

Restoration Dialogues

INSPIRING, INNOVATING, AND DESIGNING SOLUTIONS FOR SCALING LANDSCAPE RESTORATION THROUGH POLICY DIALOGUES WITH A FOCUS ON PEOPLE-FIRST, PEER-TO-PEER LEARNING

September, 19–20, 2022 | Bhopal, Madhya Pradesh | Srishti Kochhar, Shweta Prajapati, Siddharth Edake and Ruchika Singh

INTRODUCTION

It has been widely recognized that inclusive landscape restoration strategies will be instrumental in India achieving its international commitments under the Bonn Challenge, Nationally Determined Contribution (NDC) under the Paris Agreement to the United Nations Framework Convention on Climate Change (UNFCCC), Land Degradation Neutrality (LDN) target, Aichi Biodiversity Targets under the Convention on Biological Diversity (CBD), Net Zero by 2070, and the United Nations Sustainable Development Goals (SDG). The fulfillment of these commitments also points toward the net-zero pathways India can choose to achieve neutrality by 2070. Landscape restoration strategies also underpin key domestic targets, such as the vision of doubling farmer incomes, the National Mission for Sustainable Agriculture (NMSA), National Green India Mission (GIM), Mission for Integrated Development of Horticulture (MIDH), National Bamboo Mission (NBM), and Nagar Van Udyan Yojana (NVUY), among others.

The uptake and scaling of restoration depends on public policies and incentives that enable people, particularly marginalized communities such as Scheduled Castes and Scheduled Tribes; small and marginal farmers; women; the landless, and others, to improve their livelihoods and sustainably invest in their land. WRI India's research indicates that through several policies and regulations enacted over the years, India's policy framework provides multiple monetary and nonmonetary incentives that promote restoration; however, the framework faces several implementation challenges. "Restoration Dialogues," a unique, people-first, peer-to-peer convening and learning platform, aims to fill this gap by bringing together policymakers and key experts to discuss and seek solutions to issues in the design, capitalization, regulation, and implementation of key policies pertaining to landscape restoration.

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The contents of this document reflect the work and/or views of the conference/workshop participants and do not necessarily reflect the views of WRI India and other conference partners.

The first of these pioneering dialogues was held in Bhopal, Madhya Pradesh (MP), on September 19–20, 2022. The objective was to identify the key policy barriers that inhibit landscape restoration and how to overcome them. The Restoration Dialogues, *inter alia*, focused on the role that restoration interventions like agroforestry and bamboo cultivation can play in enhancing rural livelihoods, building resilience, and mitigating climate risks.

The Bhopal Restoration Dialogues aimed at inspiring, innovating, and designing solutions for scaling landscape restoration in MP. The event brought together more than 55 participants, including decision- and policymakers from various government departments and agencies such as the Forest Department, the Horticulture Department, Panchayati Raj and Rural Development Department, NBM, the Environmental Planning and Coordination Organization (EPCO), and others; civil society organizations such as the Professional Assistance for Development Action (PRADAN), the Centre for Agriculture and Rural Development (CARD), Action for Social Advancement (ASA), and others; various stakeholders from research institutions such as the Central Agroforestry Research Institute (CAFRI), the Indian Institute of Forest Management (IIFM), and the Institute of Livelihood Research and Training (ILRT); and key private players active in this realm. The findings were derived from global, national, and regional best practices to help arrive at solutions that can facilitate the expansion of landscape restoration initiatives.

DAY 1: WELCOME ADDRESS AND CONTEXT-SETTING

The workshop commenced with a welcome address by Dr. Ruchika Singh, Director, Sustainable Landscapes and Restoration, World Resources Institute India. She presented a brief overview of WRI India's landscape restoration work in MP, including the ongoing pilot in Sidhi district. She also emphasized the need for urgency in addressing the issues arising from the unsustainable use of natural resources, highlighting how the ongoing UN Decade on Ecosystem Restoration, MP, provides an excellent setting for attempting integrated solutions, and the necessity for making it happen on scale. She encouraged the participants to co-create mechanisms for restoration strategies to be streamlined through the regulatory network benefiting the stakeholders closest to the impacts of a fragmented landscape. She emphasized that landscape restoration needs to consider both ecological and human well-being, starting with people's priorities.

