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# Foresighting National Agroforestry Policy for Fostering Green Development

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Policy Paper # 02/2024

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# Preface

The concept of agroforestry, entwining trees with agricultural practices, has gained momentum globally as a sustainable approach to land use. In the Indian context, the journey towards recognizing and harnessing the potential of agroforestry as a scientific discipline began in the 1980s. As research findings underscored its benefits, India took a pioneering step by adopting the National Agroforestry Policy (NAP) in 2014. This policy, a culmination of concerted efforts by various stakeholders at national and international levels, marked a significant milestone in mainstreaming agroforestry development.

The importance of agroforestry extends far beyond mere agricultural productivity. It holds the promise of addressing pressing global concerns such as climate change and biodiversity loss. With India committing to ambitious climate goals, including a net-zero target by 2070, agroforestry emerges as a crucial strategy for carbon sequestration and ecosystem restoration. However, realizing these goals necessitates concerted action and effective implementation of the NAP.

As we delve into the nuances of agroforestry in India, this document critically examines the progress made since the inception of the NAP. It navigates through the policy landscape, identifying strengths, weaknesses, opportunities, and challenges inherent in its implementation. Moreover, it juxtaposes the Indian policy framework with global and regional counterparts, shedding light on lessons learned and potential pathways for enhancement.

The narrative unfolds with an exploration of the strategies outlined in the NAP and their execution through initiatives such as the Sub-Mission on Agroforestry (SMAF) and the *Rashtriya Krishi Vikas Yojana* (RKVY). Furthermore, it delves into the role of research institutions and state interventions in shaping the regulatory landscape and fostering innovation in agroforestry practices.

As we embark on this journey, it becomes evident that realizing the full potential of agroforestry in India requires a multifaceted approach. From policy coherence and institutional strengthening to technology dissemination and stakeholder engagement, a holistic strategy is imperative. By critically assessing the trajectory of agroforestry in India, this document aims to inform policy dialogues, guide interventions, and catalyze collective action towards sustainable land use and environmental stewardship.

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**- Authors**

# Foresighting National Agroforestry Policy for Fostering Green Development

## 1. Introduction

As the world started to work on the foundations of agroforestry as a scientific discipline, India also started focusing on trees/woody perennials in the 1980s. Over the period, the research findings, and the benefits derived from agroforestry enabled the formulation of a dedicated policy. India is the pioneer in adopting a National Agroforestry Policy (NAP) in 2014 for main streaming agroforestry development in the world. The policy was the outcome of a series of efforts by various national stakeholders (Department of Agriculture and Cooperation, Indian Council of Agricultural Research, Ministry of Environment, Forests and Climate Change) with international collaboration (International Centre for Research on Agroforestry). Indeed, it was the culmination of many previous programs and policies, which emphasized the importance of agroforestry, including the National Forest Policy (1988), the Report of the Planning Commission Task Force on Greening India (2001), the National Bamboo Mission (2002), the National Policy on Farmers (2007), and the National Mission for a Green India (2010), as well as a large volume of scientific data highlighting the potential of agroforestry to improve farm productivity and ecological security.

Promoting agroforestry as a land-use practice is critical for augmenting biological carbon sequestration (Kumar and Kunhamu, 2021) to mitigate climate change and increase the country's forest and tree cover for biodiversity conservation. Undeniably, the two most debated global agendas today are climate change and biodiversity loss. Agroforestry has the potential to ameliorate both. At the UNFCCC COP26 session in Glasgow (31 October to 12 November 2021), India vouched to meet its climate change commitments by setting a net-zero goal by 2070. India's NDC (nationally determined contributions) to the Paris climate summit is an ambitious 2 billion ton $CO_2$ equivalent by 2030 (Mathur et al., 2021). This, however, requires an ambitious agroforestry mission, to cover an additional 26 million ha to reach the target of covering 33% of India's land cover under trees, by 2030. For, presently the tree cover, i.e., trees out of the forest (TOF) cover 2.91% of India's land area, totalling 24.62% (forest and tree cover of the country) (FSI 2021). As per this report, India's forest carbon stock is 7 billion tons and the annual increment is only 21 million tons, which is only 10% of the NDC requirement. Also, the matured trees hardly sequester any carbon, as their sequestration through the growth balances the emission through litterfall. It is the growing, young trees such as agroforestry or block plantations of fast-growing multipurpose trees such as poplar that sequester carbon, up to 50 t/ha over a 7-year rotation period. The Energy Research Institute highlighted the need for a vigorous agroforestry mission for the rapid increase in tree cover as witnessed during the 1990s on account of the “social forestry” schemes that increased the tree cover in India from 64 to 69 million ha in just 10 years (Mathur et al., 2021). Given that the national policy is in place, evolving effective implementation guidelines and protocol will boost India's effort to attain the NDC commitments.

The AFOLU (Agriculture, Forestry, and Other Land Use) sector of India is both a source as well as a sink of carbon and offers the best-bet, cost-effective option for India to become a net carbon sink. Increasing the extent of natural forests in India from the current level (21.71% of the geographical area or 71.38 million ha; FSI 2021), however, may be a challenge in view of the competition between different land uses and the need for food grain production to meet the rising demands. At this juncture, agroforestry as a sustainable land use activity can augment the

tree cover on agricultural lands and improve the terrestrial carbon stocks by sequestration in soil and biomass, implying its prospects in the national climate change mitigation debate, being a low-cost option. Agroforestry can also help achieve land degradation neutrality (one of the UN Sustainable Development Goals; Target 15.3), import substitution of wood products, and sustainable land-use intensification, thus creating synergy between the UN Sustainable Development Goals. However, historically there were constraints for large-scale adoption of agroforestry in India. For example, there are strict regulatory regimes (the legal restrictions for harvesting and transportation of trees planted on farmlands in several states, a colonial legacy), lack of institutional support mechanisms, dearth of quality planting stock, inadequate marketing infrastructure for agroforestry products, lack of post-harvest processing technologies *vis-à-vis* value chain, lack of credit and insurance support, and a weak agroforestry extension system impeded agroforestry development in India in the past.

