



WRI INDIA

EXECUTIVE SUMMARY

RESTORING LANDSCAPES IN INDIA FOR CLIMATE AND COMMUNITIES

*Key Findings from Madhya
Pradesh's Sidhi District*

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FOREWORD

In its special report, *Climate Change and Land*, the Intergovernmental Panel on Climate Change spotlights the severe risks to humans, ecosystems, and species if the world fails to halt land degradation. If temperatures continue to rise, the damage to forests, agricultural productivity, food supply, and water sources could jeopardize the lives and livelihoods of millions of people. This will be tragic for countries like India where nearly 700 million people depend on forests and agriculture for their sustenance.

Investing in land restoration can be a spectacularly good investment, improving livelihoods, providing opportunities for agribusiness, fighting climate change, and making life better for all. India exemplifies this point.

This report could not have been better timed. *Restoring Landscapes in India for Climate and Communities: Key Findings from Madhya Pradesh's Sidhi District* provides rich information on planning and implementing landscape restoration. Its recommendations on inclusive, participatory, and equitable development provide guidance for other districts facing similar land scenarios.

Sidhi typifies the many resource-rich but financially poor districts in India. It is remote and highly exposed to climate change through droughts and other extreme weather events. It is also home to a large tribal and vulnerable

population. Measures to protect and regenerate forest and agricultural lands in Sidhi could have a multiplier effect on job creation, food security, freshwater availability, and on mitigating the adverse impacts of climate change.

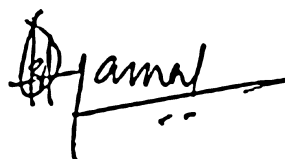
This report offers a roadmap for fulfilling Sidhi's potential and provides a scalable pathway for all of India. The report includes a *Restoration Opportunities Atlas* that identifies more than 140 million hectares that could be restored, benefiting people and biodiversity.

India has made significant commitments to the Bonn Challenge and the Paris Agreement. This report shows that these commitments are indeed achievable. With a robust policy framework in place, and proven success, India is now ready for coordinated landscape-level strategies between government departments, community-led businesses, and the private sector.

This report provides a roadmap for policymakers, civil society organizations, corporate leaders, impact investors, and development agencies to adopt landscape restoration approaches to help transform the rural economy. While the focus is on India, the approach applies in many countries. Smart landscape restoration can be a game-changer – in Sidhi, throughout India, and around the world.



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EXECUTIVE SUMMARY

More than 700 million people in India are currently dependent on forests and agriculture for sustenance. Landscape restoration can play an important role in securing their livelihoods and improving the productivity of land and forests. While past restoration work focused on site-level interventions, experience with planning and implementing programs using a landscape approach is limited. To address the gap, this report assesses an approach to integrated landscape restoration planning for the district of Sidhi in eastern Madhya Pradesh.

HIGHLIGHTS

- The Government of India has committed to a landscape approach to restoration under several international agreements and national targets. To achieve these targets, a first step is to identify the potential for restoration and estimate the environment and development benefits that could follow.
- This report adapts an interdisciplinary, iterative, and participatory process called Restoration Opportunities Assessment Methodology, used in 40 countries since 2014, to the Indian context and presents the results of a pilot assessment undertaken in the Sidhi district of Madhya Pradesh state.
- The assessment combines technological advancements in GIS and remote sensing; emerging global knowledge on restoration; and local knowledge, particularly around resource use, tenure, and rights to develop a strategy for accelerating restoration in the district.
- This assessment identifies eight tree-based interventions on more than 363,000 hectares. We estimate that implementation of landscape restoration in Sidhi could generate wage opportunities of 3.75 million person-days and result in INR 710 million (US\$10 million) in wage income over two years. Additionally, restoration could provide ecosystem benefits to residents such as secured access to fuelwood, fodder, and clean water, and improved food security.
- Recommended strategies for implementation focus on developing stakeholder-driven “accelerators” to address barriers in policy, knowledge, finance, technology, and markets and business development.

Background

Identifying restoration potential and the most suitable tree-based interventions in a landscape is a necessary first step to plan how these targets and commitments can be achieved. Landscape-based restoration recognizes the interactions between stakeholders and multiple land users by integrating them into a joint management process (GLF 2014). The landscape approach brings together actors who identify and implement practices to achieve an optimal balance of ecological, social, and economic benefits from forests and agricultural landscapes (GPFLR n.d.).

Why Focus on Sidhi District?

We chose to focus on Sidhi district because it is representative of the land use challenges and socioeconomic and environmental issues confronting other underdeveloped landscapes in India and around the world. Landscape restoration can improve local livelihoods in districts with few other opportunities. Another factor in our choice was the presence of local supporters to champion landscape restoration.