Mr. R. Parasuram, former Chief Secretary, Government of Madhya Pradesh (GoMP), and senior fellow, WRI India, helped set the context by focusing on the significance of people's participation in land restoration initiatives and the need for region-specific interventions. He highlighted the present gaps in research and implementation that hinder a comprehensive and integrated execution of restoration programs at the local level.

a. Agroforestry-based landscape restoration and its benefits for India

Dr. A K Handa, Principal Scientist, Indian Council of Agricultural Research–Central Agroforestry Research Institute (ICAR-CAFRI), Jhansi, Uttar Pradesh (UP), delivered the opening address, with a special focus on agroforestry-based landscape restoration and its benefits for India, with an emphasis on MP. He spoke about the potential of agroforestry in meeting the countrywide demand for both wood and non-wood products, as well as agroforestry's potential in restoring soil health. He highlighted the farmer-centric characteristic of India's agroforestry policy and drew attention to the limitations imposed by the presence of multiple agencies handling the subject at the policy and implementation levels. He bemoaned the absence of one single coordinating institutional structure, which can facilitate the growth and expansion of a dynamic agroforestry sector. Dr. Handa emphasized the timely need to move toward climate-smart agriculture that is driven by sustainably increasing productivity, enhancing resilience (adaptation), and reducing greenhouse gas (GHG) emissions (mitigation) to ensure the achievement of national food security and the SDGs. He showed how the ground-level involvement of farmers may play a crucial role in sustainability through agroforestry. If this practice is brought back to India's farmers, a new revolution in the agricultural sector and the Indian economy may take place.

The key points discussed by the participants following this address are summarized below:

- Establishing a nodal agency for agroforestry, and a streamlined implementation mechanism can help promote agroforestry in the state.
- There is lack of institutional capacity and resources to implement agroforestry projects. A substantial budget is being spent on planting trees, and policy-level changes are urgently needed to attract a significant part of this.
- Agroforestry is not considered profitable by small-scale farmers. Species like Ber (*Ziziphus* spp.), Amla (*Phyllanthus* spp.), and Strawberry (*Fragaria* spp.) are preferred as they start yielding harvest from the third year. They are preferred by farmers with limited land holdings looking for short-duration harvests and quick remuneration.
- The challenges faced in the adoption of agroforestry in the Bundelkhand region of MP due to limited fertile land area and high fodder requirements. Silvopasture is a suitable solution, where farmers can also cultivate fodder grass and fodder trees on bunds and boundaries.

b. High-level plenary on restoration, livelihood generation and climate mitigation through agroforestry and bamboo cultivation in MP

The high-level plenary was chaired by Mr. Ramesh K. Gupta, Principal Chief Conservator of Forest and Head of Forest Force, Madhya Pradesh Forest Department. The panel included Mr. J.N. Kansotiya, Additional Chief Secretary, Department of Horticulture and Food Processing, GoMP; Mr. Umakant Umrao, Principal Secretary, Department of Panchayat and Rural Development, GoMP; and Mr. Gupta.

Key points of discussion that arose during the plenary are summarized below:

- There is an extension system in place to connect with farmers, but benchmarks are required in district-level action plans for measuring agroforestry practices. Only a limited number of farmers who have access to information and resources can practice agroforestry. The prevalent National Agroforestry Policy should have specific provisions on awareness and capacity building. A comprehensive extension intervention by the Horticulture Department, which is the nodal agency for implementing agroforestry, is needed to expand outreach to the farmers, farm producer organizations, and so on. Lessons from successful pilots elsewhere should reach potential agroforestry practitioners.
- The MP State Forest Department should conduct field trials. Based on these mature models and quality planting material, results should be made available across the state. Interested farmers can procure the same for their use. Autonomous institutions like the State Forest Research Institute and the Tropical Forest Research Institute (TFRI), Jabalpur, can promote the distribution of plants for agroforestry-related government schemes.
- At the government level, there is a need for addressing institutional barriers that impede widespread adoption of agroforestry as a viable commercial activity, and to promote convergent action among stakeholders.
- There is a need to look at agroforestry from a landscape restoration perspective. For this, there needs to be a widespread understanding of what constitutes a landscape approach and its key components. Strong and integrated action plans that apply agriculture-horticulture models or agroforestry can be developed and implemented. Small farmers require paybacks in the short term, for which agriculture-horticulture combination models can be helpful.

- Bamboo is a plant species that can prove to be a particularly useful component of such models. Promoting incubation centers and start-ups that provide integrated solutions from farm to market can bring together and consolidate bamboo cultivation and product development.