The NAP embodies an effort to overcome these constraints. Improvement in farm productivity and profitability, besides bringing convergence, coordination, and synergy among the various elements of agroforestry development scattered in the Agriculture, Environment, Forestry, and Rural Development agencies of the Government of India are the stated objectives of NAP. Furthermore, the NAP envisages to harmonize policies in agriculture and forestry, facilitate credit and insurance to farmers, improve market access, supplement the growing timber demand, and enhance environmental security through a systematic increase in the tree cover outside recorded forests. It has been ten years since the policy was adopted. In the real sense of the term, the program started only with the establishment of a Sub-mission on Agroforestry (SMAF) under the National Mission on Sustainable Agriculture (NMSA) in 2016. In fact, NMSA is one of the eight missions under the National Action Plan on Climate Change. In 2023-24, the agroforestry scheme is supported under the *Rashtriya Krishi Vikas Yojana* (RKVY) Scheme of the government with the major emphasis on addressing the quality planting material (QPM) need of the country.

Six years after the launch of the SMAF and 10 years after enunciation of the NAP, we tried to review the progress made so far and to identify bottlenecks if any, especially those requiring policy corrections. However, clear data on the physical targets and achievements in various states of the country where the SMAF programs are being implemented were not available in the public domain, which made us to adopt a broad-brush approach avoiding state-specific details, as the same were not available. We also revisited the strengths and opportunities and the relevance of NAP in view of the many development programs implemented in India especially in the recent past (Table 1). For example, the climate fund, the Green Credit Program (GCP) and the Ecomark Scheme, the Expert Committee Report on Strategy for Increasing Green Cover Outside Recorded Forest Area, the commencement of massive agroforestry development programs involving poplar or eucalyptus for paper pulp, public-private partnership (PPP) models emerging in many sectors, and the amendment of corporate social responsibility (CSR) guidelines to put agroforestry activities under the ambit of CSR. Furthermore, many other countries and some states of India have also enunciated agroforestry policies. While countries such as Brazil, Costa Rica, Cameroon, China, Dominican Republic, Ethiopia, Indonesia, Kenya, Malawi, Niger, Philippines, Tanzania, USA and Zambia were already implementing policies/guidelines/strategies/action plans/framework on agroforestry. The Himalayan nation, Nepal has evolved a dedicated policy on agroforestry in 2019 (GoN, 2019). Likewise, the Indian state of Bihar also adopted a separate agroforestry policy in 2018 (GoB, 2018). We compared the relative merits and demerits of NAP in relation to these two recent policy proclamations, *i.e.*, the Agroforestry Policy of Nepal and the Bihar Agroforestry Policy.

**Table 1. SWOC analysis of NAP 2014**

| | |
|---|---|
| **Strengths**<br>• Integration of different enterprises being a multi-sectoral policy<br>• Envisages increase in tree cover to support raw material production for wood-based industries, rehabilitation of degraded lands, carbon sequestration, and crop diversification, while also providing livelihood security to the people without compromising environmental security<br>• Envisages meeting the timber demands from farm-grown trees as well as Trees outside Forests. This is beneficial not only for reducing imports but also in lowering carbon emissions. It is proven that wood is more eco-friendly than its energy-intensive substitutes | **Opportunities**<br>• Potential to increase trees outside forests, particularly on farmlands<br>• The flexibility of tweaking agroforestry to meet the needs of the community as well as the corporate sector is a great advantage.<br>• With an appropriate twitch, agroforestry practices can augment farmers' income<br>• Potential to tap climate fund, carbon credits and Corporate Social Responsibility (CSR) funds<br>• Offers scope for biodiversity conservation and for attaining land degradation neutrality |
| **Weaknesses**<br>• Lack of uniform institutional arrangement both at implementation and regulatory levels coupled with overlapping objectives of other programs and policies<br>• Largely promotes industrial models of agroforestry<br>• The policy is silent about the other components of agroforestry *i.e.,* crops and animal components<br>• Revitalization of the traditional agroforestry practices such as homegardens, parkland agroforestry practices, silvopastoralism, etc. or so-called "Cinderella agroforestry systems" (Nair et al., 2016) has not been focused on the policy<br>• Likewise, schemes/provisions for payment for ecosystem services are absent | **Challenges**<br>• Being multi-sectoral, agroforestry warrants inter-ministerial coordination for livelihood security, commerce, and allied regulations<br>• The policy is primarily focused on meeting the needs of wood-based industries<br>• Although environmental services are the major contribution of agroforestry the same is not adequately dealt with in the policy<br>• Property rights and collateral benefits such as green finance to encourage industry to take up agroforestry<br>• Concerns about reduced agronomic crop yields, especially after tree canopy closure<br>• Fragmentation of landholdings and associated shrinkage of holdings hamper the adoption of tree farming<br>• Unclear status of land and tree tenure hampers tree planting<br>• In sustainable utilization of the common property resources such as grazing land, common lands, water bodies, delineation of rights and responsibilities, and sharing of usufructs<br>• Value addition and market linkages are not evolved<br>• Lack of a proper institutional setup at the grass-root level, *i.e.*, a dedicated extension service network for agroforestry at the state/district/sub-district level |

## 2. Implementation strategies for NAP

For implementing the NAP, a Sub-Mission on Agroforestry (SMAF) was launched in 2016-17, as a component mission under the National Mission on Sustainable Agriculture (NMSA) (https://nmsa.dac.gov.in/pdfdoc/Agroforestory_Guidelines_new_English.pdf). It is mainly focused on expanding tree coverage on farmlands in conjunction with arable crops. The scheme is being implemented in 20 states viz., Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh., Mizoram, Meghalaya, Nagaland, and 2 UTs *viz.* J&K and Ladakh (https://pib.gov.in/PressReleasePage.aspx?PRID=1705520). Under the aegis of the SMAF, the Government of India provided financial assistance to the states for undertaking a range of agroforestry development programs such as nursery development for quality planting material (NDQPM), establishment small, big, and hi-tech nurseries, the establishment of peripheral and boundary plantations (PBP), trees on farm bunds (*Har Medh Per Pedh)*, creating low-density plantations on farmlands (LDPFL: 100 to 500 plants/ha in strips or staggered planning pattern), establishing high-density block plantations (HDBP; 500 to 1500 plants/ha in blocks), capacity building and training programs and conducting demonstrations. However, specific details on the achievements made under this program are not available in the public domain. The current revamped agroforestry scheme under RKVY has been more holistic in its objectives including research as well as agroforestry model demonstration aspects also.

