fauna and flora.
6. Adaptive research on farmers' fields needs to be carried out in every agro-ecological zone for preparing yield table of timber, fuelwood, fodder, fruits etc.
7. Role of local government and community involvement should be given due emphasis for identification of suitable species which can cater to community development in later stages.
8. Certified QPM can play major role to have ensured success of plantation efforts and maximize NPV (Net Present Value).

**Matrix showing recommendations, action points and responsible agencies**

**TOR I**

<b>S. No.</b>	<b>Recommendations</b>	<b>Action Points</b>	<b>Responsible Agency/Agencies</b>
1.	Comparative assessment of existing models in different agro-climatic zones should be carried out along with cost-benefit analysis to find-out best fit for combination of various species, with different spacing & arrangement patterns	<p>(i) ICAR &amp; ICFRE jointly discuss about existing models and their trial zones</p> <p>(ii) Responsibility to be assigned to their respective regional Institutes for field trials</p> <p>(iii) In absence of regional level Institutes or their research station, responsibilities can be entrusted to States through SAUs/ State Silviculturists/SADs</p> <p>(iv) Final assessments to be shared before finalizing models and compilation for sharing with KVKs</p>	ICAR/ICFRE/SAUs/ State Silviculturists/SADs
2.	Diversification of suitable agro-forestry models is in need for further R&D, so that farmers should have viable options of choosing appropriate model, complementary to his existing practices and thereby avoiding high input cost. A bouquet of agronomic practices should be made available to the farmers through a strong extension mechanism	<p>(i) R&amp;D for suitable agroforestry models by assigned Institute through field trials</p> <p>(ii) Criteria to be finalized for adopting model</p> <p>(iii) A bouquet of agronomic practices should be made available to the farmers.</p>	ICAR/ICFRE/SAUs/ State Silviculturists

3.	Research on suitable decision support system for selection as well as arrangement of crops	(i) Research on suitable decision support system for selection as well as arrangement of crops.	ICAR/SAUs
4.	Wasteland, fallow lands & other forms of degraded lands should be focus area of afforestation activities. These lands can be reclaimed with joint initiatives of forest department and community participation. Community lands or wastelands can be provided on lease or patta-land holding for community management in association or under supervision of forest officials with appropriate benefit sharing mechanism	(i) Identification of wastelands from satellite imageries/ revenue records (ii) Reclamation of waste/fallow & other degraded lands. (iii) Leasing / Patta land holding for community management with proper benefit sharing mechanism.	SFDs/State Revenue Departments
5.	While identifying the suitable tree species, due attention should be paid to social, environment & economic benefits. Cropping pattern and agro-forestry tree species/horticulture species should facilitate the ecological niche of native species both fauna and flora	(i) Identification of suitable tree species with due attention to social, economic & environment benefits. (ii) Looking to characteristics of tree spp, compatible crops to be decided	ICAR/ICFRE/SAD/ State Silviculturists
6.	Adaptive research on farmers' fields needs to be carried out in every agro-ecological zone for preparing yield table of timber, fuelwood, fodder, fruits etc	In every agro-ecological zone at least 3-5 willing farmers are to be identified and similar tree spp and crop to be grown under active supervision of one of these institutes to collect data periodically till final harvest of tree crops.	FRIs/SAUs/SAD/State Silviculturists/ State Forest Research Institutes
7.	Role of local government and community involvement should	Identification of suitable species with in consultation	SFDs/SAUs/SADs/ LSG Institutions

	be given due emphasis for identification of suitable species which can cater to community development in later stages	with local govt. and communities and trials of tree species to be done for maximum profitability	
8.	Certified QPM can play major role to have ensured success of plantation efforts and maximize NPV (Net Present Value)	Certified quality planting materials vis-à-vis uncertified planting materials need to be demonstrated towards profit margin	ICAR/ICFRE/SFDs/KFRI/Industries/Nationally accredited Certification Agencies



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## CHAPTER-III

### Need for certified Quality Planting Material

*(To develop strategy for research and production of certified Quality Planting Material accessible to farmers through a network of identified organizations/industries, extension of technical knowhow and marketing of the produce)*

#### 1. Introduction

- 1.1 The National Forest Policy, 1988, brought in policy shift towards using forests for bio-diversity conservation and ecological security. This policy shift eventually led to enhanced focus on “Trees Outside Forests” (TOF) to reduce pressures on forests. According to this policy, wood-based industries were supposed to network with private tree growers in order to meet requirement of raw materials, which were met out from forests.
- 1.2 As per estimates of IPMA (Indian Paper Manufacturers Association), almost 7, 40,000 ha of short rotation farm forestry plantations have been raised in the catchment areas of different pulp and paper mills in the country between 2001-02 to 2014-15, with the technical and extension support provided by these mills. As per projection provided by WWF, the demand of Round Wood Equivalent (RWE) is expected to increase from 58 million cubic meters in 2000 to 153 million cubic meters in 2020. The paper industry alone is expecting annual growth of 7-8% and expected to cross 40 million cum mark by 2030.
- 1.3 Plywood industries in India are heavily dependent on wood extracted from plantations grown under farm-forestry and agroforestry, e.g. Poplar and Eucalyptus in the North-West India. Wood based industries have been compelled to enhance sourcing their wood requirements through imports over the years in the current decade. As per a FAO report of 2014, plantations under TOF in the country have been one of the most productive wood resources when compared with the same at Asia or at global level, meeting almost 93% of wood requirement of the country. Agroforestry played a dominant role in contributing wood supply in the country. Estimates show that about 65% of the country’s

timber requirement is met from trees grown on farms. Agroforestry also generates significant employment opportunities and is perhaps the only alternative to meet the target of increasing forest/tree cover of India to 33%, as envisaged in the National Forest Policy of 1988, from the present level of less than 25%.

## **2. Importance**

- 2.1 There is significant variation in productivity of plantations of agro-forestry species and in forests. Dearth of Quality Planting Materials (QPM) is one of the major constraints in Agro-forestry. It is estimated that only about 10% of planting material is of high quality (National Agroforestry Policy, 2014). Improved productivity of plantations across the country will not be achieved until identifying the suitable species and matching it with the diverse end uses and assessing their suitability for different agro ecological zones. Without a strong R&D support it is just impossible to be achieved.

## **3. Discussions**

- 3.1 Following topics were segregated by the committee to deliberate extensively on the matter and recommendations are made topic wise:

### **A. Strategy for Research and Production of Quality Plant Material**

At present only paper industries having their in-house R&D support and Industries could set up nurseries of eucalyptus and poplar of good quality and being grown by our farmers, supply raw material to the industry, but looking to huge requirement of QPM for avenue plantation, urban forestry and farmers, due attention is needed for QPM of different species. Now only State forest departments supply saplings for various plantation programs in the country largely raised from seeds. Therefore, there is a need for getting quality seeds from superior quality parent/ elite trees and necessary support systems for verification of seed quality, seed vigour, seed pathology, seed physiology etc. Due to lack of sustained research important break-through is not reported in cases of relatively long rotation tree crops. There are 37 research centers for the All India Coordinated Research on Agro Forestry (26 SAUs, 10 ICAR & 1 ICFRE Institutes) covering every agro-climatic zone of the country, which is coordinated by Central Agro-

Forestry Research Institute (CAFRI), Jhansi since 2014. Inadequate R&D support and suitable extension mechanism in the field of agroforestry at present is the key constraint.

In order to provide common queries raised by farmers about the reduction of crop quantity due to shadow casts by tree canopy or allelopathic effect on crop need to be available in quantifiable and economic terms for which time-bound research in agroforestry is to be taken up.

## **B. Certification of Quality Planting Material**

### **(i) Production of QPM**

For Tree Improvement Program, many trees and plantations of particular species are generally screened for selecting Candidate Plus Trees (CPTs) and Seed Production Areas (SPAs) to establish a Gene Bank of these species. Even there is no harm to screen appropriate tree populations of farmers' fields of same tree species wherever available and reserved after compensating the farmers adequately. Forestland can be used for any Tree Improvement Program as it is a recognized forestry use.

Provenance trials of genetic stock can be carried out at various places of the similar agro-ecological zone to identify best suitability of a clone at a specific site. Apart from productivity of tree derivative of genetic superiority, clones must be disease resistant and drought tolerant. Once a clone is identified, multiplication of clones can be standardized through macro/micro propagation methods in large quantity.

Till the Clonal materials available, seeds collected from CPTs and designated SPAs duly certified after verification of seed quality, seed vigour, seed pathology etc. as standardized by R&D will be used for producing Quality Plant Material (QPM).

### **(ii) Certification of QPM**

A certification scheme outlines the rules, procedures, standards and management requirement for carrying out the certification against the standard. Developing credible certification scheme for produce and standards for nursery management encompass guidelines for certification process from seed stage to quality planting material incorporating essential content of the standard for sustainable management practices such

as legality, land tenure, community rights, environmental safeguards, management plan etc. and chain of custody such as tracking, traceability, batch accounting and logo usage etc.

The scheme for certification of Forest Reproductive Material (FRM) developed by OECD and EU with global acceptance would be used for certification of FRM in India based on identified source. Development of the certification scheme and standard for the Quality Planting Material certification (Annexure 5) may be taken up by Technical Assessment Committee at State level by combined group of specialists from the Agriculture and Forests. Usually a Certification mark on the product, providing wider acceptability and greater economic value in National and International market. This scheme will comprise a dynamic standard, which will be subjected to subsequent revisions as and when required.

### **(iii) National QPM Registry**

Development of National QPM registry (NQPMR) will provide a secure platform for issuing, tracking and retrieving information of the certified entities and certified stock & Quality Planting Material (QPM) availability (Annexure 6).

The Registry will support the objectives to provide credibility to the voluntary market, as well as to enhance business and confidence of producers/consumers and government. The registry will allow producer/buyer/seller to register process, upload documents and develop understanding on availability of certified QPM.

Information on produce origin, details of scope of certificate, historical annual lists of certified operations/product and monthly snapshots of the full data set through online portal will support ease in business of certified QPM.

Registry will assist producers/buyers in measuring, reporting and verifying the QPM in their operations, also consults with government (State Department such as Agriculture & Forest Department/Corporation).

Only certified operations can sell, label or represent products as certified QPM, unless exempt or excluded from certification.

### **C. Accessibility of QPM**

Accessibility of quality planting material (QPM) for small/marginal holdings is new challenge on integration of value chains, liberalization and globalization effects, market volatility and other risks and vulnerability etc. (Thapa and Gaiha, 2011). This improvement can only be realized, if subsistence farmers have access to quality planting materials. Eventually, community-based decentralized QPM distribution system is primary objective i.e. increment in crop productivity through the use of quality planting materials produced by small farmers themselves in their own localities is a sustainable approach.

It needs capacity building of motivated farmers, who are ready to undertake production of planting materials with quality control as a means of generating income for their livelihood. By enhancing farmers' capacities to produce planting materials in a sufficient quantity based on local demands, growing need of QPM can be met in time with competitive price locally.

### **D. Nurseries supplying QPM**

Next phase of management and strengthen the existing nurseries owned by industries/government can happen only when concerned State Governments, technical agencies, research agencies, agriculture and forest departments and industries join hands and work in unison. This will support to manage and produce the planting stocks of desired quantity and quality. Modern technological tools such as macro/micro-propagation techniques are available to produce large quantity of planting stocks easily at cheaper costs. Further, developing new nurseries at appropriate site is the most important decision for efficient production of good quality plants. The nursery site should be located near the planting site to minimize injury in handling and during transportation. It must be easily accessible to facilitate nursery field operations and supervision. Access roads should be usable during all seasons of the year.

National Horticulture Board has developed a protocol for accreditation of nurseries set up for supply of Quality Planting Materials and the similar protocol may be adopted for third party certification of Nurseries. Legal provisions already exist in our country for certified seeds/plant materials for Agri-crops, but such practices are almost non-existent so far FRM is concerned and need to be developed not only for agroforestry but also for all forest plantations.

CAMPA Funds can be used for research and development for production of QPM of agroforestry tree crops and nurseries. Further, distribution of quality planting material through certified nurseries at subsidized price /other management practices for promotion of trees outside forests on government lands should be promoted by State government. Even, Sub-Mission on Agroforestry of DAC&FW also provides for establishment of nurseries-small, big and hi-tech. The Mission is largely being implemented by State Forestry Department, Agriculture Department and Horticulture Department in few states.

#### **E. Extension of technical Knowledge**

Proper understanding of constraints that prevent adoption of agroforestry by farmers is of utmost importance such as risks associated, information failures, benefits of the new technology, willingness to experiment with the new technology. Cooperation of the governing bodies is essential to develop direct interest for certified quality planting material, its promotion and development.

#### **F. Marketing of the produce**

Marketing of the quality planting material (QPM) covers the services involved in moving product from the farm to the buyer. It is also the planning, organizing, directing and handling of QPM in such a way as to satisfy the farmer, producer and buyer. Numerous interconnected activities are involved in doing this, such as planning production, growing, accounting, transport, storage, distribution, advertising and sale. Effectively, the term encompasses the entire range of supply chain operations. However, its key function is to help direct these services, by providing proper market information, thereby linking the other operations into an integrated service with targeted outcomes. Marketing and sharing of produce comprises: Demand forecast, marketing structure, sales

promotional activities and economics/pricing of the produce. At the time of harvesting produce should carry authentic certificate to fetch good market price. Bar/colour coding should be given. Various channels through which produce can be marketed/share vary according to requirement.

#### **4. Recommendations**

Considering these issues, members of the group deliberated at length and came out with following suggestions:

1. A collaborative research is needed in the field of agroforestry by ICAR, ICFRE, Wood Based Industries and State Agricultural Universities (SAUs) based on the needs of farmers depending on site-specificity.
2. ICAR & ICFRE may jointly work out a research agenda on agroforestry research and come out with a Perspective Research Plan of 20 years. The major research and development emphasis is to be given on the genetic improvement of the planting stock and development of a “package of practices” to be given to the growers. Both ICAR and ICFRE will assign different time-bound Research Projects to their respective sub-ordinate Research Institutes/Field Research Stations of a agro-ecological zone after ensuring needed resources at their disposal.
3. Regional Institute of ICAR/ICFRE will only be assigned Research Project for genetic improvement for only one tree species at a time, suitable for agroforestry in that zone.
4. Adoptive research can be taken up on farmers’ field for data collection from tree species concerned to Tree Improvement Programme or studying results of “package of practices”.
5. CAFRI will be assigned the responsibility to create an Agroforestry Research Network by including all participating ICAR/ICFRE institutes/SAUs/Industries/IGRTB/SADs/SFDs/ Universities/TERI etc. involved

in agroforestry research to avoid duplication in similar research with scarce resources.

6. Stakeholder consultation with researchers will facilitate local knowledge in tree breeding program.
7. For effective accessibility of QPM, following interventions are proposed:
  - Developing demonstration plots at community level having the product which displays the desired characteristics from superior clones, so that farmers will adopt appropriate QPM. Demonstration plots can be selected on roadsides and Clones / Seed origin plants being demonstrated need to be properly marked (batch accounting method). Number of clones per rows can be as per the land availability.
  - To facilitate accessibility process of QPM in different part of the state, virtual Interlink of proposed National QPM registry is required to be developed with available networks/website/interlink portal of various state departments such as agricultural/rural development/Panchayati Raj/soil conservation/forest department of state for stock position.
  - Existing Farmer Producer Organizations, (FPO) consists of collectivization of Producers especially small and marginal farmers so as to form an effective alliance for collectively addressing many challenges of agriculture such as improved access to investment, technology, inputs and markets. Therefore, linking QPM nursery centres with 2064 Farmer Producer Organization (FPOs), may be 500 FPOs to start with, should be targeted as Master training centres to promote accessibility of QPM.
  - In order to meet the comprehensive credit requirements to farmers for buying QPM, financial support may be made available to farmers. Facility of Kisan Credit Card can also be provided to the farmers for tree plantation.
8. Establishment of consortium by linking and strengthening the collaborative arrangements of agricultural extension centres-Krishi Vigyan Kendra, state government agencies, IFFCO, NGOs, KRIBHCO, NABARD etc. may be helpful.



KVKs established in almost all districts which can maintain such list of nearby accredited nurseries to disseminate such information to farmers.

9. Skill development through Agriculture Skill Council should be stepped up.
10. Forestry/agroforestry graduates need to be engaged for KVKs of the country. Nodal person can be also appointed by various agencies engaged directly or indirectly with farmers, so farmers can come and discuss with him and also place order.
11. For effective extension of technical knowledge, following interventions are proposed-
  - a. Stimulate desirable developments by providing informal education to farmers through meetings, demonstrations, and field visits. This will involve capacity building programmes for seed collectors, growers/Farmers, nursery managers etc. through following ways:
    - Developing Audio/ visual training programs
    - Training material in local languages
    - Engaging with TV channels such DD Kisan
    - Developing documentary film in local languages
    - Organizing villages group programs
  - b. Organizing frequent meetings with Farmer Producer Organizations (FPOs), Farmer Associations, CBOs and QPM producing centres, information about QPM can be shared for increasing acceptability of QPM among the farmers. Amongst the 2064 FPOs, around 500 FPOs should be targeted initially as Master training centres for promoting extension of technical knowledge. Agroforestry support on Kisan Call Centres should be strengthened.
  - c. Farmers and interested people should be provided opportunities through institutions, such as the Krishi Vigyan Kendras, Trainers' Training Centres to learn agroforestry, agri-silvicultural and silvicultural techniques to ensure optimum use of their land and water resources. Short term extension courses and lectures should be organised in order to educate farmers. For this purpose, it is

essential that suitable programmes are propagated through mass media, audio-visual aids and other extension machineries.

- d. AICRP Centres should be associated more actively in the field implementation of program based on the results of in situ Demo-plots so as to increase acceptability and outcome of tree planting programs.
  - e. GIM should be dovetailed for campaigning amongst all stakeholders for availability and utilization of QPM and associated economic benefits.
  - f. Capacity building programs can be arranged to popularise QPM with available national and international funds.
12. Creating green skilled youth to work as an interface between industries and farmers for harvesting, storage, marketing and transport, will create employment potential in rural sector.
  13. In order to enhance outreach of the QPM from agricultural land, QPM marketing aspect can be brought under one umbrella of the operational guidelines, integrated scheme for agriculture marketing, 2014.
  14. Financial institutions should finance young entrepreneurs /start-ups to establish wood-based industries in the vicinity of the production areas. Projects promoted by private entrepreneurs other than State agencies should be eligible to avail assistance under the sub-scheme, irrespective of the reforms undertaken by the State Government/UTs in their respective APMC Acts.
  15. Development of assurance mark for certified product and efficient market information on credibility and uniqueness mark for certified QPM can be shown to have positive benefits for farmers and traders. Modern communications technologies open up the possibility for market information services to improve information delivery through SMS on cell phones and the rapid growth of FM radio stations offers the possibility of more localized information services. In the longer run, the national registry may become an effective way of delivering information to farmers and buyers. Thus, sensitization on *'Mark developed for certified Quality planting material'* can be achieved through:

- Advertisement on TV channels
  - Radio talks
  - Published Materials
  - Brochures in local languages through stakeholder
  - Seminars/meeting/ small gathering at village level
  - Organization campaign
16. Quality planting material developed in State forest nurseries and distributed by Forest Corporation should be encouraged by government subsidies. MOEF&CC should ensure implementation of relaxing the state transit rules as per the recent order issued by Ministry as well as Ministry of Agriculture and Farmers' Welfare. State Govt. industrial policy promotion and State Forest Department should include wood-based industries in such production areas for suitable tax incentives.
17. Promote public private partnership for adopting as an alternative to enhance the income of the farmers. Develop alternative avenues for economic and social benefit of farmers such as eco-tourism activities. Geographical Indicators tagged to the subsidiary produce as value addition such as lac, silk etc.

**Matrix showing recommendations, action points and responsible agencies**

**TOR II**

<b>S. No.</b>	<b>Recommendations</b>	<b>Action Points</b>	<b>Responsible Agency/Agencies</b>
1.	A collaborative research is needed in the field of agroforestry by ICAR, ICFRE, Wood Based Industries and State Agricultural Universities (SAUs) based on the needs of farmers to address complete value chain depending on site-specificity and requirement of industries.	<ul style="list-style-type: none"> <li>(i) A National level Workshop of participating Institutes</li> <li>(ii) Identifying roles of participating institutes</li> <li>(iii) Decision on time bound research agenda avoiding duplication</li> </ul>	ICAR/ICFRE/SAUs/ State Silviculturists/ State Forest Research Institutes
2.	<p>ICAR &amp; ICFRE may jointly work out a research agenda on agroforestry research and come out with a Perspective Research Plan of 20 years. The major research and development emphasis is to be given on the genetic improvement of the planting stock and development of a “package of practices” to be given to the growers.</p> <p>Both ICAR and ICFRE will assign different time-bound Research Projects to their respective sub-ordinate Research Institutes/Field Research Stations of a agro-ecological zone after ensuring needed resources at their disposal.</p>	<ul style="list-style-type: none"> <li>(i) Working out a joint research agenda by ICAR and ICFRE on agroforestry and bring out a perspective research plan for 20 years covering following aspects: <ul style="list-style-type: none"> <li>A. Tree Improvement &amp; tree breeding programs</li> <li>B. Development of agronomic practices</li> </ul> </li> <li>(ii) Assigning responsibilities to sub-ordinate institutes under their respective umbrellas</li> <li>(iv) Decision on feed back mechanism</li> </ul>	ICAR/ICFRE/ State Forest Research Institutes)
3.	Regional Institute of ICAR/ICFRE will only be assigned Research Project for genetic improvement for only one	Assigning Regional institute of ICAR/ICFRE with only one tree species at a time for genetic improvement suitable	CAFRI, Regional Institutes of ICAR/ICFRE& SAUs

	tree species at a time, suitable for agroforestry in that zone.	for agroforestry in that zone.	
4.	Adoptive research can be taken up on farmers' field for data collection from tree species concerned to Tree Improvement Programme or studying results of "package of practices".	Conducting adoptive research on farmers' fields in every agro-ecological zone with different clones of same species to choose best fit clone in the zone.  Similarly different package of practices to be tried to establish best package after trials.	Regional Institutes of ICAR/ICFRE/SAUs/SADs/SFDs/ State Forest Research Institutes
5.	CAFRI will be assigned the responsibility to create an Agroforestry Research Network by including all participating ICAR/ICFRE institutes/SAUs/Industries/IGRT B/SADs/SFDs/ Universities/TERI etc. involved in agroforestry research to avoid duplication in similar research with scarce resources.	Assigning CAFRI the responsibility of creation of agroforestry research network of different institutes and maintaining of research database for all participating institutes besides updating database through periodic monitoring	<b>CAFRI/ ICAR</b>
6.	Stake holder consultation with researchers and farmers will facilitate local knowledge in tree breeding program.	Stakeholder consultation with researchers & farmers by organizing regional/local workshops periodically	Regional Institutes of <b>ICAR/ICFRE</b> , SAUs, SFDs/SADs
7.	For effective accessibility of QPM, following interventions are proposed: <ul style="list-style-type: none"> <li>Developing demonstration plots at community level, including for agroforestry at KVKs and other Government lands. having the product which displays the desired characteristics from superior clones, so that farmers will adopt</li> </ul>	(i) Development of agroforestry demonstration plots at community level.	SAD/SFD/KVK/SAUs

	<p>appropriate QPM. Demonstration plots can be selected on roadsides and Clones / Seed origin plants being demonstrated need to be properly marked (batch accounting method). Number of clones per rows can be as per the land availability.</p> <ul style="list-style-type: none"> <li>To facilitate accessibility process of QPM in different part of the state, virtual Interlink of proposed National QPM registry is required to be developed with available networks/website/interlink portal of various state departments such as agricultural/rural development/ Panchayati Raj/soil conservation/forest department of state for stock position.</li> </ul> <p style="text-align: center;">I.</p> <ul style="list-style-type: none"> <li>Existing Farmer Producer Organizations, (FPO) and Cooperatives consists of collectivization of Producers especially small and marginal farmers so as to form an effective alliance for collectively addressing many challenges of agriculture such as improved access to investment, technology, inputs and markets. Therefore, linking QPM nursery centres with 2064 Farmer Producer Organization (FPOs), may be 500 FPOs to start with, should be targeted as Master Training Centres to promote accessibility of QPM.</li> <li>In order to meet the comprehensive credit requirements to farmers for</li> </ul>	<p>(ii) Development of virtual interlink of National Quality Planting Material. Registry with available networks/website of State Departments.</p> <p>(iii) Formation of an effective alliance of FPO's &amp; cooperatives for addressing challenges and linking FPO's with QPM nurseries.</p> <p>(iv) Providing financial support for buying QPM and</p>	<p>MoA&amp;FW, MoEF&amp;CC, Nationally accredited Certification Agency</p> <p>MoA&amp;FW, MoEF&amp;CC, SADs, SFDs, Nationally accredited Certification Agency)</p> <p>MoA&amp;FW, SADs</p>
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	buying QPM, financial support may be made available to farmers. Facility of Kisan Credit Card can also be provided to the farmers for tree plantation.	provision of Kisan Credit Card to farmers.	
8.	Establishment of consortium by linking and strengthening the collaborative arrangements of agricultural extension centres- Krishi Vigyan Kendras, ATMA, state government agencies, SFDs, IFFCO, NGOs, KRIBHCO, NABARD etc. may be helpful. KVKs established in almost all districts can be provided such list of nearby accredited nurseries to ensure that farmers can be able to obtain Quality Planting Materials without any difficulties	Establishment of consortium by linking and strengthening the collaborative arrangements of agricultural extension centres- Krishi Vigyan Kendras, ATMA, state government agencies, SFDs, IFFCO, NGOs, KRIBHCO, NABARD etc. and provision of list of such QPM nurseries. Different institutes may be given liberty to choose their respective area informing nearby KVKs	MoA&FW, SAUs, SADs
9.	Skill development of farmers, JFMC members, SHGs, Cooperatives through Agriculture Skill Council should be stepped up.	(i) Skill development of farmers, JFMC members, SHGs, Cooperatives through Agriculture Skill Council should be stepped up.	MoA&FW, MoEF&CC, SAUs, SFDs, SADs
10.	Forestry/agroforestry graduates need to be engaged for KVKs of the country. Nodal person can be also appointed by various agencies engaged directly or indirectly with farmers, so that farmers can come and discuss with him and also place necessary orders for planting materials. KCC (Kishan Call Centers) are needed to be strengthened for handling such queries from farmers	(i) Engaging forestry/ agroforestry graduates for KVKs and strengthening of Kisan Call Centre.	KVKs, SAUs &SADs

11.	<p>a) Stimulate desirable developments by providing informal education to farmers through meetings, demonstrations, and field visits. This will involve capacity building programmes for seed collectors, growers/Farmers, nursery managers etc. through following ways:</p> <ul style="list-style-type: none"> <li>• Developing Audio/ visual training programs</li> <li>• Training material in local languages</li> <li>• Engaging with TV channels such DD Kisan</li> <li>• Developing documentary film in local languages</li> <li>• Organizing villages group programs</li> </ul> <p>b) Organizing frequent meetings with Farmer Producer Organizations (FPOs), Farmer Associations, CBOs and QPM producing centres, information about QPM can be shared for increasing acceptability of QPM among the farmers. Amongst the 2064 FPOs, around 500 FPOs could be targeted initially as Master training centres for promoting extension of technical knowledge. Agroforestry support on Kisan Call Centres should be strengthened.</p> <p>c) Farmers and interested people should be provided opportunities through institutions, such as the Krishi Vigyan Kendras, Trainers' Training Centres to learn agroforestry, agri-silvicultural and silvicultural techniques to ensure optimum use of their land</p>	<p>(i) Provision of informal education to farmers. Capacity building programme for farmers using conventional mass media listed in the recommendation</p> <p>(ii) Organizing frequent meetings of FPO's, CBO's and QPM producing centers for promotion and support of agroforestry extension.</p> <p>(iii) Conducting short term training programme on agroforestry.</p>	<p>SADs/KVKs</p> <p>SADs/KVKs</p> <p>SADs/KVKs/SAUs</p>
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	<p>and water resources. Short term extension courses and lectures should be organized in order to educate farmers. For this purpose, it is essential that suitable programmes are propagated through mass media, audio - visual aids and other extension machineries.</p> <p>d) AICRP Centres should be associated more actively in the field implementation of program based on the results of in situ Demo-plots so as to increase acceptability and outcome of tree planting programs</p> <p>e) GIM should be dovetailed for campaigning amongst all stakeholders for availability and utilization of QPM and associated economic benefits.</p> <p>f) Capacity building programs can be arranged to popularise QPM with available national and international funds.</p>	<p>(iv) Mass awareness campaign to be taken up through audio-visual means.</p> <p>(v) AICRP centers to be involved in field implementation.</p> <p>(vi) Dovetailing of Green India Mission for using QPM.</p>	<p><b>CAFRI/ICAR</b></p> <p>MoEF&amp;CC, SFDs, SADs</p> <p>State Agriculture Extension Wing/SAUs/ SFDs</p>
12.	<p>Creating green skilled youth to work as an interface between industries and farmers for harvesting, storage, marketing and transport, will create employment potential in rural sector.</p>	<p>(i) Creation of green skilled youth cadre to act as interface between industries and farmers.</p>	<p>MoEF&amp;CC, Skill Development Ministry, SFDs, SADs</p>
13.	<p>Financial institutions should finance young entrepreneurs /start-ups to establish wood-based industries in the vicinity of the production areas. Projects promoted by private entrepreneurs other than State agencies should be eligible to avail assistance under the sub-scheme,</p>	<p>(i) Financial support to young entrepreneurs for wood based industries and inclusion of private projects for availing assistance to these young entrepreneurs.</p>	<p>Ministry of Industries/ State Finance Department, SADs</p>

	irrespective of the reforms undertaken by the State Government/UTs in their respective APMC Acts		
14.	<p>Development of assurance mark for certified product and efficient market information on credibility and uniqueness mark for certified QPM can be shown to have positive benefits for farmers and traders. Modern communications technologies open up the possibility for market information services to improve information delivery through SMS on cell phones and the rapid growth of FM radio stations offers the possibility of more localized information services. In the longer run, the national registry may become an effective way of delivering information to farmers and buyers. Thus, sensitization on <i>'Mark developed for certified Quality planting material'</i> can be achieved through:</p> <ul style="list-style-type: none"> <li>• Advertisement on TV channels</li> <li>• Radio talks</li> <li>• Published Materials</li> <li>• Brochures in local languages through stakeholder</li> <li>• Seminars/meeting/ small gathering at village level</li> <li>• Organization campaign</li> </ul>	(i) Development of quality certification of planting stock and wide spread campaign for using QPM all over the country using all modern communication technologies	SAD/SAMB, SAUs. MoA&FW
15.	Quality planting material developed in state forest nurseries and distributed by Forest Development Corporations should encourage by government subsidies. MOEF&CC	(i) Providing subsidy for QPM produced by FDC's.	SFDs/FDCs, MoEF&CC

	<p>should ensure implementation of relaxing the state transit rules as per the recent order issued by ministry as well as ministry of agriculture and farmer welfare. State Govt. industrial policy promotion and state forest department should include wood-based industries in such production areas for suitable tax incentives.</p>	<p>(ii) Provisions of tax incentives for wood based industries located in agroforestry production centers.</p> <p>(iii) Ensuring of relaxation of felling &amp; transit rules by States.</p>	
16.	<p>Promote public private partnership for adopting as an alternative to enhance the income of the farmers. Develop alternative avenues for economic and social benefit of farmers such as eco-tourism activities. Geographical Indicators tagged to the subsidiary produce as value addition such lac, silk etc.</p>	<p>(i) Promotion of PPP for enhancing income of farmers. Ecotourism and geo-tagging of produce etc. also be taken up in such forms for enhanced income.</p>	SADs/ SFDs



## CHAPTER-IV

### Financing Mechanisms

*(To suggest ways and means to access funding mechanisms to give further boost to the efforts of the Government.)*

#### 1. Introduction

- 1.1 Trees outside forests are an important component of the forests and tree cover of the country. The National Forest Policy, 1988 envisages a target of bringing 33% of the country's area under forest and tree cover through afforestation and other tree planting activities. India's Nationally Determined Contributions (NDC) submission to the UNFCCC, have commitments to create an additional carbon sink of 2.5-3 billion CO<sub>2</sub> equivalent through enhancement of forest and tree cover by 2030. Growth of forest and tree cover across the states can potentially make significant contribution towards meeting this target.
- 1.2 According to ISFR 2017, the extent of forest cover and tree cover constitutes 24.39% of the geographical area. Out of which the forest cover is 70.82 m ha (21.54% of GA) and tree cover is 9.38 m ha (2.85% of GA).
- 1.3 It is crucial to improve the quality of existing forest areas, have increased afforestation activities in forest and outside forest areas. There has to be a balance between the two areas and have a net positive impact, with multiple benefits and moving closer to the 33% target. India has seen 'forest transition since mid-1990s and the declining trend in forest cover has been reversed there by making the country's forests a carbon sink than a source.