Sidhi is a remote district in eastern Madhya Pradesh in Central India that is highly vulnerable to climate change (Gosain et al. 2014). Much of the population is poor and economic opportunities are limited. Forests and agriculture are lifelines to Sidhi’s population, more than half of whom live below the poverty line. The majority of people work marginal landholdings of less than one hectare. The landholding pattern is skewed in favor of upper-caste households who own large and medium-size holdings with access to irrigation. Changes in forest cover and composition (from mixed forest to primarily teak plantations) have reduced the availability of fuelwood, fodder, and minor forest products. Loss of forest and tree cover and declining soil fertility threaten the flow of critical biodiversity services and the livelihood base of local communities, particularly women, tribal peoples, and other marginalized groups that are heavily dependent on forests, common land, and marginal land for their subsistence.

This assessment identifies the potential to increase forest and tree cover in different land uses, including forest and agriculture, in Sidhi district. It suggests a range of interventions including farmer-managed natural regeneration, mixed-species plantations, and agroforestry interventions like trees on boundaries and agri-horti-

forestry/wadi. The report seeks to demonstrate that landscape restoration, when implemented at scale, can conserve biodiversity, improve water recharge, sequester carbon, enhance rural livelihoods, and spur rural development. Landscape restoration can both improve the lives of Sidhi's population and contribute to achieving India's climate and sustainable development goals.

The Sidhi district is a microcosm of land use challenges and mirrors the socioeconomic and environmental issues faced in other underdeveloped landscapes in India, such as the districts in the Son river basin of Madhya Pradesh—Singrauli, Shahdol, Umaria, and Anuppur—or the districts identified by the National Institution for Transforming India (NITI) Aayog¹ for transformative change under the aspirational districts program.²

The *Restoration Opportunities Atlas*, developed by the World Resources Institute India (WRI India) shows nearly 140 million hectares with potential for forest protection and landscape restoration (Chaturvedi et al. 2018). States like Madhya Pradesh, Maharashtra, and Chhattisgarh have the best opportunity for establishing near-contiguous forests. Madhya Pradesh, Maharashtra, and Rajasthan have the best potential for mosaic restoration like agroforestry (WRI India 2018; Figure ES-1). The *Atlas* supports developing national and state pathways to meet India's

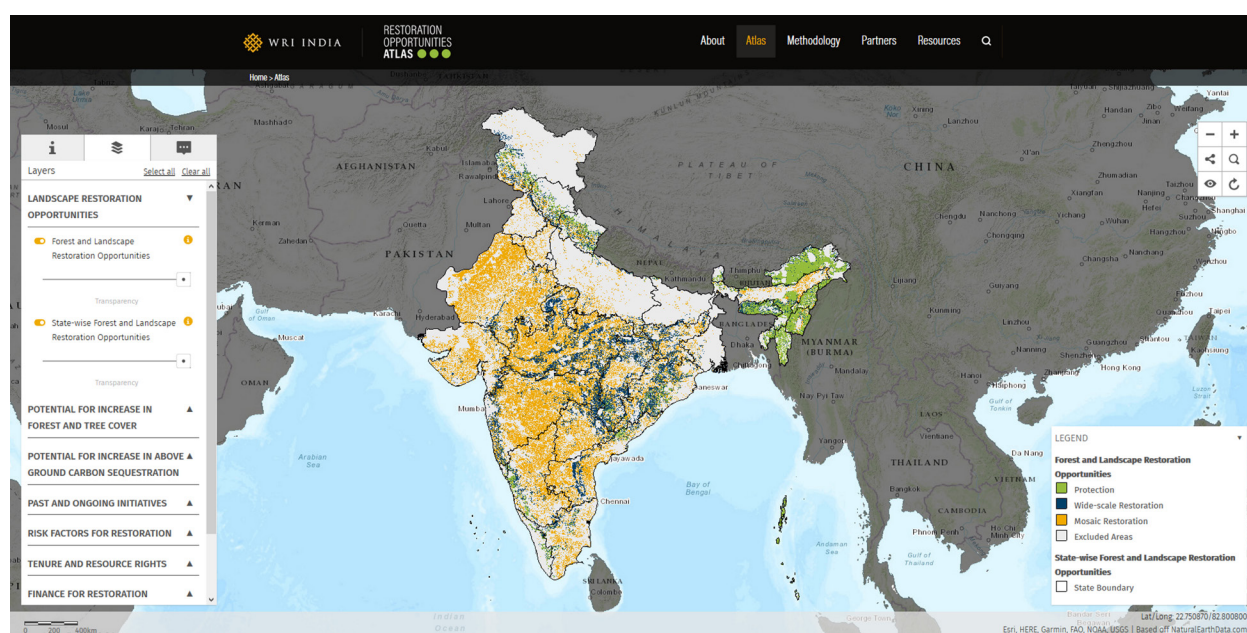
nationally determined contribution and Sustainable Development Goals targets. Findings from this report showcase a path forward to accelerate restoration implementation in Sidhi district. A similar path could be followed by other districts of India and similar landscapes globally.