To overcome the deficiency in area-specific agroforestry models, the ICAR-Central Agroforestry Research Institute (CAFRI) in collaboration with the World Agroforestry (ICRAF) has brought out several publications on promising agroforestry tree species as well as successful agroforestry models for different agroecological regions in India (Chaturvedi et al., 2017; Handa et al., 2020). In addition, an Agroforestry Extension Research program was launched at CAFRI on a pilotscale. This, however, may not be enough to meet the national-level agroforestry extension requirements. To boost the outreach programmes in agroforestry, the CAFRI has created an agroforestry extension framework in collaboration with the Food and Agriculture Organization (FAO) and the National Rainfed Area Authority (NRAA) (FAO and ICAR-CAFRI, 2022).

Several states have also taken steps to streamline the regulatory framework for felling and transport of timber from farmlands, as envisaged in the NAP. There have been changes in the felling and transportation rules of farm-grown timber after interventions by the Sub-Mission on Agroforestry in progressive states like Gujarat, Karnataka, Tamil Nadu, Maharashtra etc. For instance, the state of Assam has recently brought out a separate legislation - the Assam Trees Outside Forest (Sustainable Management) Rules 2022 and deregulated 54 tree species including Agarwood and Indian Sandalwood. Similar efforts being made by different states. A pilot scheme on consortium model of industrial agroforestry was developed by the Tamil Nadu Agricultural University, which has successfully collaborated with different stakeholders such as wood-based industries, financial institutions, and farmers (NAIP, 2011; Parthiban et al., 2019). Replicating this model to create village clusters surrounding the industries in other parts of the country will help to upscale agroforestry in India.

## 3. Shortcomings of the policy

The NAP defines agroforestry as “a land-use system which integrates trees and shrubs on farmlands and rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability” (GoI 2014). Although the policy promoted integrating woody perennials *i.e.,* trees and shrubs on farmlands, it was silent (i) on the autecology of the trees that are to be promoted, and (ii) on the scope of promoting it in non-arable lands. Mention has been made that “barren community land/other non-forest wastelands to be encouraged for plantation of

agroforestry tree species to provide opportunities of economic returns as well as contributing towards ecological benefits". However, there is lack of clarity about the categories of approximately 55.76 million ha of wastelands in the country that could be brought under agroforestry (NRSC, 2019). There have been concerns of community rights with industry engagement, but a harmonious, "win-all" design needs to be promoted. Although the policy articulates the implications and concerns for ecological security and even one of the goals of NAP emphasizes "protecting the environment and providing environmental security", a mechanism for augmenting the ecosystem services of agroforestry has not been scripted (e.g., payment for ecosystem services). The voluntary carbon market scheme (mostly private) and the carbon credit scheme (nodal agency - ICFRE) are yet to reach the states. Certain countries like Costa Rica has attempted to develop such systems which needs to dissected for understanding and further development. The policy is particularly botched up in respect of identifying a specific agency responsible for the implementation without which the policy shall not realize its targeted goals.

India is one of the countries with a strong institutional framework for protecting forests. Starting with the state forest department to the National Green Tribunal, there are a wide array of institutions empowered with legislations like the Indian Forest Act (1927), Wildlife Protection Act (1972), Forest Conservation Act (1980), Forest Rights Act (2006), Environment Protection Act (1986) and many others. As forests are in the concurrent list as per constitutional provisions, the States have also enacted a few legislations and policies (Table 2), specifically for preserving the trees outside forests (TOFs) and for production of wood and other minor products (Dogra and Chauhan, 2016; Dutta, 2019). Irrespective of the nature of the legislation, the authoritarian setup has been a hurdle to the tree growers. In many situations, trees occurring on private lands/farmlands is not fully regarded as a property of the landowners which is a major disincentive in the adoption of agroforestry.

**Table 2. Major legislations of the Indian states with implications for tree planting and protection of Trees Outside Forests**

| S.No. | Act/Policy/Rules | Year |
|---|---|---|
| 1. | Punjab Land Preservation Act | 1900 |
| 2. | The Orissa Preservation of Private Forests Act | 1947 |
| 3. | The Bihar Private Forest Act | 1947 |
| 4. | The Saurashtra Felling of Trees (Infliction of Punishment) Act | 1951 |
| 5. | Tamil Nadu Hill Areas (Preservation of Trees) Act | 1955 |
| 6. | The Rajasthan Land Revenue (Control and Management of Forest Growth) Rules | 1960 |
| 7. | Maharashtra Felling of Trees (Regulation) Act | 1964 |
| 8. | The Jammu and Kashmir Preservation of Specified Trees Act | 1969 |
| 9. | The Andhra Pradesh Sandal Wood and Red Sanders Wood Transit Rules | 1969 |
| 10. | Tamil Nadu Sandalwood Possession Rules | 1970 |
| 11. | The Punjab Plantation and Maintenance of Trees Act | 1974 |
| 12. | Maharashtra (Urban Areas) Preservation of Trees Act | 1975 |
| 13. | Karnataka Preservation of Trees Act | 1976 |
| 14. | Uttar Pradesh Protection of Trees Act in rural and hill areas | 1976 |