#### 2. Importance

- 2.1 India being the 10<sup>th</sup> most forested country in the world, having the national target of 33% of geographical area under forest and tree cover and the NDC target submission has

enhanced the roles and responsibilities of the forestry and environment sector to address these activities and opportunities.

- 2.1 Estimates indicate that India needs around USD 206 billion between 2015 and 2030 for implementing climate change adaptation actions in agriculture, forestry, fisheries infrastructure, water resources and ecosystems. Financing these activities is the utmost requirement. Hence investments are crucial for conservation, restoration, enhancement and sustainable utilisation of natural resources. Trees Outside Forests is one such emerging domain which has diverse scope for investments and provide equally remunerating returns. There are several public, private and public-private; funds and financing mechanisms already available for increasing country's area under forest and tree cover. New and modern financial tools and techniques, voluntary or government oriented, need to be developed for the Indian context to upscale the availability and utilisation of the existing funds and for further generation of more funds. Missing links here are successful business models that can be cashed in after rationalization of regulatory regimes and mainstreaming of agroforestry and farm forestry.
- 2.2 The second link after the availability of funds is the allocation, channelization, and utilisation to fulfil the respective objectives. The various partners and organisations for this are the government and state machinery, various departments, development agencies, non-governmental organizations, civil society organisations, scientific and technical organisations/institutions, private sector, CSR foundations, etc. With the involvement of money, requirement of good governance also emerges. There are tools that exist and need to be incorporated within the project requirements to reduce the misuse and improper utilisation of these funds. One such voluntary tool is certification. It is one of the most successful and comprehensive monitoring and evaluation tool applicable to the forestry and allied sector, trees outside forests, can also be in the scope of this management tool.
- 2.3 Certification will help farmers get benefits by getting better price for their produce, ensuring regular fund flow. It will also help the administration and funding organisations maintain records and check progress. Linkage with a comprehensive raw material bank database will help in checking the demand-supply, manage price fluctuation and volatility.

### **3. Discussion**

3.1 Financing for promotion of trees outside forests is needed for the following activities:

- (i) High quality planting material production and supply
- (ii) Skill enhancement in nurseries, value addition, wood-based commerce, bio-energy
- (iii) Research & Development
- (iv) Nursery accreditation
- (v) Monetary incentives for maintenance, and protection after planting
- (vi) Price stabilization funds, Minimum support price and insurance
- (vii) Tree based entrepreneurship development
- (viii) Soil and moisture conservation on public wasteland
- (ix) Transport and marketing infrastructure in remote tree production areas

3.2 The funding opportunities for promotion of trees outside forests can be broadly divided into (a) government, (b) non-government and (c) public-private partnerships.

#### **(a) Government**

The major funding sources from the government side are from Ministry of Environment, Forests & Climate Change and Department of Agriculture, Cooperation and Farmers Welfare. The budgetary allocation for these for 2018-19 is Rs. 2,675.42 crore and Rs. 46700crore respectively. The details of the government fund sources are annexed (Annexure 7).

1. The financing sources under MoEF&CC are:
  - a. National Afforestation Programme (NAP)
  - b. Green India Mission (GIM)
  - c. Compensatory Afforestation Fund Management and Planning Authority (CAMPA)
  - d. Afforestation under Corporate Social Responsibility Funds of the Banking Institutions/PSUs
  - e. Japan International Cooperation Agency (JICA)
  - f. Nagar Van Udyan Yojna
  - g. Global Environment Facility (GEF)
  - h. Green Climate Fund (GCF)
  - i. National Adaptation Fund on Climate Change (NAFCC)
  - j. 14th Finance Commission Awards

2. The financing sources under MoAC&FW are:
  - a. Sub-mission on Agroforestry (SMAF)
  - b. National Bamboo Mission (NBM)
  - c. Mission for Integrated Development of Horticulture (MIDH)
  - d. Agricultural Marketing
  - e. Integrated Scheme for Agricultural Marketing (ISAM)
  - f. National Agriculture Market (e-NAM)
  - g. National Mission on Oilseeds and Oil Palm (NMOOP)
  - h. Tree Insurance
  
3. The financing sources under other government ministries are:
  - a. Ministry of Rural Development
  - b. (Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
  - c. MGNREGA & IWMP Convergence
  - d. MGNREGA & NAP Convergence
  - e. MGNREGA & Rubber Board Convergence
  - f. Ministry of Road Transport & Highways
  - g. National Green Highway Mission (NGHM)
  - h. Ministry of Skill Development and Entrepreneurship
  - i. National Skill Development Corporation (NSDC)
  - j. National Skill Development Mission (NSDM)
  - k. Department of Consumer Affairs
  - l. Ministry of New & Renewable Energy
  - m. National Policy on Biofuels

The government needs to build robust mechanisms for ensuring TOF and agroforestry are taken up farmers, industries and entrepreneurial models are evolved around it for which it needs to ensure economic incentives, price stabilization funds, insurance mechanisms and minimum support price. The other area of improvement with respect to government programs and funds is the utilization of funds and implementation of schemes. Other than the government departments and state machinery other organizations such as non-governmental organizations, civil society organizations, scientific and technical



organizations/institutions, private sector, CSR foundations, etc. should be able to access funds to implement the government programs.

**(b) Non-Government/Private**

- (i) Banks, Priority Sector Lending, Securities, Industry Buy-Back Models, and more tools for agroforestry and tree planting funding should be devised. Efforts to be taken for designing the plantation models in the pattern developed by M/s ITC etc. ensuring assured price for the timber produced.
- (ii) CSR Funds of public limited & private companies to be utilized for promoting the tree plantations as it is the most cost-effective option for the mitigation of the climate change.

**(c) Public-Private-Partnerships**

- (i) Interventions by pulpwood industries to develop farm-forestry regions in India have been impressive but are required to be scaled up massively and wood production from these systems need to be brought under the domain of forest certification to meet global SFM criteria.
- (ii) The shortcomings of these models need to be corrected and the Public-Private-Partnerships (PPP) models need strengthening to involve more farmers to grow trees on their private lands under model Contract Farming Act and its adoption by State Governments.
- (iii) Green Bonds are issued with an objective that the capital being raised is to fund 'green' projects. They can mobilize resources from domestic and international capital markets for climate change adaptation, renewable, emission reductions and other environment-friendly projects. Thus, green bonds can also be explored for tree planting, agroforestry, climate resilient activities, etc.
- (iv) Debt-for-nature swaps are financial transactions in which a portion of a developing nation's foreign debt is forgiven in exchange for local investments in environmental conservation measures. These are of three types commercial debt-for-nature swap, bilateral debt-for-nature swaps and multilateral debt-for-nature swaps.

- (v). Emissions trading system can either be cap and trade or voluntary. This can be tried in the Indian environment in pilot scale before upscaling. These mechanisms create a price for verified emissions as carbon credits thus providing accessibility to carbon trading in the local and global market. This provides dual advantage, providing economic incentives and also achieving emission reduction targets. This backbone to this financing mechanism is a carbon registry and such registries are already existing in global carbon markets such as states of USA (California, Washington), provinces of Canada (Alberta), European Union, Brazil, New Zealand, Columbia, Mexico, Thailand and China, etc.

#### **4. Recommendations**

Funding of trees outside forests is no longer a major impediment in the country as the various schemes and programs of the Central and state governments are ensuring the provision of funds to the farmers and others interested in taking up planting of industrial raw material trees, medicinal trees, fruit trees, fodder trees, cash tree crops like rubber, coconut, spices trees etc. The state governments need to take proactive steps ensuring convergence of state & central schemes for effective promotion of trees outside forests which is the insurance against natural calamities for doubling of income of farmers in the country.

1. Existing funds need to be more efficiently tapped and utilized as it has been found in many records that a major issue is non-utilization of funds
2. Implementation and operational guidelines should be issued for the schemes and programs
3. Incentives, subsidies, credit, insurance and similar financial tools must be developed for TOF systems
4. Result based financing should be encouraged for TOF systems
5. Roles and Responsibilities of Public, Private and Public-Private fund pools need to be clearly earmarked
6. Private Sector contribution towards TOF funding needs to increase
7. Accountability of government departments towards allocation and utilisation of funds needs to ensure, monitoring and evaluation systems to be in place
8. Public-Private funding collaborations should be promoted more

9. Collaborative Partnership/Forum of various organizations and funding agencies for managing funds for increasing the tree cover and TOF in the country can be setup under the government or as an independent setup
10. Mechanism should exist to access CAMPA funds for states having a minimum threshold between forest and TOF.

## Matrix showing recommendations, action points and responsible agencies

### TOR III

S. No.	Recommendations	Action Points	Responsible Agency
1.	Existing funds need to be more efficiently tapped and utilized as it has been found in many records that a major issue is non-utilization of funds within the year of release resulting in non-completion of works and spill over to the following year.	Effective utilization of funds by agencies within the financial year through periodic monitoring of expenditures	MoA&FW&MoEF&CC, SADs, SFDs
2.	Incentives, subsidies, credit, insurance and similar financial tools must be developed for TOF systems.	Development of Incentives, subsidies, credit, insurance etc. for ToF system.	MoA&FW&MoEF&CC, SADs, SFDs
3.	Result based financing should be encouraged for TOF systems.	Developing result based financing for TOF.	MoA&FW&MoEF&CC, SADs, SFDs
4.	Roles and Responsibilities of Public, Private and Public-Private fund pools need to be clearly earmarked.	Clear delineation of roles of public, private, public-private fund pools by developing appropriate guidelines	MoA&FW&MoEF&CC
5.	Private Sector contribution towards TOF funding needs to increase.	Stepping up private sector TOF funding by prescribing methodologies	MoEF&CC, MoA&FW
6.	Accountability of government departments towards allocation and utilization of funds needs to ensure, monitoring and evaluation systems to be in place.	Ensuring accountability of Govt. departments by constant monitoring & evaluation systems.	MoA&FW&MoEF&CC
7.	Public-Private funding collaborations should be promoted more.	(i) Promotion of Public-Private funding.	MoA&FW&MoEF&CC
8.	Collaborative partnership/Forum	Setting up of Collaborative	MoA&FW&MoEF&

	of various organizations and funding agencies for managing funds for increasing the tree cover and TOF in the country can be setup under the government or as an independent setup.	partnership/Forum of various organizations and funding agencies for managing funds for increasing the tree cover and TOF in the country.	CC, SADs, SFDs
9.	Mechanism should exist to access CAMPA funds for states having a minimum threshold between forest and TOF.	Setting up of mechanism for using “CAMPA” funds in states having minimum threshold between forest and TOF	MoEF&CC, SFDs



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## CHAPTER-V

### **Rationalization of regulatory regime to promote Agro-forestry**

*(Evaluation of present regulatory regime impeding adoption of tree planting in the form of Agro-forestry and farm forestry by farming community and suggest appropriate reforms for their rationalization.)*

#### **1. Introduction**

- 1.1 Policy and regulatory regime has played an important role in growth of agro-forestry and farm forestry in the country in last three decades. One of the objectives of National Forest Policy, 1988 was to reduce pressure on forests for fuelwood, fodder and industrial raw material, by growing tree plantations under agroforestry, farm forestry and social forestry. To achieve this, state forest departments, forest corporations, and the pulp and paper industries joined hands with farmers and other stakeholders, leading to creation of a sustained wood resource base of more than a million hectare in the country. This has helped the farmers and industry and has reduced considerable pressure on forests.
- 1.2 However, this growth has been not being Pan India. The reasons for such a lopsided growth are due to various reasons including regulatory regime as well as policies including trade policies which may be impacted by policies of other countries. Therefore, rationalization of our regulatory regimes, relook on various policies including that of export and import relating to wood and wood-based products, would go a long way in realizing the potential of farm forestry and Agro forestry as well as future growth of ToF (Trees outside Forests) in the country.

#### **2. Importance**

- 2.1 An analysis of spread of farm forestry plantations, across the country, indicates that felling and transit restrictions on tree species grown by the farmers have also hampered its growth in most of the states, even when favorable attributes for its growth such as land availability, land quality, enterprise level of farmers and demand for wood, were available. In some of the states, though transit restrictions have been relaxed for farm

forestry species, but felling restrictions are not relaxed simultaneously and inability of the administrative system to ease it fully at the field level continues to defeat the purpose.

- 2.2 Bamboo may not require a felling and transit permit in originating State but its transport to an industrial or usage location in another State may require transit pass / permit for its movement. This kind of restriction is existing for some of the tree species also, and it defeats the very purpose of relaxation of regulation or promotion of plantation in originating state. Though MoEF&CC has issued advisory to States to issue a pan India transit permit, but barring Himachal Pradesh, no State has come forward to adopt these yet. This is an extremely important point of intervention by Government of India, under relevant sections of Indian Forest Act, so that prevailing anomalies can be removed. Increased penetration level of farm forestry and agroforestry plantations in the existing wood catchments or the new wood catchments, supports industry as well as rural livelihoods. Also, agroforestry holds immense potential for reducing the livelihood risks of farmers, as it combines more vulnerable agriculture crops with trees. Therefore, Ministry of Agriculture and Farmers' Welfare, Govt. of India formulated the National Agroforestry Policy, 2014 which besides other issues also talks about an enabling regulatory regime for growth of Agroforestry.

### **3. Discussion**

- 3.1 Structure of import duty on wood, being imported in the form of logs and chips as well as wood-based products such as veneer and pulp, has also impacted the establishment of related industries and actual farm realization by the wood growing farmers, thereby impacting tree plantations in their farm land.
- 3.2 An important pre-requisite for receiving Central assistance under the Sub Mission on Agroforestry, launched in 2016-17, soon after formulation of the Policy, is the relaxation by States /UTs of transit rules of important species. 27 States have relaxed transit regulations so far, but none of these relaxations have Pan India jurisdiction (refer Annex 8&9)



- 3.3 Besides, better field level implementation of these relaxations have potential to give fillip to growth of farm forestry as well as help farmers in realizing remunerative farm gate price, which may further drive the growth of trees outside forests. This should be used as a tool to increase intensity of plantations (also termed as penetration level of plantations) in existing wood catchments as well as spreading the plantations to new wood catchments and the states, which are still lagging behind.
- 3.4 Establishment of forward linkage-based processing industries in various parts of country, is also necessary for suitable growth of trees outside forests, as it prevents glut in prices as is seen in case of poplar and Eucalyptus in Punjab and Haryana MoEF&CC have issued new guidelines for setting up of wood-based industries in country, however, majority of states have still not moved forward in this direction by enacting/ amending their policies/regulations in this regard.
- 3.5 Above scaled up plantations will also help in improving green cover, availability of wood in the country, cost competitiveness of wood produced as well as import substitution. There should not be any apprehension that captive plantations on FDC lands, would substitute Agro-forestry and farm forestry in the country, as their base would be extremely low, but these can certainly help in effective and efficient utilization of all available resources as well as improving the cost competitiveness of wood produced in the country on the strength of scale and mechanization. It is important that production forestry is promoted on these lands with a prime focus on timber species, as against more multi-purpose tree species on farmlands, so as to reduce dependency on imports as well.
- 3.6 Rationalization of policy and regulatory framework would prove to be an important strategy to drive second generation growth of farm forestry and agro forestry plantations in the country.

#### **4. Recommendations**

1. Easing out felling and transit restrictions on farm forestry/agroforestry tree species and products is necessary to realize their full potential and to benefit the farmers. State Governments need to declare all agroforestry species as agriculture

produce to facilitate ease of felling, transport and marketing under the model Agriculture Produce and Livestock Marketing (APLM) Act, 2017. Also, a clause would be added under model APLM act by MoA that all species declared as agriculture produce would not require any felling permission under provision of any of the existing acts of the state.

2. There is a need to amend section 2(4) of Indian Forest Act, to indicate that any specie of tree/plants notified as agriculture produce under respective model APLM Act, will not be treated as a forest produce whether found in the forest or not. Section 2 would also include that RET species specified under schedule VI of Wild Life Protection Act, IUCN Red List or CITES or in any Gazette published by Union/ State Government or notified under international treaty adopted by Central Government, will continue to be treated as forest produce, even if these are declared as agriculture produce under model APMC Act of any of the states.
3. MoEF&CC should take up with urgency the removal of Dalbergia sissoo from Appendix II of CITES since this is an important species taken up for plantation by farmers and use for furniture and other artifacts
4. But RET species as well as those found in forests, need to be promoted for cultivation in farm land to reduce pressure on forests, and to ensure this pan-India transit of such trees/species need to be allowed under a benign mechanism. Section 41 of IFA need to be amended to issue pan-India Transit pass (TP) by authorized DFO for any tree/plant species, based on certificate of source of origin by competent authority with whom farmers/tree owners will register their plantations (in the form of one-time registration in tree/crop cards). Competent authority to issue such certificate of origin would be-
  - Designated Officer of Revenue Department (for Trees outside Forests)
  - Designated Officer of Forest Department (for Trees inside Forests)
5. Format for Source Certificate can be given with following details like Name of Farmer, Name of Village, Location of Farm (Latitude, Longitude), District, State, Species grown, Source of sapling (seed source, if known), Date/Year of Planting, number of trees etc.

6. Provisions of certificate of origin indicated in above paras would be applicable till a national portal is created in sync with portal of state land records departments to register new farm plantations with provision of self-registration and third-party certification for authentication of such plantations. This platform will be used for certifying source of origin certificate for agroforestry produce.
7. A portal needs to be created for issue of pan India Transit Passes having link with land revenue department portal, which also have information about trees on farm and access for generate bar coded passes be given to all growers themselves. As soon as TP for certain number of trees is generated, that number of trees must get reduced from the revenue department's record automatically.
8. All forest barriers (At least those situated on State and national Highways) may be linked digitally so as to facilitate faster movement on highways. A provision for issuance of bar coded Transit passes digitally may be put in place.
9. Contract farming/leasing of farm land for farm forestry/agroforestry should be carried out under Model Contract Farming Act, 2018 for its adoption by State Governments, as a mainstream mechanism for production of biomass for household use and industrial raw material. Scaled up farm forestry/agroforestry activity would lead to mechanization, cost competitiveness, efficiency of resource use, and wider participation by local communities.
10. Apart from existing incentives of Government of India/State Government to promote agro forestry/ farm forestry plantations, a renewed focus and incentive mechanism needs to be put in place to medicinal, aromatic, flavour and fragrance in agroforestry models due to the burgeoning herbal industry both in beauty and wellness sector and the potential for enhanced remuneration to farmers.
11. A system of third party based certified nurseries/plant material for agro forestry/ farm forestry needs to be put in place, to incentivize and ensure that farm forestry and agro forestry plantations use only certified plant material, and productivity of ToF is not compromised.

12. A model collaborative agreement need to be advised/approved by Government of India to enable raising of productive plantations under PPP mode by willing Forest Development Corporations (FDCs) to enable improving productivity of plantations in FDC lands for medium to long rotation tree species only. FDCs may be given the option of working arrangement, tenure, and species of plantations and rotation of plantations (medium/long rotation only) depending on land sites, market demand and financial viability of FDCs.
13. Next phase of farm forestry growth should be focused in the states which have been laggard in this regard, in last two decades. This can happen only when concerned state governments, technical agencies, research agencies, agriculture and forest departments and industries join hands and work in unison to develop site specific, disease resistant and productive clones and package of practices and its extension through Krishi Vigyan Kendras (KVKs). A focused Programme under ICAR may be taken to drive this activity forward. The Central Agro Forestry Research Institute (CAFRI), Jhansi and the 37 centers of the All India Coordinated Research Project on Agroforestry should be strengthened for improved advocacy among farmers by way of agroforestry models, together with agronomics, for the various agro climatic regions of the country.
14. Wood based Industries need to be treated at par with the Food Processing industry, for the Schemes such as Creation of Infrastructure for Agro-Processing Clusters under Kisan Sampada Yojana, 2017 - a scheme to develop modern infrastructure to encourage entrepreneurs to set up processing units based on cluster approach. These industries also need to be incentivised in tax structure to bring in cost competitiveness, mainly through (i)-relaxed licensing for establishment or for increased scale of manufacturing, (ii)- reduced distance of catchment of wood sourcing, (iii)-increased productivity of farm/agro forestry plantations by developing new clones as well as by developing site specific package of practices and (iv)-ensuring large scale extension and hand holding programmes for adoption of agro forestry models.

15. To promote Make in India for peeling, hardwood chemical and Bleached Chemo Thermo Mechanical (BCTMP) pulp industries, and to promote related plantations under agroforestry of hardwood tree species, import of hardwood pulp and hardwood BCTMP pulp import needs to be dis-incentivized. It is proposed that 20% import duty/anti-dumping duty may be imposed on all hardwood chemical and BCTMP pulp as well as veneer/furniture.
16. Planting of trees under Agroforestry/ Farm forestry be provided medium term credit within priority sector lending norms with provisions of interest subvention.
17. A protocol may be developed for payment of ecological services to the farmers in case of plantation of RET species on their farms.
18. Agroforestry tree crops be covered under agricultural insurance scheme and also be eligible for input subsidy in case of disasters as per NDRF norms.
19. The policy of complete ban on green felling above 1000-meter MSL needs to be reviewed by MoEF&CC for North Eastern States as well as for other areas and ban on felling needs to be removed for slopes below 30 degree. Vulnerable areas, if any, may be demarcated and identified separately to continue the ban. This will ensure productive use of community and private land available in north east as well as in other states, without compromising on environmental safeguards. Suitable species of long rotation tree species may be promoted to be to meet growing requirements of soft wood as well as for import substitution of products of these species.
20. There is a need to control menace of trade of illegal timber in the country as well as globally, to ensure a fair value to legal producers. For this purpose, third party and reliable forest certification will be promoted in the country by providing suitable support (both technical and budgetary) to the state forest departments, communities and growers.
21. Credible, third party Forest Certification should be made compulsory for import of logs and finished products like veneers, Plywood/furniture etc. to ensure

legality and traceability of the products and also to ensure that as a country we support only legal and sustainable global forest trade practices.

22. Primary processing industries should not be treated as industry, so that these do not come under the purview of tax regime, including GST.
23. Bamboo is an integral part of rural livelihood in the country, and appropriate policy interventions are needed to improve bamboo availability of right species, quality and maturity, to support bamboo based industrial products and applications in the country under Mission mode program, which have immense potential to improve farm level earnings as well as to create economic activities in rural and remote areas. This is envisaged in the restructured National Bamboo Mission and the States should come forward more pro-actively to plan and implement integrated action plans for the complete value chain with forward linkages with industry and appropriate marketing of innovative products
24. Though section 2(7) of Indian Forest Act has been amended to exclude bamboo from the list of trees, to enable farm grown bamboo to be free from any felling and transit restrictions, ground level reports suggest that forest check posts are still asking farmers/growers to prove that bamboo carried from their farm land is not extracted from forests. This will keep on restricting the growth of bamboo resources in farmer's land. This problem can only be resolved, once Government of India amends section 2 (4) of Indian Forest Act as suggested in above paras, to ensure that no transit restriction on any species of bamboo of non-forest land can be imposed in any of the States/UTs. In addition there are other levies like royalty and market fee which is proving counter-productive to the progressive amendment of IFA. (Refer Annexure 8 and 9 for Common Agroforestry species de-regularized by the states).

**Matrix showing recommendations, action points and responsible agencies**

**TOR IV**

<b>S. No.</b>	<b>Recommendations</b>	<b>Action Points</b>	<b>Responsible Agency/Agencies</b>
1.	Easing out felling and transit restrictions on farm forestry/agroforestry tree species and products is necessary to realize their full potential and to benefit the farmers. State Governments need to declare all agroforestry species as agriculture produce to facilitate ease of felling, transport and marketing under the model Agriculture Produce and Livestock Marketing (APLM) Act, 2017. Also, a clause would be added under model APLM act by MoA that all species declared as agriculture produce would not require any felling permission under provision of any of the existing acts of the state	Simplification of felling and transit regulations on farm forestry/ agro forestry tree species grown on private lands through appropriate modification in model APLM Act, 2017. Special clause as recommended may be included by States/UTs with concurrence of their respective Forest/Revenue Departments as these departments have so far prohibitive regulations against tree felling on their special Acts.	MoA&FW, States/UTs
2.	There is a need to amend section 2(4) of Indian Forest Act, to indicate that any specie of tree/plants notified as agriculture produce under respective model APLM Act, will not be treated as a forest produce whether found in the forest or not. Section 2 would also include that RET species specified under schedule VI of Wild Life Protection Act, IUCN Red List or CITES or in any Gazette published by Union/ State	Amendment of section 2 (4) of IFA 1927 for exclusion of agro/farm forestry produce from the definition of “Forest Produce” except RET species	MoA&FW, MoEF&CC, States/UTs

	Government or notified under international treaty adopted by Central Government, will continue to be treated as forest produce, even if these are declared as agriculture produce under model APMC Act of any of the states		
3.	MoEF&CC should take up with urgency the removal of Dalbergiasissoo from Appendix II of CITES since this is an important species taken up for plantation by farmers and use for furniture and other artifacts	Removal of Dalbergiasissoo from Appendix II of CITES for encouraging furniture industry & exports as this species is commonly grown everywhere in India	MoEF&CC
4.	Rare, Endangered and Threatened (RET) species as well as those found in forests, need to be promoted for ex-situ cultivation in farm land to reduce pressure on forests, and to ensure this pan-India transit of such trees/species need to be allowed under a benign mechanism. Section 41 of IFA need to be amended to issue pan-India Transit Permit (TP) by authorized DFO for any tree/plant species, based on certificate of source of origin by competent authority with whom farmers/tree owners will register their plantations (in the form of one-time registration in tree/crop cards). Competent authority to issue such certificate of origin would be- <ul style="list-style-type: none"> <li>• Designated Officer of Revenue Department (for Trees outside Forests)</li> </ul>	(i) Promotion of RET species on agriculture land as a part of ex situ conservation program  (ii) Amendment of section 41 of IFA 1927 to facilitate farmers to grow trees on private lands for its felling and transporting after getting due certificate from competent authority about its Source of Origin by proper Gazette Notification.	MoEF&CC



	<ul style="list-style-type: none"> <li>Designated Officer of Forest Department (for Trees inside Forests)</li> </ul>		
5.	Format for Source Certificate can be given with following details like Name of Farmer, Name of Village, Location of Farm (Latitude, Longitude), District, State, Species grown, Source of sapling (seed source, if known), Date/Year of Planting, number of trees etc.	Design and approval of source certification format and its implementation by proper authorization through concurrence of concerned departments of the State Governments	MoA&FW&MoEF&CC
6.	Provisions of certificate of origin indicated in above paras would be applicable till a national portal is created in sync with portal of state land records departments to register new farm plantations with provision of self-registration and third-party certification for authentication of such plantations. This platform will be used for certifying source of origin certificate for agroforestry produce	Provision of source certification & creation of a National Portal with proper Wide Area Network	MoA&FW&MoEF&CC
7.	A portal needs to be created for issue of pan India Transit Passes having link with land revenue department portal, which also have information about trees on farm and access for generate bar coded passes be given to all growers themselves. As soon as TP for certain number of trees is generated, that number of trees must get reduced from the revenue department's record	Creation of a National Portal for Pan India Transit Permits and linking it with Revenue Department website.	MoA&FW&MoEF&CC

	automatically		
8.	All forest barriers (At least those situated on State and national Highways) may be linked digitally so as to facilitate faster movement on highways. A provision for issuance of bar coded Transit passes digitally may be put in place	Creation of National Portal for Pan India Transit Permits and ensuring its implementation by interlinking nationwide forest barriers.	MoEF&CC, SFDs
9.	Contract farming/leasing of farm land for farm forestry/agroforestry should be carried out under Model Contract Farming Act, 2018 for its adoption by State Governments, as a mainstream mechanism for production of biomass for household use and industrial raw material. Scaled up farm forestry/agroforestry activity would lead to mechanization, cost competitiveness, efficiency of resource use, and wider participation by local communities.	Adoption of contract farming in farm land for farm/agroforestry by Wood based Industries for getting sustained supply of raw materials	MoA&FW/SADs
10.	Apart from existing incentives of Government of India/State Government to promote agro forestry/ farm forestry plantations, a renewed focus and incentive mechanism needs to be put in place to medicinal, aromatic species in agroforestry models due to the burgeoning herbal industry both in beauty and wellness sector and the potential for ensuring enhanced remuneration to farmers.	Renewed focus and incentive mechanism of aromatic plants in agroforestry.	MoA&FW/AYUSH, SADs & SFDs

11.	A system of third party based certified nurseries/plant material for agro forestry/ farm forestry needs to be put in place, to incentivize and ensure that farm forestry and agro forestry plantations use only certified planting material, and productivity of ToF is not compromised.	Institution of third party certification for agro forestry/ farm forestry materials and their procurement centers	MoA&FW&MoEF&CC, SADs, SFDs
12.	A model collaborative agreement need to be advised/approved by Government of India to enable raising of productive plantations under PPP mode by willing Forest Development Corporations (FDCs) to enable improving productivity of plantations in FDC lands for medium to long rotation tree species only. FDCs may be given the option of working arrangement, tenure, and species of plantations and rotation of plantations (medium/long rotation only) depending on land sites, market demand and financial viability of FDCs.	Adoption of model agreement for PPP with FDCs for production of long rotation tree crops as their raw materials.	MoEF&CC/FDCs, SFDs
13.	Next phase of farm forestry growth should be focused in the states which have been lagging behind in this regard, in last two decades. This can happen only when concerned state governments, technical agencies, research agencies, agriculture and forest departments and industries join hands and work in unison to develop site specific, disease resistant and productive clones	<ul style="list-style-type: none"> <li>(i) Identification of States lagging in agroforestry/farm forestry</li> <li>(ii) Collaborative efforts for developing appropriate Agro-forestry models keeping KVKs in confidence</li> <li>(iii) Field trials of developed models in farmers' fields and multiplication by demonstrating success</li> </ul>	ICAR, CAFRI