Technical session 1: A discussion on the role of policy incentives in removing barriers and creating enabling conditions for scaling landscape restoration through case studies and good practices

The first technical session began with a presentation by Dr. Sonali Ghosh, Chief Conservator of Forest of forest, Assam Forest Department, that delved into scaling restoration through agroforestry in the state of Assam. Dr. Ghosh highlighted the key challenges for agroforestry in Assam, which include the small size of landholdings and the promotion of cultivation of species with market potential in close proximity to wood-based manufacturing units. Inadequate availability of quality planting material and standard plantation techniques are also key barriers to agroforestry initiatives.

She stated that the broader challenges include limited monetary incentives, inadequate ecosystem enablers as regulatory incentives, quality standardization, technical assistance, lack of quality input materials, quality linkages (financial, market, value chain strengthening), limited knowledge of farmers, and data deficiency in demand and supply estimation. Less than 50 percent of the demand from wood-based industries is supplemented through forests. The remaining deficit cannot be fulfilled if not planned through agroforestry system management outside the forest areas of a landscape. The planning should include strategies that involve farmers with smallest landholdings to adopt this as a practice. Creating champion for scaling Trees outside Forests (ToF) through efforts towards capacity building, training, and awareness is required. Other challenges include preventing human-wildlife conflict, especially depredation by wild elephants. While the recent initiatives have mostly been top-down and politically driven, the Assam Agroforestry Development Board, registered as a Section 8 company of the Companies Act, 2013, has been set up to impart to the sector a more bottom-up character, bringing together all stakeholders for the integrated and sustainable development of the sector. The Board will be exploring integrated approaches under agroforestry, including linear plantation, fruit orchards and agriculture-horticulture. Developing ecosystem enablers and training and capacity building for practitioners are other measures needed to support agroforestry.

Following the presentation, a panel discussion ensued. The panelists for this discussion were Ms. Sufiyah Faruqui Wali, Commissioner, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), GoMP; Mr. Anurag Shrivastava, IFS Retd., MP Forest Department; Mr. Lokendra Thakkar, Coordinator, Climate Change, EPCO, GoMP, and Dr. Ruchika Singh. The panel was chaired by Mr. Chitaranjan Tyagi, Principal Chief Conservator of Forest & Head of Forest Force, MP Forest Department.

The key points emerging from this session are summarized below:

- Mr. Thakkar highlighted that, based on India's NDCs, MP's State Action Plan on Climate Change (SAPCC) is currently being revised. The SAPCC has three key components: climate projections, vulnerability assessment, and a greenhouse gas emissions inventory. Among the states, MP is one of the top 10 emitters in India and 26 districts in the state are seen as vulnerable to climate change. Therefore, restoration, nature-based solutions or similar approaches that emphasize restoration of our ecosystems are crucial.
- Mr. Tyagi emphasized that the landscape restoration approach emphasizes the interconnectedness among land, soil, and vegetation of distinct characteristics, actors, and practices across multiple regions.

- A key requisite for successful landscape restoration is for all stakeholders to work together for planning and implementation, as the nature of interactions between stakeholders and departments affects results, leading at times to different results and outcomes.
- Large-scale landscape restoration projects with assured multiyear funding should be collaboratively prepared and implemented for benefiting the overarching objectives and goals of restoration and for successful adaptation to climate change.
- According to Mr. Shrivastava, four key components should be borne in mind for any attempts at successful landscape restoration: data, research, subsidies, and cadre management. Along with this, Ms. Wali emphasized the importance of a guiding framework for bringing coherence to the functioning of smaller projects and different government departments.
 - Data collection and management require a resolution of issues relating to access and availability, and open data sharing policies need to be practiced.
 - Research on advanced varieties with proven market potential is required. The next crucial step is to develop an understanding of how improved agricultural and horticultural practices can be integrated with forestry to make agroforestry profitable.
 - Subsidies under various development schemes need to be reassessed to build the most enabling incentive structure for agroforestry.
 - There is no dedicated cadre of grassroots-level extension service professionals for agroforestry. The implementation of agroforestry requires synergistic cooperation between multiple departments to take forward Trees Outside Forests and agroforestry implementation at scale. A beginning can be made by building a cadre for forest extension services by retraining forest guards.
- Dr. Ruchika Singh highlighted the key findings from WRI India's research on implementation of ToF models in six states of India.
 - The key enabling conditions for landscape restoration include political and bureaucratic will, convergence of state-level schemes, and profit motivation for farmers.
 - The key barriers to the same include policy barriers such as lack of systematic restoration plans, unclear permits for transit and harvest, neglected tree tenure, poor access to information for farmers, and economic and market-related barriers.
- All panelists highlighted the salience of promoting community-based institutions for restoration-based initiatives:
 - Community institutions have a major impact on restoration-based development activities, both forest and non-forest.
 - For local restoration practices to be sustained, adequate investment must be made for the institutional capacity building of these institutions as independent entities.
 - Self-help groups (SHGs) and joint forest management committees (JFMCs) can work together to provide quality plantation material for several marketable crops.
- The panelists made several recommendations at the policy level to streamline and consolidate efforts:
 - Functioning of government departments and programs should be decentralized so that organizations or groups can resolve minor issues without recourse to higher policymaking levels at every step.

