THE SCIENCE WORLD
A Monthly e Magazine
ISSN:2583-2212
March, 2025 Vol.5(3), 6640−6650
Popular Article

Agroforestry Mission and Schemes for Sustainable Development in India

M. Ramesh Naik[1], A.V. Ramanjaneyulu[2], K. Anuradha[1] and M. Koteshwari[1]
[1]ICAR-National Academy of Agricultural Research Management, Hyderabad, Telangana (500 030), India
[2]Professor Jayashankar Telangana Agricultural University (PJTAU), Hyderabad, Telangana (500 030), India
DOI:10.5281/ScienceWorld.15273661

Abstract

Agroforestry (AF) in India represents a sustainable land-use system that integrates trees with agricultural crops and livestock, enhancing both ecological interactions and economic returns. The National Mission on Agroforestry (NMAF) plays a crucial role in promoting AF as part of India's "Evergreen Revolution," addressing deforestation, biodiversity loss, and climate change. By diversifying incomes through timber, fuelwood, and fruits, AF benefits small farmers while improving soil health and water conservation. It contributes to achieving the United Nation's Sustainable Development Goals (SDGs). Government initiatives like the Sub-Mission on Agroforestry (SMAF) and NITI Aayog's GROW initiative employ geographical information systems (GIS) and remote sensing (RS) to expand AF across degraded and wasteland areas. The Union Budget 2024-25 allocated significant funds to scale up AF in India. With it's potential for biodiversity conservation, employment generation, and sustainable land management, AF stands as a vital strategy for ensuring India's agricultural and environmental sustainability.
Keywords: Agroforestry, mission, policy and sustainability

1. Introduction

Agroforestry (AF) in India has a rich historical background, deeply embedded in traditional agricultural practices that have evolved over centuries. It involves raising tree species and agricultural crops and or animals on the same piece of land, resulting in specific ecological interactions and maximized economic returns. It has enormous potential to provide farmers and the rural community with an economically and environmentally viable option for large-scale agricultural diversification in order to stabilize ecosystems (increase tree cover, produce timber and other wood products, and lessen the strain on the forests) on the one hand, and to obtain supplemental fuel, fodder, fruits, and fibres on the other. The farmers in northern India practises "Kheti-Wadi," where they cultivate crops alongside

trees to enhance soil fertility and provide additional income through timber and non-timber forest products (Rizvi *et. al.*, 2024). Globally, agroforestry is estimated to be more than one billion hectares, with significant contributions from Latin America, Asia, and Africa. India's forests cover 24.5% of it's geographical area (MoEF & CC, 2019). As stated in the National Forest Policy (NFP) of 1988, efforts are made to reach the national goal of bringing of 33% of geographical area under forest and tree cover. The growing population puts massive demands and pressures on the land and forest resources and various agro-ecological regions have shown it's potential through decades of research findings and several good practices have been widely adopted. This area includes various agroforestry systems that integrate trees with crops and livestock to improve productivity and sustainability (Sarvanan *et. al.*, 2020).

Agroforestry has garnered significant attention for its role in enhancing rural livelihoods, reducing deforestation, promoting biodiversity, and supporting climate change adaptation and mitigation. With its potential to facilitate biofuel development, generate employment, sequester carbon, and improve farm productivity, agroforestry serves as a vital approach to sustainable land use. Its economic benefits are closely tied to agricultural production, while its diverse outputs and resilience-building capacities have attracted interest from research institutions and private organizations. Aligned with global initiatives such as the United Nations Sustainable Development Goals (SDGs), agroforestry contributes to food security, climate action, and ecosystem conservation. In India, efforts to expand forest cover to at least one-third of the total land area rely on enforcing strict regulations, implementing scientific interventions, and fostering public-private partnerships for afforestation and reforestation. These initiatives focus on degraded forests, land managed by Forest Development Corporations, and areas beyond traditional forest boundaries.