	<p>and package of agro-forestry models and its extension through Krishi Vigyan Kendras (KVKs). A focused Programme under ICAR may be taken to drive this activity forward. The Central Agro Forestry Research Institute (CAFRI), Jhansi and the 37 centers of the All India Coordinated Research Project on Agroforestry should be strengthened for improved advocacy among farmers by way of agroforestry models, together with agronomics, for the various agro climatic regions of the country.</p>	<p>of these models to farmer groups</p>	
14.	<p>Wood based Industries need to be treated at par with the Food Processing industry, for the Schemes such as Creation of Infrastructure for Agro-Processing Clusters under Kisan Sampada Yojana, 2017 - a scheme to develop modern infrastructure to encourage entrepreneurs to set up processing units based on cluster approach. These industries also need to be incentivised by suitable tax structure to bring in cost competitiveness, mainly through (i)-relaxed licensing for establishment or for increased scale of manufacturing, (ii)-reduced distance of catchment of wood sourcing, (iii)-increased productivity of farm/agro forestry plantations by developing new clones as well as by developing</p>	<p>Promotion of wood based industries through increased supply of raw materials and facilitation through various govt. programmes and linking them with farms growing raw materials</p>	<p>MoA&amp;FW&amp;MoEF&amp;CC, SADs, SFDs</p>

	site specific package of practices and (iv)-ensuring large scale extension and hand holding programmes for adoption of agro forestry models		
15	To promote Make in India for peeling, hardwood chemical and Bleached Chemo Thermo Mechanical (BCTMP) pulp industries, and to promote related plantations under agroforestry of hardwood tree species, import of hardwood pulp and hardwood BCTMP pulp import needs to be dis-incentivized. It is proposed that 20% import duty/anti-dumping duty may be imposed on all hardwood chemical and BCTMP pulp as well as veneer/furniture	Institution of Import restrictions for promotion of pulping, peeling and furniture industry.	MoA&FW/MoEF&CC/MoC, DGFT
16	Planting of trees under Agroforestry/ Farm forestry be provided medium term credit within priority sector lending norms with provisions of interest subvention	Priority lending for agro/ farm forestry and interest subvention.	MoA&FW, NABARD, Co-operative Banks
17	A protocol may be developed for payment of ecological services to the farmers in case of plantation of RET species on their farms	Development of PES protocol to farmers growing plantation of RET species and linking them to appropriate agency for compensating them	MoA&FW&MoEF&CC
18	Agroforestry tree crops be covered under agricultural insurance scheme and also be eligible for input subsidy in case of disasters as per NDRF norms	Negotiation with Institution of insurance for agroforestry tree crops at Ministry level and floating suitable schemes to compensate farmers	MoA&FW, SADs, NDMA
19	The policy of complete ban on	Review of restriction on	MoEF&CC,

	<p>green felling above 1000-meter MSL needs to be reviewed by MoEF&amp;CC for North Eastern States as well as for other areas and ban on felling needs to be removed for slopes below 30 degree. Vulnerable areas, if any, may be demarcated and identified separately to continue with the ban. This will ensure productive use of community and private land available in north east as well as in other states, without compromising on environmental safeguards. Suitable species of long rotation tree species may be promoted to meet growing requirements of soft wood as well as for import substitution of products of these species</p>	<p>green felling above 1000 meter MSL for promotion of productive use of community and private lands.</p>	<p>concerned SFDs</p>
20	<p>There is a need to control the illegal timber trade in the country as well as globally, so as to ensure a fair value to those farmers who produce timber through legal means.. For this purpose, third party and reliable forest certification will need to be promoted in the country by providing suitable support (both technical and budgetary) to the state forest departments, communities and growers</p>	<p>(i) Control of illegal timber trade and promotion of forest certification.</p>	<p>MoEF&amp;CC&amp;Nationally accredited Certification Agencies, SADs, SFDs</p>
21	<p>Credible, third party inspection and certification should be made compulsory for import of logs and finished products like veneers, Plywood/furniture etc. to ensure legality and traceability of</p>	<p>Institution of third party inspection and certification for import of logs &amp; wood products.</p>	<p>MoEF&amp;CC&amp;MoC, DGFT, WCCB, CITES designated agencies</p>

	the products and also to ensure that as a country we support only legal and sustainable global forest trade practices.		
22	Primary processing industries should not be treated as industry, so that these do not come under the purview of tax regime, including GST.	Exclusion of primary processing industries/ units from Industries status and tax regime.	MoEF&CC, MoI&MoF, MoC
23	Bamboo is an integral part of rural livelihood in the country, and appropriate policy interventions are needed to improve bamboo availability of right species, quality and maturity, to support bamboo based industrial products and applications in the country under Mission mode program, which have immense potential to improve farm level earnings as well as to promote economic activities in rural and remote areas. This is envisaged in the restructured National Bamboo Mission and the States should come forward more pro-actively to plan and implement integrated action plans for the complete value chain with forward linkages with industry and appropriate marketing of innovative products	Promotion of bamboo in mission mode for complete value chain.	National Bamboo Mission and the States, MoA&FW, SADs, SFDs,SAUs& SFDs
24	Though section 2(7) of Indian Forest Act has been amended to exclude bamboo from the list of trees, to enable farm grown bamboo to be free from any felling and transit restrictions, ground level reports suggest that	(i) Institutions of an all India Portal for transit of bamboo & other produce.	MoEF&CC& SFDs

<p>forest check posts are still asking farmers/growers to prove that bamboo carried from their farm land is not extracted from forests. This will keep on restricting the growth of bamboo resources in farmer's land. This problem can only be resolved, once Government of India amends section 2 (4) of Indian Forest Act as suggested in above paras, to ensure that no transit restriction on any species of bamboo of non-forest land can be imposed in any of the States/UTs. In addition there are other levies like royalty and market fee which is proving counter-productive to the progressive amendment of IFA.</p>		
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## CHAPTER-VI

### Monitoring and Evaluation of TOF coverage

*(To suggest a centralized database system and mechanism for monitoring the progress of coverage under TOF in the country)*

#### 1. Introduction

- 1.1 Trees Outside Forest (TOF) & Agroforestry play a vital role in the Indian economy by way of tangible and intangible benefits. It helps in rehabilitation of degraded non-forest lands on one hand and increases farm productivity on the other. Changing priorities like timber production, bio-fuels, employment generation, carbon sequestration and optimization of farm productivity are now being focused through TOF & Agroforestry.
- 1.2 According to Food and Agriculture organization of United Nations trees outside forests means “Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in-situ*. It does not include land that is predominantly under agricultural or urban land use”.
- 1.3 Whereas in India TOF means all trees available outside the Recorded Forest Area (RFA). Non-availability of digital boundaries of RFA makes the planning, management and assessment of TOF difficult. Presently, there are few estimations for area under agroforestry. Dhyani et al. (2014) estimated 25.32 million ha area under agroforestry, however, this estimation is not based on revenue records or actual measurements. Further Dhyani (2014) pointed out that the forest cover assessment of FSI also includes a large area of agroforestry mainly covered under agri-silviculture, silvi-pastoral, block plantations, orchards (agri-/silvi-pasture) on crop lands, and homestead interpreted as forest. The actual area under both the classes will be less than these estimates. Since agroforestry areas are partly covered under Forest Cover and Tree Cover as per the assessment of FSI, about 20-25 million ha land can be stated as extent of agro-forestry area safely. However, in future, exact assessment can be worked out. The best way to assess the area under agroforestry will be the use of spatial technologies.

## **2. Importance**

- 2.1 The TOF coverage assessment and maintaining a centralised database solves three basic purpose - management, monitoring and planning. At country level, such assessment will provide credible spatial and statistical data that can be used for managing, planning and accounting the services provided by TOF in terms of food security, species available outside forests, raw material for the industries, aesthetic values, among others. Such data will help country to allocate funds and develop economically promising land uses with TOF. One of the many important roles of TOF is meeting industrial timber need of the country. Industries can use species wise TOF data and volume to acclimatize their requirement for the raw material and supporting policy makers, farmers, and state forest departments to identify and grow timber value species in Agroforestry and Social forestry areas.
- 2.2 In addition to this, estimating of the TOF coverage in the country will give National Policy makers an opportunity to assess the possibilities to increase the tree coverage to achieve the national target of bringing 33% of geographical area under forest and tree cover from the present level of less than 25% while creating additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent by the year 2030. Such an assessment will provide authentic information available on TOF area coverage in the country as on date while creating a centralised database system to projecting the availability and stock of TOF resource in the country.

## **3. Discussion**

- 3.1 A focused Group meeting of agencies involved in assessment of Tree Cover (Forest Survey of India, ICAR- Central Agroforestry Research Institute, Indian Space Agency and ICRAF) was held on 8.03.2018 as per the decision taken in the 2<sup>nd</sup> meeting of the Expert Committee held on 15<sup>th</sup> & 16<sup>th</sup> February 2018 at Indira Paryavaran Bhawan, New Delhi. To understand the technologies and sampling techniques used by various agencies, presentations were made by the concerned agencies in the meeting. It was concluded that the FSI is mainly estimating the growing stock of TOF and the area of Tree Cover (where

tree patches/groves are less than 1 ha and not captured with mid resolution satellite imagery), while CAFRI is involved in mapping of agroforestry coverage only.

- 3.2 Mapping of agro-forestry area has been done by CAFRI (Central Agro-Forestry Research Institute), Jhansi using Remote Sensing IRS-1D LISS III data in 2007 as a project work under DST funding. Initially two pilot districts namely, Yamuna Nagar (Haryana) and Saharanpur (UP) were taken to standardize the methodology. Based on this mapping of agro-forestry area was taken using Sub-pixel-based method instead of Pixel based. Out of total 630 districts, 127 districts in 15 Agro-climatic zones were sampled. Multi-spectral remote sensing data were analyzed for land uses and land cover (LU&LC). From LU&LC obtained by pixel-based classification agricultural area (crop land and fallow lands) was masked. On this agricultural area interpreted from LISS III imageries, sub-pixel classifier was used to get tree cover within a pixel. An output of tree cover within a pixel was assessed in decadal percentage scale. In this way all trees in block, scattered or linear within agro-forestry system obtained and the data of 20% sample district was extrapolated for entire agro-climatic region. Few randomly chosen districts from each representative state for ground inventory. It was also reported that Sugarcane grown areas posed problem in the interpretation. Total agro-forestry area of 10 agro-climatic zone has been estimated as 16.60 M ha, which is 7.98% of the total GA of the zones. According to the expert from CAFRI, for all 15 agro-climatic zones, estimated area may be between 21 to 25 M ha. The accurate estimation of agro-forestry area can be done through geo-spatial technology which is an integration of GIS, Remote Sensing and GPS and three are used for different purposes- GIS used for geo-referencing, masking of area and for area estimation, GPS data used for collecting locations of agro-forestry from the ground and Remote Sensing data to create Land Use & Land Cover map and delineation of other features.
- 3.3 National Remote Sensing Centre (NRSC) is annually preparing LU&LC maps using AWIFS data. NRSC and FSI are collaborating in this effort. FSI has been preparing Forest Cover Maps every second year which goes as input in NRSC's LU&LC maps.
- 3.4 FSI, Dehradun estimates growing stock of TOF every second year, and reflects the same in the India State of Forest Report. FSI elaborated the process followed in assessment of

Forest Cover and Tree Cover of TOF which lead them to estimate the Growing Stock, Carbon Stock and annual potential increment of wood. Forest cover assessment is done using remote sensing technology supported by intensive ground truthing whereas tree cover is assessed combining high resolution imagery with field inventory as a part of the National Forest Inventory. FSI uses IRS LISS-III data with a spatial resolution of 23.5 meters at a scale of interpretation 1: 50,000 resulting in a Minimum Mapable Unit of 1 ha to assess the forest cover. The country's forest cover is classified into 3 categories based on the density namely: Very Dense with a canopy cover more than 70%, Moderately Dense with a canopy density between 40-70%, Open with a canopy density between 10-40% and the scrub forest areas with less than 10% cover. National Forest Inventory designed in 2001 has been done in nearly 60 districts completed in 2 years out of 633 districts of the country (10% districts), aiming to cover the entire country in 20 years. In NFI besides inventory of forests, inventory of TOF is also done where high resolution (5.8 m) satellite imagery is also used to identify TOF. FSI has now changed the NFI design since 2016 for estimating growing stock forests and TOF in a 5-year cycle. For this entire country is now classified under a grid system, each of 25 sq. km. area. There are nearly 1,34,000 such grids covering the entire country. 20% grids will be selected randomly for forest inventory every year and the grids having 0.5 sq.km. are considered for random selection. Out of non-forested grids, which are about 100,000. 10% grids are randomly chosen for ToF inventory. Tree cover is off shoot result of this ToF inventory. FSI is not involved in directly mapping of Agroforestry area of the country, rather focuses on assessment of the tree cover outside of the forest.

- 3.5 National remote Sensing Centre (NRSC) was of the view that LISS-III data was good enough for this purpose during 2007. However, with decreasing cost of imageries, it is now possible to use better resolution to increase the confidence level of the output map. Hence ground data sharing among agencies and synergy of technology for estimation of agroforestry/ Tree Outside Forest can lead in to cost effective solution.

#### **4. Recommendations**

Based on the discussions the working group for ToR 5 of the expert committee has following recommendations -

1. CAFRI, FSI, NRSC, and ICRAF should work in consortium mode where in NRSC will share high resolution remote sensing data and FSI will share TOF inventory data to CAFRI to know the distribution pattern of tree species in different regions of country after geo-tagging. ICRAF will provide experiences/ techniques from other countries and a global perspective.
2. State Forest Departments may be advised to capture geo-spatial digital boundaries of RFA and incorporate the maps in working plans
3. The base map of LU&LC may be taken from NRSC which is annually prepared and within its agriculture area the agro forestry may be mapped by CAFRI. It will not reduce workload only, but it will eliminate all disparities arising from two different efforts of mapping as well.
4. Methodological development is a continuum and need to be undertaken because of the new data/information/technological improvement and statistical advancement. Therefore, there should be a permanent collaboration in all the involved agencies.
5. CAFRI will share agroforestry maps with NRSC to upload on Bhuvan portal as well as to FSI, Dehradun.
6. Based on maps provided by CAFRI on 1:50,000 scale, FSI will find out the extent of agroforestry on non-forest land using available geo- spatial digital RFA boundaries.
7. Since FSI is undertaking inventory of TOF in the entire country on a grid-based system, the information obtained through field inventory can be provided to CAFRI for validation of agro-forestry maps. Alternately, CAFRI can provide the agroforestry maps to FSI for validation and accuracy assessment.
8. On non-forest land, after delineating agroforestry area, remaining areas may be estimated under block/linear plantations on community land, public land or private land as a part of Forest Cover/Tree cover.

9. Since FSI has necessary software for FC, TC and Forest Inventory, data processing part will be done by FSI using ground data collected by their own staff as well as staff of CAFRI.
10. Present infrastructure facilities at CAFRI for agroforestry mapping appear inadequate. It needs upgradation of existing facilities for which latest software (Arc GIS, ERDAS, etc.) & hardware (Computers & Printer) are required. More technical manpower is also needed for such jobs. It is recommended that CAFRI should be provided Rs. 1.20 crores annually for at least 5 years continuously for wall to wall mapping of agroforestry for the entire country so as to monitor the coverage of agroforestry out of which Rs. 1 crore may be needed for non-recurring expenditure.
11. Since FSI already has classified National Database they will continue to maintain data of forest cover, tree cover and TOF areas (provided by CAFRI) separately and it will be reflected in their biennial Report of SFR. When digitized boundaries of recorded forest areas will be made available by State Forest Departments, FSI will report forest cover information both inside and outside forest separately.
12. As perceptible changes are not noticed in a short period of two years, this Expert Committee strongly feels that present cycle of 2 years period of forest and TOF assessment may be enhanced to 5 years period. Eventually, it will lead to a cost saving which may be utilized for procurement of high resolution Satellite Imageries leading to better accuracy of results.
13. CAFRI will prepare Agroforestry maps in every five-year cycle and as far as possible will provide Species wise maps by using spectral signature data of common agroforestry species available in their Digital Library. Similarly, extension of agroforestry in rainfed and irrigated areas can be mapped. These maps will be useful in monitoring the coverage of agroforestry. CAFRI can continue the agroforestry and species mapping only when dedicated fund and resources are made available in the form of long duration project.

14. Further, there is a need to educate the stakeholder that every assessment /mapping/ inventory has an uncertainty attached with its estimates which is generally of the tune of up to 10% eg; classification accuracy of forest cover mapping is around 91/92%; Standard error percentage of Growing Stock estimates of NFI is around 2/3% of its mean.
15. On GIS Platform Timber Markets and their respective agroforestry catchment can be worked out in collaboration with farmers, agricultural marketing hubs and industry.
16. By working in collaborative mode, duplication of efforts will be reduced, and the whole exercise will be more cost effective.
17. Farmer's associations, timber industry, private nurseries, timber market associations and other Major Stakeholders concerned with TOF coverage and availability should be involved in the process, at least when field level data are needed.





**Matrix showing recommendations, action points and responsible agencies**

**TOR V**

<b>S. No.</b>	<b>Recommendations</b>	<b>Action Points</b>	<b>Responsible Agency/Agencies</b>
1.	CAFRI, FSI, NRSC and ICRAF should work in consortium mode where in NRSC will share high resolution remote sensing data and FSI will share TOF inventory data to CAFRI to know the distribution pattern of tree species in different regions of country after geo-tagging. ICRAF will provide experiences/techniques from other countries and a global perspective.	Formation of a consortium for analysis of remote sensing data for forest/TOF inventory management. Both Ministries shall take lead by organizing Workshop at National Level and then signing a MoU drafting clearly roles and responsibilities of the constituent institutions of the Consortium	MoA&FW&MoEF&CC, ICAR, CAFRI, NRSC, ICRAF, FSI
2.	State Forest Departments may be advised to capture geo- spatial digital boundaries of RFA and incorporate the maps in working plans.	Capturing of geo spatial digital boundaries of Recorded Forest Areas (RFA) by SFD's for Working Plan requirement as well as forest mapping	MoEF&CC/SFDs
3.	The base map of LU&LUC may be taken from NRSC which is annually prepared and within its agriculture area the agro forestry may be mapped by CAFRI. It will not reduce workload only, but it will eliminate all disparities arising from two different efforts of mapping as well.	Utilization of LU & LUC map prepared by NRSC for mapping of agro-forestry areas by CAFRI	CAFRI, NRSC
4.	Methodological development is a continuum and need to be undertaken because of the new	Permanent collaboration for methodological development.	CAFRI/FSI/NRSC

	data/ information/ technological improvement and statistical advancement. Therefore, there should be a permanent collaboration in all the involved agencies.		
5.	CAFRI, will share agroforestry maps with NRSC to upload on Bhuvan portal as well as to FSI, Dehradun	Uploading of agroforestry maps in Bhuvan Portal	CAFRI/NRSC/FSI
6.	Based on maps provided by CAFRI on 1:50,000 scale, FSI will find out the extent of agroforestry on non-forest land using available geo- spatial digital RFA boundaries.	Assessment of extent of agroforestry on non-forestry areas by FSI	CAFRI & FSI
7.	Since FSI is undertaking inventory of TOF in the entire country on a grid-based system, the information obtained through field inventory can be provided to CAFRI for validation of agroforestry maps. Alternately, CAFRI can provide the agroforestry maps to FSI for validation and accuracy assessment.	Validation of agroforestry maps.	CAFRI & FSI
8.	On non-forest land, after delineating agroforestry area, remaining areas may be estimated under block/linear plantations on community land, public land or private land as a part of Forest Cover/Tree cover.	Estimation of block/linear plantation lands on community/ public or private lands	FSI, SFDs
9.	Since FSI has necessary software for FC, TC and Forest Inventory, data processing part will be done	CAFRI will share data related to agroforestry in assigned grids with FSI	CAFRI/FSI

	by FSI using ground data collected by their own staff as well as staff of CAFRI.		
10.	Present infrastructure facilities at CAFRI for agroforestry mapping appear inadequate. It needs upgradation of existing facilities for which latest software (Arc GIS, ERDAS, etc.) & hardware (Computers & Printer) are required. More technical manpower is also needed for such jobs. It is recommended that CAFRI should be provided Rs. 1.20 crores annually for at least 5 years continuously for wall to wall mapping of agroforestry for the entire country so as to monitor the coverage of agroforestry out of which 1 crore may be needed for non-recurring expenditure.	Upgradation of infrastructure at CAFRI and funding the same by providing desired funds annually by the MoA&FW through ICAR	MoA&FW, ICAR
11.	Since FSI already has classified National Database they will continue to maintain data of forest cover, tree cover and TOF areas (provided by CAFRI) separately and it will be reflected in their Bi-annual Report of ISFR brought out by FSI. When digitized boundaries of recorded forest areas will be made available by State Forest Departments, FSI will report forest cover information both inside and outside forest separately.	Publication of report on forest cover, tree cover & TOF by FSI.	FSI, SFDs
12.	As perceptible changes are not noticed in a short period of two years, this Expert Committee strongly feels that present cycle of	Assessment of Forest and TOF to be done at a 5 year interval using high resolution satellite	MoEF&CC/FSI

	2 years period of forest and TOF assessment may be enhanced to 5 years period. Eventually, it will lead to a cost saving which may be utilized for procurement of high resolution Satellite Imageries leading to better accuracy of results.	imageries. Appropriate decision may be taken by the MoEF&CC at the apex level as it will be a departure from present norm considering pros and cons	
13.	CAFRI will prepare Agroforestry maps in every five-year cycle and as far as possible will provide Species wise maps by using spectral signature data of common agroforestry species available in their Digital Library. Similarly, extension of agroforestry in rain-fed and irrigated areas can be mapped. These maps will be useful in monitoring the coverage of agroforestry. CAFRI can continue the agroforestry and species mapping only when dedicated fund and resources are made available in the form of long duration project.	Preparation of Agroforestry maps at species level using spectral signature data.  Spectral Data bank of common agro-forestry tree crops of different regions may be developed.	MoA&FW/CAFRI, ICAR
14.	Further, there is a need to educate the stakeholder that every assessment /mapping/ inventory has an uncertainty attached with its estimates which is generally of the tune of upto 10% eg; classification accuracy of forest cover mapping is around 91 to 92%; Standard error percentage of Growing Stock estimates of NFI is around 2 to 3% of its mean.	Awareness generation on accuracy of mapping/ resource inventory. FSI needs to develop frequent dialogues with State Forest Departments, Wood Based Industries by organizing Seminars/ Workshops	MoEF&CC, FSI
15.	On GIS Platform Timber Markets and their respective agroforestry catchment can be worked out in	Development of GIS platform by CAFRI in collaboration with all	CAFRI, FSI

	collaboration with farmers, agricultural marketing hubs and industry.	stakeholders stated in the recommendations	
16.	By working in collaborative mode, duplication of efforts will be reduced, and the whole exercise will be more cost effective.	CAFRI & FSI should organize at least one joint meeting every year to sort out various technical issues besides nominating Technical Co-ordinator from either side.	CAFRI & FSI, NRSC
17.	Farmer's associations, timber industry, private nurseries, timber market associations and other major stakeholders concerned with TOF coverage and availability should be involved in the process, at least when field level data are needed.	Provision of data sharing by stated agencies in the recommendation.	MoEF&CC&MoA&FW, SFDs, SADs



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## CHAPTER-VII

### Sustainable management of TOF

*(To suggest policy intervention for sustainable management of TOF)*

#### 1. Introduction

- 1.1 Tree outside Forest (TOF) is a versatile natural resource and as important as our recorded forest areas. However, its management is a bigger challenge because of its wider spread in the overall landscape, fragmentary in nature but unincorporated in to any databases. Further, these trees are under various ownership groups and diverse management systems. They are also designated as gardens, parks, woodlots, tree groves, sacred groves, commemorative plantations, trees growing in the field, road-side plantations, canal bank plantations, shelter belt/wind brake, tank foreshore plantations, orchards etc. Policy makers and managers for a very long time ignored these resources as they are looked after by various sectors and agencies unlike forests, which is always under a centralized management and compact.
- 1.2 It is true that in last few decades, the global attention on our forest resources has increased manifold where as our attention on tree outside forests has remain diffused as intrinsically these are multi-sectoral and multipurpose. Our attention basically remains divided for agro-forestry, silvi-pastoralism, urban forestry, recreational forestry etc. rather having an undivided attention to the TOF in entirety. Trees Outside Forests is a providential source of timber, firewood, NTFP, medicine but in absence of statistical data it is overlooked for its gross contribution to the economy and what to talk of policy, legislation or research etc.
- 1.3 In recent years, due to demographic explosion and mounting demand on wood and non-wood products and at the same time, conservation-oriented approach in forests for ensuring ecological security and retention of biodiversity, TOF has come to center-stage of public attention. Particularly in India, after a moratorium on silvicultural felling of trees from forests, significance of trees outside forests has increased manifolds.



## 2. Importance

- 2.1 In India, after the National Commission on Agriculture submitted its report in 1976, Social Forestry gained momentum and ambitious afforestation program was undertaken on all kinds of barren wastelands outside of the forest area. It covered all vacant lands available in linear strips along roads, railway tracks, canals; block planting on the Government and Community lands besides distribution of free saplings to farmers for encouraging them in agro/farm forestry in rural areas and similarly in urban areas to plant trees on vacant institutional lands, industrial complexes, educational institutions, public parks & gardens, crematories and graveyards and even in urban household premises of the public. A network of nurseries was created in every district for raising millions of seedlings. This momentum was also supported by overseas donor assisted projects. Wasteland development board also gave an impetus to expand tree outside forest.
- 2.2 Keeping in view, the National Forest Policy, 1988 was enunciated replacing National Forest Policy of 1952; where emphasis was laid on Social Forestry while a conservative approach was adopted for natural forests. Felling of timber was totally banned from high altitude forests. Wood based industries were denied supply of raw materials from natural forests and rather encouraged to develop a net-work with private growers for sustained supply of raw materials. Import of wood was liberalized while exports were made stringent for wood. On the other hand, wood substitutes were encouraged in housing, furniture making etc. to further reduce domestic demand on wood.
- 2.3 Social Forestry was implemented quite successfully in states like Gujarat, Rajasthan, Uttar Pradesh, Odisha, West Bengal, Maharashtra, Karnataka, Tamil Nadu etc. However, basically few agriculturally advanced states Haryana and Punjab and partially Western UP showed phenomenal progress in Agro-Forestry by planting short rotation tree-crops like Eucalyptus, Poplar, Subabul etc. Few prominent industries like ITC, WIMCO also encouraged farmers of Andhra Pradesh, Karnataka to plant trees with regular food crops under agro-forestry program. For promoting the growth of agro-forestry and wood-based Industries, Governments of Haryana Government declared wood from agro-forestry as “agricultural produce”. Haryana Government vide notification dated 4th March 2008,

declared the wood of poplar and eucalyptus as agricultural produce under Punjab Agriculture Produce Marketing Act 1961 to collect marketing fees on its sale. No benefit accrued to farmers due to this notification; as the restrictions on cutting of these species were already withdrawn vide notification dated 28th November 1997. In fact, felling permits and transit pass restrictions were not in force in the Haryana state at the time of its formation except the areas of Shiwalik and Aravalli hills closed under Punjab Land Preservation Act (PLPA), 1900. Haryana Government vide notification dated 28th November 1997 & 29th March, 2011 exempted the cutting of Eucalyptus & Poplar, *Ailanthus excelsa*, Amrood, Bakain and bamboo species in closed areas under PLPA.

2.4 As a result, within a decade these two forest deficit states came in the category of wood-surplus states. Practically, in India the total supply of wood is coming from either from trees outside forests or imported woods when virtually extraction of wood stopped from forest areas. A report of FAO in 2014, based on the data published in SFR, 2013 showed the scenario of wood supply in the country vis-à-vis the status in the world and Asia as follows:

Area (Million ha)					Annual Industrial log production (million cum)		
	Geographic Area	Forests	Plantation	Plantation (%)	Forests	Plantation	Plantation logs (%)
World	14800	3683	187	5%	1121	562	33%
Asia	4381	432	116	21%	201	151	43%
India	328	70	9	11%	3	46	93%

Table 4. Forest and Plantation areas and production levels

Source: FAO Report 2014 & SFR 2013

- 2.5 According to the estimated growing stock from TOF areas in three successive SFRs of 2011, 2015 and 2017 are 1548.43, 1573.34 and 1604 M Cu. Mt. respectively whereas estimated annual potential production from TOF are 44.34; 69.04 and 74.51 M Cu. Mt. respectively.
- 2.6 A status report, titled “*Wood is Good*” published by Centre for Science and Environment (CSE) in 2017, estimated annual timber availability 70.9 M Cu. Mt. whereas annual consumption 68.9 M Cu. Mt. Out of the total availability, 3.175 M Cu.Mt.is obtained from the natural forests and Forest Development Corporations (FDC); 44.34<sup>1</sup> M Cu. Mt. from TOF; 5.38 M Cu. Mt. bamboo and 18.01<sup>2</sup> M Cu. Mt. from imports. Besides, 385.25 M Cu. Mt. is obtained annually as fuelwood from both forests and TOF.
- 2.7 Even if the annual production of timber as estimated by CSE used data sets of different years, we may not get exact figure of annual production and consumption of wood but it is certain that a substantial part of annual production of timber is generated from trees outside forests. Similarly, at present looking to increasing trend of obtaining timber from TOF; the increasing import of timber is not justified as the production of timber from forests is fairly constant. The sustenance of humanity needs to be the primary objective of having more trees on the surface of the earth and its ecological functions should be the only criteria like amelioration of climate, sequestration of carbon, purifier of water, driver of water cycle or instrumental behind the soil and moisture conservation. All other attributes like getting wood or non-wood products from trees should be secondary.
- 2.8 India is one of the countries where per capita tree is very less compared to other nations in spite of a congenial climatic condition.
- 2.9 Total number of estimated trees in India is around 35 billion and due to huge demographic quotient, per capita tree in India as per a study conducted by Yale University in 2015 was found only 28, where as in Canada per capita tree was found 8953 and a small nation like Suriname in southern hemisphere with less than million population had 15,273 trees per person

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<sup>1</sup> CSE used data of 2011

<sup>2</sup> CSE used data of 2015

2.10 Russia due to its huge size has maximum estimated trees like 682 billion, followed by Canada, Brazil and USA. Desert countries of Middle East or Sahara Desert of Africa have almost one tree per person. Thus trees are “natural wealth” of a country as well as “natural asset” for the human beings of that country. If eco-system services will be counted towards calculation of GDP, countries with large areas and less populated countries will get maximum benefit.

### **3. Discussion**

3.1 Since the economics will be the main driver in planting outside forests including agro-forestry/farm forestry, relatively short rotation tree crops will remain major outputs from non-forest areas. Sustainable wood based industries have equal demand for both short rotation and long rotation crops. State Forest Departments(SFDs) or FDCs can afford to grow long rotation tree crops and supply to markets whenever required otherwise it will have to be imported from outside. At the same time, both forest and non-forest land plantation should not be very costly otherwise industries as well as consumers will tend to import it from places where it is cheaper, left to free market.

3.2 India has huge potential of wood-based industries and considered to be an emerging wood market. However due to absence of scientific and efficient wood processing in the hands of a largely unorganized sector, this sector did not make any impetus. Absence of adequate skill manpower is also a major bottleneck. ITTO report, 2004 mentions that India’s domestic supply of round-wood is insufficient to meet its growing demand and therefore import of industrial wood has grown three folds in last decade. Growth in reality and housing sectors, despite being the major driver in timber demand is not getting commercial hard wood timbers like teak, shisham, rosewood, red sanders etc. due to strict conservation policy, ecological concerns and regulatory regime in harvesting of these valuable species. Present NFP, 1988 favours import of wood while restrict export. At the same time, the policy of using wood substitutes did not able to boost up demand of wood in the domestic market. Only the present policy able to increase the supply from TOF areas and over two decades nearly 93% of the demand of industrial wood could be met from TOF area in spite of negligible supply of wood from natural forests.