- A district perspective plan should be developed with inputs from all concerned stakeholders, and from this a district level restoration plan can be designed.
- Efficacy of several ongoing initiatives under MGNREGS that contribute toward landscape restoration needs to be increased with the help of a guiding framework. Examples include water management structures, community nutrition gardens and the Sajha Manch Initiative.
- Models for collaboration between various actors should be explored: for example, EPCO can provide its technical expertise with MGNREGS providing funds and an implementation framework.
- Suggestions for pre- and post-plantation management and greening of undulating landscapes should be taken up under MGNREGS.
- The GIM should be considered for implementing landscape restoration as it is completely focused on landscapes and already includes interventions such as silvopasture.
- Provisions under the NBM should be added for smallholders to get free planting material and subsidies, that can help with planting in common areas cultivated by smallholders.

FIGURE 1 | Panel discussion on policy-related key barriers and enabling conditions for land restoration in MP



Source: WRI India

Technical session 2: A discussion of sustainable management of agroforestry systems through case studies and good practices

The second technical session began with presentations by Dr. S. Umesh Kanna, Professor, Tamil Nadu Agriculture University (TNAU) who shared particulars about the Consortium for Industrial Agroforestry, one of the largest producer-consumer networks of growers and wood-based industries in India and incubated in house at TNAU. Dr. Kanna spoke of the key elements that link tree-growing farmers to wood-based industries, technology development and transfer, organized plantation management, technical aspects of tree growing and felling, establishing mechanisms for transportation, price support and marketing, and suggested changes in policies that govern the sector. He asserted that the TNAU model is scalable, provided

that appropriate institutional mechanisms can be put in place. He presented an interlinked matrix of key constraints and challenges in agroforestry, based on the production, consumption, processing, and social framework as action points to be considered by practitioners.

This was followed by a presentation by Dr. Sangeeta Agasty, Regional Director, South Asia, International Network for Bamboo and Rattan (INBAR) who described how bamboo could be made the species of choice in the reclamation of lands spoiled by mining, as well as the role that bamboo can play in environmental and socioeconomic rehabilitation of the landscape and people. Dr. Agasty presented a case from Allahabad, where farmers had sold the topsoil from their cultivable lands to brick kilns, leading to total degradation and no way to cultivate the soil. Results of a greening program in this area have shown that bamboo-based restoration helped improve humus in the soil, improved the groundwater table, helped improve increased soil carbon content, and helped improve the pH of water, while also enhancing local biodiversity. She highlighted the fact that over two billion hectares of land are affected by land degradation resulting in loss of fertile soils, biodiversity, and carbon stock. Under the Bonn Challenge, a total target of 350 million hectares is to be covered by 2030 globally. INBAR member states have made their commitment to plant bamboo on six million hectares to contribute to the Bonn Challenge target.

Following the presentations, a lively panel discussion ensued. The panelists for this discussion were Dr. Nanita Berry, Scientist, TFRI, Jabalpur; Dr. Bhimappa Kittur, Assistant Professor, IIFM; and representatives of civil society organizations working on restoration in MP including Self-Reliant Initiatives through Joint Action (SRIJAN), Action for Social Advancement (ASA) and The Nature Conservancy (TNC) India. The panel was chaired by Dr. D.H. Ranade, acting Vice-Chancellor, RVS Agriculture University, Gwalior.