2. Why Agroforestry Should be Promoted?

Agroforestry should be promoted in India as it offers a sustainable solution to environmental, economic, climatic and social challenges. This system is crucial as more than 80% of Indian farmers are smallholders who depend on rainfed agriculture. Integrating trees into farming systems can enrich soil fertility, increase biodiversity, upturn resilience against climate change, carbon sequestration, groundwater recharge and stimulating sustainable land management. It also supports food security, employment generation, particularly benefiting small and marginal farmers.

It diversifies farmers' income through products like timber and non-timber, while reducing risks from climate shocks and market fluctuations (Fig.1). As India seeks to achieve sustainable development goals, promoting agroforestry can build a channel between agricultural productivity and ecological

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

sustainability, making it an essential policy for the country's future. Agroforestry offers additional benefits beyond its primary roles, as given below.

i. **Soil Conservation and Erosion Control:** AF help stabilize soil, reduce erosion, and enhance water retention especially in vulnerable areas.

ii. **Biodiversity Enhancement:** AF create habitats for diverse plant and animal species, promoting natural pest control and supporting pollinators, increasing agricultural resilience and ecosystem health.

iii. **Energy and Water Savings:** It improve soil moisture retention, reducing irrigation needs, and provide renewable energy through wood fuel production, benefiting areas with limited water and energy resources

iv. **Rural Employment and Empowerment:** Agroforestry empowers rural and marginalized populations, especially women, by generating employment possibilities in agro-processing, conservation, and wood production and generating additional income.