| | | |
|---|---|---|
| 15. | Himachal Pradesh Land Preservation Act | 1978 |
| 16. | Goa, Daman and Diu Preservation of Trees Act | 1984 |
| 17. | The Kerala Preservation of Trees Act | 1986 |
| 18. | Delhi Preservation of Trees Act | 1994 |
| 19. | Tamil Nadu Rosewood (Conservation) Act | 1994 |
| 20. | The Sikkim Transit of Timber and other Forest Produce Rules | 1999 |
| 21. | Tripura State Bamboo Policy | 2001 |
| 22. | Nagaland Bamboo Policy | 2004 |
| 23. | The Kerala Promotion of Tree Growth in Non-Forest Areas Act | 2005 |
| 24. | West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act | 2006 |
| 25. | The Sikkim Private and Other Non-Forest Lands Tree Felling Rules | 2006 |
| 26. | Maharashtra State Bamboo Policy | 2017 |
| 27. | Bihar Agroforestry Policy | 2018 |
| 28. | Assam State Bamboo & Cane Policy | 2019 |
| 29. | Manipur Bamboo Policy | 2020 |
| 30. | NTFP Policy of Tripura | 2020 |
| 31. | The Assam Agarwood Promotion Policy | 2020 |

Despite, the meticulous exercise in framing the national agroforestry policy; there are a few gaps in the national level action plan for agroforestry such as the need for an agroforestry tree manual, region-specific agroforestry models, framing of uniform timber transit rules, developing agroforestry extension services, creation, and facilitation of insurance as well as credit schemes. Although convergence and synergy with other government programs is a stated objective of NAP, no clear blue-print for convergence of central schemes like Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), National Horticulture Mission (NHM), *etc.* has been proposed (Chavan et al., 2015).

More importantly, India the "cradle of agroforestry", has numerous traditional tree-based land use systems such as tropical homegardens, agri-silviculture, silvo-pastoralism and others. The NAP, however, did not take cognizance of these traditional and time-tested community-based agroforestry systems with strong socio-cultural ethos.

Yet another problem in NAP is that no attempt has been made to evolve an agroforestry extension system to take agroforestry technologies to farmers through frontline extension. Most of the Krishi Vigyan Kendras, which are involved in frontline agricultural extension do not have subject matter specialists in agroforestry, and as a result, technology refinement and demonstration are choked.

## 4. NAP *vis-a-vis* other recent policy

A comparative analysis of the three agroforestry policies (Table 3) indicates that all three policies are focused on improving farm productivity, contributing to the economy, conserving environment and biological diversity and improving the adoption of agroforestry. A prominent deficiency in the NAP compared to the agroforestry policy of Nepal and the state of Bihar is that there is no provision for reviewing the policy or reviewing the financial incentives over a period of time. In addition, there are no specific prescriptions for area-based agroforestry models for commercialization, while the Nepal and Bihar policies do have such prescriptions.

**Table 3. A comparison of India's National Agroforestry Policy with the national policy of Nepal and the state policy of Bihar, India.**

| S.No. | Parameters | NATIONAL AGROFORESTRY POLICY INDIA [2014] (GoI 2014) | NATIONAL AGROFORESTRY POLICY NEPAL [2019](GoN 2019) | AGROFORESTRY POLICY BIHAR [2018] (GoB 2018) |
|---|---|---|---|---|
| 1. | Geographical area | 3,287,263 sq.km | 147,181 sq.km | 94,163 sq.km |
| 2. | Forest and tree cover area | 24.56% | 40.36% (DFRS 2015) | 7.84% |
| 3. | Net Sown Area | 139.42 m ha (GoI 2020) | 4.12 m ha (FAO 2021) | 5.29 m ha (GoI 2020) |
| 4. | Land degradation | 30% | 11.81% | 60% approximately |
| 5. | Objectives Incorporation of trees/woody perennials | Integration of trees in a complementary and integrated manner. | No specific emphasis on the manner of trees/woody perennials integration. | Integration of trees in an appropriate and integrative manner. |
| 6. | Focus | Rural households and smallholder farmers. | Entire population. | Marginal rural households |
| 7. | Climate resilience | Promotes resilient cropping and farming systems. | Focuses on developing a climate resilient ecosystem. | Promotes resilient cropping and farming systems. |
| 8. | Protection of forests | To reduce pressure on natural forests. | To reduce pressure on natural forests. | To minimize pressure on natural forests. |
| 9. | Tree cover | Aims to increase forest/tree cover. | No | No |
| 10. | Capacity building | Develops capacity and strengthens research in agroforestry. | Aims to conduct research and capacity enhancement activities | No |
| 11. | Vision statement | No | To contribute to national prosperity through the development, expansion, and commercialization of agroforestry. | Being a significant component of agriculture in Bihar, agroforestry contributes substantially to the state's GDP and employment, and benefit the deprived rural population. |
| 12. | Wood production | Aims at bridging the supply-demand gap of timber | No such commitment | Encourages wood-based industries and do not mention about bridging the supply-demand gap |

| | | | | |
|---|---|---|---|---|
| 13. | Provisions for reviewing of policy | No guidelines | Once every 5 years | Once every 10 years |
| 14. | Private sector involvement | Promotes private sector participation. | Promotes industrial involvement. | Agroforestry will be included in Bihar Industrial Investment Promotion Policy, 2016. |
| 15. | Implementation agency | No specific committee is formed | Coordination Committee | State Agroforestry Mission or Board |
| 16. | implementation guidelines | Guidelines will be formulated later | Guidelines are given | No guidelines |
| 17. | Coordination committee structure | No guidelines | Composition is mentioned | No specific mention about the structure |
| 18. | Focal tree species | The states are responsible for identifying the focal tree species | No guidelines | Provides a list of trees and crop components |
| 19. | Focal land areas | Barren community land and other non-forest waste lands | Barren, fallow, and marginalized land | Farmlands |
| 20. | Research and development partner involvement | ICAR, ICRAF and ICFRE are partners in research and development | No specific agency has been identified | No guidelines formulated |
| 21. | Approach for upscaling agroforestry | specific regional agroforestry models | Location-specific agroforestry models for different zones | Moving from tree approach to system approach |
| 22. | Assessment of area-based agroforestry | No plans given | Guidelines given | Guidelines given |
| 23. | Financial Incentives | No guidelines | No guidelines | Review once every 10 years |
| 24. | Financial commitment from govt. | 4000-5000 crores | No commitment | No commitment |