The key points and recommendations that emerged from this session are summarized below:

- A designated nodal agency should be established to coordinate all activities relating to agroforestry in the state and to facilitate the development of district-wise plans and harmonize the state-level planning process.
- There is an impetus to develop new varieties of forest trees and subsequently forge better linkages among the lab, the farmers, and the industry to promote the propagation of these new varieties. However, the barrier imposed by distance has been a big hindrance as manufacturing units usually prefer to procure raw materials from distances not more than 200 km from their location, which is rarely the case. For example, in the Jabalpur area, farmers are not able to harvest the Eucalyptus grown by them due to lack of buyers.
- Agroforestry produce, to the largest extent possible, should be grown in any given region for supply to manufacturing units located in the vicinity, obviating the need to import from long distances, which adds significantly to costs. Local farmers should be incentivized to plant species that have local demand both in their raw and value-added state.
- A marketing strategy for better trade linkages and providing market information at the village level, is required. Additionally, models developed through social mobilization at the community level to enhance the organized efforts on marketing of agroforestry or wood-based value chain are likely to yield good results.

DAY 2: INTRODUCTORY SESSION

The second day commenced with Dr. Uttam Kumar Subuddhi, Mission Director, MP State Bamboo Mission, delivering the keynote address on the status and potential of bamboo-based value chains in MP. Bamboo is recognized as a miracle crop: it is perennial in nature, has the resilience to grow on several types of soils, and has high tolerance to drought conditions, floods, and fire. It is fast growing and can achieve high levels of efficiency in resource utilization.

The key takeaways are summarized below:

- India has become a major importer of bamboo products across the board, with the total annual bamboo imports being estimated at roughly INR 5,11,00,00,000 (US\$62 million). There are three key stakeholders in this sector: bamboo growers; artisans and micro, small and medium enterprises; and designers, scientists, and other experts. The mission tries to bring them all together to expand domestic production.
- The MP State Bamboo Mission involves itself in plantation on forest and revenue lands, wastelands, ravines, riverbanks, roadsides, canal sides, and farm boundaries.
- The Mission has been devoting attention to expanding the availability of quality planting material by establishing and accrediting nurseries and tissue culture labs. It has helped in the setting up of Samanya Suvidha Kendras (common facility centers). These centers provide technical support by making available modern tools and machinery for use by growers and entrepreneurs.
- The following crucial policy enablers have helped expand areas under bamboo plantation and promote forward linkages:
 - The Indian Forest (Amendment) Ordinance, 2017, 1927, has done away with the categorization of bamboo grown in nonforest areas as a tree. Now, therefore, there is no need to obtain permits for its felling or transit.
 - The MP state government has imposed a ban on single-use plastic since July 1, 2022.
 - The Directorate General of Foreign Trade has given certain relaxation in the norms for bamboo exports from India in 2017, while also removing the ban on export of bamboo charcoal in 2022.
 - Initiation of district export promotion plans, starting with the Dewas district, where the Bambusa bambos species will be procured from the farmers to make processed engineered bamboo boards, has helped strengthen market linkages for bamboo growers.
 - Schemes, such as the Scheme of Fund for Regeneration of Traditional Industries, can benefit bamboo-based traditional artisans by developing product clusters.

The presentation was followed by a session of questions and answers. The following key points emerged from the discussion:

- Buyback arrangements can play a significant role in attracting farmers to grow bamboo. Strong market linkages can be developed by encouraging the private sector to play a bigger role. Funding by the government and attracting corporate social responsibility funds would prove inadequate for expansion and upscaling.
- MP comprises 11 agroclimatic zones, and details of what type of bamboo can grow best in each of these zones are available. Such knowledge transfer and awareness building among farmers about bamboo cultivation and value-chain development needs to be prioritized.

- Planting and making available the right kind of bamboo for products that have market potential is of crucial importance. There are 136 varieties of bamboo available in India with different varietal specificity for different products.

Technical session 3: Kickstarting India's circular economy with multiple benefits through landscape restoration: A case study of bamboo-based agroforestry

The session began with an overview of the bamboo economy by Dr. Agasty. Underlining the salience of bamboo for landscape restoration, Dr. Agasty spoke about the multiple benefits that can accrue from bamboo-based landscape restoration, which include enhanced food security, protecting biodiversity, improved soil and water management, energy security, resilience, gender parity, and community participation.