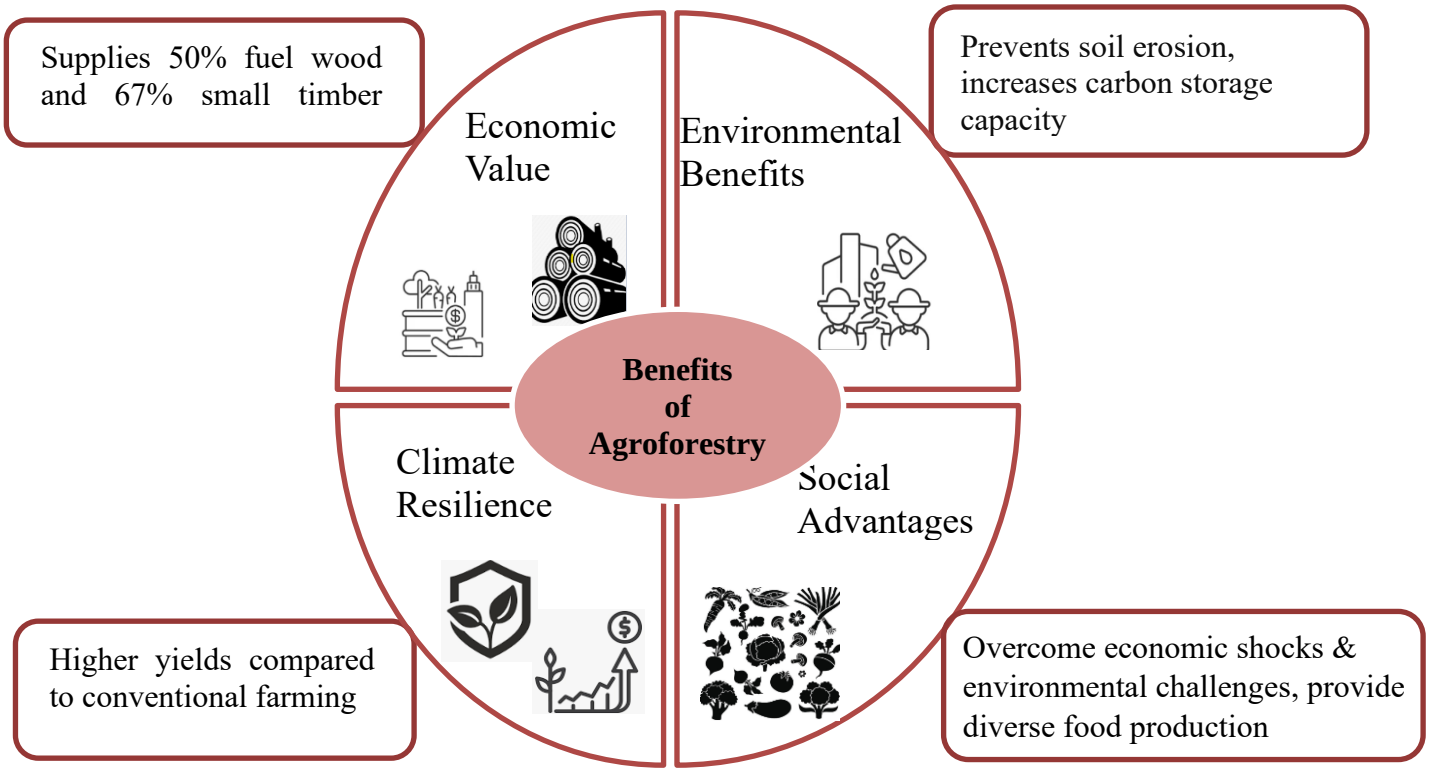


Figure1: Various benefits of Agroforestry

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

3. Scope of Agroforestry

The scope of agroforestry in India is significant due to its versatility across diverse ecological zones. India's challenges with climate change and food security highlight the importance of agroforestry in building resilient agricultural systems. Farmers are increasingly turning to sustainable practices like agroforestry, which provide environmental benefits while also ensuring economic gains. Incorporating trees into farmland enriches biodiversity and supports vital ecosystem functions, including water management and soil preservation.

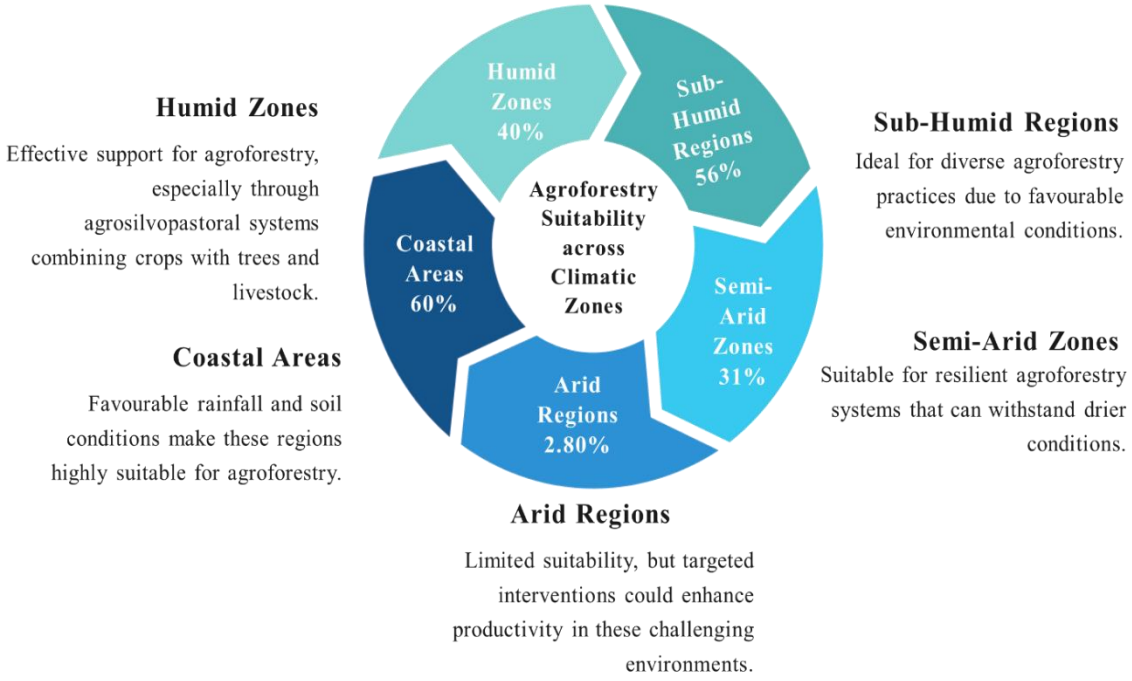


Figure 2: Suitability of Agroforestry in Different Climatic Zones of India

India's diverse agro-climatic zones offer a unique opportunity for the growth of agroforestry systems (*Fig.2*). Future, the following practices (*Table.1*) also provides an opportunity to promote AF system.