### 4.1 Reimagining NAP: changes envisioned

The NAP ideally should establish a decentralized institutional mechanism for implementing and monitoring the agroforestry development activities and for upscaling agroforestry in different types of lands under the given set of socio-economic caveats and edapho-climatic exigencies. To address the concerns on environmental security, the policy must articulate the payment for ecosystem services, which is still an unresolved issue in India. Since agroforestry falls in the interface of agriculture or forestry domains, it may get entangled in bureaucratic turf wars, which need to be resolved for gaining strategic advantages in our way to achieve the net-zero

emission targets outlined at the COP21. A hybrid implementation protocol is needed for increasing the efficiency and a possible framework is suggested (Figure 1).

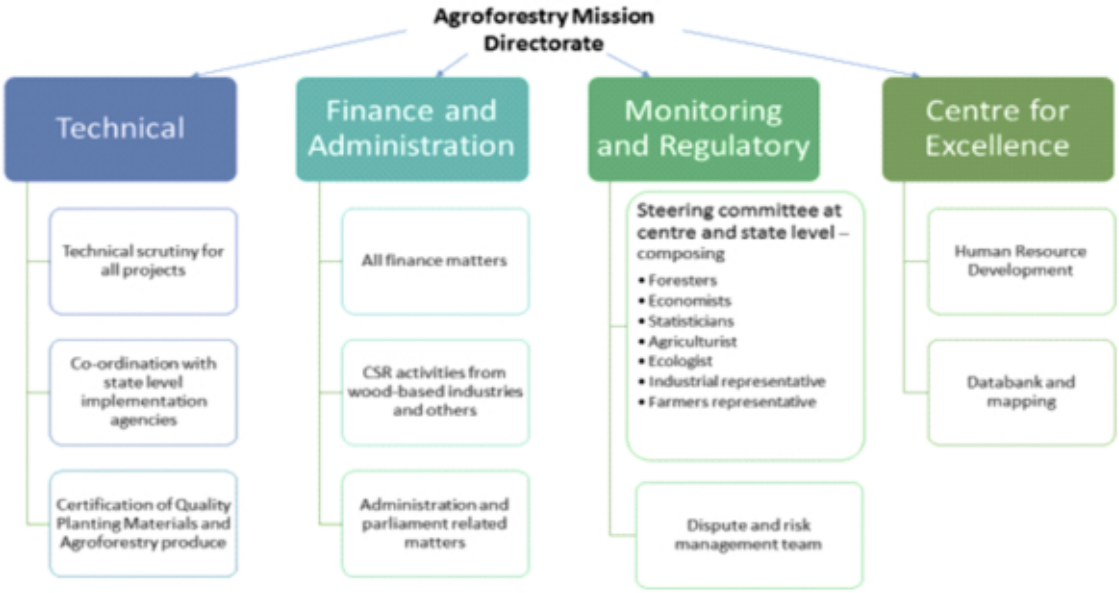


**Figure 1.** The organizational framework for the National Agroforestry Mission

The policy targets to increase the green cover of the country from the existing 24.56% (80.73 m ha of recorded forest and TOFs) to 33% for which agroforestry is an appropriate strategy (Figure 2). Despite this, the policy did not envisage exclusive allocation of human resources for agroforestry management. It is desirable to establish a trained cadre of extension agroforesters, besides establishing Centre(s) for Excellence in Agroforestry for capacity building.

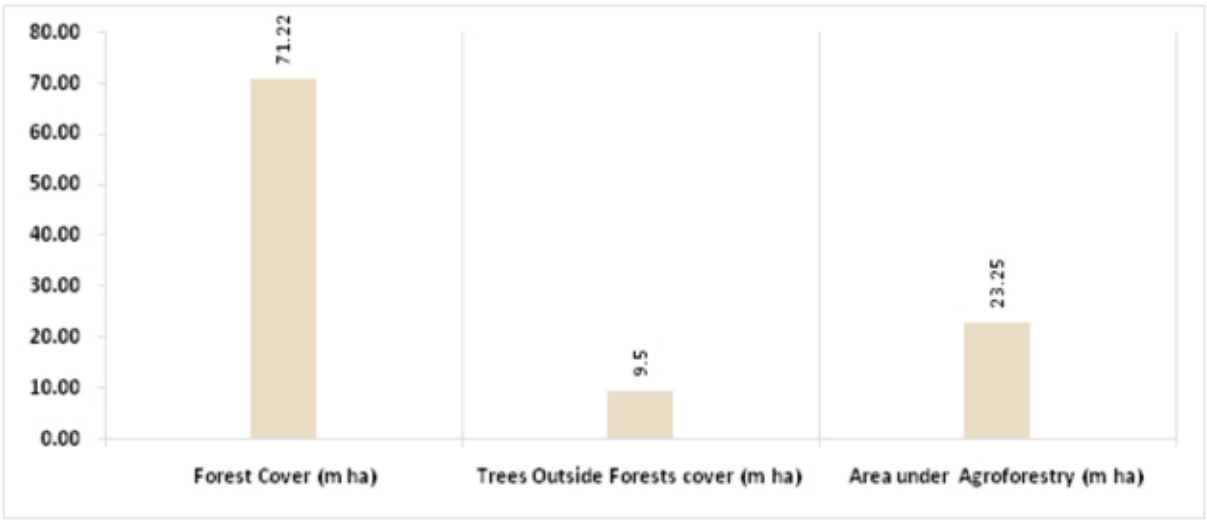


**Figure 2.** The area under Forest Cover, Tree Outside Forests cover and Agroforestry in India (Source: FSI, 2021; CAFRI, 2019)

## 5. Challenges in the implementation of NAP

The implementation of any government policy may face hurdles and technical glitches and NAP is perhaps no exception to that general rule. Nonetheless, data are inevitable for decision-making and data pertaining to agroforestry both at the production and productivity level is currently scarce and no comprehensive database is available at the state or country level. This

calls for developing a nation-wide protocol and uniform procedures for compilation and data analysis to enabling proper decision making. If agroforestry is to be promoted on farmlands, then there is also a need for eco-psychological information associated with tree farming. Inadequate availability of quality planting material is yet another challenge. Although the SMAF has launched some schemes in this regard, nursery accreditation and certification of quality planting material still remains to be accomplished.