The key barriers to the bamboo economy and recommendations for kick-starting the same are summarized below:

- Although India reportedly is the second highest bamboo producing country, the number of registered bamboo manufacturing units are much less when compared to others. MP, for instance, has only one registered manufacturing unit. Most of the manufacturing is in the informal sector.
- Barriers that limit growth of the sector include lack of awareness and accurately collected information on availability of suitable bamboo species and institutional arrangements for collaborative action by the three major stakeholders: research or academia, policymakers and industry. Key drivers for sustainable growth of the sector need to be identified and acted upon.
- Some of the key points of intervention can come from planning for high-quality nurseries for scaling up planting material production; large-scale plantation; sustainable management practices, including for harvesting; and value-chain development. These can lead to greater social, economic, and environmental returns.

This was followed by a presentation by Dr. Himangana Gupta, WRI India, on the importance of bamboo value chains in India, based on lessons learned from a project undertaken by WRI India and the Centre for Responsible Business's Climate-Smart Forest Economy Program, the findings from which are situated amid recent changing trends observed in the use of wood as a construction material. The key findings from national, regional, and one-to-one consultations are summarized below:

- Some of the important barriers for selecting bamboo as a species of choice for both restoration and carbon sequestration are lack of data, unorganized value chains, and lack of awareness.
- More than 500,000 houses are constructed in MP every year under various government programs, more so in the private sector. Resorts at ecotourism sites, including in the proximity of national parks and sanctuaries, are also potential customers. Resort owners can be encouraged to use bamboo for a large number of applications.
- There is a potential to develop a solid value chain in MP based on the available industrial base and market for bamboo, use of indigenous species for construction, and willingness of farmers to take up bamboo plantations.
- Traceability mechanisms affect felling and transit of bamboo across state borders. This is because while there is no need to obtain permits for its felling or transit from non-forest areas, use of bamboo resources from forest areas is not allowed. There is also a need to allay apprehensions on the fire resistance or retardation capability of bamboo.

- Bamboo will have to withstand the competition of wood and non-wood alternatives. Bamboo products will have to find broader acceptance in the market, growing out of their dependence on handicrafts fairs (melas). The challenge is to make bamboo a material of choice for wider application and mass consumption.
- From an engineering point of view, bamboo is recognized as a high strength material for building construction, but it is used by either the poorest or the elite. There are no pocket-friendly housing options for middle-income homeowners in India, which limits bamboo's uptake in the construction sector.
- Bamboo use need not be limited to bamboo-only products as it lends itself beautifully for composite use with other materials, both in construction and items for daily usage.
- Robust tools for life-cycle assessment of bamboo products, grading mechanisms, certifications, and similar mechanisms are required for assessing impact of these products on the environment.

Following the presentations, a panel discussion ensued that focused on key policy barriers and identifying enabling conditions for bamboo-based restoration strategies in MP. The panelists for this discussion were Dr. Amitabh Pandey, Professor, IIFM; Dr. Sangeeta Agasty, Regional Director, South Asia, INBAR; Dr. S. Umesh Kanna, Professor, Tamil Nadu Agriculture University (TNAU) and Dr. Rajendra Singh Gautam, Dean, ILRT. The panel was chaired by Dr. Ajoy Bhattacharya, IFS Retd. and Chairperson, Integrated Development Organization.

The key barriers that emerged are summarized below:

- Uncertainty at the policy level due to the absence of clarity on who is ultimately championing agroforestry at the state level.
- A virtually absent or unclear vision for what needs to be done, indicating that initiatives lack coherence, remain scattered and are not at scale that result in prohibitive costs and expensive products.
- Weak linkages down the production and value addition chains from growers to consumers, and results-focused research and development that result in low contribution by the bamboo sector, much below its realizable potential.
- A need to appreciate the inherent conflict between seeing forestry primarily as a conservation activity as against bamboo cultivation as a commercial activity, coupled with effective measures to delink the two.
- Lack of consolidated information, updated in real-time, on bamboo products in India. To get complete and disaggregated information, one must sift through information spread across various sectors, cull out that which involves bamboo, and then collate it.
- Informational asymmetry at the grass roots:
 - Farmers are unaware of the dynamics of the bamboo economy: where to obtain quality planting material, who will buy the produce from them at remunerative prices, and how and where.
 - Farmers do not know pre-production requirements, production management, and proper harvesting practices.
 - Support functions needed for production, value addition and marketing are not easily accessible.
 - Institutional support on standardization, processes and technologies is available through at least 50 government-run institutes, which is not widely known.