Table1: Various Agroforestry practices and their key features

Agroforestry Practice	Key Features
Alley cropping (Hedge-row intercropping)	Involves growing crops between rows of trees. This approach allows yearly cultivation of annual crops while trees mature.
Home gardens	Multi-stairs combinations of wide varieties of trees and crops in residences.
Silvopasture	Combining trees with forage (pasture or hay) and livestock production.
Forest farming (Multi-story cropping)	Involves growing high-value crops under a managed forest canopy.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

Shelterbelts and windbreaks	Trees to shield fields from storm damage, sea encroachment, floods, etc.
Taungya	Growing agricultural crops in the early phases of forestry (timber) plantations.
Contour farming	Farming along the contour lines of a sloped field to improve water conservation and reduce soil erosion.
Riparian zones/ buffer strips	Planting strips of perennial vegetation plants along the waterways to protect water quality.

(Nair *et. al.*, 2008)

4. National Missions/Schemes to Promote Agroforestry: There are different national missions/schemes which was launched by Government of India (*Fig.3*) to promote Agroforestry system in India (Chavan *et. al., 2015*).

2024 — **Greening and Restoration of Wasteland (GROW):** The program by NITI Aayog specifically targeting the utilization of degraded lands through remote sensing and GIS technologies for agroforestry, aiming to maximize land use and carbon sequestration.

2021 — **Trees Outside Forests in India (TOFI):** To enhance tree cover out sides of forest areas, improve livelihoods and increases ecosystem services.

2019 — **Jal Jeevan Hariyali Mission (2019):** To minimize the ill effects of climatic change, ensure rainwater harvest and increase green cover in the state by Government of Bihar

2016 — **National Agroforestry Mission (NAM)/Sub-Mission on Agroforestry (SMAF):** Launched under the National Mission for Sustainable Agriculture. Provides financial support for nurseries, plantations, and intercropping to encourage tree-based farming systems.

2015 — **Paramparagat Krishi Vikas Yojana (PKVY)**: Supports organic and natural farming systems that integrate agroforestry, enhancing soil health and farm productivity.

2015 — **National Adaptation Fund for Climate Change (NAFCC):** Supports agroforestry projects for climate-resilient farming, particularly in vulnerable areas.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