### 5.1 Steps to overcome the challenges

To bridge the data deficiency, a dedicated study-cum-data acquisition platform by periodically mapping and monitoring agroforestry areas in the country may be launched under the Sub-mission on Agroforestry. CAFRI has been attempting to map agroforestry resources, but this effort requires additional funding and human resources. And at the production level, there is not enough clarity about the term 'agroforestry produce' in the policy. If economically viable products of agroforestry systems are to be treated at part with any other agri-produce, then there is a need to compile a list of agroforestry produces to encourage production, value-addition and value-chain development of agroforestry tree produce, especially in view of its lower environmental costs. The Energy Research Institute (TERI) has recently prescribed a minimum support price model for agroforestry produce, which looks promising and can be improved before implementation (Mathur et al., 2020). Besides, third party certification of agroforestry produce like timber certification must be instituted to avoid red-tape issues.

Extension is the key to agricultural development, and it is important for agroforestry too. An integrated digital platform such as Farm Tree mobile *app* can boost digital outreach of this ecologically viable agripreneurialendeavor (https://play.google.com/store/apps/details?id=com.cafri.farmtree&hl=en_IN). Nevertheless, trained agroforesters are meagre in the country and so concerted efforts should be taken to capacitate the extension personal in ATMA (Agricultural Technology Management Agency) and/or KVKs through crash training modules. Further, the *Van Vigyan Kendras* (VVKs) are to be involved in this endeavor. As VVKs are established by ICFRE whose mandate is slightly different, they need to be roped in to have enhancement in agroforestry by systematic inclusion and hand-holding the VVKs staff. Farmer-to-farmer extension model (Kiptot and Franzel, 2015; Rohit et al., 2017) is also appropriate asissues on landholding and tenure could besorted out at that level. Meanwhile, a national-level study to understand farmers' interests and socio-economic factors influencing the level of adoption of agroforestry may be initiated as it can help bridge the missing links for upscaling agroforestry.

At the implementation level, there is a strong need to assess the implementation agency across the states as their feedback could strengthen the NAP. A matrix analysis may be conducted in each state where the SMAF programs are implemented as they may have other priorities identified for sustainable development. Most importantly, a dedicated digital dashboard on NAP implementation is a must for more transparency and efficacy. Also, a single-window timber permit clearance system is the need of the hour to encourage farmers to adopt agroforestry and harness the accompanying benefits, and the dependent industries to access and market agroforestry produce, so that the farmers will be benefitted.

## 6. Overlapping Goals: National Agroforestry Policy (NAP) and National Bamboo Mission (NBM)

Although NAP was well-conceived,it is perhaps not fully structured or fully equipped with implementation strategies to achieve its objectives. Although convergence with other

government programs has been articulated as a policy objective, there is some palpable overlap with certain other programs. For instance, one of the objectives of NAP is to 'meet the raw material requirements of wood-based industries and reduce import of wood and wood products to save foreign exchange'. A similar objective is listed for the National Bamboo Mission also. While the National Agroforestry Policy is implemented as a sub-mission (SMAF), a dedicated National Bamboo Mission (NBM) without any clearly defined policy is simultaneously being implemented by the Ministry of Agriculture and Farmers' Welfare of the Government of India (https://nbm.da.gov.in/). Although the scope of agroforestry is far wider, it has not got equal treatment as NBM.

Moreover, the total area under bamboo in the country including reserved forests is only 16 million ha (FSI, 2021), while the area under agroforestry has been estimated as 26.329 million ha (Rizvi et al., 2013). Hence bamboo can be included as a subset of agroforestry, implying the need for restructuring both NAP and NBM. Yet another difference in this respect is the small-scale industry perspective rolled out by NBM in contrast to the livelihood focus and industrial raw material production attributes of NAP.

The Forest Survey of India (FSI) has been monitoring the bamboo resources of the country since 2011. This agency although made a first attempt in 2013 to assess the extent of agroforestry in the country, it was subsequently discontinued. The ICAR-CAFRI with its limited resources has been making efforts to map the agroforestry resources, which it was acknowledged in the Expert Committee report on strategy for increasing green cover outside recorded forest areas submitted to the Ministry of Environment, Forests and Climate Change, Government of India in 2018. The recommendations of the Expert Committee include (i) forming a consortium of CAFRI, FSI, National Remote Sensing Centre (NRSC), and ICRAF to map the distribution pattern of tree species in agroforestry systems in different regions of the country using high-resolution remote sensing technology, (ii) FSI to collaborate and share its grid-based information on field inventory of Trees Outside Forests with CAFRI to let the latter validate agroforestry maps with global experience brought in by ICRAF, (iii) Funding support for the 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, (iv) Assigning the responsibility to create an Agroforestry Research Network by including all participating institutions like ICAR, ICFRE, SAUs, Industries, SADs, SFDs and other universities including TERI which are involved in agroforestry research to avoid duplication in research, and (v) a provision of Rs. 1.20 crores annual funding to CAFRI for at least 5 years continuously for wall-to-wall mapping of agroforestry for the entire country. Implementing these recommendations in letter and spirit will help assess the extent of agroforestry in India precisely.