- 3.3 According to a report in 2016 by South Carolina Forestry Commission solid wood products have not been found predominantly in Indian construction and as per 2011 Census report, the use of wood/bamboo is only 3.4% in flooring, 5.4% in wall and only 15.58% in roof construction. Actually, the growing middle-class population with rising income level shows more inclination for imported lumbers of soft and hard wood varieties for application in building projects, particularly in finishing and furniture uses.
- 3.4 Wood being a renewable resource and low Carbon footprints are now more preferred to other wood substitutes like steel/aluminium which are non-renewable and very high Carbon footprint.
- 3.5 Since a large extent of forest and non-forest areas are presently underutilized in India, there is a great possibility of growing wood in these areas through the sustainable management of both forest and non-forest land. Nearly 40% of forest area is degraded, which is nearly 9% of the total geographic area, similarly it is 11% of GA falls under cultivable wasteland and fallow land and 55% land are cultivated. By adopting farm forestry in 20% area and agro-forestry on cultivated land, more than 100 M Cu. Mt. wood can be grown annually which can be mixture of hardwood and softwood. This will be sufficient for meeting the domestic demand and carry on with international trade so that in a reasonable time India can go from a net importing country to net exporting country in wood commerce. Reason behind restrictive growth of wood commerce in India is well known and discussed in this Report earlier. However, through sustainable management of TOF, not only the forest can be conserved for its rich bio-diversity and ecological security of the country but ensure sustained supply of wood and non-wood products for meeting needs of domestic market and still be in a position to have surplus for exports.

#### **4. Recommendations**

For sustainable management of Tree Outside Forest, the Ministry of Environment, Forest and Climate Change need to play a pivotal role through Policy Intervention, Institutional Mechanism and Sustained Funding.

##### **4.1 Policy Intervention:**

- 4.1.1 Department of Forest & Wildlife under the MoEF&CC may co-ordinate with Department of Land Resources under the MoRD to go for ambitious afforestation with intensive Soil-Moisture-Conservation on degraded wasteland currently under schemes of RD Ministry.
- 4.1.2 Larger chunks of wasteland may be leased to Corporate Industries for development under their CSR funds keeping safeguards for the interests of local community and wildlife.
- 4.1.3 Government of India with willing State Governments may consider a Scheme in collaboration with some national level voluntary forest certification agency to involve interested common citizens, private entities, NGOs and Corporates in tree plantation on some identified Government Waste Land for neutralizing their carbon footprint. The certification agency will be entrusted to independently monitor that appropriate trees/species are planted, geotagged and recorded in its registry and stipulated biomass/carbon sequestration is ensured as per a credible methodology, and a certificate is issued to the contributing agency every five years, to the effect that stipulated carbon sequestration/credit is available in favour of the contributing agency. It will encourage the citizen to plant trees and additionally help in meeting Nationally Determined Contributions (NDC) commitments of the country by 2030.
- 4.1.4 Plantation along village roads, tank foreshores, village common lands may be undertaken under MGNREGA involving the rural youth.
- 4.1.5 Agro-forestry may be taken on the private agriculture land of willing farmers under IWMP and NRLM/SMAF/National Bamboo Mission.
- 4.1.6 Combating Desertification Program may be taken up by the MoEF&CC in the hot desert areas of Rajasthan/Gujarat and cold desert areas of J&K/HP through Shelter belt Plantation/Sand Dune Stabilization/Agro-Forestry, out of special assistance from UNCCD/GEF projects.
- 4.1.7 MoEF&CC may ensure continuous funding for Tree Improvement & Tree Breeding Program through at least 10% amount of CAMPA Fund to supply QPM for higher productivity in forest as well as TOF area.

- 4.1.8 A National Forest Seed Corporation and State Forest Seed Corporations should be established for supplying certified seeds.
- 4.1.9 Regulatory mechanism as provided in the Forest Act should be simplified and withdrawn in a phased manner by taking advantages of technological advancement by Forest Governance.
- 4.1.10 Wood Based Industries and other Industries dependent on tree based products -may be encouraged under Make In India program. These industries should get the benefit of tax holidays proportionate to their catchment area of agro-forestry expansion.
- 4.1.11 Rural unemployed youth may be imparted green skills like wood work and carpentry, raising of nursery for QPM, organic farming, urban forestry, value addition in bamboo and cane products, wood carving etc.
- 4.1.12 e-Procurement policies are already in place and functional in the government systems. It ensures an open, transparent and fair procurement approach. The next systematic approach that can be emphasized in central, state and local level government departments is Green Public Procurement of wood and wood based products. The wood and wood based products procured are *construction & furnishing items* like doors, windows and window frames, panelling, etc. *furniture & decorative items* like tables, desks, cabinets and lastly *paper products* like copier paper, files, notebooks, etc. The step that lies ahead in the procurement of these products is ensuring and introducing green, sustainable and certified procurement.
- 4.1.13 MoEF&CC, DAC&FW and Commerce Ministry can work together to review current EXIM Policy and take a time bound balanced approach to make India, a net exporting country in wood and wood products from current situation of net Importing country in wood and wood products.

## **4.2 Institutional Mechanism**

- 4.2.1 MoEF&CC is directly responsible for country's forest land spread over its quarter of total Geographical Area. However, with increasing areas under Tree Outside Forest inclusive of Agro-Forestry which not only contributing to total green cover but also creating

additional carbon sink of 2.5 to 3 billion MT of CO<sub>2</sub> for achieving India's intended nationally determined contribution targets in forestry sector.

- 4.2.2 Tree outside Forest is also making a significant contribution in meeting 93% of domestic demand of industrial wood. Forest Survey of India, a sub-ordinate body under MoEF&CC in every two years interval not only mapping the area but also estimating the growing stock and carbon stock of the area. Therefore, it is imperative that irrespective of ownership of land, these scattered trees distributed over the landscape need to be cared and protected. Management of TOF, being an added thrust area as per the future Forest Policy to be enunciated shortly, it is high time now to have a proper Institutional Mechanism in place.
- 4.2.3 Since various Ministries of Central Government, PSUs, Departments under State Governments, PRIs are custodian of lands, their vacant lands can be used for tree planting purposes, the Ministry of Environment, Forest & Climate Change can play the role of Nodal Ministry to co-ordinate with Central Ministries/PSUs as well as with State Governments to get these vacant lands for plantation purposes only to make them productive. State Forest Departments can provide planting materials and technical support in this venture.
- 4.2.4 Keeping in view these developments, it is strongly suggested that a separate Division may be established in the MoEF&CC under the Department of Forest & Wildlife and an IGF rank officer may be posted for full time to co-ordinate with other Ministries and Government of States/UTs and facilitate expansion of TOF area in the country. This Division will coordinate with MoAC&FW for agro-forestry/ Farm Forestry, Urban Development Ministry for enhancing green spaces in urban areas, NHAI for roadside plantations, Ministry of Railways for planting along Railway side, Ministry of Water Resource for planting along water courses etc.
- 4.2.5 This division at MoEF&CC will co-ordinate with states and central agencies like FSI, Dehradun and CAFRI, Jhansi for maintaining a reliable database for TOF and validate it time to time with Centralized Database maintained at FSI.



- 4.2.6 Agro-forestry, a major subset of TOF will continue to be under MoAC&FW and as envisaged in the NAF, 2014 will be looked after by a Mission or Board for implementing the agro-forestry policy. But without a strong inter-ministerial coordination, programmatic convergence, financial resource mobilization and leveraging, capacity building facilitation besides technical and management support, a path breaking development appears to be impossible in the field of agro-forestry. Coordinated R&D support between Indian Council of Agriculture Research (ICAR) and Indian Council of Forestry Research & Education (ICFRE) will provide desired boost to Agro-Forestry. Similarly, without a close linkage between KVKs and VVKs, it will be impossible to mainstream agro-forestry with Indian agriculture for ensuring both food and wood security as well as challenges posed by climate change on Indian agriculture.
- 4.2.7 Ultimate success of agro-forestry will basically depend with better state and district level co-ordination between Forest and Agriculture Department. Both these departments should work hand in hand. Unless State Forest Department will ensure availability of certified QPM from their certified Nurseries and liberalize regulatory mechanisms of tree felling and hassle-free transit permits to farmers, agro-forestry can never be adopted in large scale and attaining 33% green cover of the country will remain as a myth.
- 4.2.8 Forest rich states may consider setting up a Special Wing or a separate Directorate for Social Forestry in the pattern of Maharashtra state to give a focused attention on Social Forestry so that more non forest lands can be put under tree cover in order to meet needs of timber and small timber besides NTFP from outside of natural forests. Of course, in forest deficit states, SFDs can go for plantations in both forest and non-forest areas.
- 4.2.9 Voluntary market mechanism for management and marketing like e-NAM, certification, A/R CDM projects, etc. should be supported and promoted by government.

### **4.3 Sustained Funding**

- 4.3.1 Since a dedicated green cover is a national imperative, Central Government and State Governments should provide sufficient funds under Green India Mission (GIM), which is one of the eight missions under the National Action Plan on Climate Change (NAPCC).

- 4.3.2 Out of the Net Present Value component of CAMPA Fund, at least a certain portion (5%) may be set apart for R&D in forest to raise certified QPM. Indirectly, this will benefit in use of plants in TOF area.
- 4.3.3 25% of the CSR Funds of the Banking Institutions/PSUs can be set apart as Tree Planting Funds and can be used for plantation of TOF area.
- 4.3.4 MoEF&CC can encourage for ODA funding for Donor assisted Social Forestry Projects to expand TOF.
- 4.3.5 Various committed International Funds like GEF (Global Environmental Facility), GCF (Green Climate Fund), NAFCC (National Adaptation Fund on Climate Change) can be effectively utilized for assisting vulnerable states. Looking to the vast scope of Combating Desertification in arid states such funds can be spent for increasing TOF.
- 4.3.6 The sub-Mission on Agroforestry is operational under the umbrella of NMSA and funding pattern is 60:40 from Center and State share. But for 8 Himalayan States like North East, HP, UK and J&K, funding pattern is 90:10 and for UTs 100% Central assistance. Funds are provided to states having notified exemption of species from transit rules.
- 4.3.7 Farmers are going to be benefitted from subsidy under National Bamboo Mission (NBM) and Mission for Integrated Development of Horticulture (MIDH) where farmers will plant bamboo on their fields to supplement their farm income and help in increasing green cover.
- 4.3.8 1% of Total Project Cost of Highways projects is kept for Green Highways Fund for development of green corridor and management
- 4.3.9 It is proposed to establish institutional tie-ups with agroforestry industries (pulp, paper, bio-ethanol, floriculture etc.) for the buyback of sustainable harvest. This collaborative model is expected to generate desired funds, manpower and technological resources for the Green Highways Project.
- 4.3.10 Plantation of non-edible oil bearing plants would be declared as a priority sector for the purposes of lending by financial institutions and banks.

4.3.11 Internal fund raising and incentive mechanisms should be present encouraging farmers raise trees on their farms, assessing these for the carbon storage, providing a money value to this carbon, trading of these carbon credits and in turn achieving the NDC target.

4.3.12 Though some of the funding sources are mentioned above are only indicative but not exhaustive. Managers and Administrators may take innovative ways of converging funds from a particular source with ongoing schemes and programs run by the Government at local level to plant more and more saplings wherever possible. Since planted saplings are vulnerable to adverse climate and heavy biotic pressure, aftercare and effective protection are very much important. Without community involvement and stakeholders' participation these plants may not also survive till their maturity and become purposeful.

**Matrix showing recommendations, action points and responsible agencies**

**TOR VI**

<b>S. No.</b>	<b>Recommendations</b>	<b>Action Points</b>	<b>Responsible Agency</b>
1.	Forest & Wildlife wing under the MoEF&CC may co-ordinate with Department of Land Resources under the MoRD to go for ambitious afforestation with intensive Soil-Moisture-Conservation on degraded wasteland currently treated under various schemes of RD Ministry.	Coordination of MoEF&CC with DoLR of MoRD for ensuring synergy between various schemes.	MoEF&CC, MoRD, DoLR, SFDs
2.	Larger chunks of wasteland may be leased to Corporate Industries for development under their CSR funds keeping safeguards for the interests of local community and wildlife	Leasing of wasteland to corporate entities for development using CSR funds safeguarding the interests of local population in PPP mode	MoEF&CC, DoLR, State Revenue Department, SFDs
3.	Government of India with willing State Governments may consider a Scheme in collaboration with some national level voluntary forest certification agency to involve interested common citizens, private entities, NGOs and Corporates in tree plantation on some identified Government Waste Land for neutralizing their carbon footprint. The certification agency will be entrusted to independently monitor that appropriate trees/species are planted, geotagged and recorded in its registry and stipulated biomass/carbon sequestration is	(i) Monitoring of tree plantations and certification on stipulated carbon sequestration norms for availing carbon credit by individuals/agencies.	MoEF&CC & Nationally accredited Certification Agencies, FSI, SFDs

	<p>ensured as per a credible methodology, and a certificate is issued to the contributing agency every five years, to the effect that stipulated carbon sequestration/credit is available in favour of the contributing agency. It will encourage the citizen to plant trees and additionally help in meeting Nationally Determined Contributions (NDC) commitments of the country by 2030</p>		
4.	<p>Plantation along village roads, tank foreshores, village common lands may be undertaken under MGNREGA involving the rural youth.</p>	<p>Encouraging agroforestry plantation on farmers' lands, village common lands etc. under MGNREGA.</p>	<p>MoRD&amp;MoEF&amp;CC, State RD Departments, SFDs</p>
5.	<p>Agro-forestry may be taken up on the private agriculture land of willing farmers under IWMP and NRLM/SMAF/National Bamboo Mission.</p>	<p>Agroforestry promotion on private lands using IWMP, NRLM, Bamboo Mission funds etc.</p>	<p>MoRD&amp;MoA&amp;FW, DoLR, State RD Departments, SFDs , SADs</p>
6.	<p>Combating Desertification Program may be taken up by the MoEF&amp;CC in the hot desert areas of Rajasthan/Gujrat and cold desert areas of J&amp;K / HP through Shelter belt Plantation / Sand Dune Stabilization / Agro-Forestry, out of special assistance from UNCCD/GEF projects.</p>	<p>Combating of desertification using shelter belts, sand dune stabilization and agroforestry both in hot deserts and cold deserts may be taken in massive scale as these are repository of culturable wastelands in a continuous manner by tapping international funding.</p>	<p>MoEF&amp;CC&amp;MoRD, DoLR, SFDs, SADs</p>
7.	<p>MoEF&amp;CC may ensure continuous funding for Tree Improvement &amp; Tree Breeding</p>	<p>Ensuring funding for tree improvement/ breeding research sustainably from</p>	<p>MoEF&amp;CC, ICFRE, SFDs</p>

	Program through at least 10% amount of CAMPA Fund to supply QPM for higher productivity in forest as well as TOF area.	CAMPA funds for developing QPM	
8.	A National Forest Seed Corporation and State Forest Seed Corporations should be established for supplying certified seeds.	Establishment of National & State Forest Seed Corporation or collaborate with Agriculture Seed Corporations for supplying certified tree borne seeds from quality sources	MoEF&CC, SFDs
9.	Regulatory mechanism as provided in the Forest Act should be simplified and withdrawn in a phased manner by taking advantages of technological advancement by Forest Governance.	Simplification of the existing regulatory mechanism in Forest Act by taking advantages of technological advancements and mainstreaming it with Forest Governance	MoEF&CC, SFDs
10.	Wood Based Industries and other Industries dependent on tree based products may be encouraged under Make In India program. These industries should get the benefit of tax holidays proportionate to their catchment area of agro-forestry expansion.	Encouraging wood based industries and other tree based industries with tax incentives & holidays for agroforestry promotion under the ambitious Make-in-India program	MoEF&CC/ MoI, SFDs, State Labour&Indusries Departments
11.	Rural unemployed youth may be imparted green skills like wood work and carpentry, raising of nursery for QPM, organic farming, urban forestry, value addition in bamboo and cane products, wood carving etc.	Imparting of green skills on rural youth like QPM production, nursery, carpentry etc.	MoEF&CC&MoSD
12.	e-Procurement policies are already in place and functional in the government systems. It ensures an	Encouraging green public procurement of wood & wood based products for	MoEF&CC& DGSD, MoUD, CPWD, SPWDs, SFDs

	<p>open, transparent and fair procurement approach. The next systematic approach that can be emphasised in central, state and local level government departments is Green Public Procurement of wood and wood based products. The wood and wood based products procured are <i>construction &amp; furnishing items</i> like doors, windows and window frames, panelling, etc. <i>furniture &amp; decorative items</i> like tables, desks, cabinets and lastly <i>paper products</i> like copier paper, files, notebooks, etc. The step that lies ahead in the procurement of these products is ensuring and introducing green, sustainable and certified procurement</p>	<p>construction &amp; furnishing industries.</p>	
13.	<p>MoEF&amp;CC, DAC&amp;FW and Commerce Ministry can work together to review current EXIM Policy and take a time bound balanced approach to make India, a net exporting country in wood and wood products from current situation of net Importing country in wood and wood products.</p>	<p>Modification of EXIM policy for making India a net wood &amp; wood products exporter.</p>	<p>MoEF&amp;CC/ MoA&amp;FW and MoC</p>

## **Success Story 1**

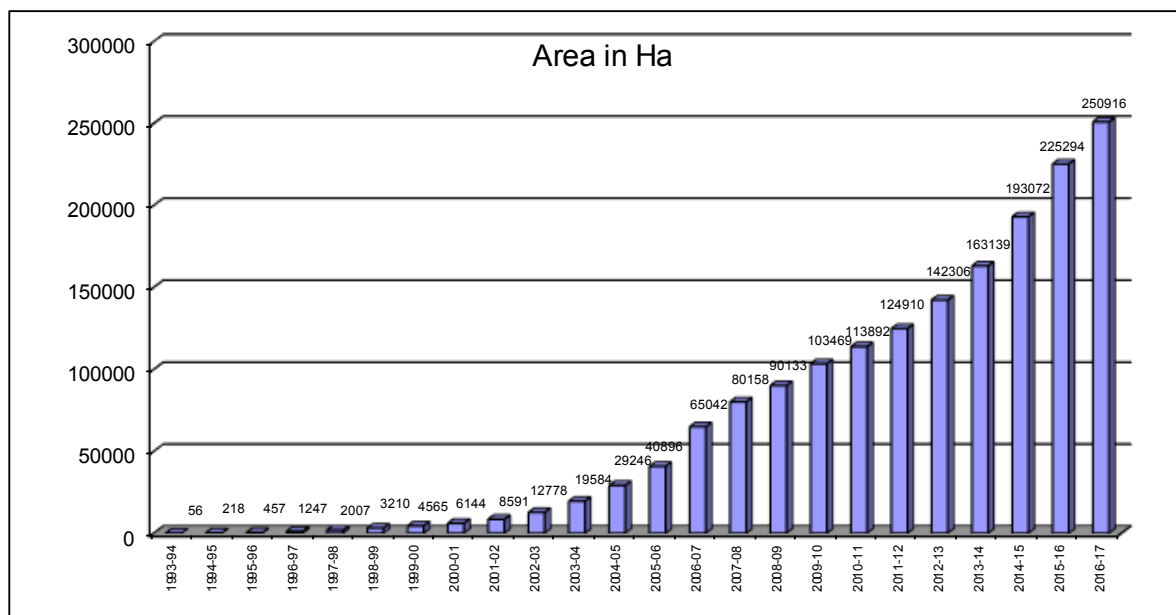
### **Growth of Farm Forestry and Agroforestry in India - ITC Case Study**

#### **Introduction**

The National Forest Policy (NFP) 1988 emphasized on the need for conservation of forests, and to increase the forest and tree cover in the country through massive afforestation and social forestry programs. Regarding the industrial raw material needs, the NFP 1988 recognized that raw material can no longer be sourced from forests and suggested that the necessary raw material should be raised by the industry by collaborating with the farmers and others. This prompted, the ITC to encourage and enable farmers to grow trees through farm forestry and agroforestry. To enable farmers to adopt to these plantations, ITC initiated Tree Improvement Programme (TIP) in 1989, which focussed on genetic improvement of planting stock leading to development of site specific, high productive and disease resistant clones of eucalyptus, Subabul and Casuarina of 107, 12 and 15 numbers, respectively. These clones are also called ITC or Bhadrachalam clones. Along with these clones, effort was also made to develop improved and site specific package of practice for each of the operational agro-ecological regions, to make the plantations competitive vis a vis agriculture crops.

Once TIP efforts got successfully translated and transferred to the field, which almost took 10 years, farmers began to realise its economic benefits, mainly on the strength of almost 400% increase in productivity of these clonal plantations vis-à-vis the option of seed-based plantations, which were available earlier. This development brought an exponential growth in farm forestry and agroforestry plantations in the states like Andhra Pradesh, Madhya Pradesh, Karnataka and Uttar Pradesh. It also created a massive wave of productive plantations in other states, supported by agencies such as Forest Development Corporations, Forest Departments and other pulp and paper mills which contributed immensely to increase in Tree outside Forests (TOF) between 2001-15. ITC itself raised more than 250,000 ha of farm forestry plantations during this period, in its promoted catchments in the states of Telangana, Andhra Pradesh (AP), Madhya Pradesh (MP), Uttar Pradesh (UP) and Karnataka, as indicated below. This can probably be termed as one of the largest intervention in TOF in the country by a single agency.





Further, as per the estimates of IPMA (Indian Paper Manufacturers Association) about 740,000 ha of farm forestry plantations have been raised in catchment areas of different pulp and paper mills in the country between 2001-02 to 2014-15, with the technical and extension support provided by these mills. It is also estimated that almost an equal extent of area has been brought under farm forestry beyond the reported mill catchments with the support of private and government nurseries during this period. The contribution of this massive afforestation drive was visible from the fact that the pulp mills were sourcing only 13% of their requirement from forests in 2013 (CSE 2013), against 90% in 1990.

Plantations under TOF in India are one of the most productive wood resources when compared with the same at Asia or at global level, as indicated in Table 1 below. Also, it is estimated from field studies that about 10-15% of a tree harvested for pulpwood, plywood or timber gets converted as fuelwood. Quantity of such fuelwood obtained from forestry plantations is approximately 7.5-8.0 million tonnes/annum (IPMA 2015). Thus farm forestry as well as agroforestry have contributed significantly in mitigating the pressure for industrial wood as well as fuelwood on natural forests particularly in the post-NFP period

According to the India State of Forest Report (ISFR 2015) prepared by the FSI, the extent of forest cover and tree cover is 70.18 and 9.26 mha (million hectare), respectively. Further, the FSI has estimated an increase in the forest and tree cover by 4.17 mha between 2001 and 2015. The tree cover alone has increased by 1.1 mha during this period. ToF plantations have buffered the pressure on forest for biomass and played a vital role in forest transition in India (Singh 2016). About 93% of the industrial logs are sourced from farm forestry and other plantations in India as indicated below.

Table 1- Forest and Plantation areas and production levels

	Area (Million ha)				Annual Industrial log (million cum) production from		
	Geographic Area	Forests	Plantation	Plantation %	Forests	Plantation	Plantation logs %
World	14800	3683	187	5%	1121	562	33%
Asia	4381	432	116	21%	201	151	43%
India	328	70	9	11%	3	46	93%

Source: FAO Report 2014 & SFR 2013

### How farm forestry is different from agroforestry?

Farm forestry and agroforestry, both involve growing of trees in agriculture farm lands, however the two differ in terms of crop composition. In farm forestry, the crop consists entirely of trees so grown, and in agroforestry, trees are grown mixed with agricultural crops. Here it would be relevant to mention that agro forestry is defined as growing of tree crops along with suitable agriculture crops, on a wider spacing basis in the farm or on the farm bunds whereas farm forestry can be termed as growing tree species in blocks in farm/agriculture lands. In a wider context, agro forestry can be considered as a subset or a model of farm forestry.

Further, farm forestry and agroforestry programs have the potential to reduce the vulnerability of agriculture sector and rural livelihoods to current climate variability and climate change in the long term. In this case study, we also assessed and identified the drivers of farm

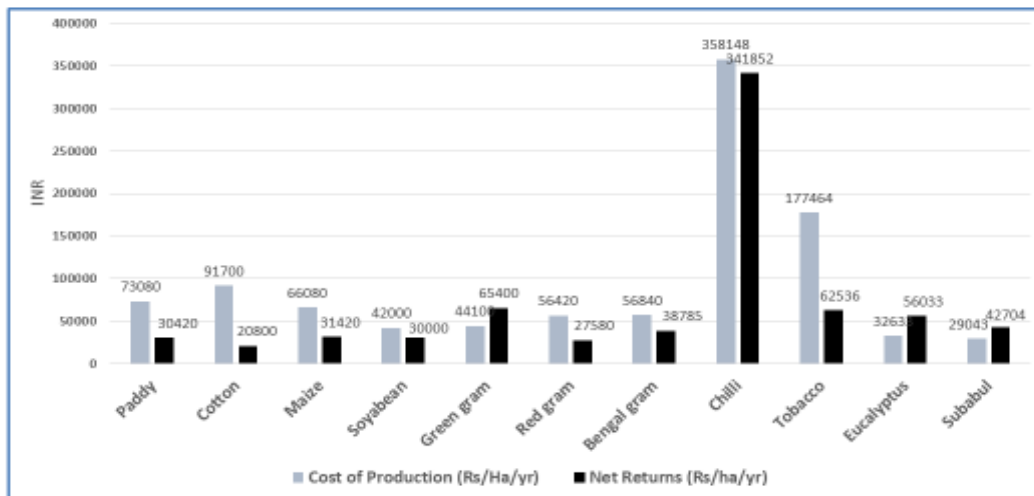
forestry/agroforestry in India and discussed the need for policy reforms in light of the lessons learnt.

### **Farm forestry/agroforestry- the growth drivers**

A detailed evaluation of the productivity and competitive viability of tree crops (Eucalyptus and Subabul clones) has been done by ITC in Andhra Pradesh (AP) and Telangana states in 2014 (ITC 2014) and again in 2016 (ITC 2016). Farm forestry has been extremely successful in these states on the strength of the following:

- Simplification of the regulatory regime pertaining to tree felling and transit restrictions
- Availability of suitable-size land holdings and quality of land
- Demand for industrial wood
- High enterprise level of farmers

It is found that on the basis of annual profitability, these tree crops fair extremely well vis-a-vis almost 60-70% of the agriculture crops grown by the farmers in this agro-ecological region. The figure also shows that a major driving factor for competitive viability of these tree crops under farm forestry has been higher level of farm gate price realised by the farmers on annualised basis. Farm gate price is the per metric ton price realised by the farmer for felled, billeted and debarked wood in case of Eucalyptus, and felled, billeted and with-bark wood in case of Subabul.



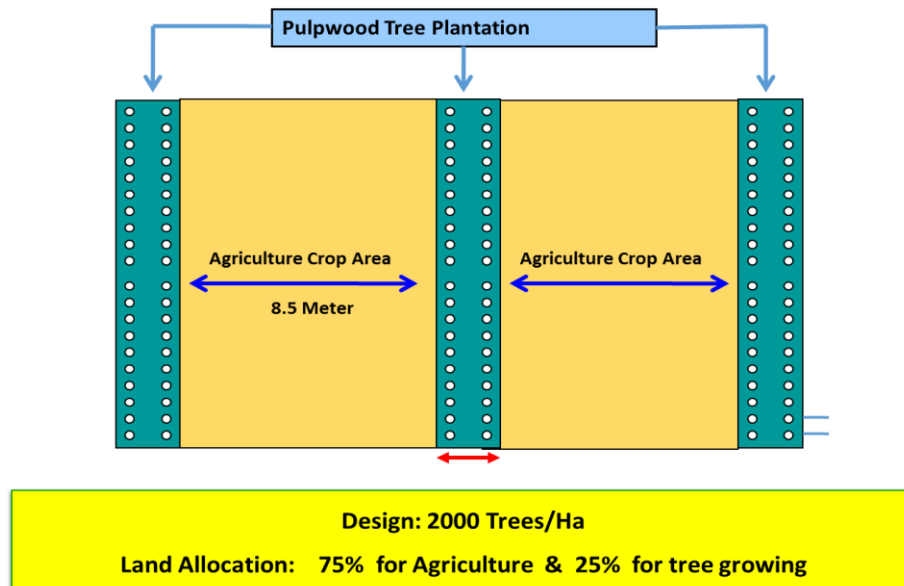
- Cost of production includes all input costs, for the crops
- Net returns indicates sale realisation from crops produce minus cost of production
- Agriculture crops annual in nature, whereas Eucalyptus and Subabul are harvested after 3 years; 12% annual interest on cost considered to compare the agriculture crops with Eucalyptus and Subabul
- Land rental values have not been taken in to account for any of the crops

Chart 2: Comparative crop economics of plantations and agriculture crops in Telangana in 2016

### Why agro forestry works better?

A mixed crop productive model of farm forestry has been developed by ITC, which has also been validated by CRIDA (Central Research Institute for Dryland Agriculture). It is termed as agro forestry model, and is being implemented by ITC in the states of Telangana, AP as well as UP, Punjab and Haryana. It is based on mix of tree species such as eucalyptus and poplar with agriculture crops such as mustard, maize, cotton, wheat and pulses. Agro forestry model promoted by ITC in Telangana and Andhra Pradesh is based on eucalyptus species of trees and involves raising of paired row of trees at 1.5 meter x 1.0 meter spacing, with each paired rows separated by 8.5 meter, as indicated in Chart 3 below. It leads to planting about 2000 trees/ha, which is almost equivalent to the number of trees planted in a block plantation (3 meter x 1.5 meter) under farm forestry. Area of farm occupied by trees and agriculture crop is in 25:75 ratio. Income from agriculture crop is realised every year, and from tree crops it comes after 4 years of planting, which mitigates the risk of any potential agriculture crop failure due to draught, floods, pest and disease. Land profitability under agro forestry model improves by 60-70%, in a 4 years cycle, vis-à-vis the same, if land is used entirely for agriculture or for tree plantation under farm forestry.

Chart 3: Mixed crop agroforestry model developed and implemented by ITC, Bhadrachalam in Telangana and Andhra Pradesh



In case of agro forestry on Poplar tree species, promoted in Punjab, Haryana and UP by ITC, trees are planted at 5 meter x 4 meter spacing, with agriculture crop grown in between the rows. In some areas, agro forestry is also promoted with eucalyptus or poplar trees planted on bunds at 2 meter spacing.

**Picture 1: Poplar and eucalyptus tree species based agroforestry in north India**



**Poplar with mustard**



**Eucalyptus with maize**

Study also suggested that the states where agro forestry has been introduced successfully by ITC, are also the states where farm forestry has been extremely popular, on the strength of enabling policy and regulatory framework and presence of market driven wood supply network.

Implementation of agro-forestry model, has increased annual profitability of land, as well as has been able to provide much desired wood and food security in national context. In the states of AP and Telangana, agro forestry based plantations of eucalyptus has grown from 500 ha/annum in 2011 to about 7000 ha/annum in 2016. This model provides a win-win situation for industry as well as for the farmers, as it reduces the burden of competitive profit realisation entirely on tree crops/wood produced, thereby making plantations profitable even at reduced farm-gate price (price realised by the farmer for standing crop on Rs./MT basis). This model also ensures that farm forestry penetration level (% of net sown area covered in a region by farm forestry plantations) is maintained at considerable high level, even with lower farm-gate price. Major benefit to Indian wood industry would accrue, if in coming years, considerable areas of farm forestry is brought under coverage of agro-forestry model.