- A study conducted in the Sidhi district has demonstrated that the reluctance to plant bamboo arises from concerns for food security. It is widely believed that planting bamboo would adversely affect cereal and vegetable crops. Neighboring farmers protest if a farmer decides to plant bamboo, as it casts a shadow and can also sprout in their fields

Based on these perceptions, the following policy recommendations were made:

- The approach needs to change from production-oriented to market-oriented. Product-wise value chains will need to be developed, centered around specific products. For example, *agarbatti*, paper, and handicrafts will require developing separate value chains.
- Informational asymmetries at the grassroots need to be addressed.
- A policy should be developed around common property resource management.
- There should be a focus on linkages including where to procure, how to manage production, and how to mobilize the community.
- Provisions under the Forest Rights Act, 2006, and Panchayat (Extension to Scheduled Areas) Act, 1996 should be utilized to encourage bamboo cultivation.
- There is a need to promote and nurture multi-stakeholder partnerships for scaling up production of bamboo as a large and viable farmer-centric activity.
- Manufacturing clusters should be developed at scale, with large-scale investments in providing common facilities and attendant infrastructure.

Technical session 4: A discussion of sustainable management of bamboo agroforestry systems through case studies and good practices

The session began with a presentation on the bamboo value chain in China by Dr. Agasty, where she outlined the following points:

- China has shown how major efficiency gains affecting both price and quality can be achieved. One aspect of China's strategy is to ensure that all parts of a bamboo plant are put to commercial or household use. As a result, a range of products are manufactured by industrial units down the entire value chain, thereby reducing both waste and costs.
- India needs to pay attention to value-chain integration. The following policy initiatives can help achieve this:
 - Making bamboo integral to the forest resources inventory as done in China. This helps in providing usable data and information for procurement of raw materials by industrial users.
 - Imposing restrictions on timber options with relatively poor resource-use efficiency when compared to bamboo.
 - Subsidies for smallholders to establish bamboo plantations, and discounted loans for companies and ecotourism projects.
 - Relaxation of the 18 percent goods and services tax on bamboo products so as to allow the industry to grow.
 - Bigger and more coordinated investments in research and development.

- Strong inter and intra-connections between key actors.
- Development of localized units or clusters for manufacturing bamboo products.

Dr. Agasty's presentation was followed by a presentation by Dr. S.A.R. Hashmi, Principal Scientist Retd., CSIR-AMPRI, MP, on a case study of the bamboo value chain from MP. Dr. Hashmi highlighted key issues that need to be addressed down the value chain:

- Bamboo needs proper treatment for ensuring a longer shelf life for its manufactured products. For this to happen, testing facilities and certification at appropriate stages becomes necessary for quality assurance. Growing species which lend themselves for end use is necessary.
- Collection of production data, availability of raw material, and market intelligence by a reputable agency is essential.
- Policymakers should address long-term needs and use of bamboo, current and short-term demand, and strategies for creating and expanding the demand for new and emerging sectors. One could consider the present scenario and plan for the next 10 to 20 years.
- Focused and strategically targeted research and development, spearheaded by government-owned institutions can take this forward. There should also be a focus on refurbishment technology.

Following the presentations, a lively panel discussion ensued that focused on business ideas to facilitate the growth of the industry. The panelists for this discussion were Mr. Shashank Gautam, Founder, Mianzi; Mr. Debopam Mukherjee, Founder and Director, Artison Agrotech, Devas; and Mr. Rahul Saxena, Founder and Director, Sustainable Options, Bhopal. The panel was chaired by Dr. Manmohan Yadav, Dean IIFM, Bhopal.

The ensuing discussion brought out the following recommendations:

- Scientific crop management and harvesting practices can contribute to the efficient use of what is grown. Planting of different species on a large scale across landscapes will lead to enhanced use-efficiency and cost-cutting. This can also enable small and medium-sized enterprises to use services available at common facility centers and encourage processing units present at various stages of the value chain.
- Establishing primary processing workshops closer to growers will save transportation costs.
- The ageing or maturing required for different products is different. This factor needs to be considered while building value-chain processes or transporting raw materials from one actor or level to another. A focus on design and management aspects along the value chain will also contribute to user efficiency.

The panel also suggested the following potential business ideas to facilitate growth of the industry:

- A biochar manufacturing model where JFMCs benefit from planting bamboo by selling raw materials to a company, such as, Sustainable Options. The company in turn uses this bamboo as biochar for energy generation. The JFMC does not incur any planting costs as that is covered by an investor who invests to get carbon credits from the bamboo plantations.
- Promotion of an industry around processed engineered bamboo board, which is 18 percent stronger than steel. The board can be used several ways, including construction, furniture, and so on. Even the waste or dust can be used for making sanitary napkins and diapers.
- It is important to identify potential areas, establish buyback agreements with farmers and motivate them to grow bamboo, which is the raw material for the industry developed by Artison Agrotech, for example.