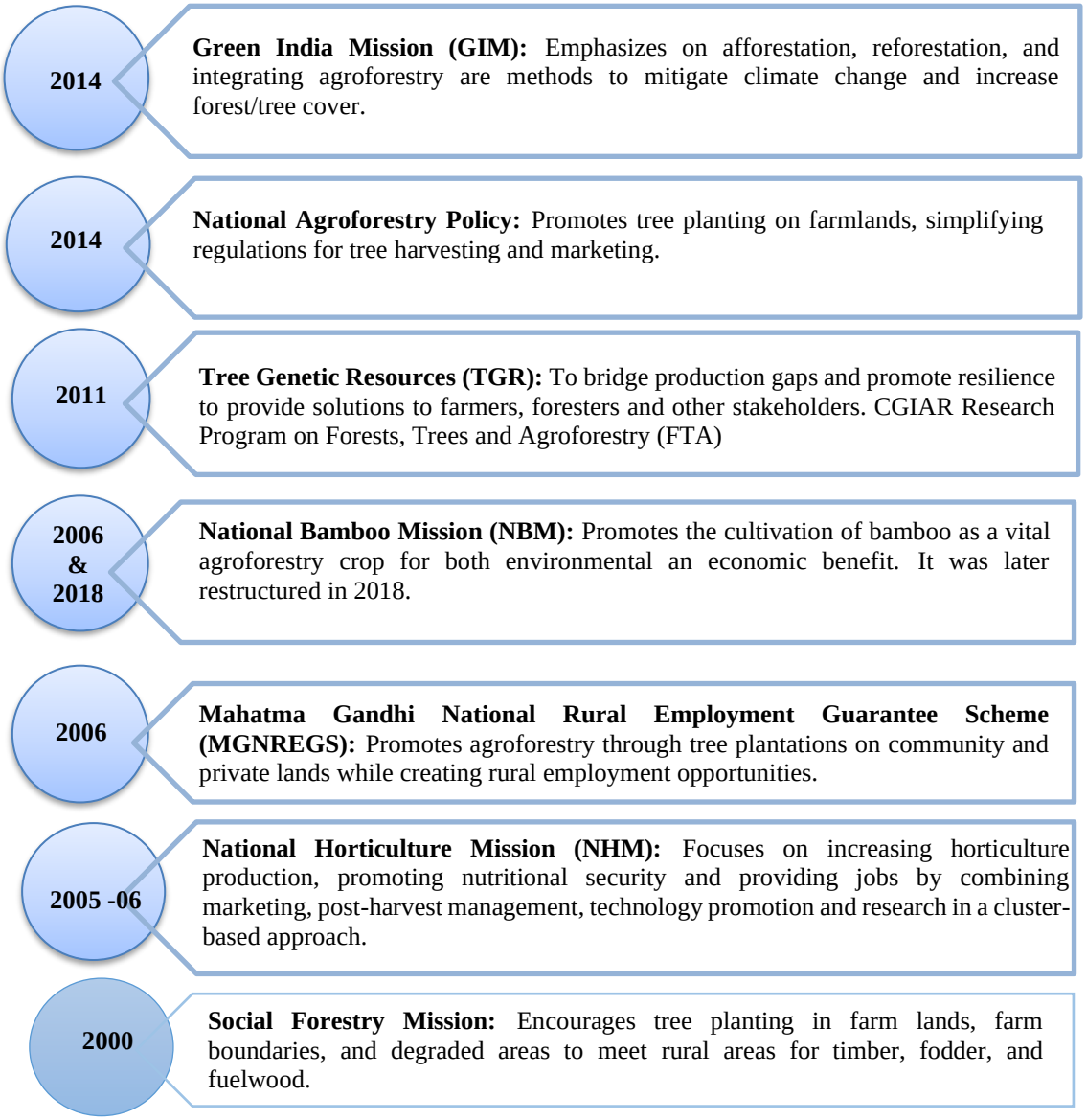


Figure3: Overview of National Agroforestry Missions and Schemes

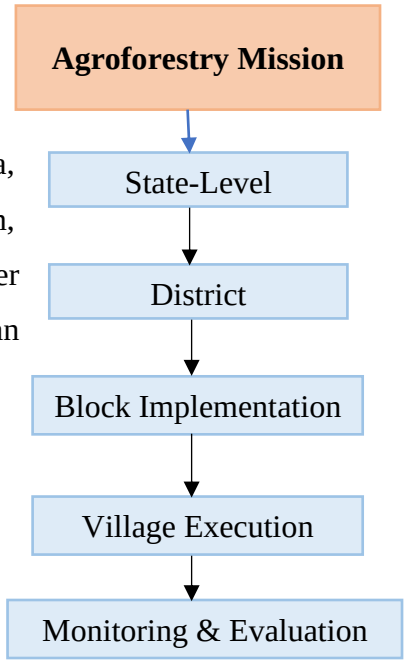
5. National Mission on Agroforestry (NMAF)

AF now plays a significant role in the nation's "Evergreen Revolution" movement in the country. More than 25 years of research founding have clearly showcased the potential of agroforestry across various regions of the country, with several practices gaining widespread adoption. The National Agroforestry Policy, 2014 came to address the issues of quality planting material, tree insurance, restrictions on transit, marketing of agroforestry produce, research and extension.