### **Farm forestry-what did not work?**

Growth of farm forestry plantations have also been studied in the states of Madhya Pradesh (MP), Chhattisgarh and Jharkhand. The study indicates that regulatory provisions in terms of requirement of felling and transit permissions have hampered its growth in these states. Though transit pass requirement have been relaxed in these States after 2010 (for eucalyptus), inability of the administrative system to ease it fully at the field level continues to hamper the growth of farm forestry in these states. Also, experts like Dr. Kulkarni believe that presence of large contiguous tracts of forests and rocky areas pose constraints in terms of non-availability of large areas of contiguous private holdings and of good soil depth in these states. Soil of about a meter depth, is required for productive and viable farm forestry plantations. These constraints seem to have denied any potential opportunity to industries to develop large wood producing catchment. Assessments carried out in Odisha show that proactive approach of Government towards relaxing transit pass requirement for farm forestry tree species and the relentless efforts by industries such as Ballarpur Industries Limited (BILT) and JK Paper have enabled development of farm forestry plantation areas in Koraput district of the state. However, the growth of farm forestry would have been far more intensive and widespread, if removal of regulatory framework in terms of felling restrictions, could also have been eased and implemented at the field level. Enabling regulations potentially promote growth of farm forestry as well as help farmers in realising appropriate farm gate price.

There has been another type of limiting factor created by a protective regulatory regime implemented in the state of Tamil Nadu (GOT 2010), which does not allow felled and debarked farm forestry based eucalyptus wood to be transported outside the State. Apparently, it aimed to protect the pulpwood industries operating in the state. But, it went against the interests of the farmers, as it made it difficult for them to realise competitive and market driven farm gate price (ITC 2016). Average farm gate price for eucalyptus in Tamil Nadu has always been about 20-25% lower than the same in the adjacent states of Andhra Pradesh and Karnataka (ITC 2015). This constrained the growth of farm forestry plantations in the state and compelled the industry to bring required pulpwood from neighbouring states of Puducherry and Karnataka (ITC 2016) paying a much higher transportation cost.

Honourable National Green Tribunal (NGT) in its order dated 20 July 2015 in the Original Application number 9 of 2014 has clearly stated that based on the studies conducted in different countries, growing of eucalyptus - one of the major farm forestry species - has no adverse environmental impact per se and it is not disastrous for ground water table (para-31); eucalyptus consumes less water per unit of biomass generated compared to many other tree and agricultural crops (para-29). Studies show that impact of adverse perception of eucalyptus has been so huge that in 2013, when eucalyptus farm gate price increased by more than 30%, penetration level of farm forestry kept on showing a negative trend in Karnataka. Subsequently it is found that Karnataka Government has banned raising of eucalyptus plantation in the State, which would have immense adverse impact on growth of farm forestry/ ToF.

### **Learnings for the future**

Farmers have gained significantly from farm forestry/agroforestry plantations in the states of AP, Telangana, UP, Karnataka, Gujarat, Haryana, Punjab and Uttarakhand by way of improvement of marginal/degraded lands and increased profitability of their land holdings. It has also reduced the risk on account of failure of crops, and has contributed immensely to increased soil and water conservation, organic nutrient recycling, as well as making available fuelwood and fodder. Farmers in Telangana and Odisha catchments have also willingly adopted forest certification for their plantations. Forest certification ensures international benchmarking of existing management

practices as well as legal and statutory compliances. This gives a niche value to the certified wood produced by the farmers as well to the products, manufactured out of such certified wood.

One of the learning for Indian wood industry, from last fifteen years of farm forestry growth in the country, has been that it has helped the industry survive, after their raw material supply stopped from forests, due to policy shift brought in by the National Forest Policy, 1988. It has ensured availability of wood, as a vital raw material for the wood based industries. Another learning has been that industry could have avoided and adapted to the down side of cycle of farm forestry growth as well as upside of the cycle of farm-gate price through long-term planning and by envisaging a moderate but competitive farm-gate price for a longer duration. The following measures can potentially enhance cost competitiveness of the wood-based industries:

- Increased scale of manufacturing;
- Incentivised wood sourcing from nearer catchments to reduce transportation costs;
- Increased productivity of farm forestry plantations by developing new clones and optimizing site specific package of practices; and,
- Extension and hand holding programmes for adoption of farm forestry and agroforestry models.

Farm forestry plantations benefit us by *in situ* soil and moisture conservation, ground water recharge, soil enrichment<sup>1</sup> due to accumulation of leaf litter and (leguminous) intercropping, and, direct sequestration of carbon in trees. To demonstrate the carbon sequestration potential of farm forestry, 3070 hectare farm forestry plantations raised in Khammam district of Telangana were registered (registration no. 2241) by ITC in 2009 as reforestation CDM (Clean Development Mechanism) project under Kyoto Protocol of the UNFCCC (United Nations Framework Convention on Climate Change). In December 2012<sup>1</sup>, 4,03,610 CER (Certified Emission Reduction) carbon credits were issued to the project for the period 2001-2009. According to the Ernst and Young LLP Independent Assurance Audit<sup>9</sup>, about 5.12 million tonnes of CO<sub>2</sub> has been sequestered in the farm forestry plantations (2,25,000 hectare) of ITC during the assessment year 2015-16. India has submitted its Intended Nationally Determined Contributions (INDC) to the UNFCCC, wherein it is committed to create an additional carbon sink of 2.5-3 Gt CO<sub>2</sub>e through enhancement of forest and tree cover by 2030. Growth of farm forestry plantations across the



states can potentially make significant contribution towards meeting the abovementioned carbon sequestration target. A policy framework that encourages farm forestry is necessary to actualize carbon sequestration benefits for climate change adaptation and mitigation.

From the policy evolution perspective, the following learnings emerge.

- The penetration level of farm forestry and agroforestry needs to be expanded in the existing wood catchments or new wood catchments to support industry as well as rural livelihoods.
- Agroforestry holds immense potential for reducing the livelihood risks of farmers as it combines more vulnerable agriculture crops with trees.
- Lack of enabling policy and regulatory framework inhibits the growth of farm forestry/agroforestry even when favourable attributes such as land availability, land quality, enterprise level of farmers and demand for wood, are available.
- Leasing of land for farm forestry/agroforestry could be permitted on pilot basis to assess its potential for adoption as a mainstream mechanism for production of biomass for household use and industrial wood. Jacking up the scale of farm forestry/agroforestry activity may lead to efficiency of resource use, effectively of implementation and wider participation by local communities.
- To improve cost competitiveness of domestic industry, it is also important that next phase of farm forestry growth is focussed in the states which have been laggard in this regard, in last two decades. This can happen only when concerned state governments, forest departments and industries join hands and work in unison.
- Easing out felling and transit restrictions on farm forestry/agroforestry tree species is necessary to realise their full potential and to benefit the farmers. In this regard, Bansal Committee instituted by the Ministry of Environment, Forest and Climate Change (MoEF&CC) in 2012 on “The Regulatory Regime on Felling and Transit Regulations for Tree Species Grown on Non Forests/ private Lands” has recommended full exemption for eucalyptus, poplar and certain other species that are generally not found in natural forests from the regulatory regime of felling and transit permits. The Committee recommends a benign regulatory mechanisms controlled by local village institutions/ panchayats/ forest

officers for the species that commonly grown by farmers and are also found in natural forests locally.

**(Contributed by Mr. Suneel Pandey, VP, ITC Ltd.)**

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## **Success Story 2**

### **Growth of Agroforestry in Haryana**

The north Indian State of Haryana is one of the smallest State of India. It has Shiwalik hills in the north-east, Aravalli hills in the south, fertile plains in the central region and aeolian plains in the west. The climate of the state varies from moist sub-tropical in north bordering Himachal Pradesh to arid in the southern part bordering Rajasthan. As per the 2011 census, Haryana has population density 573 persons per sq. km. Haryana is predominantly an agricultural state where more than 80% of the land area is cultivated. Haryana state which was carved out of Punjab state in 1966 was deficient in forest resources at the time of its formation. A massive afforestation was undertaken on the lands along the railway lines, roads & canals, on common and institutional lands for meeting the demands of fuel, fodder, timber.

#### **Advent of Social Forestry**

Initially, the activities of the department were confined to provide planting material and technical guidance to the farmers, which did not yield much result. But the real breakthrough was achieved during early 1970s, when a 'Crash Scheme for Rural Employment' was implemented in which the department took over the entire responsibility of planting farmlands free of cost. Under the Extension Forestry Scheme, the department planted trees in farmlands which served as demonstration plots for the farmers. To consolidate forestry activities in the state, the department implemented externally-aided projects like, Social Forestry Project (1982-91) of World Bank, Aravalli Project (1992-99) of European Union, Haryana Community Forestry Project (1998-08) of European Union and Integrated Natural Resource Development Project (2004-11) of JICA. These projects mainly created forest resources on non-forest lands and contributed towards wood production besides increased the forest & tree cover (FTC) of the state.

In the past, seventy five percent of the planting on non-forest lands was undertaken through distribution of free plants, whose success rate was very low; hence strategy was changed to planting of farmlands by the department itself during 2012-13. Presently, the clonal eucalyptus is planted free of cost for small and marginal farmers under the scheme of farm forestry, while free planting for all categories of the farmers under the schemes of "waterlogged areas and pollution

control along highways”.Presently, the quantum of plantations on non-forest lands is about 60% of the planting activities in the state.

### **Enabling Environment**

In the Haryana state, there was no restrictions on felling of trees from non-forest lands except the areas of Shiwalik and Aravalli hills which were closed under the Punjab Land Preservation Act, 1900 (PLPA). To encourage the agro-forestry, Haryana Government vide notification dated 28<sup>th</sup> November, 1997 & 29<sup>th</sup> March, 2011 (exempted the cutting of Eucalyptus & Poplar trees and subsequently Ailanthus, Amrood, Bakain, Bamboo species in areas closed under PLPA. The State of Haryana does not have any Timber Transit Rules since the formation of the state; hence the farmers bring their wood for sale in Yamuna nagar timber market which provides better rates as compared to other timber markets. Haryana Government vide notification dated 4th March, 2008, under Punjab Agriculture Produce Marketing Act 1961 declared the wood of Poplar and Eucalyptus as agricultural produce just to collect the marketing fees on its sale (enclosed as annexure -iii). Also, there was no restriction on the establishment of wood-based industries (WBIs) in the state before those were regulated by the Hon’ble Supreme Court in 2002. Hence, the absence of regulations on tree crops also helped in encouraging tree farming in Haryana state.

### **Increase in Wood Production**

With the passage of time, Haryana Forest Department, FRI and WIMCO made extension activities for popularizing the high yielding varieties of Poplar and Eucalyptus, which reduced the harvesting period of tree crops and increased the profitability of farmland plantations. This development led to large scale farming of tree crops by farmers in this region, which increased the availability of farm-grown wood that not only helped in expanding the wood-based industries in Haryana state, but also led to large scale export of wood & wood products to other wood deficit states. An effort has been made in succeeding para to quantify the achievement under agro-forestry in Haryana state. In the Haryana state, the estimated wood production in different years, were as follows.

Table: 1. Wood Production in Haryana

Year	Wood Production (lakh cum)
1985-86	13
1993-94	16
2006-07	22

Central Empowered Committee of the Hon'ble Supreme Court estimated the wood production of 22 lakh cum in the state for licensing of wood-based industries (Anonymous, 2007). The average annual yield from the forests of the state was about 1.5 lakh cum and the remaining 20.5 lakh cum was from non-forest lands (about 14 times of the yield from RFAs). The area under FTC in the state was 6.6% of its geographical area, out of which forests in 1.7% of its area and Trees outside Forests (TOF) of the state is about 4.9% of its area. TOF also consists of plantations along Rails, Roads and Canals (RRC), known as strip forests which are under the management of forest department. The strip forests cover about 1.8% area of state along roads, water courses & railway tracks and the estimated area under farmland plantations is 3.1 % of the geographical area of the state. However, in ISFR-2017, a decline in wood production from Haryana is reported by FSI in comparison to the year 2006-07 but it is not consistent with the reality. Inadequate sampling size appears to be major constraint behind the gross underestimation of timber production in the state.

### **Development of Wood-based Industries**

Over the years, Yamuna nagar city has developed into the biggest market of farm-grown wood of the country as the wood worth Rs 1000 crore was traded during 2002-03 (Bisht et al., 2008). Looking at the annual turnover of this market, it is estimated that about Rs 500 crore is going back to the tree growers of this region of the country through agro-forestry (Bisht et al., 2008). The forest department estimated that arrival of wood from Haryana was about 9.3 lakh tonnes while 16.9 lakh tonnes of wood from adjoining states during 2005-06. The easy and sustained availability of large quantities of wood in this city played a major role in the expansion and shifting of wood-based industries from north-eastern region which were closed down on the directions of the Hon'ble Supreme Court in 1996. The city now has a heavy concentration of

wood-based industries, such as plywood, veneer and saw mills. Led by Yamuna nagar, the growth of wood-based industries in Haryana state is as follows:

Table-2. Development of Wood-based Industries in Haryana

<b>Year</b>	<b>Plywood &amp; Veneer</b>	<b>Sawmills &amp; Others</b>	<b>Total</b>
1990	55	1,109	1,164
1994	117	1,681	1,798
2006	679	4,407	5,086

The value of products manufactured from farm-grown wood is about Rs 3,000 crore which generates a lot of employment for laborers and tax revenue for the government. The wood-based industries in this district provide employment to one lakh people and multiplying with wage rate of Rs 300 per day, this sector generates employment worth Rs 900 crore annually. Yamuna nagar produces about 50% plywood of the country, which helped it being accredited as the Plywood Capital of the country.

The competitive backward and forward linkages have led to establishment of agro-forestry as a suitable and profitable model of Land Use System in the state. This is evident from the expansion of industry and also expansion of area under agro-forestry. This model has helped in reducing some pressure on the natural forests of the country and contributed towards environmental conservation through carbon sequestration by the agro-forestry crops. Further, absence of government interventions provides an example of mutually symbiotic relationship between the WBIs and farmers.

**(Contributed by Mr. R. K. Sapra)**

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## **List of Annexure**

1. Annexure 1 : Office Memo
2. Annexure 2 : Office Memo
3. Annexure 3 : List of Expert Committee Members
4. Annexure 4 : Proceedings of Expert Committee Meetings
5. Annexure 5 : Subject ToR 2
6. Annexure 6 : Subject ToR 2
7. Annexure 7 : Subject ToR 3
8. Annexure 8 : Subject ToR 4
9. Annexure 9 : Subject ToR 4

F.No.1-1/2018-FP  
Government of India  
Ministry of Environment, Forest & Climate Change  
Forest Policy Division

Indira Paryavaran Bhawan,  
Vayu Wing, 6<sup>th</sup> Floor,  
Jor Bagh Road, Aliganj,  
New Delhi -110 003  
Dated 08.01.2018

**OFFICE MEMORANDUM**

**Sub: Expert Committee constituted for strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) to help achieve the target of National Forest Policy and other country's commitment-reg**

An Expert Committee has been constituted under the Chairperson of Shri Abhijit Ghose, Ex-PCCF & HoFF, Government of Rajasthan for strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) to help achieve the following targets:-

- (i) National target of bringing 33% of geographical area under forest and tree cover,
- (ii) Country's international commitment of additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent by the year 2030 (NDC),
- (iii) Doubling of farmers' income by 2022
- (iv) Address the trade deficit caused by import of wood and wood products worth about USD 4.5 billion per annum and
- (v) Enrichment of soil-moisture system by increasing moisture retention in soil.

2. In this regard, a copy of the notification No. 14-18/2017-SU dated 8.01.2017 is forwarded to all Members of the Committee for information and needful action.

  
(Noyal Thomas)

Dy. Inspector General of Forest (Forest Policy)  
Tel: 24695323

To

1. All members of the Committee
2. PS to Hon'ble MEF&CC
3. PPS to Secretary, EF&CC
4. PPS to DGF&SS/ PPS to ADGF(FC)/ PPS to ADGF(WL)



F. No.14-18/2017-SU  
Government of India  
Ministry of Environment, Forest & Climate Change

Indira Paryavaran Bhawan,  
JorBagh Road, Ali Ganj  
New Delhi – 110003

Dated: 8<sup>th</sup> January, 2018

**NOTIFICATION**

An Expert Committee has been constituted consisting of following members to develop strategy to increase green cover outside recorded forest areas (Tree Outside Forests), to help achieve

- a. National target of bringing 33% of geographical area under forest and tree cover,
- b. Country's international commitment of additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent by the year 2030 (INDC),
- c. Doubling of farmers' income by 2022,
- d. Address the trade deficit caused by import of wood & wood products worth about USD 4.5 billion per annum and
- e. Enrichment of soil-moisture system by increasing moisture retention in soil.

- i. Shri Abhijit Ghosh, Ex-PCCF & HoFF, Rajasthan - Chairperson
- ii. Shri Rajkumar, Ex-PCCF & HoFF, Punjab - Member
- iii. Dr P.P. Bhojvaid, Ex-PCCF & HoFF, Haryana - Member
- iv. Dr Rekha Pai, Ex-PCCF, Uttarakhand - Member
- v. Dr Javed Rizvi, Director, ICRAF - Member
- vi. Shri Chandrabhushan, Centre for Science & Env. - Member
- vii. Shri Jitendra Sharma, PCCF, Punjab - Member
- viii. Shri RB Sinha, APCCF, Madhya Pradesh - Member
- ix. Nominated official of DG, ICFRE - Member
- x. Joint Secretary, Ministry of Agri. & Farmers' Welfare - Member
- xi. Representative of Industries - Member
- xii. Representative of NCCF - Member
- xiii. DIG of Forests (SU), MoEF&CC - Member
- xiv. DIG of Forests (Forest Policy) - Member Secretary

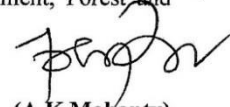
2. The terms of reference of the Committee are as under: -

- (i) To analyze and classify the agricultural regions into silvi-climatic zones and suggest zone-wise tree species
- (ii) To develop strategy for research and production of certified quality planting material accessible to farmers through a network of identified organizations/industries, extension of technical knowhow and marketing of the produce



- (iii) To suggest ways and means to access funding mechanisms to give further boost to the efforts of the Government
  - (iv) To evaluate the present regulatory regime impeding adoption of tree planting in the form of agroforestry and farm forestry by farming community and suggest appropriate reforms for their rationalization
  - (v) To suggest a centralized database system and mechanism for monitoring the progress of coverage under TOF in the country
  - (vi) Any other specific function as entrusted by the MOEF & CC, Government of India
3. The Committee may co-opt specialists/resource person in any of its sessions.
  4. The committee will complete its task within three months from the date of constitution of the Committee.
  5. Non- official members of the Committee will be paid the sitting fee of Rs 4000/- per day as per instruction of Department of Expenditure from time to time. Settlement of TD/DA claims of non-official the members of the Committee shall be done as per SR-190 whereas official members will claim as per entitlement from their respective parent organizations.
  6. All the expenditure for conducting the meeting of the Committee will be borne by the Ministry of Environment, Forest and Climate Change

This issue with the approval of Hon'ble Minister of Environment, Forest and Climate Change, Government of India.



(A.K.Mohanty)

Dy. Inspector General of Forests (SU)

Telefax: 011-24695273

**Distribution:**

- (i) All members of the Committee.
- (ii) PS to Hon'ble MEF&CC.
- (iii) PPS to Secretary (E,F&CC)
- (iv) PPS to DGF&SS.

**F.No.1-1/2018-FP**  
**Government of India**  
**Ministry of Environment, Forest & Climate Change**  
**Forest Policy Division**

**Indira Paryavaran Bhawan,**  
**Vayu Wing, 6<sup>th</sup> Floor,**  
**Jor Bagh Road, Aliganj,**  
**New Delhi -110 003**  
**Dated 17.01.2018**

**MEETING NOTICE**

**Sub: Expert Committee constituted to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) to help achieve the target of National Forest Policy and other country's commitment-reg**

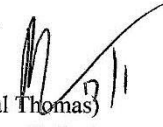
An Expert Committee has been constituted vide the Ministry's order dated 8.01.2017 to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) to help achieve the targets of National Forest Policy and other country's commitment.

2. To formulate a sound strategy to expand tree cover outside forests with a focus on Agro-forestry, the Chairman of the Committee is pleased to co-opt following experts as the members of the Expert Committee:

- (i) Shri Suneel Pandey, Ex-IFS, Vice-President, ITC, Secunderabad
- (ii) DDG (NRM), ICAR, Ministry of Agriculture and Farmers Welfare, New Delhi

3. Further, DG, ICFRE has nominated Shri Vipin Chaudhary, DDG(Ext), representing ICFRE as a member of the Expert Committee.

3. All the members and co-opted members are requested to make it convenient to attend the meeting on **30<sup>th</sup> January, 2017 from 10.00 AM to 3.00 PM** at Indus Conference Hall, Jal Wing, Ground Floor, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi.

  
(Noyal Thomas)

Dy. Inspector General of Forest (Forest Policy)  
Tel: 24695323

To

1. The Chairman of the Committee and all members of the Committee
2. Shri Vipin Chadhary, DDG(Ext), ICFRE, Dehradun
3. Shri Suneel Pandey, Ex-IFS, Vice-President, ITC, Secunderabad
4. DDG (NRM), ICAR, Ministry of Agriculture
5. PPS to DGF&SS/ PPS to ADGF (FC)/ PPS to ADGF (WL) for information

F.No.1-1/2018-FP  
Government of India  
Ministry of Environment, Forest & Climate Change  
Forest Policy Division

Indira Paryavaran Bhawan,  
Vayu Wing, 6<sup>th</sup> Floor,  
Jor Bagh Road, Aliganj,  
New Delhi -110 003  
Dated 31.01.2018

**OFFICE MEMORANDUM**

**Sub: Constitution of Working Group under the Expert Committee constituted to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) reg**

It is informed that the first meeting of the Expert Committee to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) was held on 30.01.2018 in the Ministry. As decided, six Working Group have been constituted for six different ToR of the Expert Committee. The details of WG are as under:-

- I. *To analyse and classify the agricultural regions into Silvi-climatic zones and suggest zone-wise tree species*
  1. Mr. Abhijit Ghose
  2. Dr. Rekha Pai (Convener)
  3. Director, CAFRI, Jhansi (Invited Resource Person)
  4. ADG (Soil), Ministry of Agriculture & FW (Invited Resource Person)
- II. *To develop strategy for research and production of certified QPM accessible to farmers through a network of identified organisations/industries, extension of technical knowledge and marketing of the produce.*
  1. Mr. R. K. Sapra
  2. Dr. P.P. Bhojbaid
  3. Mr. Vipin Chowdhury
  4. Ms. Devashri Nayak (ICRAF)
  5. Mr. Sachin R Jain (Convener)
- III. *To suggest ways and means to access funding mechanisms to give further boost to the efforts of the Government*
  1. Mr. Pramod Kant (Invited Specialist)
  2. Mr. A. K. Srivastava (Invited Resource Person)
  3. Mrs. Alka Bhargava
  4. Mr. Noyal Thomas (Convener)
- IV. *To evaluate the present regulatory regime impeding adoption of tree planting in the form of agro-forestry and farm forestry by farming community and suggest appropriate reforms for their rationalization*
  1. Mr. R.B.Sinha
  2. Mr. Suneel Pandey
  3. Mr. Chandra Bhusan
  4. Mr. A.K.Mohanty (Convener)
- V. *To suggest a centralized database system and mechanism for monitoring the progress of coverage under TOF in the country*
  1. Dr. Devendra Pandey (Invited Specialist)
  2. Mr. Vinod Kumar (Invited Resource Person)
  3. Mr. Rajesh Kumar, FSI
  4. Dr. Javed Rizvi (Convener)
  5. Director, CAFRI

VI. *To suggest policy intervention for sustainable management for TOF*

1. Mr. Abhijit Ghose
2. Mr. R. K. Sapra (convener)
3. Dr. Rekha Pai

3. All member conveners of each WG are requested to kindly coordinate with the working group members and prepare a group report.

  
(Noyal Thomas)

Dy. Inspector General of Forest (Forest Policy)  
Tel: 24695323

To

1. The Chairman of the Committee and all members/ Co-opted members of the Committee
2. PPS to DGF&SS/ PPS to ADGF (FC)/ PPS to ADGF (WL) for information

## Annexure 3

**Expert Committee constituted to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) to help achieve the target of National Forest Policy and other country's commitment**

### List of Members

S.No.	Name & Designation	Office Address/Postal Address	Contact Details/ Email
1.	Shri Abhijit Ghosh, Ex-PCCF&HOFF , Rajasthan	Chairperson of the Committee	Email: <a href="mailto:abhijitghose50@gmail.com">abhijitghose50@gmail.com</a> Mob: 09414058332
2.	Shri Rajkumar Sapra, Ex- PCCF & HOFF, Haryana	Ex-PCCF & HOFF, Haryana	Email: <a href="mailto:rk_sapraus@yahoo.com">rk_sapraus@yahoo.com</a>
3.	Dr P. P. Bhojvaid, Ex- PCCF & HoFF, Haryana	357J, Mulberry Villa, Omaxe City, New Chandigarh, Mullanpur, SAS Mohali. 140901. Panjab	Email: <a href="mailto:padam57@rediffmail.com">padam57@rediffmail.com</a> Mob: 9411570056
4.	Dr Rekha Pai, Ex-PCCF, Uttarakhand	Ex-PCCF, Uttarakhand	Email: <a href="mailto:rekhapaiifs@gmail.com">rekhapaiifs@gmail.com</a> Mob: 9873889666
S.No.	Name & Designation	Office Address/Postal Address	Contact Details/ Email
5.	Dr Javed Rizvi, Director, ICRAF	Director, ICRAF 1 <sup>st</sup> Floor, Block C National Agricultural Science Centre (NASC)	Email: <a href="mailto:j.rizvi@cgiar.org">j.rizvi@cgiar.org</a> Mob: 9999755192

		Dev Prakash Shastri Marg, Pusa Campus, New Delhi, India 110012	Tel: +91 11 /25847885/6
6.	Shri Chandrabhushan, CSE, New Delhi	CSE, New Delhi	Email: <a href="mailto:chandra@cseindia.org">chandra@cseindia.org</a>
7.	Shri Jitendra Sharma, PCCF, Punjab	PCCF, Punjab	Email: <a href="mailto:pccfpb@punjab.gov.in">pccfpb@punjab.gov.in</a> <a href="mailto:pccfpunjab@gmail.com">pccfpunjab@gmail.com</a> Mob: 9650273274 Tel: 0172-2298005
8.	Shri R. B. Sinha, APCCF, Madhya Pradesh	APCCF, Madhya Pradesh	Email: <a href="mailto:apccfbgt@mp.gov.in">apccfbgt@mp.gov.in</a> Mob: 9868124217
9.	Nominated Official of DG, ICFRE	ICFRE, Dehradun	Email: <a href="mailto:dg@icfre.org">dg@icfre.org</a>
<b>S.No.</b>	<b>Name &amp; Designation</b>	<b>Office Address/Postal Address</b>	<b>Contact Details/ Email</b>
10.	Joint Secretary, DAC&FW	Joint Secretary [Ms. Alka Bhargava] Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare Room No. 155, Krishi Bhawan,	Email: <a href="mailto:jsnrm-agri@gov.in">jsnrm-agri@gov.in</a> Mob: 9891089019

		New Delhi	
11.	Representative of Industries	TBD	
12.	Representative of NCCF	Network for Certification and Conservation of Forests (ex- Additional Director General of Forests, Govt. of India Ministry of Environment, Forests and Climate Change) 505, 5th Floor, Matrix Tower, Sector 132, Noida 201304	Email: <a href="mailto:executivedirector@nccf.in">executivedirector@nccf.in</a> <a href="mailto:aksmoef@gmail.com">aksmoef@gmail.com</a> Tel: 0120- 6758611/6758614 (o); 011-24106006(R); 09811984499(M)
13.	DIG(SU), MoEF&CC, New Delhi	MoEF&CC, New Delhi	Email: <a href="mailto:dig.fpd@gmail.com">dig.fpd@gmail.com</a>
14.	DIG(Forest Policy)- Member Secretary	Member Secretary, MoEf&CC, New Delhi	Email: <a href="mailto:digfpolicy-mef@nic.in">digfpolicy-mef@nic.in</a>



**Proceedings of Expert Committee Meetings**

**Proceeding of the First Meeting of the Expert Committee held on 31.1.2018 constituted by the MoEF&CC to develop strategy to increase green/tree cover outside recorded forest areas (Tree Outside Forest)**

1. List of participants is annexed.
2. First Meeting of the Expert Committee was held on the 30<sup>th</sup> January, 2018 in the Indus Conference Hall of Jal Wing of the Indira Paryavaran Bhawan, New Delhi under Chairmanship of Sri Abhijit Ghose, Ex-PCCF (HoFF), Rajasthan at 10 am. At the beginning, Sri Siddhanta Das, Director General of Forests & Special Secretary to Government explained the background of the constitution of this Expert Committee with the maiden objective of achieving the goal of country's green cover to 33% from the existing 24.2% by expanding mainly under Tree outside Forest besides fulfilling country's international commitment of additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub>equivalen by the year 2030. He also emphasized the simultaneous need of enrichment of the density of the forests through a landscape based management from the traditional forest block management, particularly in catchment areas of major river basins. He also pointed out special thrust in control of forest fires, enhancing percolation of moisture and promoting growth of grassy vegetation on forest floor.
3. In the opening remark, the Chairman, Sri Abhijit Ghose emphasized the enormous potential of tree planting outside forests on various public, private and community lands through the big initiatives like Social Forestry, Farm Forestry, Wasteland afforestation etc. Particularly, the scope of Agro-forestry expansion is very large in India and it will give the nation both the food and wood security. As the National Agro-forestry Policy, 2014 is now in place, there is an urgent need of mainstreaming it with present day agriculture as climate resilient farming will reduce the vulnerability of our farming community, dealing with natural calamities like recurring droughts and floods. If farm ecology and economics go wrong, nothing else will go right, as we experienced in our

country. Chairman also appealed to all members to limit themselves only within the framework as provided in the Terms of Reference and expressed sincere hope to complete the task assigned within the stipulated timeframe.

4. In spite of the constraint of least forest areas, the states of Haryana and Punjab had exhibited a remarkable achievement through their efforts of tree planting on non-forest land in recent years and made a table turn from wood-deficit states to wood-surplus states. Mr. R. K. Sapra, Ex-PCCF (HoFF), Haryana and also Dr. P. P. Bhojvaid, Ex-PCCF (HoFF), Haryana made two very informative presentations highlighting the success story of their States. As per an optimistic estimate of Mr. Sapra, 1% increase of tree cover will lead to 80% increase in wood production. Both these experts were of the view that liberalization of transit permit rule by Haryana Government was one of the most important factor in such transformation. However, lack of a proper timber market (Timber Mandi), extension supports to farmers by Agriculture Extension works, fragmentation of land holdings, lack of mechanization, competing of FD with farmers in sale of timbers were identified as constraints by them. It was informed by members that restrictive regime for timber & bamboo transport in various states are the major hindrances for the growth and development of the agroforestry in the country. It was informed by DIG (FP) that an advisory for Pan India Permit for bamboo has been issued by the Ministry. Taking part in this discussion, Mr. Chandra Bhusan from CSE suggested that Forest Development Corporations (FDC) should grow only long rotation tree-crops as farmers may not like to grow them in agricultural fields due to economic reasons. He also suggested that present experience of Haryana is only restricted to few species like Eucalyptus, Poplar and Ailanthus excelsa etc. But there is vast scope for trees bearing oilseeds, horticulture species like Mango, Mahua, Aonla etc. Representative of ICRAF, Ms. Devashri Nayak informed that Central Agro-Forestry Research Institute (CAFRI), Jhansi has come up with 25 potential Agro-forestry species which will be shared with members of expert committee soon. She also pointed out that certain discrepancies in the growing stock estimated by FSI and CAFRI as regards tree crops outside forests. Dr. Vipin Chowdhury, DDG (Extension), ICFRE informed that FRI, Allahabad has also developed Agro-forestry models.