### 6.1 Envisaged deliverables of the policy

The policy has envisaged certain deliverables in the form of strategy and pathway for achieving the deliverables. It would be apt to take stock our achievement after one decade of its implementation (Table 4). In the meantime, there were some parallel activities that happened in the last 10 years that inadvertently supported the upscaling of agroforestry policy

1. Green India Mission – Promoting tree planting outside forests also
2. Amendments in the Indian Forest Act 1927 – Bamboo has been exempted from the definition of trees which will enable cultivation of Bamboo in farmlands also.
3. Green Credit Scheme - It has been rolled out recently and it will have direct implication on the attitude for tree cultivation

4. NITI Aayog has reviewed the National Agroforestry Policy and has brought out document – Greening and Restoration of Wastelands with Agroforestry (GROW) which details onagroforestry suitability map for wasteland greening.
5. The National Transit Pass System (NTPS), branded as 'One Nation-One Pass', initiative aims to facilitate the seamless transit of timber, bamboo, and various forest produce across India.
6. NABARD has notified six bankable agroforestry models and some are in the process of notification
7. Tree Insurance scheme applicable to pulpwood tree growers and producers, whose produce/ yields are likely to be affected by the specified perils. The policy shall cover and indemnify the insured against pecuniary loss suffered by the insured in respect of cost of inputs (agreed value) on account of the total loss or damage to the trees occasioned by specified perils/risks like fire, flood, cyclone, storm, frost and pest & diseases etc., either in isolation or concurrently
8. Developed agroforestry clusters in Yamuna nagar as well as the Consortium of Industrial Agroforestry in Coimbatore are market-oriented agroforestry upscaling efforts
9. Also, there are efforts taken to the promote the entrepreneurship activity in agroforestry sector like the Agroforestry Business Incubation Centre at ICAR-CAFRI, EDII-Mettupalayam Agroforestry Business Incubation Forum at TNAU, etc.

**Table 4. Envisaged deliverables of the National Agroforestry Policy**

| S.No. | Envisaged | Action Taken | Pending Issues |
|---|---|---|---|
| 1. | Establishment of Institutional Setup at National level to promote Agroforestry | Sub-Mission on Agroforestry was rolled out and later it was revamped as Agroforestry scheme under RKVY | There is National Bamboo Mission being implemented without any policy mandates; while agroforestry lacks strong institutional set up |
| 2. | Simple mechanisms / procedures to regulate theharvesting and transit of agroforestry produce within the State | The deregulation of tree species has happened in many states and the One Nation and One Transit scheme facilitate it | More efforts are needed |
| 3. | Development of a sound database & information system | - | There is not concreate effort taken on this point |
| 4. | Short term extension courses and lectures should be organized in order to educate farmers | ICAR-CAFRI and other organizations has devised a few programms | - |
| 5. | There is need to develop yield and volume tables of agroforestry tree species. Likewise, the species with high carbon sequestration capacity need to be identified | - | Yet to be developed |

| | | | |
|---|---|---|---|
| 6. | Improving access to quality planting material | Efforts are taken for accreditation of nurseries and it is in preliminary stages of implementation | Continuing the efforts on this aspect is needed |
| 7. | Providing institutional credit and insurance cover for agroforestry | Only pilot scheme launched in few states and it has not yet upscaled at pan-India level | Continuing the efforts on this aspect is needed |
| 8. | Facilitating increased participation of industries dealing with agroforestry | - | There is not dedicated scheme supporting agroforestry related industries |
| 9. | Strengthening farmer access to markets for tree products | The e-NAM portal has incorporated certain trees in its marketable categories. The IIFM Bhopal has also piloted to develop some tradable parameters for few agroforestry tree species | - |
| 10. | Dedicated corpus be created to leverage resources available under various schemes/ programmes/missions in undertaking focused and synchronized interventions for agroforestry | - | No effort taken up so far |
| 11. | States have to identify about 20 commonly grown trees species which can be grown on farmlands for the economic and ecological benefits | Few states have taken the efforts on listing out tree species | No effort taken up so far |
| 12. | States to ensure a secured land tenure system, safeguarding the interest of small and marginal farmers and create a sound base of land records and data for developing a Information system for agroforestry | Land records are being digited across all states and this is one step towards realizing the goal | - |
| 13. | Data collection with source of agroforestry produce at National level by recognized statistical organizations (*viz.* CSO, NSSO) | - | No effort taken up so far |

| | | | |
|---|---|---|---|
| 14. | National Research Centre for Agroforestry (NRCAF) may be upgraded to a National level Institute of Agroforestry with regional setups in major agro-climatic zones of the country. Agroforestry research wing of ICFRE also be strengthened and taken advantage of to provide stimulus and create an enabling environment for the growth of private research and extension services | NRCAF has been renamed as CAFRI and ICFRE has strengthened agroforestry activity, but there no coordination between these entities. Moreover, there is lot duplication in research efforts due to lack of coordination | - |
| 15. | Integrating agroforestry content in the agriculture extension packages and developing an unified extension system for all farming systems in the country | An Agroforestry Extension Framework has been developed by ICAR-CAFRI and it needs to be implemented | - |
| 16. | Encouraging agroforestry as a course curriculum in school education and motivating youths to grow and conserve trees | Awareness activities are being taken but so far curriculum is not included | - |
| 17. | National Bureau for Plant Genetic Resources (NBPGR) to focus on conserving, monitoring and providing guidelines for germplasm exchange of agroforestry species. | There is standard Material Transfer Agreement for germplasm exchange but there is no separate entity to regulate the clone/ germplasm release in agroforestry context. Thus, ICAR-CAFRI has constitute an Agroforestry Variety Identification Committee which has been constituted by ICAR-CAFRI – the nodal agency for agroforestry in the country | - |
| 18. | Agroforestry commodities also be enlisted under Warehouse Development and Regulation Act 2007 (WDRA) for ensuring adoption of quality standards of the “Warehousing Manual for Operationalizing of Warehousing (Development and Regulation) Act, 2007 so as to become eligible for availing finance for harvested produce of agroforestry | - | No effort taken up so far |

Apart from the above points, there are some areas which needs to be revisited for upscaling the agroforestry in the country like the district agroforestry plan, implementation of payment of ecosystem services, focus on supporting traditional agroforestry systems, there is limited focus on augmenting the community property resources-based agroforestry system like silvipastoral system, woodlots, etc. There is no mandated institution for estimating the agroforestry in the country and this statistic is more essential needed for upscaling agroforestry in the country; although ICAR-CAFRI has initiated a modest beginning.