The Agroforestry Missions in India is an essential initiative aimed at promoting sustainable agricultural practices through the integration of trees with crops and livestock. It is primarily concerned with the expansion of tree coverage on farmlands alongside with arable crops. Step-by-step Implementation of

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

Mission Agroforestry in different states of India are given in fig 4. 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 (*Fig.5*). Under the aegis of the Sub-Mission on Agroforestry (SMAF), the Indian government provides the financial support to implement a variety of agroforestry development initiatives, including the establishment of Small, Large, and High-tech nurseries, Nursery development for quality planting material (NDQPM), Peripheral and boundary plantations (PBP), Trees on farm bunds (Har Medh Per Pedh), Low-density plantations on farmlands, High-density block plantations, Capacity building and Training initiatives, and Demonstrations (Ayyanadar *et. al.*, 2024)



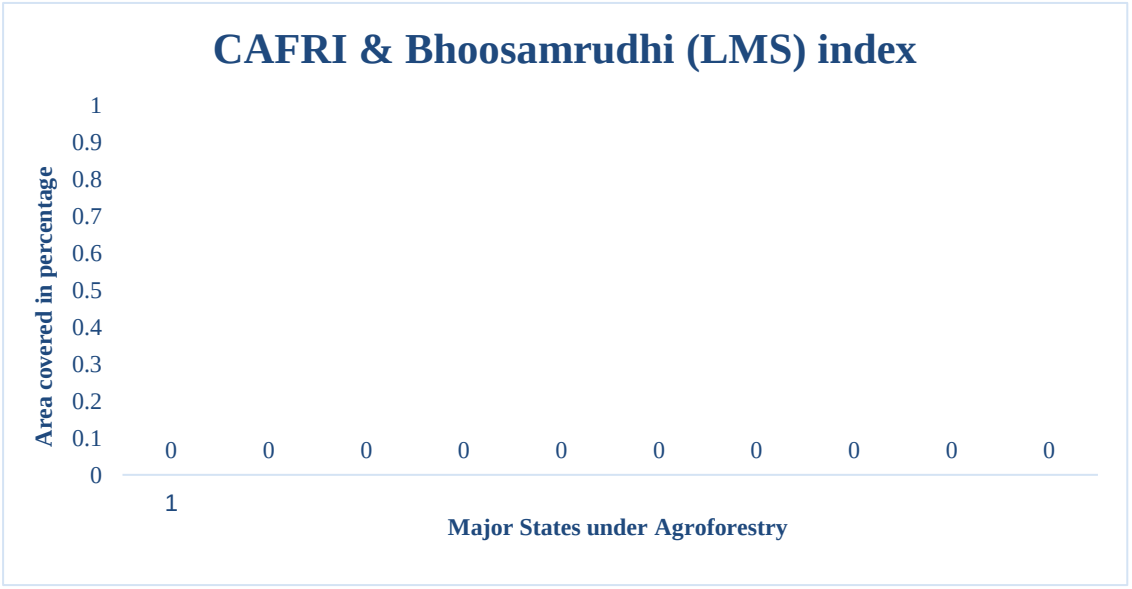


Figure 5: Major States under Agroforestry covered as per CAFRI & Bhoosamrudhi (LMS) (Chavan et al., 2015)

5.1 Mission Objectives

The Agroforestry Mission seeks to achieve several key objectives:

Increase tree cover: Improve the percentage of tree cover on farmland by increasing the agroforestry area form about 25 to 53 million hectares to improve biodiversity and carbon sequestration.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

- **Enhance livelihoods:** Include trees into farming to foster food security, lower poverty, and increase the income of smallholder farmers.
- **Promote sustainable practices**: To reduce the effects of climate change by promoting sustainable land use practices. Agroforestry systems are more climate-resilient, farmers can adapt to changing weather conditions and still be productive.
- **Improve soil health and fertility:** Using tree-based farming practices to improve organic matter, restore degraded soils, and minimize soil erosion.
- **Enhance biodiversity conservation:** Develop a number of agroforestry systems that promote ecological balance by benefiting flora and fauna.
- **Support research and development:** To execute research on agroforestry practices that are suitable for various agro-ecological zones. Collaborations with organizations such as the World Agroforestry Centre (ICRAF) and the Indian Council of Agricultural Research (ICAR) is essential to creating cutting-edge agroforestry models and practices.