Dr. Yadav summed up the discussions and concluded the session by once again highlighting the versatility of bamboo, the need to develop new application-oriented technologies, and promotion of entrepreneurship. He emphasized that to make bamboo's business case a success, it needs to be led by the market. But this will call for strengthening the role and participation of all stakeholders.

FIGURE 2 | Participants on Day 2 of the restoration policy dialogues



Source: WRI India

PLENARY SESSION: WAY FORWARD AND CALL TO ACTION

The plenary session was summarized by Mr. R Parasuram, Former Chief Secretary, GoMP, and Senior Fellow, WRI India; Dr. Ruchika Singh, Director, Sustainable Landscapes and Restoration Program, WRI India; Mr. Chittaranjan Tyagi, PCCF Development, Forest Department, GoMP; and Dr. Amitabh Pandey, Professor, IIFM. The following key points emerged as takeaways at the end of the two days of discussions and deliberations:

Multi-stakeholder environment and convergent action: Landscape restoration opens an opportunity to bring together key stakeholders with different roles and functions to create synergies for cooperation and action. A forum for discussing key barriers and solutions needs to be created with the government playing a leading role, helping with removal of institutional barriers, and encouraging adoption of novel approaches. The early success of the NBM, despite its limited resources, is a pointer to what convergent action can accomplish. Taking cognizance of creating synergies among relevant organizations, a detailed discussion took place between WRI India and EPCO. The two organizations agreed to jointly develop long-term projects and proposal ideas focusing on nature-based solutions like landscape restoration and sustainable agriculture, which can be posed to international climate finance avenues like the Green Climate Fund, as well as domestic climate finance avenues, such as Sovereign Green Bonds. In addition, stakeholders attending the dialogues decided to work on the development of joint proposals for climate-change mitigation and adaptation.

Institutional arrangements: In the aftermath of these dialogues, at the national level in April 2023, the Central Agroforestry Research Institute under the Indian Council for Agricultural Research was designated the nodal agency for providing technical support on promoting agroforestry. This is a welcome step at the national level and must be supplemented with the designation of a nodal department or agency for agroforestry within the government at the state level. Further, it is essential for the government to make strategic decisions on how to help with program design and funding and the kind of space it will create for players from civil society, multilateral agencies, and the private sector for upscaling the efforts for the restoration of ecosystems.

Public participation: Policy must account for public opinion or will. It is important, therefore, to build a supportive environment and build consensus among local communities, as well as establish participatory mechanisms and accessible forums for grievance redressal.

Robust data and metrics: Baseline studies and dynamic, online, easy-to-access documentation commissioned and managed by a government-designated nodal agency are essential, both in the scaling of landscape restoration and for promoting agroforestry and bamboo cultivation.

Value-chains and business models: A strong consensus emerged on building scalable value chains and business models. Indeed, for all stakeholders to be committed and linked in the long term, there needs to be a balance among ecological, social, and market forces. In MP, there are several business incubation centers, which can help with business opportunities.

Targeted research and development: Testing and carrying out experimentation on different species is beneficial to see what can drive long-term results. Similarly, with regard to promoting bamboo cultivation and the sector at large, the government should strengthen the human and financial resources of the NBM, which has done excellent work within the space it has been provided. Bamboo can also be grown in forest areas, and local communities can be involved in managing this resource.

Knowledge transfer and information sharing: There is a need to leverage the strengths of different institutions and imbibe lessons learned from different models, such as the TNAU model shared by Dr. Kanna or the Assam model shared by Dr. Ghosh. Further, organizations like EPCO can play a key role by lending their technical expertise, while resources can come from MGNREGS. Institutes like IIFM, which is an academic and management institution, can look at developing protocols for certification and standardization. Finally, knowledge transfer at the grass roots is imperative.

Capacity building of local community-based organizations: Different local-level institutions can contribute to implementing and scaling landscape restoration. There is a need to enhance their capacities so that they can be the key loci for restoration.

FIGURE 3 | Summing up the restoration policy dialogues spread over two days



Source: WRI India

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ABOUT WRI INDIA

World Resources Institute India is a research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.



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