5. After a lively discussion by members, Mr. Suneel Pandey, VP, ITC who joined as an expert from Industries made a presentation of the success stories of Agro-forestry in Southern States of India as implemented by ITC. Remarkable work was done by them in clonal propagation of Eucalyptus, Subabul and Casurina. Promising new clones will enhance the productivity by 25 to 40%. Since WIMCO has been taken over by ITC, in Tarai-belt of Uttarakhand, agro-forestry model of Poplar looks promising. He informed that 90% of raw materials for Pulpwood are indigenously met. He emphasized for the need of a Policy Research Advisory Group. Mr. Sachin R Jain, Convener, NCCF also presented a strategy paper for undertaking additional area coverage under TOF to bridge the gap between goal of 33% vegetal cover as envisioned in NFP, 1988 and the current level of 24.2%, as per estimate of FSI, Dehradun.
6. The session was very interactive and informative on the discussion related to identifying the major impediments for increasing TOF and factors that drive farmers, individuals and wood based industry to grow more wood. The steps taken by the Ministry regarding relaxing the felling and transit permit on the tree species grown on non forest land and for promotion of agroforestry was also highlighted. Members also discussed on the recent amendment in IFA regarding classification of bamboo. Endorsing the initiatives of the Ministry, Dr Rekha Pai requested the Ministry that if a brief note in this regard would be circulated to all members would be fruitful for the Committee. She further said that inter-state transit permit is still a big impediment for growth of market of wood sector. The Pan India Permit should be respected by all the States. Import and Export policy on wood was also discussed and it was pointed out that the species which are banned under WTO India has to comply this and has to ban the same thing. Actively participating in the discussions Shri A. K. Srivastava gave emphasis on need to promote skill development in forestry sector. Dr Rekha Pai said that DIG (RT) is coordinating the Skill Development Programme. DIG (FP) has been requested to get the inputs from DIG(RT). It was pointed out that some states which have surplus wood and glut in market but a low demand whereas in some states no surplus supply of wood but there is a high demand. This supply and demand will be eased by the policy intervention. The NFP 1988 talks about substitution of wood utilization in construction, furniture and other uses etc. However, time has come now to reverse the earlier notion and think for promotion of use of wood

in place of other products such as steel & plastics having high carbon footprints. There is need to generate awareness and promotion that Wood is Good. On the issue of relaxing the felling and transit system, Shri Chandra Bhushan said that Transit System was introduced mainly for stopping the illegal felling and protecting the forest resources. However large scale illegal felling has never been a big problem in India. One of important aspect is that can we think differently on the issue to protect forest resources including bamboo inside forest areas without having the traditional transit system in place in the era of modern times which is leveraged with high technological advancement. Almost all of members were agreed on the suggestion of using RS/GIS and High Technology/ Mobile Apps together with adequate manpower for protection of forest resources. These valuable suggestions were well noted. However the mandate of the Committee is limited. Shri R. B Sinha, APCCF, MP, Mrs Alka Bhargava, JS, DAC&FW; Mr. Noyal Thomas, DIG, Forest Policy and Mr. A. K. Mohanty, DIG, SU also provided valuable inputs as and when necessary from the perspective of Government of India.

6. In the post-launch session, as suggested by the Chairman, the members of the Expert Committee reviewed the Terms of Reference as given in the notification of the committee issued on 8<sup>th</sup>. January, 2018 and suggested to include an additional point in TOR as “Policy Intervention for Sustainable Management of Tree Outside Forest”, subject to the concurrence of the Ministry.
7. It was also decided to form small Working Group for each of the TOR and for this purpose they are free to co-opt Specialist/Resource Person from outside to prepare a Base Paper and put up in the next meeting of the Expert Group for ratification. Expert Group members volunteered to choose their respective group.

Following Working Groups are suggested for different TOR.

***I. To analyse and classify the agricultural regions into Silvi-climatic zones and suggest zone-wise tree species***

1. Mr. Abhijit Ghose
2. Dr. Rekha Pai (Convener)
3. Director, CAFRI, Jhansi (Invited Resource Person)

4. ADG (Soil), Ministry of Agriculture & FW (Invited Resource Person)
- II. *To develop strategy for research and production of certified QPM accessible to farmers through a network of identified organisations/industries, extension of technical knowledge and marketing of the produce.***
1. Mr. R. K. Sapra
  2. Dr. P.P. Bhojbaid
  3. Mr. Vipin Chowdhury
  4. Ms. Devashri Nayak (ICRAF)
  5. Mr. Sachin R Jain (Convener)
- III. *To suggest ways and means to access funding mechanisms to give further boost to the efforts of the Government***
1. Mr. Pramod Kant (Invited Specialist)
  2. Mr. A. K. Srivastava (Invited Resource Person)
  3. Mrs. Alka Bhargava
  4. Mr. Noyal Thomas(Convener)
- IV. *To evaluate the present regulatory regime impeding adoption of tree planting in the form of agro-forestry and farm forestry by farming community and suggest appropriate reforms for their rationalization***
1. Mr. R.B.Sinha
  2. Mr. Suneel Pandey (Convener)
  3. Mr. Chandra Bhusan
  4. Mr. A.K.Mohanty
- V. *To suggest a centralized database system and mechanism for monitoring the progress of coverage under TOF in the country***
1. Dr. Devendra Pandey (Invited Specialist)
  2. Mr. Vinod Kumar (Invited Resource Person)
  3. Mr. Rajesh Kumar
  4. Dr. Javed Rizvi (Convener)
  5. Director, CAFRI
- VI. *To suggest policy intervention for sustainable management for TOF***

1. Mr. Abhijit Ghose
  2. Mr. R. K. Sapra (Convener)
  3. Dr. Rekha Pai
8. It is decided that the nominated conveners will co-ordinate with other working group members and prepare group report (Action: Conveners designates). Mr. Noyal Thomas, DIG, FP & Member Secretary was requested to extend invitation to all co-opted Specialist/Resource Person of the Working Groups by intimating them to attend the next meeting in the Ministry to be held on two consecutive days on **15<sup>th</sup>& 16<sup>th</sup> February, 2018**. Apart from these, invitation to Director, IPRITI, Bangalore may be extended. It was further decided that if members cannot attend meetings due to their prior commitments, they can exchange notes through emails among working group members. Any input which will qualitatively enrich the final report as per members, can be uploaded in the email so that it can be shared among all members. (Action: DIG, FP & Member Secretary)
9. At the end, the Chairman expressed his appreciation and sincere gratitude to all members who in spite of their busy schedule could move it convenient to attend the first meeting.

**Proceeding of the Two days of the 2<sup>nd</sup> Meeting of the Expert Committee constituted by the MoEF&CC to develop strategy to increase green/tree cover outside recorded forest areas (Tree Outside Forest)**

1. List of participants annexed.
2. Second meeting of the Expert Committee was held for two days on 15th & 16th February, 2018 at Indus Conference Hall of Jal Wing, Indira Paryavaran Bhawan, New Delhi under Chairmanship of Sri Abhijit Ghose, Ex-PCCF (HoFF), Rajasthan from 11AM to 4 PM.

**Day 1: 15.02.2018**

3. At the beginning, Sri Abhijit Ghose, Chairman of the Committee welcome the expert members of the group as well as invited members who joined the meeting. He expressed his satisfaction as most of the Sub-Groups have started their deliberations and attempted to make a report. Before going to these presentations of Sub-Groups, he asked Dr. Javed Rizvi from ICRAF to put up his points as he intended to leave for another meeting.
4. Dr. Rizvi made a request that for mapping of Tree Outside Forest, a focused discussion is needed comprising a small group of Scientists, Technicians and their Managers of three institutes primarily engaged in the estimation of green cover contributed by the TOF where the uniformity in the output is rarely observed. Responding to him, Dr. Devendra Pandey, Former DG, FSI, Dehradun; who joined the meeting as a Special Invitee told that concerned institutes like FSI, CAFRI and ICRAF need to make a presentation regarding methodologies adopted by them, their limitations and sampling techniques adopted for ground truthing. Thereafter, a procedure can be worked out for the future estimation of the tree cover outside of the forest areas. Shri Vinod Kumar, CCF, Haryana; who joined the meeting as Special Invitee, suggested to make-use of high resolution LiDAR data, which can enhance the accuracy in mapping of areas under TOF, though it may cost more. Chairman suggested that a Pilot Study can be initiated for few districts of a larger state or a small size state like Haryana; before upscaling it in the entire country. He also emphasized the need for enhancing the current assessment cycle of FSI from 2 years to 5 years, at least to reduce cost, increasing quality of the output and getting some quantifiable changes for interpreting any policy implications on the field. Sri Sunil Raj

advocated for adopting best global practice after conducting a pilot study. The Member Secretary was requested to arrange a focus group meeting of these institutes at the earliest.

5. Mr. R.B.Sinha, APCCF & Expert Member from MP cadre presented the findings of the Sub Group that worked on the framework for future policy and regulatory regime for enhancing TOF in the country. He informed that out of 9.2 million ha of area outside of forest areas in the country, roughly 3 million ha is under agro-forestry or farm forestry and TOF contribute to domestic wood supply to the extent of 93% of demand of industrial wood; now which is about 47 million C. Mt. per year and in future it can play a major role, not only in attaining 33% green cover of the country but also can make the country self-reliant in wood.
6. India imports wood and wood products annually of worth of Rs. 43,000 Crores which can be met with from increasing coverage of TOF, penetration level in to interior rural set up and higher level of productivity from agro forestry. This will help the Indian farmers to increase their farm income too. At present the Mill delivered cost of timber in India is very high as compared to other Asian countries like Indonesia, Malaysia etc. as the Industries have captive plantations on degraded forestlands of large extent, mechanization in planting and harvesting processes besides cost competitiveness offered by agro-forestry farmers.
7. As import of timber in the country is for both high rotation tree crops like Teak, Mohagany, Gurjan etc. and short rotation tree crops like Eucalyptus and Poplars, both long rotation and short rotation crops need to be raised in the country. Since most farmers cannot afford to raise long rotation crops, Forest Development Corporations need to be geared for raising at least 50% of long rotation crops in their fields. Productivity of plantations done by FDCs should be at least 20 Cu. Mt. per annum as against current productivity which is abysmally low. Strategy and policy initiatives should be in place to control illegal trade in order to give fair price to the legal producers.
8. Bamboo, being an integral part of rural livelihood in the country, appropriate initiative need to be taken for availability of right kinds of bamboo species for promoting bamboo based industries which will help farmers to enhance their farm income.



9. Particularly in forest deficit states, farmers, forest department and industries should work in unison and targeted tree species to be raised need to be declared as “agricultural produce” and concerned State Authorities should ensure that these are made free from the requirement of felling and subsequent transportation permits within and without the state boundary by amendment of provisions in forest acts. Agro-forestry tree crops need to be covered by agriculture insurance and need to be compensated from NDRF in eventualities of natural disasters. He further suggested that wood based industries need to be incentivized and for encouraging effort for “Make-In-India”, there is a need to liberalize Export Policy and tighten the Import Policy as present scenario is exactly opposite.
10. Taking part in the discussion, Sri Chandra Bhusan from CSE opined that in India since large scale illegal felling is not reported from forest areas; forest governance need to be modernized (by surveillances’ from low flying Drones, Satellite Imageries etc.) and Transit Pass System need to be done away with completely. He supported his claim by giving examples of other developing and developed countries like Thailand, South Africa, Swaziland, Cameroon and Canada, Sweden and New Zealand, where there is no system of Transit Pass for wood extraction. Refuting it, Dr Devendra Pandey informed that countries stated by him considered as “High Deforestation Zones” and India’s effort of forest conservation is appreciated in the entire world. Though foresters are not in favor of Transit Pass in principle, overnight withdrawal of Transit Mechanism may lead to disasters as in India vested interest groups are ever vigilant in flouting rules. In the past there are examples when FRA introduced thousands of illegal encroachments in forest boundaries were reported and during abolition of Zamindari system, thousands of ha of forests were felled and liquidated to get instant profit.
11. Chairman also informed that ground realities in states are different as vacancies of grass-root forest employees are not filled up timely and adequate number of personnel are never deputed. Modernization of staff is of low priority in most of the states. Hence, judicious decisions need to be taken by balancing the actual reality on ground and best possible initiative to create an enabling environment for encouraging TOF. Sri Chandra Bhusan further informed about illegal timber trade to China where Teak is traded. He

also said that though timber felling have been prohibited above 1000 Mt. in Himalayan States, no further EIA Study conducted so far to assess the impact of this action. He insisted that when felled produce is in transit, only it is to be backed by its certified origin.

12. There is a growing concern that promoting TOF is not gaining momentum due to our liberal Import policy and the stringent Export policy in the country. Besides revisiting our Forest Policy, members felt that a detail focus discussion is needed on Exim Policy for the wood and wood products. It is also pointed out that in last 15 years, imported timber and other wood products are growing, while Haryana and Punjab states where there is a glut in domestic market often reported. NCCF has circulated a Draft Policy Paper on Promoting Sustainable Trade of Wood and Wood Based Products in India for submitting to MoEF&CC, MoA&FW, Ministry of Commerce and Industry and Ministry of Textiles. The paper presented is very informative and based on a good analysis. It also provides a brief overview of the status of wood and wood products in India. This can be the base paper for discussion when focused discussion with Ministry of Commerce and Industry will be held later. Dr. Dhayni from Ministry of Agriculture & Farmer Welfare suggested to invite JS of Trade Policy Division from the Commerce Ministry dealing with Agriculture and Forest or DGFT may be invited to know their views in the next meeting and the Member Secretary was requested to do needful for facilitating such discussion. Since Mizoram the producer of Muli bamboo was not getting market for it in neighbouring states, with the intervention of the MoEF&CC, its export line is opened now.
13. Ministry of Environment, Forest & Climate Change has taken proactive steps ever- since the Bansal Committee Report strongly recommended to liberalize felling permits and transit pass for promoting TOF and agro-forestry in particular through issuing Advisory Notes to the State Governments and many states also issued guidelines and declared commonly grown agro-forestry tree crops free from taking prior felling permit and transit pass. A milestone step has been taken by declaring “Bamboo” from tree crop to grass which has been hailed by all quarters. As a consequence, now all kinds of bamboo crops get automatically free for getting FP or TP. Ministry has issued Advisory to States for

issuing Pan India Permit for Bamboo though issue of language has been raised. Though TP is unwarranted for the produce coming from Private Land, TP is needed for bamboo growing in Forests as well as FRA areas. Some viable solutions need to be developed for identifying bamboo (like the hammer mark on timbers extracted from coupes).

14. Members strongly felt that timber processing units in interior rural India will certainly facilitate wood based industries and long distance transportation of forest produce can be easily avoided. High School drop-outs of rural youths can be gainfully employed after getting them trained through the Skill Development Ministry on wood base industries. Participating in this discussion, Sri Jitendra Sharma, PCCF &HoFF, Punjab informed that Industrial Policy of his state also favours Cluster Approach of wood based industries using woods of Poplar and Eucalyptus grown by farmers on agricultural fields which was endorsed by Sri Chandra Bhusan from CSE. Sri Sharma also advocated for growing of endangered herbs and shrubs in Agro forestry which are highly demanded in International market.
15. Dr. Dhyani from the MoA informed that ICAR has provided a list of 20 commonly grown Agro-forestry tree species in the country. If states want to get funds for agro-forestry, one pre-requisite is to liberalizing of felling permits and transit pass provisions. Chairman also insisted that a larger co-ordination between SFD and DoA in state level is essential. DrDhyani also informed that though there is no uniformity in states, few states like Bihar, UP and Odisha have their State Level Agro-Forestry Policy. He also advocated that farmers need to be compensated to retain trees from funds for sequestration of carbon, as gestation period of tree crops is longer.
16. In the post-launch session, with the permission of Chair, Sri Vinod Kumar made an authoritative presentation on use of different high resolution satellite imageries for interpretation of tree outside forest which was very informative.
17. After the presentation, Chairman asked Dr Rekha Pai (Convener) of Sub Group I to present Tree Species for different Silvi-Climatic Zones as per ToR. She informed that for tree spp. in forest areas across the country, 16 Forest Types are identified. From agricultural context usually Agro-climatic zones/Agro-ecological zones are used. Hence, the expert committee after deliberations decided to go with Agro-ecological zones rather

for Silvi- Climatic Zones. CAFRI has worked on Agro-Forestry System and identified suitable Multi- purpose tree species for 19 agro-ecological zones which are further divided in 120 sub-zones. Suggested tree species for each zone are indicative and not exhaustive. Convener was requested to review it carefully and list of multi-purpose tree species zone-wise may be finalized.

18. At the end, the Chairman expressed his appreciation and sincere gratitude to all members including special Invitees who in spite of their busy schedule could able to attend the meeting.

**Day 2: 16.02.2018**

19. Apart from expert members and Invited members, Mr. A.K.Bansal, Ex-ADG (Forests) joined in the first session of the meeting as a Special Invitee. After, welcome address of the Chair, Dr. Devendra Pandey, Ex-DG, FSI, Dehradun made a presentation on the scope of increasing green cover with in forests and outside of forests.
20. He stated that according to the Land use Statistics of the Country, out of total geographical area of 328.7 million ha, 23 million ha is not available and only 305.8 million ha available. Again, out of the available area, nearly 42.2 million ha further unavailable due to permanent settlement, roads, rocks etc. 76.96 million ha are under forests and nearly 183.5 million ha are culturable area. According to him North –East states, A&N Islands have rich forests, three Himalayan States (J&K, HP and Uttarakhand) have limited scope for expanding forest as high altitude land belonging to these 3 states are above Tree Line. Only TOF expansion in these states is possible. Six states (Assam, Chhattisgarh, Goa, Jharkhand, Odisha and Kerala) have more than 33% forest cover. As a result, only 12 states which support less than 33% forest cover are having a larger scope of expanding TOF and forest cover too. Mostly these states fall in Indo-Gangetic basin, Western plains and on Deccan Plateau. All these states have potential for enriching of forest cover besides expanding their TOF areas. However, States are supposed to spell out their green cover strategies under their State Forest Policy. Both Rajasthan and Haryana have stated their maximum green cover to the maximum extent of 20% in their respective State Forest Policies.

21. The Chairman offered his view by stating that such prioritization is essential due to limited resources. In Rajasthan, the Forest Policy drafted by him also highlighted the scope of increasing forest cover and tree cover district-wise keeping in mind the forest areas, agriculture and other available wasteland. Mr. Bansal pointed out the political acceptability of area prioritization is sometime not risk-free. Mr. Promode Kant suggested that in NE areas, scope of expanding trees in old shifting cultivation areas is also to be looked into.
22. Mr. Promode Kant made an elaborate presentation by pointing out several International and National streams where from funding can be made available for expanding tree outside forest areas. He indicated areas where funding will be required:
- High quality Planting material production and supply
  - Skill enhancement in nurseries, value addition, wood based commerce, bioenergy
  - R&D
  - Nursery accreditation
  - Monetary incentives for maintenance and protection after planting
  - Price stabilization funds, Minimum support price, insurance
  - Tree based entrepreneurship development
  - Soil and moisture conservation on public wastelands
  - Transport and marketing infrastructure in remote tree producing areas
  - Biomass based energy generation plants
  - Conducting regular farmers' meetings on agroforestry
23. He then indicated potential funding sources from global and national perspective as follows:
- National – Through convergence of current ongoing programs of central and state governments relating to Ministries of E&F, Agriculture, Rural Development, Tribal Affairs, Urban Development - Smart Cities, Highways, Water and Sanitation, MNRE, Skill enhancement, Tourism and Culture
  - International – Multilateral and bilateral funds for Climate change adaptation and mitigation, UNCCD, CBD, Large International Foundations

- Private – Commercial investments, PPP, carbon sequestration, bioenergy production, Corporate advertisements and publicity, greening of carbon footprints
  - Private – CSR, Trusts and Foundations,
  - Banks – Green Bonds, priority sector lending
24. He had further elaborated his claim by stating details of programme currently undergoing in each Ministries. Under the Ministry of Environment, Forest & Climate Change, major sources of funding are NAP, Green India Mission (GIM) and CAMPA. The Ministry has issued convergence guidelines for GIM and another flagship programme of RD i.e. MGNREGA as well as CAMPA. A part of untied GEF funds can also be possibly utilized as indicated by him. Other important counterpart will be the Ministry of Agriculture which under current ongoing scheme of NMSA can fund to states in 60:40 ratio and 90:10 ratio (for hill states of J&K, HP and UK) under the condition of relaxation of felling and transit rules. Under 100% CSS funds are given to states under NBM as a sub scheme MIHD (Mission for Integrated Horticulture Development).NICRA (National Initiative on Climate Resilient Agriculture) - network project of ICAR and National Mission on Oilseeds and Oil Palm (NMOOP): interventions will be in the ratio of 75:25 between Central and State Governments can also be utilized for agro-forestry/other plantation on non-forest lands. Apart from that Rs. 5000 Crores are expected to be generated from Kishan Kalyan Cess and can be used for funding to agro-forestry.
25. However, he also pointed out many other Ministries of GoI which can fund tree planting by their own funding such as Ministry of Road Transport & Highways, MoRD, Ministry of Urban Development etc. Banking Institutions/PSUs and other Corporate Sector can come forward for tree planting through specific projects. Looking to the huge scope from Energy Sector, generation of electricity from Bio-mass or Bio-fuel plantation can be funded easily. During the discussion Chairman also pointed out that as urea is coated with Neem Oil, Fertilizer Companies can support large scale planting of Neem Trees for getting assured production of Neem oil. Similarly Government Departments like Defence, PWDs, Railways who has large chunk of vacant lands can use their own funds for tree planting to reduce their carbon footprints. Roadside plantations along approach roads to villages can be funded from RIDF of NABARD. Successful planting has been

done in Rajasthan by using funds of MGNAREGA. National Adaptation Funds on Climate Change can assist tree plantation in states particularly vulnerable to adverse effect of Climate Change. XIV Finance Commission has recommended grant to states having good forest cover with a view to compensate their losses caused due to non-harvesting of timber. In future forest deficit states can also claim greater share for increasing green cover by expansion of TOF.

26. Discussion on topic assigned to Sub Group II, could not be presented as most of the members could not able to attend the meeting. The Convener was requested to present it in the next meeting by collecting response of other members through emails. Since the important inputs are to come from ICAR and ICFRE, their views need to be incorporated particularly for developing strategy for research on agro forestry. Inputs of leading industries like ITC are also essential as they have developed new clones of certain species. It is expected that this group will also provide essential inputs of marketing strategy of agro-forestry produce. However, the current scenario of extension of agro-forestry was raised. Dr Dhyani informed that there are nearly 600 Kishan Vikas Kendra (KVK) are operating in the country but the post of Subject Matter Specialist (SMS) on Agro-forestry are vacant. It was suggested that capacity building of Agronomists are also needed to train them in agro-forestry.
27. As another meeting has been slotted in the same venue, the post lunch session was concluded at 3.30 PM. At the end, the Chairman expressed his appreciation and sincere gratitude to all members including special Invitees who in spite of their busy schedule could able to attend the meeting.

**Proceeding of the Discussion Meeting of the Agencies involved in the assessment of Tree Cover of outside Forest Area, particularly under Agro-forestry in the country**

1. List of participants annexed.
2. A focused Group meeting of agencies involved in assessment of Tree Cover was held on 8.03.2018 as per the decision taken in the 2<sup>nd</sup> meeting of the Expert Committee held on 15<sup>th</sup>& 16<sup>th</sup> February, 2018 at Indus Conference Hall of Jal Wing, Indira Paryavaran Bhawan, New Delhi under Chairmanship of Sri Abhijit Ghose, Ex-PCCF (HoFF), Rajasthan from 11AM to 4 PM.
3. At the beginning, Sri Abhijit Ghose, Chairman of the Committee welcome the participating members of the focused group as well as few invited members who joined the meeting. Clarifying the purpose of the meeting, he informed that Central Agro-forestry Research Institute, ICRAF and Forest Survey of India are three agencies who are involved in the estimation of Tree Cover outside Forest. However, uniformity in their output is seldom found. Hence before going to suggest a suitable mechanism for monitoring the progress of coverage under TOF in the country as per the provision of ToR suggested the Expert Committee wanted to understand the methodologies adopted by each of three agencies/institutions, limitations in them as well as sampling techniques followed keeping in view the specific purpose behind their assessment.
4. Dr. Rizvi from ICRAF informed that for mapping of Tree Outside Forest, is never attempted by ICRAF independently and they are associated with CAFRI in the mapping of the Agro-forestry area of the country, which is a subset of the TOF. Dr. Devendra Pandey, Former DG, FSI, Dehradun; clarified that the FSI is not involved in mapping of Agro-forestry areas of the country and it undertakes assessment of the tree cover outside of the forest to make an assessment of the growing stock available outside of forest contributing to additional wood availability for supplementing domestic demand as well as their role in the sequestration of Carbon to minimize the negative impact on the climate change.
5. Dr. R. H. Rizvi, Principal Scientist, CAFRI, who is involved in the mapping of Agro-forestry areas of the country informed that this exercise was undertaken in 2007 under a



DST Project for the first time as a pilot project in two districts; Yamunanagar (Haryana) and Saharanpur (UP) using LISS III data. He also informed that a Digital Library has been prepared with respect to 4 species, namely Mango, Poplar, Eucalyptus and Aonla to identify their spectral signatures based on hyperspectral data. The mapping of agro-forestry area was attempted by them under Pixel based method to Sub-pixel based method for which out of total 633 districts, 127 districts in 20 Agro-ecological zones were sampled in which agriculture crop land and fallow lands were interpreted from LISS III imageries and 20% of each district was randomly chosen for ground inventory. He informed that Sugarcane grown areas posed problem in the interpretation.

6. Participating in the discussion, Dr. C.S. Jha, Group Director, NRSC informed that LISS-III data was good enough in the context of 2007 but with decreasing cost of imageries it is now worthwhile to use better resolution data to increase the confidence level of the output map. Chairman remarked that when the satellite data cost is declining, the ground inventory costs are rising high. Hence ground data sharing among agencies and synergy of technology for estimation of Tree Outside Forest can lead in to cost effective solution. Dr. Jha further suggested that availability of cheaper data by optimization of resource should be the look out of the Committee.
7. Dr. Javed Rizvi told that Corporate Sectors are encouraged to invest to know the accurate estimation of species wise agro-forestry plantation. In mixed canopy, species identification is a challenge and technology has not yet been standardized. In natural forest, however, knowledge of species association is well known. Dr. Jha repeatedly assured that any national level project will never be affected for high cost of satellite data. Data of Bhuvan Portal can also be shared. He strongly advocated for a co-ordinated approach of different institutes in sharing of information.
8. Sri Rajesh Kumar from FSI, Dehradun made a presentation subsequently about the Inventory of Tree Outside Forest which is being estimated in every two year cycle and reflected in the State-Of-Forest Report. Assessment of ToF in India has started prior to global assessment in 2000. It has assumed importance due to depletion of forests at alarming rate, thrust on conservation of natural forest, increasing demand on forest

produce and sequestration of carbon by trees. He pointed out the distinct difference in definition of forest cover and tree cover from the angle of FSI and FAO.

9. FSI is mandated to prepare Forest Inventory, Tree Outside Forest (Rural) and Tree Outside Forest (Urban) in every two years cycle. In TOF, plantation geometry also matters. Somewhere trees are found in compact blocks, scattered trees over the large area, linear patches along river, roads, canals and railway tracks etc. Importances of TOF are seen from economic, ecological, social and global perspectives. The objectives of assessment of TOF are as follows:
  - To estimate the total number of trees in TOF
  - To estimate the wood volume in TOF
  - To estimate carbon sequestered in TOF
  - To evaluate the role of TOF in the timber production
  - To estimate the contribution of TOF in GDP
  - To estimate the contribution of TOF in tree cover
  - To evaluate the role of TOF in the context of fuelwood, fodder and NTFP
  - To evaluate TOF contribution to soil and water conservation
10. Sri Rajesh Kumar further elaborated the process followed by FSI in assessment of Forest Cover and Tree Cover of TOF which lead them to estimate the Growing Stock, Carbon Stock and annual potential increment of wood which are well documented in the bi-annual report on State of Forest. He also informed that ground truthing is done now in nearly 60 districts out of 633 districts of the country (10% districts) so as to cover the entire country in 20 years. FAO has suggested that 20 years is rather long and forest cover need to be revisited in a 5 year cycle preferably. For this entire country is now put under a grid system, each of 25 sq. km. area and there are nearly 1,33,000 grids cover the entire country. 20% grids will be selected every year randomly and in 10% area of the grid i.e. 0.5 Sq. Km. will be surveyed for FC and 10% grids will randomly be chosen for TC inventory.
11. It was agreed that CAFRI will provide the mapped areas of Agroforestry to FSI and since agro-forestry is a sub-set of TOF, FSI can have inventory of agro-forestry area. Ground

sampling data can be shared between CAFRI and FSI in future. A new chapter can be added henceforth in the State of Forest Report for agro-forestry and its contribution for wood, timber production, carbon stock etc.

12. From the subsequent discussions held between agencies, it was reported by CAFRI that out of 15 agro-climatic zones, in 10 zones Agro-forestry area was found to be 16.6 million ha. which is 7.98% of total TRGA and when data will be compiled for entire country, the total agro-forestry area will be to 20-21 Million ha. Dr. S. K. Dhyani et al. of ICAR wrote a joint paper titled, “Area under agroforestry in India: An assessment for present status and future perspective “in 2013, which was published in the Indian Journal of Agro-forestry, Vol-15, No.1 where estimated area under agro-forestry was stated to be 25.32 million ha. which is 8.2% of total TRGA (305.67 Mha.)
13. Since agro-forestry areas are partly covered under FC and TC as per the assessment of FSI, about 20-25 million ha land can be stated as extent of agro-forestry area safely. However, in future exact assessment can be worked out.
14. At the end, the Chairman expressed his appreciation and sincere gratitude to all members including special Invitees like Dr. Devendra Pandey, Dr. C.S.Jha and Sri Rajesh Kumar, who inspite of their busy schedule could able to attend the meeting.

**Proceeding of the Third Meeting of the Expert Committee constituted by the MoEF&CC to develop strategy to increase green/tree cover outside recorded forest areas (Tree Outside Forest)**

1. List of participants annexed.
2. Third meeting of the Expert Committee was held on 9<sup>th</sup> March, 2018 at Indus Conference Hall of Jal Wing, Indira Paryavaran Bhawan, New Delhi under Chairmanship of Sri Abhijit Ghose, Ex-PCCF (HoFF), Rajasthan from 11AM to 4 PM.
3. At the beginning, Sri Abhijit Ghose, Chairman of the Committee welcome the expert members of the group as well as invited members of the day who joined the meeting. He briefed the members of the Expert Committee about the outcome of the discussion meeting held on previous day with CAFRI, ICRAF and FSI. He then suggested to proceed with the incomplete discussions on certain ToRs of last meetings.
4. Dr. S.K. Dhyani from ICAR presented the sub group report on behalf of Dr. Rekha Pai, Convener of the Sub-Group. As decided previously, the Sub-Group is supposed to suggest Agro-Forestry species for 20 Agro-Ecological zones which are spread over the entire country. In 20 agro-ecological zones, there are 60 sub zones. However, in the presentation, zone-wise names of states, whole or part are depicted. As per Dr. Dhyani, 20 broad species were identified including Jatropha, which is considered somewhere as a small tree or a shrub. In the list, timber/small timber/industrial wood are shown in one category and horticulture species were shown as a separate category. Chairman requested that another one column may be added in each zone to show its climatic range and one column may be added to depict soil type, its texture and other important soil parameters as Agro-ecological zones are not specifically defined. He also added that for adoption of a species, economics will be a driving force and so economics of tree and crop combinations will be very important. Dr. Dhyani in response to it, informed that 35 different agro-economic models developed and can be found on the website of CAFRI. The detail silviculture of 25 agro forestry trees is also recently made available on the website of CAFRI. Dr. Dhyani suggested that if farmers are compensated for keeping tree crops for longer period compared to their agri-crops by PES (Payment of Eco-system Services) like Carbon Sequestration, Recharging of ground water etc. more farmers may

come for agro-forestry expansion. It was felt that depending on direct economic benefits only, agro-forestry will be always viable. Hence, PES may remain restricted to forests which are conserved over long period. Chairman informed that few members advocated for performance linked incentives for trees, but in the past the experience of such incentives never remained encouraging. Under some Social Forestry Projects, farmers were given some incentives for survival of plants in first three years but because of a nexus between farmers and reporting agencies, it remained counter-productive. Members were of strong view that any kind of incentive/subsidy is not desirable and role of free market may be respected. Farmers can earn more profit, if their crop will be ready first compared to those farmers who take least care for tree crops.