5.2 Roles and responsibilities of the mission

In coming generation, the mission will more adversely takes place for promoting sustainable and climate-resilient agriculture through AF in India by providing financial assistance, technical expertise, capacity building and policy support to enable farmers on adopting agroforestry as a viable solution for enhancing productivity and ensuring environmental sustainability. The NMAF aims to reach approximately 1,82,503 farmers with targeted land area to cover around 7.5 L ha of land through agroforestry practices at District and Block-level in each State with local authorities, farmer groups, and NGOs to promote agroforestry adoption. Currently the mission was operational in 20 states and 2 union territories, actively promoting agroforestry through various schemes and programs where the funding from central government contributes 60% of the costs, while state governments cover 40% to achieve tangible growth in tree-based farming adoption across different regions. The periodic real-time data will be managed via GIS and remote sensing to monitor and evaluate plantation activities and assess the effectiveness of agroforestry interventions.

5.3 Implementation Strategies

To realize its objectives, the Agroforestry Mission employs a multi-pronged strategy:

- **Multi-pronged strategy:** Maintaining high-quality seeds and seedlings on hand is vital for the successful implementation of agroforestry. Establishing nurseries to produce better planting materials is encouraged by the mission.
- **Capacity building:** The mission focuses on providing training and extension services to farmers, ensuring they have access to knowledge about best practices in agroforestry.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

- **Financial assistance:** Farmers receive financial assistance for establishment of nurseries, tree planting, and agroforestry initiatives up to 50% of the total expenses of initiatives can be given to farmers, with greater support given to specific regions like the Northeast.
- **Policy support and coordination:** To facilitate finance mobilization and technical assistance for farmers, a National Agroforestry Mission/Board has been established to coordinate efforts across multiple governmental entities.

5.4 Implementation of mission at clusters

The **National Mission on Agroforestry (NMAF)** enhances agroforestry through structured, state-specific action plans over four years, aligning with local agro-climatic conditions. **Agriculture Officers** prepare **Detailed Project Reports (DPRs)** for selected clusters, detailing interventions like plantations and nurseries. **Capacity building** is a key focus, with training programs for farmers, workshops, and exposure visits. NMAF works with programs like as MGNREGS and MIDH to integrate tree-based farming with traditional agriculture in order to tackle climate change, land degradation, and monoculture reliance. By 2024, it has trained **25,268 individuals (35% women)** and supports **state-specific agroforestry policies** under the **Trees Outside Forests in India (TOFI)** initiative. **FPOs, SHGs, and** NGOs significantly contributing in community-driven agroforestry models. The mission intends to **scale cluster-based agroforestry, improve market access, and use of GIS and remote sensing for monitoring** and driving India's **agro-ecological transformation.**

5.5 Mission at state level

The NMAF operates through a multi-faceted approach involving both national and state-level actions. District-level nodal authority will be established by the state government to carry out agroforestry programs in collaboration with a range of groups, including KVGs, non-governmental organizations, farmers' cooperative societies, and private sector organizations. To ensure effective implementation formulating Block Action Plans (BAP) and District Action Plans (DAP) through a "bottom-up approach," considering the requirements at the block and district levels. The following committees at state level will be overseen on policy guidance and implementation at state and district level in coordination with central agencies are State Agroforestry Steering Committee (SASC), State Agroforestry Nodal Agency (SANA), District Agroforestry Committees.

5.6 Mission at block level

At this level, NMAF works to build awareness and train farmers and local communities through workshops, training programs, and field demonstrations on the benefits and best practices of agroforestry. It focuses on capacity building by training agricultural extension officers, forest

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

department personnel, and local leaders to act as facilitators in promoting agroforestry adoption. The selection of farmers from gram panchayats to effectively operate NMAF at the block level by leveraging their grassroots presence and community connections. The mission also provides financial incentives, subsidies for planting tree species, technical guidance on selecting the right species, and assistance in adopting agroforestry systems at block levels. Monitoring and evaluation systems ensure the mission's goals are achieved effectively, with regular reporting to address challenges faced by farmers. Collaborations with local institutions, such as Panchayats, NGOs, and cooperatives, help tailor the program to local needs, especially for small and marginal farmers.