## 7. Way forward

The Indian Council of Agricultural Research (ICAR) in collaboration with the Ministry of Agriculture and Farmers' Welfare organized Workshop on National Agroforestry Policy (NAP) on 5th April, 2024. Based on the discussion at workshop and the following recommendations are evolved out for realizing the goals of National Agroforestry Policy:

| Envisaged action in NAP | Contention/Way Forward | Responsible Department/ Organization for Action |
|---|---|---|
| Establishment of Institutional Setup at National level to promote Agroforestry | There is National Bamboo Mission being implemented without any policy backup; whereas agroforestry R&D promotion needs a strong institutional set up. It can be achieved through a synchronised National Bamboo Mission and Agroforestry<br>National Agroforestry Board as per the policy<br>Also, in the NMSA strategy plan, it has been envisaged to expand the sub-mission on agroforestry into a full- fledged mission<br>Woody perennials on farmland should also be treated as agriculture produce. | DAC&FW, Ministry of Agriculture and Farmers' Welfare |
| Development of a sound database & information system for Agroforestry | As per the assessment, the country has 28.427 m ha area under Agroforestry. Hence, Ministry shall consider putting in place a national level agroforestry dashboard/ portal.<br>Woody perennials on farmland should also be treated as agriculture produce. | DAC&FW, Ministry of Agriculture and Farmers' Welfare |
| Providing institutional credit and insurance cover for Agroforestry | Efforts to continue; specifically, to evolve simple single-window system to enable credit flow through co- financing and clear insurance. It was also pointed out to evolve a mechanism to consider tree as source of finance.<br>Also to determine the scale of finance and the lifecycle productivity analysis for various agroforestry systems including contribution of Agroforestry to national GDP. | NABARDand Banking system<br>ICAR-NIAP in collaboration with ICAR-CAFRI and ICFRE |
| Data collection with source of agroforestry produce at National level by recognized statistical organizations (*viz.* CSO, NSSO) | Periodical agroforestry data collection including estimates on area and carbon sequestration. | NSSO/ICAR/ICFRE/FSI/ ICRAF through joint institutional programme |

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| Facilitating increased participation of industries dealing with agroforestry | States to come up with Demand-Supply Gaps and Scoping Studies for agroforestry<br><br>Leveraging CSR (corporate serial responsibility) for agroforestry | State Nodal Agencies of Agroforestry under RKVY DoA&FW, GoI shall initiate having CSR-based Corpus Fund exclusive for agroforestry |
| Establishment of Trainers' Training Centre | In the NAP, there is a provision of having a Technical Institute notified as a Centre of Excellence (CoE) for Capacity Building<br><br>Establishment of Agroforestry Business Incubation Centre | DoA&FW, GoI may consider notifying the ICAR-CAFRI to be a CoE<br><br>DoA&FW, GoI may consider allocations for establishment of ABiCs |
| Dedicated corpus be created to leverage resources available under various Schemes/ programmes/ missions in undertaking focused and synchronized interventions for agroforestry | A dedicated R&D and extension services fund must be provided like in DBT/SERB<br><br>Wood-based Industries (WBIs) can pool CSR funding for R&D project for industrial AGROFORESTRY | MoAF&W, GoI<br><br>DoAC&FW, GoI may write to the WBIs |
| Gap areas to be discussed further:<br>• Industrial agroforestry<br>• Payment of Ecosystem Services | Focused Group Discussions needed to discuss on these gap areas | DoA&FW & ICAR can jointly work on these |

## 8. Conclusion

Upscaling agroforestry among the farming community is the ultimate agenda of NAP. Upscaling can occur through providing incentives and support schemes to the farmers *i.e.,* providing external push from the institutionalized setup. Another strategy for upscaling is attracting and incentivizing people to adopt/practice agroforestry by projecting it as a profitable and environment-friendly land-use option. There have been many government initiatives to promote tree cultivation on farmlands and communal lands through various schemes like *Apna Van Apna Dhan* Scheme, Tree cultivation in Patta lands, Tank-bed plantations, *Sanjha Van Sanjeevani Van*, and many other social forestry as well as farm forestry schemes apart from the mundane integrated watershed management schemes. In the current scenario, there is a need to tweak some of the existing tree plantation schemes including CAMPA (Compensatory Afforestation Fund Management and Planning Authority) plantations into agroforestry practices to support the greater cause of climate change mitigation. Also, the government can ensure that a part of the corporate social responsibilities (CSR) of the wood-based industries and others are focused on agroforestry promotion and help to upscale bankable agroforestry models. Provisions for funding research and development, establishment of nurseries for quality planting materials, setting up credit mechanisms for tree growers, *etc*. are other options in this regard. Overall, there is a requirement for having an institutional mechanism for upscaling agroforestry in degraded, barren and wastelands. Establishing assured quality inputs for tree planting will ensure output quality. Ensuring minimum support price (MSP) for tree products from outside the forest will revolutionize tree cultivation on farmlands (Mathur et al., 2020). It is also necessary to establish a smooth

marketing system and industry participation for the MSP mechanism to work. Coupled with it, establishing finance, credit and insurance facilities for tree cultivation and agroforestry will promote agroforestry in a competitive commercial setting also. Overall, it is time to consider agroforestry as a land-use category for national level landuse/land cover assessment and monitoring purposes by the national survey agencies. This will help earmark suitable areas for promoting agroforestry including degraded lands. A positive development in this context has been the relaxation of the trade and transit rules of forest produce and bamboo, which resulted in higher plantation areas and outputs. Recently, there is an online National Transit Pass System launched for inter-state and intra-state transportation of timber, bamboo and other forest products from private lands/government/ private depots. Furthermore, a comprehensive institutional framework with a strong extension protocol would ascertain and boost agroforestry. These recommendations will pave way for realising the objectives of the Agroforestry Policy.

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