5. Mr. Jitendra Sharma, PCCF (HoFF), Punjab suggested to include RET (Rare, Endangered & Threatened) species need to be brought under the fold of agro forestry fold in order to brought back them in mainstream to reduce their vulnerability. In fact certain herbal medicinal plants can be grown as a cash crop in agro forestry. This will help the Indian farmers to increase their farm income too. But after wider discussions by members it was strongly suggested that before advising farmers to adopt them, the regulatory mechanisms from the angle of their harvest and transit permit, Bio-diversity Act, CITES rules and regulations need to be relaxed and facilitated otherwise it will seriously affect the farmers confidence in new adoption. However, increasing of agro-biodiversity is always welcome step.
6. The convener of the Sub-Group 2, Mr. Sachin Raj made a presentation on behalf of the group for developing strategy for research and production of certified Quality Planting Material (QPM) accessible to farmers through a network of identified organisations/industries, extension of technical knowhow and marketing of the produce. It is observed that corporate sectors have contributed significantly in producing clones of Poplar and Eucalyptus. R&D of ITC developed QPM with respect to four tree species like Poplar, Subabul, Casurina and Eucalyptus. IGTFB has developed QPM with respect to Shisham, Melia dubia and Casurina. Generally, tissue culture propagation in India never remained encouraging in Public Sector. Rather vegetative propagation is more successful in tree breeding programs. Forest Departments every year are raising millions

of seedlings for their plantations but only limited planting stocks are raised from seeds of known sources.

7. Mr. R. K. Sapra suggested that since 20-25 prominent agro-forestry tree crops are to be focused initially, seed orchards need to be established in different regions, keeping in view the total demand for species-wise seeds, annual production of viable seeds from a tree of that species etc. Tissue culture should be limited to those species from which viable seeds are not obtained in sufficient quantities. Clonal research is being target oriented keeping in view their end-use, clones developed for timber production need not be mixed with clones developed for pulp. Since in recent years, for QPM of fruit plants significant advancements demonstrated by the Horticulture Departments, majority of members advocated for adoption of Horticulture Model. DDG (Research) from ICFRE suggested for development of productive and adaptable genotypes/clones for agro-forestry plantations and tree breeding program may be taken up keeping in view specific traits. He informed that scheme for certification of Forest Reproductive Material (FRM) developed by OECD and EU with global acceptance would be used for certification of FRM in India based on identified source, selected from source and duly tested before selection. Devashree Nayak from ICRAF informed that certified high quality planting materials can be supplied to farmers which need to be linked with market based incentives. Suneel Pandey informed that ITC-413 is a clone of Casurina suitable for inland dunes.
8. Mr. A. K. Srivastava, Ex. ADG told that for the purpose of Standardisation Process of QPM/ Nurseries, requirement of funds will not be very high and can be funded from the Central component of CAMPA Funds. However for drive in there is a need for overarching Board, regular funding and accreditation entrusted to Third Party in horticulture model. Though Mr. Sachin Raj suggested a very elaborate process for certification for QPM/Nursery to the Ministry, it is felt that initially nurseries may be certified on the basis of few important parameters like use of FRM from known source which is decided by selection after testing; capacity of nursery, their accessibility and general sanitation besides other regulations taken by them for phyto-sanitary measures. Mr. Sapra suggested that Corporate/Private sector may be encouraged to take up R&D in

tree improvement, certification of State/Private nurseries. A network of accredited nurseries for mass multiplication of certified FRM would be put in place towards supply of authentic, high quality, certified germ-plasm, not only for farmers adopting Agro-forestry but also for all SFDs engaged in tree plantations on forest lands.

9. Agro-forestry Research Network is essential for participating Institutes/SFDs/SAUs/ Industries to understand their research agenda to avoid duplication in research on development of QPM without wasting further scarce and limited funds.
10. It is always encouraging where Wood Industries came forward to ensure buy back guarantee to farmers through MoU as in case of ITC. However, designating agro-forestry wood produce as agri-produce the advantage of e-NAM platform can be taken in the interest of the farmers. Recently in the budget of 2018, it is announced that 22,000 rural markets will be linked to provide information of best price to farmers. It is suggested that at the time of harvesting, produce should carry authentic certificate to fetch good market price with bar/color coding. Tree Growers Co-operative in different regions can be registered which can bargain about the price for the benefit of farmers.
11. Chairman also insisted that wood based industries should be promoted by creating an enabling environment for tree growers under “Made-in-India” or “Start-Up-India” programs by giving some special incentives to new entrepreneurs. If industries are set up, in the catchment area not only agro-forestry would be promoted but many rural youths can be engaged after enhancing their skill. Rural wood based artisans can also be engaged in wooden handicrafts which has huge export potential.
12. Extension for agro-forestry may be taken up by Agriculture Departments in states through the strong network of nearly 600 KVKs by engaging one Subject Matter Specialist of Forestry background and organizing farmers’ camp regularly. T&V programs will be very fruitful for farmers who are willing to go for agro-forestry in their field. If agro-forestry plots are not established in Demonstration Farms, different models can be developed and economics be provided through print media and televisions. In other words, agro-forestry should be mainstreamed in place of agriculture only as a sustainable mode of farming.

13. Dr. B. N. Mohanty, Director, IPIRTI, Bangluru under Ministry of Environment, Forest & Climate Change has explained activities of his Institute for promoting wood based industries. He explained about three generations wood products like Plywood, Particle Board and Medium Density Fibre Board. Similarly he explained about three generations bamboo products initially Mat based, then Strip based and finally Lumber based products and their growing market. He also showcased the role of his Institute both in Research and in Transfer of Technology. In South India, four species namely Eucalyptus, Poplar, Melia and Silver Oak are being utilized for plywood industry. Institute has taken up a plantation of Melia dubia on the field of a progressive farmer of Karnataka which is managed under silvicultural rotation of 12 years. Realizing the challenges of making plywood and panel boards from farm grown Eucalyptus and Poplar spp in comparison of better species from forest, the Institute developed and successfully transferred technology to wood industries of Yamunanagar and set up a testing of wood and training centre at Mohali in 2008. About 50% Plywood demand is met from Yamunanagar industries. He also explained about the technology of particle board using non-conventional materials from wastes of agriculture and forests like pine needles, coconuts husks, bagasse etc. The institute has developed dyed face veneers and flexi-ply. Face veneer of Melia dubia is used in Plywood technology.
14. Due to shortage of time, Mr.R.K.Sapra, Convener of Sub Group 6 quickly presented different policy interventions needed at the level of the Central Government and State Governments for the sustainability of Agro-Forestry in India which is appreciated by members.
15. Since many members expressed their unavailability in month of March, it is decided that on the basis of valuable inputs provided by most of the Committee Members and Special Invitees, the draft report will be compiled and sent to everybody in which the learned participants can make further value addition and the Chairman will finalize it with the consent of everybody before its final submission to the Ministry.
16. However, it is decided that the Chairman and various Sub Group Conveners who will be available at New Delhi will meet on 15<sup>th</sup>. March 2018 in the Ministry for a short meeting



to discuss about the format in which the Report will be submitted. The Member-Secretary will issue the notice of the meeting.

17. At the end, the Chairman expressed his appreciation and sincere gratitude to all members including special Invitees who inspite of their busy schedule could able to attend the meeting.

**Proceeding of the 4<sup>th</sup> Meeting of the Sub-Group Conveners of the Expert Committee on 15<sup>th</sup> March, 2018**

1. List of participants annexed.
2. A Conveners' Group meeting was held on 15.03.2018 at Krishna Hall, IPB as per the decision taken in the 3<sup>rd</sup> meeting of the Expert Committee held on 8<sup>th</sup> and 9<sup>th</sup> March, 2018 at Krishna Conference Hall of Jal Wing, 4<sup>th</sup> Floor, Indira Paryavaran Bhawan, New Delhi under Chairmanship of Sri Abhijit Ghose, Ex-PCCF (HoFF), Rajasthan from 10AM to 12:30 PM.
3. At the beginning, Sri Abhijit Ghose, Chairman of the Committee welcome the Conveners of different sub-groups as well as few invited expert members who joined the meeting. Clarifying the purpose of the meeting, he informed that valuable inputs obtained from time to time by expert members and special invitees need to be consolidated now and can be presented in the form of Report. He also informed that due to some compelling reasons he will have to go out of country for a longer period, most of the work will be done by co-ordinating through e-mails and Skype and maximum efforts will be made to submit the report by Mid-April to the Ministry. In case, any meeting is needed to finalize the Report, the next Senior most member, Mr. R. K. Sapra in consultation with the Member-Secretary Mr. Noyal Thomas can keep in case of exigencies. (Action: Chairman & Sub Group Conveners)
4. A tentative format for the Report was also discussed. It was decided to showcase few "Good Practices" for promotion of tree planting outside forests including agro-forestry like the process adopted by forest deficit state of Haryana to become a timber surplus state in the country or the leadership role played by ITC to network with farmers for meeting its raw material demands. During the compilation of report, efforts will be made to make it more attractive. Mr. Sachin Raj offered the modern facilities of his office to make use of in bringing out a quality report which was hugely appreciated by members. At the compilation stage, the Member Secretary, Mr. Noyal Thomas, DIG (FP) will co-ordinate with the office of Mr. Sachin Raj of NCCF. It was also further decided that analysis and synthesis of various ideas presented, if appears to be disjoined or not in appropriate place, can be corrected during editing as well as value addition in the report.

Chairman then presented salient points of different ToRs and requested concerned Conveners to present the matters keeping in view those points.(Action: Mr Sachin Raj & DIG (FP))

5. In case of ToR-I, since the committee had decided earlier to go with the Agro-Ecological zones, the Chairman requested Dr.S.K. Dhyani to write at least one para stating reasons to go with such classification for identifying suitable agro-forestry tree species. He also pointed out to consider a district unit as far as possible co-terminus with one broad agro-ecological zone or sub-zone. Mr. R.K. Sinha told that in certain district rainfall is very high but a portion of the same district falls in to rain shadow zone due to presence of a hill range obstructing south-west monsoon. Total districts in the country are as large as 670 now. But only in case of few districts such aberrations noticed. As suggested in earlier meeting Dr. Dhyani indicated climatic and soil details against each zone. In the final report a coloured map indicating all 20 zones will be included. Against each zone, Multi-purpose Tree Spp. and Fruit species will be shown. Economic models of agro-forestry for different agro-ecological zones may also be part of this chapter. In case if any innovative farmers try something unconventional, such cases need to be closely observed by concerned KVK. Dr. Dhyani and Dr. Rekha Pai will finalise the write up in consultation and put it in the group mail by 25<sup>th</sup>. March and after receiving suggestions for further improvement by members of the expert Group, the final version will be uploaded in group mail by 31<sup>st</sup>. March, 2018.

(Action: Dr. Rekha Pai& Dr. S.K.Dhyani)

7. As regards ToR-2, strategy for research and production of QPM need to be spelt out. Tree breeding program in forestry is not very much developed in SFDs. Earlier under an Indo-Denis Project in 70s and later under World Bank funded Research Project in ICFRE in 90s, some efforts were made in identification of CPT (Candidate Plus Trees) and Seed Production Areas of few plantation species in various regions. Development of QPM in case of agro-forestry spp is mainly contributed by R & D support of some industries like ITC, WIMCO etc. Lack of continuity in research and non-availability of sufficient scientists in Public Sector Research Organizations besides funding are measure bottle necks. Unlike crops, research on tree species is very time consuming. Clonal propagation

of tree crops is not very successful in forestry. So it should be attempted to only in tree species which produce insufficient viable seeds or recalcitrant seeds.

8. Standardization of different parameters for certification of QPM as well as Nurseries, which supplies QPM are also measure challenge. A well thought-out strategy will have to be spelt out along with protocol to be followed for certification. During discussion, a general consensus was made for recommending sustained fund flow for R&D from CAMPA Fund as through Tree Improvement and production of QPM, productivity of forests as well as agro-forestry will be improved. Agencies for certification of QPM of Agro-forestry tree crops and even nurseries which will supply QPM may also be notified. KVKs established in almost all districts can maintain such list of near-by accredited nurseries to disseminate such information to farmers. It was also suggested that forestry research institutes need to take part in Farmers' Fares under their mandated area to give information related to tree crop. Demonstration areas in every agro-ecological zone may be set up by Forestry Research Institute.
9. Forestry/Agro-Forestry Graduates need to be engaged in all 681 KVKs of the country against unfilled posts of SMS at the earliest so that technical knowledge can be passed on to farmers for promoting agro-forestry system and how through a farm diversification with tree crops/animal husbandry/ other related livelihood like bee-keeping or pisciculture, vermi-composting etc. not only a stability obtained in farm income but also increase farm income manifolds.
10. Though the QPM will always give a premium on the usual price of agro-forestry products but inadequate market information is a serious disadvantage to farmers. Networking of wood trading centers can give a transparent picture of best market price to farmers. If woods from agricultural land treated as agro produce and traded in Krishi Upaj Mandi (Agriculture Market) the platform of e-NAM can facilitate both food and wood.
11. Mr. Sachin Raj of NCCF is the Convener of the Group. He was requested to prepare a report of his Sub-Group in consultation with his other members (as he has all high tech facilities of communication in his office). He was requested to prepare a write-up on TOR-2 and send in group mail to all by 25<sup>th</sup> March as a first draft and after incorporating

acceptable suggestions send final draft to all latest by 31<sup>st</sup>. March. (Action: Mr. Sachin Raj)

12. Chairman then drew the attention of members on ToR 3 which were to suggest ways and means to access funding mechanisms to give further boost to the efforts of the Government. Green India Mission (GIM) funds available with MoEF& FC need to be spent both for Forest areas and Non Forest Areas. Similarly though the general feelings of members to spend CAMPA Funds generated from NPV amount in diversion of forest lands is similar but many believe that NPV amount need to be invested in forests only. However, it can be safely spent for R & D in forestry, development of infrastructure of Hi Tech Nurseries, Seed Production Area etc. that can enhance productivity of our forest. Such infrastructures will also benefit for raising QPM for agro-forestry purpose. MoEF can also facilitate for donor assisted projects for State Governments to promote Social Forestry through which ToF can increase. Mr. Sachin Raj suggested that apart from external donor agencies, internal donors can contribute and a mechanism, though uncommon in Government, can also be devised to tap resources. Chairman agreed and told how in Rajasthan, contributed funds under BhamasahaYojna is used in for education, water and other fields for development activities.
13. Looking to the large scope of plantation in desert areas through Shelter Belt Plantation, Sand Dune Stabilization and Agro-forestry for combating desertification. Ministry has a cell for Desertification but actual funds of RD Ministry was used in the past for DDP, DPAP or CDP which were discontinued in favour of certain flagship programs like MGNAREGA, Watershed Projects etc. MoEF &FC may tap funds of UNCCD or GEF for running such programs in desert areas. Agro Forestry Mission Funds can be given to state Agriculture or Forest Department for promoting agro-forestry. CSR funds can be tapped for R&D in agro-forestry. Convergence of resources in innovative manner will always provide larger scope in forestry and agro-forestry. Wood Based Industries should get various tax incentives for producing QPM and also expanding agro-forestry coverages. DIG, FP who has been designated as Convener of this Sub Group was requested to produce a write up by end of March and circulate to all members for further suggestions and improvements. (Action: Mr. Noyal Thomas, DIG (FP))

14. As regards ToR 4, even if lot of proactive steps have been initiated by the Ministry of Environment, Forest & Climate Change ever-since the Bansal Committee Report strongly recommended to liberalize felling permits and transit pass for promoting TOF and agro-forestry in particular through issuing Advisory Notes to the State Governments and many states have also responded well and issued guidelines and declared commonly grown agro-forestry tree crops free from taking prior felling permit and transit pass. A milestone step has been taken by declaring “Bamboo” from tree crop to grass which has been hailed by all quarters. As a consequence, now all kinds of bamboo crops get automatically free for getting FP or TP. Ministry has issued Advisory to States for issuing Pan India Permit for Bamboo though issue of language has been raised. Though TP is unwarranted for the produce coming from Private Land, TP is needed for bamboo growing in Forests as well as FRA areas. Some viable solutions need to be developed for identifying bamboo (like the hammer mark on timbers extracted from coupes).
15. However, majority of members felt that lack of uniformity in relaxing an agro-forestry spp in one state may not necessarily be same in neighboring states, farmers will not be comfortable to carry it across state boundaries to a place where they get favorable market for their product. Since Agro-Forestry Policy 2014 has been announced, it is felt that an enactment can be done as Agro-Forestry Act where the tree products coming from agricultural land can be defined as “Agriculture Produce” and not a “Forest Produce”. But a suggestion was put forward in the meeting that it can be done as States like Haryana and Punjab did it by including in APMC Act. In case of species notified as of RET (Rare, Endangered and Threatened) category or notified by CITES some exception can be taken. Members also suggested that for provision of PAN India Permit, Government of India can bring a change in Sec 41 of Indian Forest Act, 1927. It is still debatable whether any change is warranted in Forest Act when we are now thinking to give Agro-Forestry produce the status of “Agri-product”. There is no restriction in the movement of food grains within the country. It is also required that while leveling a tree produce as agriculture produce, a Source Certificate is to be issued by local Sarpanch of Gram-sabha/Patwari or RI of Revenue Department/ Forest Guard or Forester of Forest Department/ Industries entered with MoU with farmer for raw material/ nearest KVK. Members suggested for devising some standard formats for Source Certificate.

16. Forest Check Posts will be mandated to permit transporting wood coming from farms accompanied by Source Certificate issued by competent authorities. Agriculture Ministry can fund for development of online portal for forest check posts when on the basis of Self Certification by farmers and uploaded on this portal, Forest Check-posts can permit transit of agro-forestry products. Any attempt to harass transporter carrying necessary details will be punishable under relevant Act considering as dereliction of duties for staff at Check Posts. In front of Check Post Barriers, all relevant rules must be notified and displayed on big hoardings. Police Departments who are authorized for checking of transportation of forest produce need to follow similar practice for agro-forestry products.
17. Contract farming/leasing of farm land for farm forestry/agroforestry need to be permitted under Model Contract Farming Act, for its adoption as a mainstream mechanism for production of biomass for household use and industrial wood as raw material and both Ministry of Agriculture & Farmers' Welfare and MoEF&CC may take up the matter.
18. As prescribed in the policy, there was a complete ban on felling of trees above 1000 M elevation. Since almost three decades have elapsed in this matter, an evaluation of policy impact is needed from economic, social and environmental angles. As high altitude conifers have some specific industrial demand. It was requested to Mr R K Sinha to prepare a write up for ToR 4 with Mr. Suneel Pandey and finalize it by March end in consultation with other members. (Action: Mr. R. K. Sinha & Mr. Suneel Pandey)
19. Regarding ToR 5, it is suggested that a common portal may be created on which ToF plantations of different Departments and Ministries will be geo-tagged and uploaded in a database. Most of the states now have digitized their revenue maps and Khasras. Information of standing trees on different khasras need to be uploaded in the same ToF portal where a sub-portal for Agro-Forestry database can be created separately for authentic future record. Authentication of trees on agriculture fields can easily be carried out from such database in future. Species and age of tree crops need to be entered in the database.
20. Mapping of AF areas may be continued to be done by CAFRI in the same manner but only with high resolution Satellite imageries; not less than 5.8 m resolution. Present methodology of finding trees after masking of cropland and fallow land on LU & LC





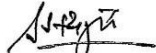
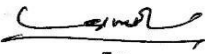





imageries. It need to be authenticated through ground sampling from selected grids of 5Km x 5 Km in which entire geographical areas of the country has been divided. This will help integration of data by other agencies who carry out their ground sampling. Presently from Remote Sensing data, species-wise map are not being prepared but looking to its future scope, digital library for spectral signatures of species can be prepared.

21. At present Forest Survey of India (FSI), Dehra Dun is including all areas more than 1 ha. with more than 10% or more crown density as Forest Cover (FC) irrespective of such areas, with-in or with out of forest areas. But after the digitization of all forest boundaries, exact non-forest areas outside of forest land can be assessed which have 10% or more crown density. If mapped areas of agro-forestry alone is passed on to FSI by CAFRI, FSI can easily carry out Growing Stock or Carbon assessment in these areas as part of preparing Forest Inventory. As decided in focused group meeting a Consortium of these Agencies involved need to be constituted to take various decisions of data collection and fine tuning of methodologies in the field. CAFRI may prepare a write up on ToR 5 which can be finalized in consultation with FSI and other experts as early as possible. (Action: Dr. Rizvi, CAFRI)
22. Sustainability and Potential of Agro-Forestry was included as ToR 6 in the first meeting. Dr. Dhyanani was requested to prepare a realistic calculation of working out potential Agro-forestry area based on assumptions. He has agreed to provide it to the Chairman at the earliest. Regarding the sustainability of agro-forestry, various policies, institutional mechanism and sustained fund flow is required. Chairman and Mr. R. K.Sapra agreed to prepare a suitable write up at the earliest. (Action: Abhijit Ghose& R.K.Sapra)
23. Meeting was concluded at 12:30 pm with thanks to the Chair.



Dated - 15-02-2018

Meeting of the Expert Committee constituted to develop strategy to increase green cover/ tree cover outside recorded forest areas (Tree Outside Forests) on 15<sup>th</sup> & 16<sup>th</sup> February, 2018 from 10.30 AM to 5.00 PM at Indus Conference Hall, Jal Wing, Ground Floor, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi.

S.No.	Name & Designation	Contact No. & E.mail Address	Signature
1.	Shri Abhijit Ghose	Chairman	
2.	Dr. D. Paudyal	Sp. invite	
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17.	Dr. Ajay Kumar Saxena.	9013513032 ajay@cseindia.org	Ajay
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20.			
21.			
22.			
23.			
24.			

## Certification Scheme

### Governance of the scheme

The QPM Certification standard development follows a multi-phase standard setting process ensuring meaningful participation of the relevant stakeholders. A Standard Development Group (SDG) for development of the QPM Certification Standard through identification, mapping and engagement of the potential and relevant stakeholders in the process is essential aspect.

Develop functional/administration documents, standard setting rules, Terms of References for the SDG, logo usage standard, complaints, appeals handling mechanism, governance, certification process requirements etc other important protocols required to developing effective certification scheme.

The certification scheme involves execution and development of the following components:

- Governance of the scheme
- Standard Setting procedure
- Administrative/ Secretariat procedure
- Procedures for execution of Certification Process/requirement

These components encompass systematic series of protocols, the details listed in the (A)

Establishment of a credible structure for governing the certification scheme will include the following:

<b>Structure</b>	<b>Responsibilities</b>
Governing Council	Approvals on recommendations given by Technical committee on the scheme
Technical Committee	Updating the scheme as and when required
Dispute Resolution Committee	Handling complaints and redressal mechanism
Quality Compliance Committee	To oversight the working of certification bodies & auditors and setting up framework to inspect the working of CB

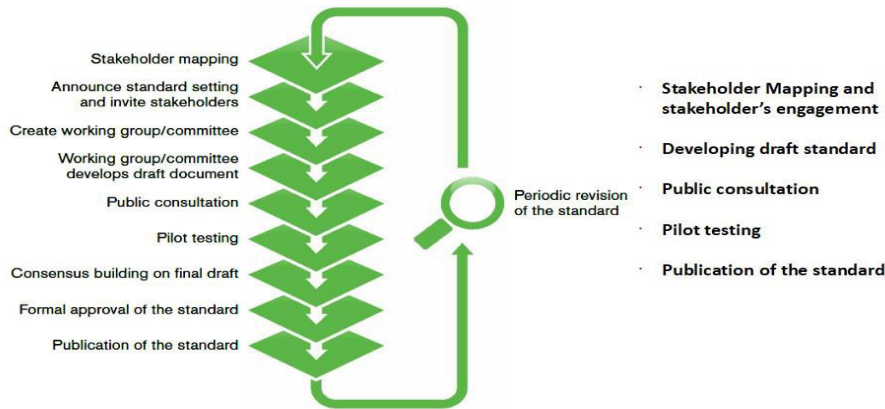
## A. Standard Setting Procedure

Involves the vital introductory procedures, standards, guidelines, development required for managing the process of standards development and certification scheme.

### B1.The standard setting document requirement are as follows:

<b>Standard</b>	QPM certification standard
	Trademark and logo usage standard
	Requirements for Certification bodies
<b>Procedure</b>	Standard Setting Procedure (new and revision)
	Certification and Accreditation Procedures
	Administrative Procedure (SOPs for administration activities and standard development)
<b>Guidance and Miscellaneous</b>	Administration of the proposed scheme
	Agreement between the scheme owner and client
	Logo usage and trademark guidelines
	Notification to CBs
	Procedures for handling complaint, appeal and redressal mechanism
	Guidelines for record keeping
	Fee structure
	Guidelines to Maintain client Database
	Guidelines for auditor's competency
<b>Document to be referred</b>	Documents to be referred for standard development

## B2. Stepwise approach for Certification Procedure:



## C. Administrative/ Secretariat procedure

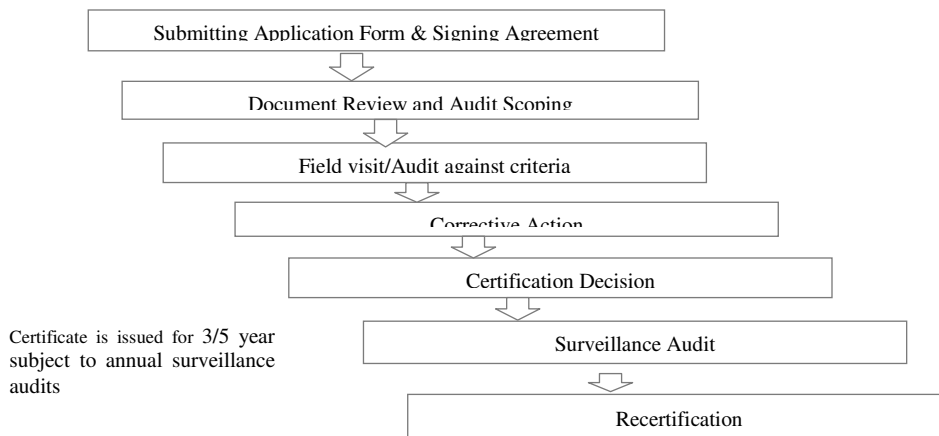
Operational implementation of functions and management of the scheme will involve:

1. Compliance with Statutory requirements
2. Record Maintenance
3. Accounting
4. Complaint handling provisions
5. Revisions in the scheme documents like - periodic review of the standard, guidance etc. as and when required
6. Database management of Certified clients
7. Conducting regular technical committee meetings
8. Extended workshops and awareness program for scheme implementation

## D. Procedures for execution of Certification Process/requirement

This component contains two parts:

### D1. Procedure for execution as explained in the flowchart below:

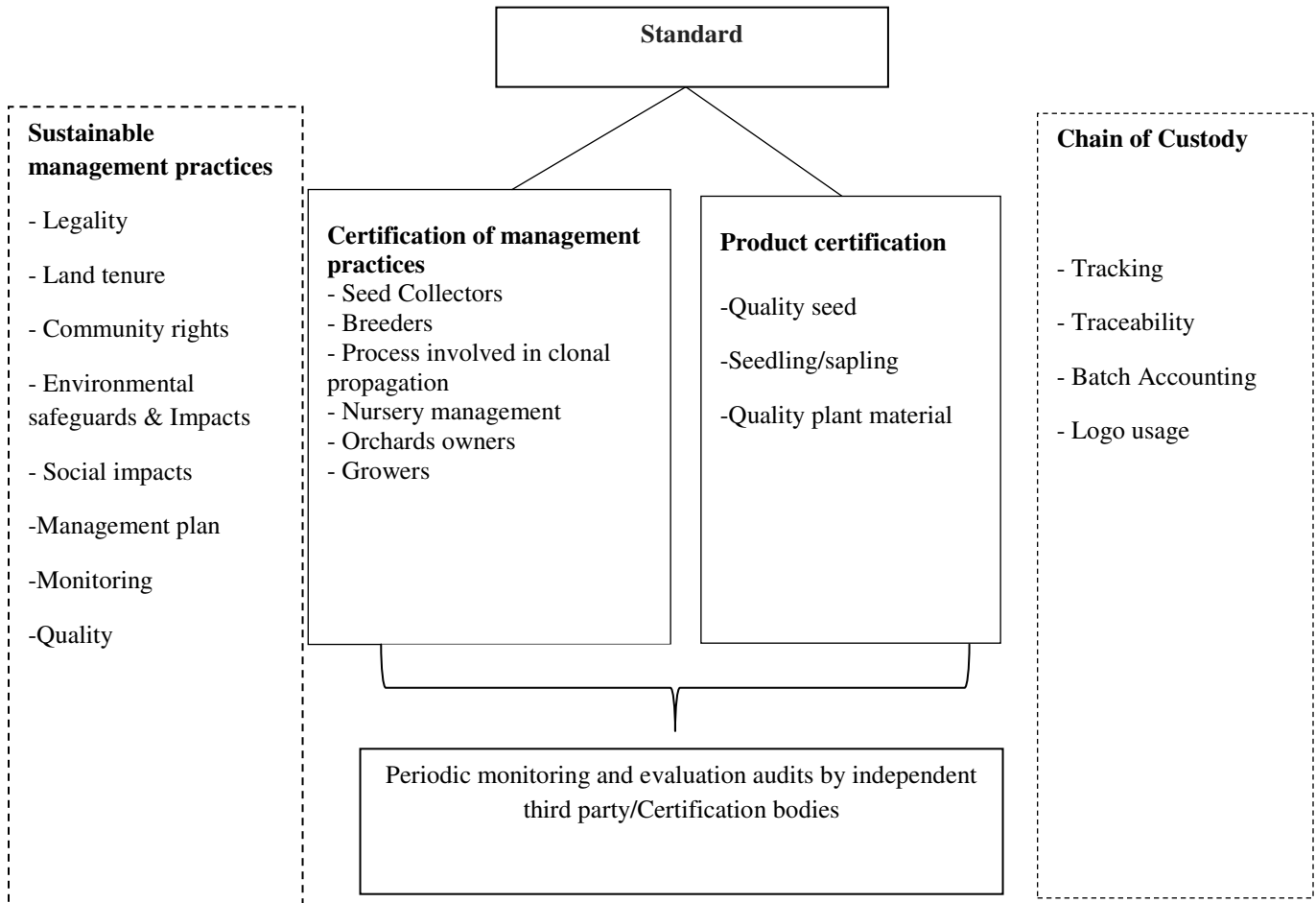


## D2. Documentation Requirement for executing the certification process:

Types of Manuals	Description
<b>Corporate Manual</b>	This document serves as the master document for the certification body which is entitled to certify companies (clients) against the certification standard. It involves company's policies, legal status, procedures for complaints, appeal and dispute, records keeping, board meetings mechanism, management review, internal audits, quality compliance policy and procedures, company agreements and contracts, etc.
<b>Certification Manual</b>	The manual outlines and illustrates the process of certification, sub-types of certification, flow of activities, its timelines, role of relevant party in the audit, stages of audit, duration of audit and renewal requirements, testing requirements, documents involved in the audit process and maintenance of certificate.
<b>Auditor's Manual</b>	This is an important procedural document which defines guidelines on auditor's qualification, auditor's continuous training requirements and ranking to handle various type of audits (simple/complex), maintaining auditor competence, auditor monitoring and evaluation, auditor resources, principles of auditing, conflict of interest, code of conduct, consulting, pre-audit activities, explaining in detail the conduct of audit, guidelines on meetings, interview and walkthroughs at client's site, identifying gaps and communication with client. To define roles and responsibilities of guides and observers, decision making for exceptional cases during audit. Setting specific guidelines on particular sub-type of certification, etc.
<b>Program Quality Manual</b>	This involves guidelines on a set of procedures e.g., Quality compliance of certification body, quality compliance of the said certification scheme, quality compliance of Certification Manual, etc
	<b>Maintenance of auditor's resource and its quality compliance</b> , viz., audit report templates and checklists, auditor training and guidance materials, including the Auditor Manual, guidance documents and templates for clients, auditor notifications and official communications, such as announcements or updates.
	<b>Maintains client resources-</b> Comprises of forms, templates and guidance documents for client to understand and follow the certification scheme efficiently. Official communications and client notifications.
	<b>Maintains employee resources and its quality compliance-</b> Employee resources encompass various documents used by employees to ensure the consistent and correct conduct of certification activities, for example through training, work instructions and shared and standardized tools for management of projects and operations.