5.7 Mission at farmer's reach

The National Mission on Agroforestry (NMAF) has proven to be highly beneficial for small and marginal farmers, offering both environmental and economic advantages while enhancing agricultural productivity. This practice diversifies income sources, reduces dependency on a single crop, and provides timber, fuelwood, fruits, and medicinal plants, increasing overall farm resilience.

6. Union Budget 2024-25 and States Under Agroforestry

The Agroforestry component under RKVY, originally part of the Sub-Mission on Agroforestry (SMAF) from 2016-17 to 2021-22, encourages tree plantation on farmland for additional farmer income. In 2024-25, ₹33.24 crore was released to 21 States/UTs, with accreditation protocols for nurseries developed in December 2023. So far 133 nurseries have been accredited. India's significant budget allocation for agroforestry demonstrates its dedication to the technique; according to recent reports, the Department of Agriculture and Farmers' Welfare is receiving about 1.22 lakh crore for the 2024–25 period, with a focus on advancing agroforestry strategies. The commitment is further strengthened by the National Agroforestry Policy, which intends to make it easier to bring trees into agriculture, and the Sub-Mission on Agroforestry (SMAF), which distributes funds for specific activities. Furthermore, programs like NITI Aayog's "Greening and Restoration of Wastelands with Agroforestry" demonstrate the government's focus on reusing degraded lands for agroforestry development, indicating an effective plan for promoting agroforestry projects throughout the country (MoA&FW, 2025).

7. Expected Outcome

Agroforestry provides far-reaching benefits for smallholder and marginal farmers, influencing agricultural productivity, economic stability, environmental sustainability enhances soil fertility, promotes nitrogen fixation, and reduces soil erosion, leading to improved crop yields, with increases of 20-30% reported depending on the specific integration of trees and crops. As farmers gain access to additional products such as fruits, timber, fuelwood, and medicinal plants. This reduces dependency

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025

on a single crop, mitigating risks from price fluctuations and improving economic resilience in rural areas. Overall, agroforestry provides an integrated approach that promotes several Sustainable Development Goals and produces benefits for the economic, environmental, and social advantages (GoI, *2023*).

8. Conclusion

Agroforestry holds immense promise for revolutionizing India's agriculture by integrating trees with crops and livestock, yielding significant environmental and economic benefits. As a sustainable farming practice enhances soil fertility, promotes biodiversity, conserves water, and mitigates the impacts of climate change. The National Mission on Agroforestry (NMAF), provides a comprehensive strategy, aims to expand tree cover, improve soil health, foster food security, and alleviate poverty, contributing to the nation's long-term sustainability goals. Ultimately, agroforestry is a critical solution to India's agricultural economic and environmental challenges, advancing the Sustainable Development Goals (SDGs) and fostering a resilient future.

9. Reference:

Ayyanadar, A., Suresh Ramanan, S. and Handa, A.K. (2024). *Foresighting national agroforestry policy for fostering green development* (Policy Paper 02/2024). World Agroforestry.

Chavan, S.B., Keerthika, A., Dhyani, S. K., Handa, A. K., Newaj, R. and Rajarajan, K. (2015). National agroforestry policy in India: A low hanging fruit. *Current Science*, *108*(10).

GoI. (2023). *Operational guidelines on agroforestry under Rashtriya Krishi Vikas Yojana (RKVY)*.

MoA&FW. (2025). *Brief on the achievements through schemes and programmes by PIB, Delhi*.

MoEF & CC. (2019). *India state of forest report 2019*. GoI Edition 16, (I).

Nair, P.K.R., Gordon, A.M. and Mosquera-Losada, M.R. (2008). Agroforestry. In *Encyclopedia of ecology* (pp. 101–110). Elsevier.

Rizvi, J., Dhyani, S.K., Arunachalam, A., Rouge, J.C. and Singh, A. (2024). The success of a national agroforestry policy in India has become a model for other countries. *CIFOR-ICRAF*.

Sarvanan, S., Berry, N. and Rao, R. (2020). Agroforestry models developed by Indian Council of Forestry Research and Education. *ICFRE*.

Official Website
www.thescienceworld.net
thescienceworldmagazine@gmail.com
Published 31/03/2025