	<p><b>Maintenance of Records-</b> Set up guidelines on how to maintain records for the certification scheme and what needs to be documented and for what duration.</p>
	<p><b>Other relevant procedures,</b> e.g. Protocols on proposal drafting for client for the said certification scheme, audit stages guidelines, application acceptance procedure, certificate transfer procedures, roles and responsibilities, fees structure, confidentiality and agreements, certificate issuance, certificate maintenance, grading of non-conformances.</p>
	<p><b>Scoping Manual-</b> The Scoping Manual outlines requirements and procedures for analyzing client’s operations to determine:</p> <ul style="list-style-type: none"> <li>• The scope of certification (size, scale, and complexity) for which they are eligible based on the nature of their operations, and,</li> <li>• The scope of audit (evaluation) that is necessary to verify their conformance for certification, according to quality compliance requirements.</li> <li>• Class of auditor required</li> <li>• Classification of organization based on the type and no. of products</li> <li>• Multi-site certification (if applicable)</li> <li>• Sample selection for testing</li> <li>• Process of scope change/expansion, etc.</li> </ul>

### National QPM Registry





## Information and MIS for Nursery (Illustrative model)

Sowing Details in the Nursery:

Nursery Code		Name of Nursery		Date	
S.no	Species	Bed Size & Number	Qty of seed received & Sown / Bed (Gms)	Date of Sowing	Germination Percentage

Species wise stock of plants Growing in the Nursery:

Nursery Code		Name of Nursery		Date				
S.no	Species Code	Species Name	Stock Ready		Stock Growing In			
			Standard	Tall	Total	Poly bags	Mother Beds	Total

1. Species wise Ready stock in a nursery:

Nursery Code:		Name of Nursery:			Date :			
S.no	Species Code	Species Name	Seedlings in stock		For Use In			Height (Cms)
			Normal	Tall	Total	Distribution	Planting	

2. Balance Stock of Plants in Nursery on Any Date:

Nursery Code			Name of Nursery:				As On Date :						
S.no	Species Code	Species name	Debit:				Credited:					Balance (a-b)	
			Initial stock	From other units	From other nurseries	Total (a)	To Distribution	To Planting	To other Nurseries	To Other	To Wastage		Total (b)

3. Weekly Progress report of Distribution of Plants at a Nursery:

Nursery Code		Name of Nursery:						Report Date:		
S. No	Quantity	Up to Last Week			During the Week			Up to this Week		
		Free	On Cost	Total	Free	On Cost	Total	Free	On Cost	Total
1	Number of plants Distributed (Nos.)									
2	Number of Beneficiaries (Nos)									
3	Revenue realized (Rs)									

4. Beneficiary details and area ( ha.) planted

Nursery Code		Name of Nursery:				Report Date:		
Farmer Details		Village Details			Planting Details			
S.No	Farmer's Name	Father's Name	Village	Block	District	Qty. of Plants Taken	Area Planted (Ha.)	Date Of Planting

### **Details of government funding opportunities for promotion of trees outside forests**

The major funding sources from the government side are from Ministry of Environment, Forests & Climate Change and Ministry of Agriculture, Cooperation and Farmers Welfare.

- A. The major schemes and programs from Ministry of Environment, Forest and Climate Change (MoEF&CC) are:

The budgetary allocation for the environment ministry for 2018-19 is Rs. **2,675.42 crore**. Under the GIM's NAP, an allocation of Rs. **160 crore** has been done under which the derivables include increased forest cover on *6163.8 hectare* of forest and non-forest lands among others.

- **National Afforestation Programme (NAP)**

- NAP is 100% Centrally Sponsored Scheme (CSS) for raising tree plantations and eco-restoration of degraded forests and adjoining areas through people participation.
- An amount of **Rs. 734.90 crores** has been released to the states for treating *233210 ha.* of degraded and adjoining areas from 2013 to 2018. However the funding has come down of late due to the emergence of the Green India Mission. The future of the scheme depends on the level of convergence between NAP & GIM. As such the National Afforestation Programme has now been merged with GIM.

- **Green India Mission (GIM)**

- GIM is one of the eight Missions under the National Action Plan on Climate Change (NAPCC). The mission will provide, demand-driven window for innovative initiatives and small scale projects to a range of stakeholders.

- The innovation funds would be available at national, state and district level mission organization. Total mission cost at the beginning is projected to be **Rs 46,000 crores**. However the allocation & funding has come down drastically due to the lack of capacity of the State departments and reduced funding from the budget of the Ministry.
  - It is estimated that the interventions under various Sub Missions will generate *2400 million person days* of wage employment costing about **Rs 24,000 crores**. Additionally, over **1 lakh** community youths will get skilled employment opportunities, costing approximately **Rs 4800 crores**. Key ongoing programs/schemes (and those in the pipeline) need to have the convergence at different levels.
  - The convergence guidelines have been issued for GIM-MGNREGA and GIM-CAMPA as all these schemes are converged at the district level. Green India Mission has allocated funds to the states to the tunes of **Rs. 70.09**, **Rs. 41.25** and **Rs 46.29 crores** during 2015-16, 2016-17 and 2017-18 respectively.
  - However funds utilization by the States has remained far from satisfactory due to various administrative and coordination issues. The implementation mechanism in the MoEF&CC and in the states are major reasons for poor performance of the scheme.
  - World Bank aided “*Ecosystem Services Improvement Project*” (ESIP) in selected landscapes of Chhattisgarh and Madhya Pradesh States has been designed to enhance the outcomes of the GIM.
- **Compensatory Afforestation Fund Management and Planning Authority (CAMPA)**
    - The **CAMPA Act 2015** has been enacted and will allow utilisation of about **Rs. 42,000 crores** of CAMPA Funds in a planned and expeditious manner.
    - The Act provides for transfer of 90 % of the funds to the States for creation and maintenance of compensatory afforestation and execution of other activities for

conservation, protection, improvement and expansion of forest and wildlife resources of the country.

- It is also for consideration that out of the Net Present Value component of CAMPA, funds be also made available for raising Trees outside Forests, including agroforestry.

- **Afforestation under Corporate Social Responsibility Funds of the Banking Institutions/PSUs**

- The Parliamentary Standing Committee chaired by Dr .T Subbaramani Reddy, held a series of meeting with the CMDs of Nationalized Banks and PSUs and impressed upon them to earmark some *25% CSR funds for Afforestation* works and necessary guidelines should be put in place accordingly. The Committee suggested for creation of Corporate Social Responsibility Tree Plantation Fund (CSR TFP) out of the CSR fund for a district.

- **Japan International Cooperation Agency (JICA)**

- **JICA** is the largest overseas development partner to the forestry sector in India. Its assistance to the sector commenced in 1991 and since then 22 projects across 13 states have been supported over the last two decades for Sustainable Management of Forests, Biodiversity Conservation, Poverty Alleviation, Watershed Management and Disaster Mitigation etc. This has amounted to a cumulative commitment of **JPY 226 billion** (approx. **Rs. 11,895 crores**). As more and more States are coming up with community oriented forestry projects through JICA funding, the funds can be very well utilized for promotion of TOF.

- **Nagar Van Udyan Yojna**

- This seeks to create/ develop at least one **CITY FOREST** in each City having Municipal Corporation/ Class I Cities. The Ministry will support one time development and non-recurring expenditure to the concerned agency of the concerned cities for creation of a City Forest. The release of an amount of **Rs. 50 crores** from *National CAMPA Advisory Council (NCAC)* Funds for the project was approved for financial year 2015-16. The allocation needs to be scaled up.

- **Global Environment Facility (GEF)**

- **MoEF&CC** is the designated *GEF Operational Focal Point (GEF-OFP)*. **Department of Economic Affairs (DEA)** is the designated *GEF Political Focal Point (GEF-PFP)*.
- Under GEF, India is member of a constituency comprising Bangladesh, Bhutan, India, Maldives, Nepal and Sri Lanka.
- *GEF 5* is the present cycle of funding eligible for India only through grants for the projects under NAPCC. Under the STAR GEF-6 funding, India has received indicative allocations under the focal areas of biodiversity, land degradation and climate change of **USD \$130.58 million** and utilized USD \$95.77 million of funds with USD \$34.80 million allocations are remaining unprogrammed.

- **Green Climate Fund (GCF)**

- India has formally signed Accreditation Master Agreement (AMA) between GCF and NABARD. GCF supports both climate change adaptation and mitigation projects in developing countries.
- “Installation of Ground Water Recharge System” in Odisha has recently been approved by the GCF for USD \$34 million. Another proposal on coastal areas has

already been submitted to the GCF Secretariat and several more projects are in the pipeline.

- India has nominated a total of *five* **Direct Access Entities (DAE)** for accreditation by the GCF. *Two* of these from the **public sector**, and *three* from the **private sector** for accreditation by the GCF.
- The public sector entities are **NABARD** and **SIDBI**. The private sector entities nominated are **YES Bank**, **IDFC Bank** and **IL&FS Environmental Services**. So far, NABARD and SIDBI have been accredited by the GCF.

- **National Adaptation Fund on Climate Change (NAFCC)**

- NAFCC has been established with, budget **Rs. 350 crores** for the year 2015-16 and 2016-17, with an estimated requirement of **Rs. 181.5 crores** for financial year 2017-18.
- The objective of the fund is to assist State and UTs that are particularly vulnerable to the adverse effects of climate change in meeting the cost of adaptation. The focus of the fund is to assist adaptation projects and programmes to support concrete adaptation activities that reduce the effects of climate change facing communities and sectors.
- Since the trees outside forests is a low cost option for climate change adaptation, this fund also could be utilized for promotion of TOF. NABARD is the National Implementing Entity (NIE) responsible for implementation of adaptation projects under the NAFCC.

- **14th Finance Commission Awards**

- To encourage conservation of existing FTC and to provide fiscal resources to the States enabling them undertake alternative economic activities as a substitute for



economic disability imposed by the forest cover, the XIV Finance Commission has recommended an award to compensate the States financially which are having more FTC (7.5%).

- The states should use a part of the additional assistance for the promotion of forests & tree cover especially trees outside the forests to enhance the greenery & for improving the income of the farmers.

**B.** The major schemes and programs from the Ministry of Agriculture and Farmer Welfare are:

Agroforestry Policy 2014 specifies that the, Agroforestry interventions can be a potent instrument to help achieve the 4 percent sustained growth in agriculture. The policy admits agroforestry not having gained the desired importance as a resource development tool due to various factors.

The mandate of agroforestry is also falling through the cracks in various ministries, departments, agencies, state governments, etc. Institutional finance in agroforestry has not been lacking due to the lacking of awareness of technical and economic data on different agroforestry models, and the techno-economic parameters required by financial institutions (FI) to evaluate finance needs and viability of the projects.

Very few developments have been done on popularizing insurance products for agroforestry ventures. Lack of awareness, unavailability of products suitable to growers, high cost of premium and unclear procedure of claim settlements are a few factors responsible for this poor state of affairs.

An institutional arrangement will ensure that agroforestry gets equal treatment with other agriculture enterprises, because at present whether in the sphere of inputs, markets, institutional finance, or research and extension, agroforestry is at a sub-optimal level.

A suitable mechanism for coordination and convergence with state agriculture, and forest departments as nodal agencies may be established. The Mission / Board may also be provided with a corpus in order to effectively leverage **Rs 4000-5000 crores** annually from the on-going programmes.

- **Sub-mission on Agroforestry**

- The Sub-Mission on Agroforestry was launched during the year 2016-17 with an outlay of **Rs 935 crores** for four years till 2019-20.
- The scheme is operational under the umbrella of NMSA and funding pattern is 60:40 as GoI : State Govts. basis for all states excepting for 8 states of NE Region, the hilly states of Himachal Pradesh, Uttarakhand and Jammu & Kashmir where it would be 90:10 fund sharing. For UTs, the assistance will be 100% from GoI.
- Funds, are provided to the states having taken appropriate measures for simplification of felling and transit rules. Hence this is the most targeted fund for TOF in the agricultural sector as it targets tree plantation on fallen lands along with other crops. So far *16000 ha.* covered under agroforestry with plantation of **96 lakh trees**. **Rs 75 crores** is targeted to be spent during 2018-19 under the sub-mission.

- **National Bamboo Mission (NBM)**

- National Bamboo Mission was initially started as a Central Sponsored Scheme in 2006-07. Since 2014-15, this scheme has been subsumed under Mission for Integrated Development of Horticulture (MIDH) for maintenance of plantations. A total of *236700 ha* of bamboo plantation in forest area has been raised under bamboo mission. Further *125091 ha* has been taken up in non-forest areas.
- The new centrally sponsored national bamboo mission with an outlay of **Rs. 1290 crore** under **National Mission for sustainable Agriculture (NMSA)** will fund development of high yielding varieties of bamboos; cultivation in non-forest areas, R&D for harvesting, development of markets and value chain etc. The funding pattern will be 60:40 for all states except the North east & Hilly states where it would be 90:10, and 100% in case of UT's/R&D Institutes/ Bamboo Technology support groups and National level agencies. Hence various species of bamboo can be taken up under the scheme which will boost the tree outside forest.

- **Mission for Integrated Development of Horticulture**

- Flow of funds and the utilization by the Implementing Agencies / State Horticulture Mission (SHMs) / State Bamboo Mission Document (SBDA)/ National Level Agencies (NLAs) / Panchayati Raj Institution (PRIs) etc. from Government of India and utilization of funds shall be governed by extant financial norms.
- Funds will be released to the State Governments. State Government will release funds to the SHMs / State Level Implementing Agencies, who in turn would make funds available to District Mission Committee (DMC) / District Implementing Agency.
- As far as possible, efforts to make on-line payment to all Implementing Agencies would be ensured, which in turn will make arrangements for making payment to beneficiaries through electronic transfer, preferably to their respective bank accounts.
- This scheme is providing assistance for development of high quality planting material, integrated planting of fruit & medicinal plants with irrigation, processing, development of markets etc. Suitable Financial assistance as per norms are provided to farmers & other growers. Hence MIDH is a major financing source for TOF in the country.

- **Minimum Support Price (MSP)**

- There is a need of various financial measures to incentivize tree farming and agroforestry such as fixing MSPs for agroforestry trees, subsidizing agroforestry planting stocks and equipment, establishing wood markets, etc. This can be modeled as in the case of the MSP's of the various agricultural produces.

- **Krishi Kalyan Cess (KKC)**

- StaRETD from 2016 Budget, is expected to generate resources worth about **Rs 5,000 crores**. Revenues collected through this cess “would be exclusively used for financing initiatives relating to the improvement of agriculture and welfare of farmers,” as announced by the central Government.
- Krishi Kalyan Cess can help fund agro-economy including agroforestry, the long-term goal with improvement in agricultural land tree productivity to earn higher income, and consumers benefit from lower prices as a result of better supplies etc.

- **National Initiative on Climate Resilient Agriculture (NICRA)**

- National Innovations on Climate Resilient Agriculture (NICRA) is a network project of ICAR. It aims to enhance resilience of Indian agriculture to climate change and climate vulnerability.
- The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. It began with an outlay of **Rs. 350 crores** for the XI Plan. Trees outside forests especially in agricultural fields can utilize these funds.

- **Agricultural Marketing**

- Integrated Scheme for Agricultural Marketing (ISAM)**

- The overall budgetary allocation is **Rs. 4548 crores** during the XII Plan. With Sub scheme Agricultural Marketing Infrastructure (AMI), Marketing Research and Information Network (MRIN), Strengthening of Agmark Grading Facilities (SAGF), Agri-Business Development (ABD) and National Institute of Agriculture Marketing (NIAM).
- The development of the markets will facilitate better prices for the agroforestry produce and will act as promoting catalyst for the trees outside forests.

### **National Agriculture Market (e-NAM)**

- e-NAM is a pan-India electronic trading portal launched by Ministry of Agriculture & Farmers Welfare, Govt. of India to facilitate farmers, traders, buyers, exporters and processors with a common platform for trading commodities.
- The Cabinet Committee on Economic Affairs approved, Central Sector Scheme for Promotion of National Agricultural Market through Agri-Tech Infrastructure Fund (ATIF). The government has allocated **Rs. 200 crores** to the newly created ATIF. With this fund SFAC will implement NAM for three years from 2015-16 to 2017-18. This will help farmers and others to fetch more value for the tree crops.

### ● **National Mission on Oilseeds and Oil Palm (NMOOP)**

- India is one of the major oilseeds grower and importer of edible oils. The diverse agro-ecological conditions in the country are favourable for growing *9 annual oilseed crops*, which include *7 edible oilseeds (groundnut, rapeseed & mustard, soybean, sunflower, sesame, safflower and niger)* and *2 non-edible oilseeds (castor and linseed)*.
- The cultivation is undertaken across the country in about *27 mha* mainly on marginal lands, of which *72%* is confined to rainfed farming.
- An area of 4375 hectares will be undertaken for systematic plantation in the States for 11 identified Tree Borne Oilseeds (TBOs) namely **Karnaja, Neem, Jatropha, Wild Apricot, Simarouba, Kokum, Tung, Mahua, Jojoba, Cheur, and Olive**. These are cultivated/grown in the country under different agro-climatic conditions in a scattered form in forest and non-forest areas as well as in waste land /deserts/hilly areas.

- These TBOs are also good source of vegetable oil and therefore need to be supported for cultivation. Cost of the interventions proposed under the Mission will be in the ratio of 75:25 between the Central and the State Governments.
- The funding for MM III on the existing wasteland/ degraded forest land @ 100% of the cost of plantation with the ceiling for different TBOs. A lump sum grant upto ₹ **50 lakh per annum** will be provided to TRIFED for promotion of collection of TBO seeds and facilitating their marketing on project mode preferably in the tribal areas (forest/non forest).

- **Tree Insurance**

Linkage of National Agricultural Insurance Scheme for Forestry/Trees

- Currently *Agriculture Insurance Company of India Limited (AIC)*, provides insurance for the selected categories namely: Bio-Fuel Tree/Plant Insurance named-peril insurance covering six different species of plants / trees, used for commercial production of bio-fuel, with optional cover against drought risk.

- Pulpwood Tree Insurance

The policy covers against pecuniary loss suffered on account of the total loss or damage to the trees occasioned by specified perils/risks like fire, flood, cyclone, storm, frost, pest and diseases. The premium is ranging from ₹ **300-600/acre** depending on the tree species.

- Rubber Plantation Insurance

Covers death/total loss of rubber trees against natural calamities and other non-preventable perils, applicable to both mature and immature plants, based on establishment cost and loss of future returns.

- Other than AIC, The *Oriental Insurance Company* and *United India Insurance Company* have some tree insurance products but limited and linked with input costs. There are many exclusions like water logging, drought, nuclear reaction, earthquake, theft, natural mortality of plants, war, insects, mites, etc. All these need to be studied carefully and suitable modifications or new schemes should be rolled out.

- **Model Contract Farming Act 2018**

- Contract farming which in essence is a pre-production season agreement between farmers (either individually or collectively) and sponsor(s), transfers the risk of post-harvest market unpredictability from the former to the latter.
- While market risk cover constitutes the fulcrum of contract farming, it also enjoys the latitude of greater partnership between the two parties, whereby, the sponsor agrees to professionally manage inputs, technology, extension education, pre and post-harvest infrastructure and services, etc. as per mutually agreed terms. The small and marginal farmer there by gets to enjoy additional benefits of operational efficiency.

### **Funding option from other government ministries**

The other government ministries having available funding options and several other funding mechanisms:

- Ministry of Rural Development

### **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**

- MGNREGA & IWMP Convergence:

Activities/tasks identified in DPR for execution under IWMP will be funded as per funding pattern of IWMP and ones under NREGA from NREGA funds.

- MGNREGA & NAP Convergence:

Convergence guidelines have been developed but it has been observed that funding through such convergence mechanisms are not regular or timely and depends on perception of officers-in charge. To overcome these difficulties and to tap huge potential of these national schemes, long term understanding and commitments by all allied departments is required to ensure timely and regular funds for afforestation activities.

- MGNREGA & Rubber Board Convergence:

Expenditure to be incurred from MGNREGA & Schemes of Rubber Board. In addition to rubber plantation development, harvesting/post-harvest processing and marketing will be funded from beneficiary's own contribution and Rubber Board will provide eligible incentives under each activity through RPS/cluster.

- **Ministry of Road Transport & Highways**

- National Green Highway Mission Provisions of funding for planning, implementation and monitoring for the green corridor development and management shall be done from 1 % of Total Project Cost of highways projects, Green Highways Fund.
- It is proposed to establish institutional tie-ups with agroforestry industries (pulp, paper, bio-ethanol, floriculture etc.) for the buyback of sustainable harvest. This collaborative model is expected to generate desired funds, manpower and technological resources for the Green Highways Project.

- **Ministry of Skill Development And Entrepreneurship**

- A National Skill Development Corporation (NSDC) has been established with Central Government commitment of **Rs. 1000 crore**. **Rs. 15,000 crore** is envisaged



to be generated from other Governments, public sector entities, private sector, bilateral and multilateral sources.

- 3-tier structure to implement objectives of the National Skill Development Mission; **Rs. 3000 crore/year** Credit Guarantee Fund for Entrepreneurship Development has been initiated.

- **Department of Consumer Affairs**

- The Price Stabilization Fund (PSF) was set up in 2014-15 to help regulate the price volatility of important agri-horticultural commodities. It is for consideration if such a fund could be used for timber raw materials. Such a price stabilization funds for timber will help promotion of the TOF in the country.

- **Ministry of New & Renewable Energy**

**National Policy on Biofuels**

- The domestic crude oil is able to meet only about 23% of the demand, while the rest is met from imported crude.
- Plantations of trees bearing non-edible oilseeds will be taken up on Government/community wasteland, degraded or fallow land in forest and non-forest areas. Contract farming on private wasteland could also be taken up through MSP mechanism proposed in the Policy.
- Plantation of non-edible oil bearing plants, processing units, creation of any new infrastructure for storage and distribution, etc. would be declared as a priority sector for the purposes of lending by financial institutions and banks. NABARD would provide re-financing towards loans to farmers for plantations.
- Indian Renewable Energy Development Agency (IREDA), Small Industries Development Bank of India (SIDBI) and other financing agencies as well as commercial bank would be actively involved in providing finance for various activities under the entire biofuel value chain, at different levels.
- Multi-lateral and bi-lateral funding would be sourced, where possible for biofuel development. Carbon financing opportunities would also be explored on account of

avoidance of CO<sub>2</sub> emissions through plantations and use of biofuels for various applications.

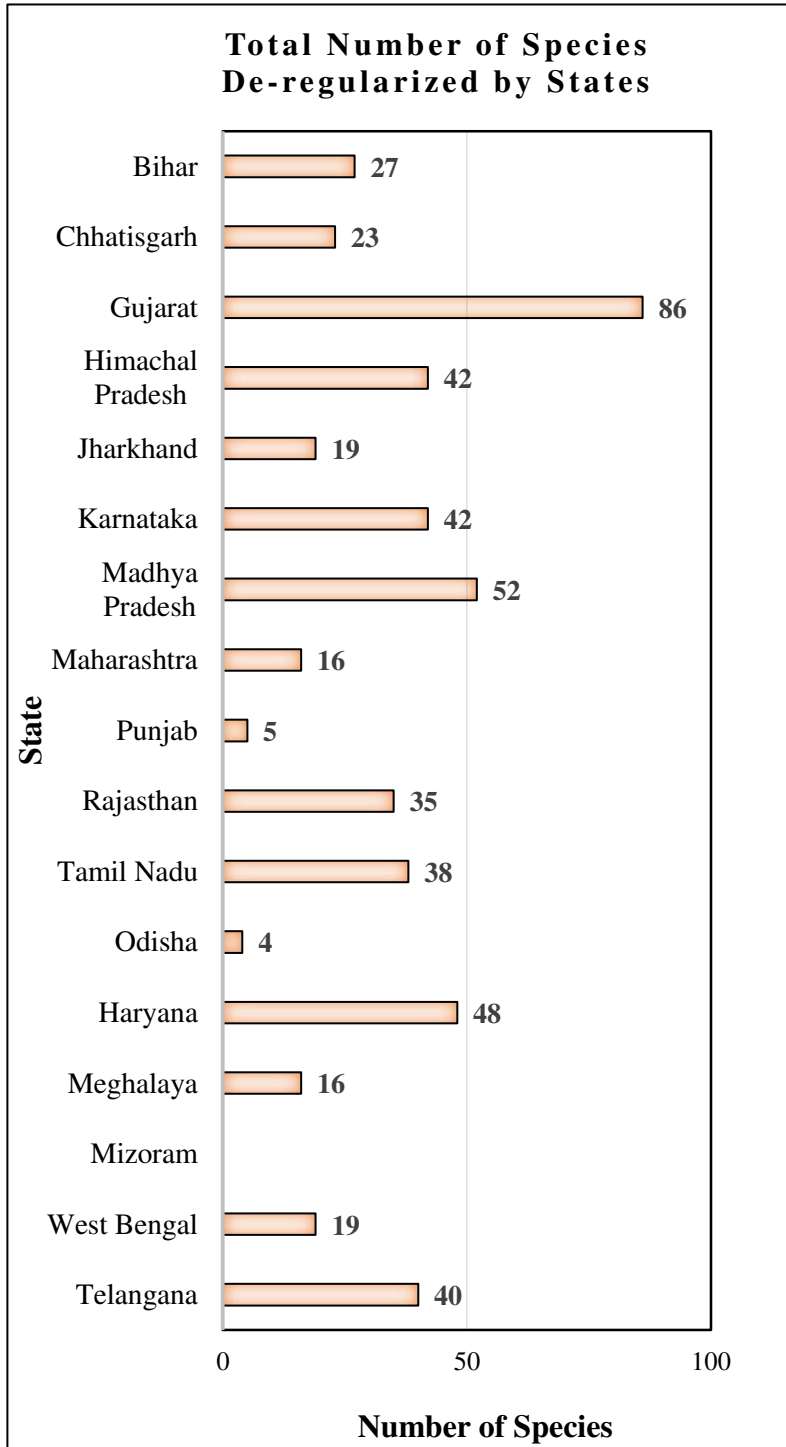
- Financial incentives, including subsidies and grants, may be considered upon merit for new and second generation feedstocks; advanced technologies and conversion processes; and, production units based on new and second generation feedstocks.
- If it becomes necessary, a National Biofuel Fund could be considered for providing such financial incentives. Biofuels being derived from renewable biomass resources they will be eligible for various fiscal incentives and concessions available to the New and Renewable Energy Sector from the Central and State Governments.

## Common Agroforestry species de-regularized by the states

S. No.	Species	Numbers and names of States that have de-regularized the species
1	Subabul ( <i>Leucaena leucocephala</i> )	(10) Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu
2	<i>Eucalyptus</i> spp.	(10) Haryana, Himachal Pradesh, Jharkhand, Karnataka, Maharashtra, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu
3	Casuarina ( <i>Casuarina</i> )	(8) Bihar, Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan
4	Poplar ( <i>Populus</i> )	(7) Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Punjab, Rajasthan
5	Silver oak ( <i>Grevillea robusta</i> )	(8) Bihar, Chhattisgarh, Jharkhand, Odisha# Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu
6	Gamhar, Khamer ( <i>Gmelina</i> spp.)	(6) Bihar, Chhattisgarh, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu
7	Maharukh ( <i>Ailanthus</i> )	(6) Chhattisgarh, Jharkhand, Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu
9	Israili Babul ( <i>Acacia tortilis</i> )	(6) Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Rajasthan
8	Bakain ( <i>Melia azaderach</i> )	(5) Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan, Tamil Nadu
9	Kadamb ( <i>Anthocephalus</i> )	(5) Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Tamil Nadu
10	Babul ( <i>Acacia</i> sp.)	(5) Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan
11	Vilaiti Babul ( <i>Prosopis</i> spp.)	(5) Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Rajasthan
12	Siris, Safed Siris, ( <i>Albizia</i> )	(4) Chhattisgarh, Madhya Pradesh, Rajasthan, Tamil Nadu

S. No.	Species	Numbers and names of States that have de-regularized the species
13	Sissoo ( <i>Dalbergia sissoo</i> )	(4) Chhattisgarh, Madhya Pradesh, Rajasthan, Tamil Nadu
14	Shahtut ( <i>Morus alba</i> )	(5) Bihar, Jharkhand, Madhya Pradesh, Punjab, Rajasthan
15	Aam ( <i>Mangifera indica</i> )	(6) Bihar, Jharkhand, Karnataka, Madhya Pradesh, Odisha, Tamil Nadu
16	Kathal ( <i>Artocarpus</i> )	(4) Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu
17	Semal ( <i>Bombax ceiba</i> )	(4) Bihar, Madhya Pradesh, Rajasthan, Tamil Nadu
18	Kapok ( <i>Ceiba pentandra</i> )	(4) Chhattisgarh, Madhya Pradesh, Rajasthan, Tamil Nadu
19	Karanj ( <i>Millettia pinnata</i> )	(3) Madhya Pradesh, Rajasthan, Tamil Nadu
20	<i>Gliricidia</i>	(3) Chhattisgarh, Karnataka, Madhya Pradesh
21	Neem ( <i>Azadirachta indica</i> )	(2) Madhya Pradesh, Tamil Nadu
22	Salix ( <i>Salix tetrasperma</i> )	(1) Himachal Pradesh

**Pan India De-regularization Status**



**Issues in State Notification**

- Haryana:** No transit permission required for any of the species. But felling permission is for 4 spp. only.
- Himachal Pradesh:** No. of species de-regularized may be >24 (but doc. mention 24 species only).
- Karnataka:** Exempted 42 species for transit but felling permission for 16 species only.
- Kerala:** In process for de-regularization
- Mizoram:** Exempted 16 species and also all horticulture species (but not able to add number of horticulture species). So total exemption no. may be more than given in graph.
- Uttarakhand:** only mentioned about rules and fee and not given species exempted
- Union Territories:** Delhi, Chandigarh, A&N not exempted any of the species.