The audience for this report includes subnational government agencies, such as the zilla panchayat³ (district council); state governments; state departments of forests, agriculture, rural development, and tribal development; financial institutions like the National Bank for Agriculture and Rural Development (NABARD); donor organizations; and civil society organizations involved in restoration decision-making or implementation. This report will also be of interest to researchers, media, and private sector entities involved in restoration.

Approach and Methodology

WRI India adapted the Restoration Opportunities Assessment Methodology (ROAM) developed by the International Union for the Conservation of Nature (IUCN) and WRI (IUCN and WRI 2014) to suit the local context in Sidhi district. We made four key additions to ROAM to underscore not only the environmental benefits of landscape restoration but also the development priorities that restoration can support.

Figure ES-1 | Landscape Restoration Opportunities in India



- A focus on multiple ecosystem services likely to be generated by landscape restoration and ways to manage the synergies and trade-offs between them.
- A livelihood analysis that identifies potential value chains and lays out the short, intermediate, and long-term benefits that could flow to communities.
- An enhanced focus on actors and networks to identify opportunities to build stronger networks of key actors and champions who can aid in implementing and scaling landscape restoration.
- Integration of systemic structural issues around land tenure, governance, gender, and social inclusion.

The Sidhi ROAM assessment was undertaken between October 2016 and September 2017. Participatory tools such as the Restoration Diagnostic card game, the Ecosystem Services Diagnostic, social landscape analysis using Net-Map, and Collect Earth-Based Mapathon supported the opportunity assessment.

WRI India led the assessment with support from local partners, including the Institute of Livelihood Research and Training of Bhopal, and the Centre for Environmental Law at World Wide Fund for Nature India (WWF-India). Locally elected leaders, district and sub-district officers of various government departments, such as forests, horticulture, watershed, as well as the program Madhya Pradesh State Rural Livelihoods Mission, farmers, farmer producer organizations, nongovernmental organizations (NGOs), and the Rewa district NABARD development officer participated in stakeholder consultations.

The Sidhi district assessment focused on six principal questions:

- **Restoration potential:** Where is restoration socially, economically, and ecologically feasible? What is the extent of restoration potential? Which restoration interventions are suitable?
- **Ecosystem services analysis:** What ecosystem services and benefits can be derived from the identified restoration interventions?

- **Policy, legal, and institutional analysis:** What enabling conditions are in place or missing to achieve landscape restoration?
- **Social landscape analysis:** Who are the actors that can facilitate implementing landscape restoration?
- **Livelihood analysis:** What livelihood benefits could flow from the identified restoration interventions?
- **Cost analysis:** What is the financial cost of implementing the identified restoration interventions?

Key Findings

More than 363,000 hectares in Sidhi have potential for restoration

The 363,000 hectares with potential for restoration account for 75 percent of the total area of Sidhi district. We identified eight landscape restoration interventions as suitable for the district: assisted natural regeneration, mixed-species plantations, bamboo plantations, farmer-managed natural regeneration, riverbank plantation, trees on boundaries, agri-horti-forestry (a system called *wadi*),⁴ and pastureland development (Figure ES-2).

There are several successful examples of landscape restoration activities in Sidhi that can be scaled up. For instance, communities restored more than 2,400 hectares of bamboo forests over four years in partnership with the forest department with a benefit sharing agreement. These bamboo forests continue being protected by the communities even though the project has ended and benefits have not been shared. Clarifying a benefit sharing mechanism and tenurial security aspects could enable scaling of these practices in other parts of Sidhi. Farmers in Sidhi are also experimenting with different models of integrating trees on farms. Successful regeneration models from other parts of Madhya Pradesh and India can also be adapted and introduced in Sidhi to implement the identified restoration potential.

Restoration will provide critical ecosystem services to communities

Realizing Sidhi's restoration potential will support a flow of ecosystem services and provide direct benefits to communities including enhanced food and energy security, biodiversity conservation, and water recharge (see Figure ES-2). Ecosystem services are central to the lives of nearly 90 percent of the district's population.

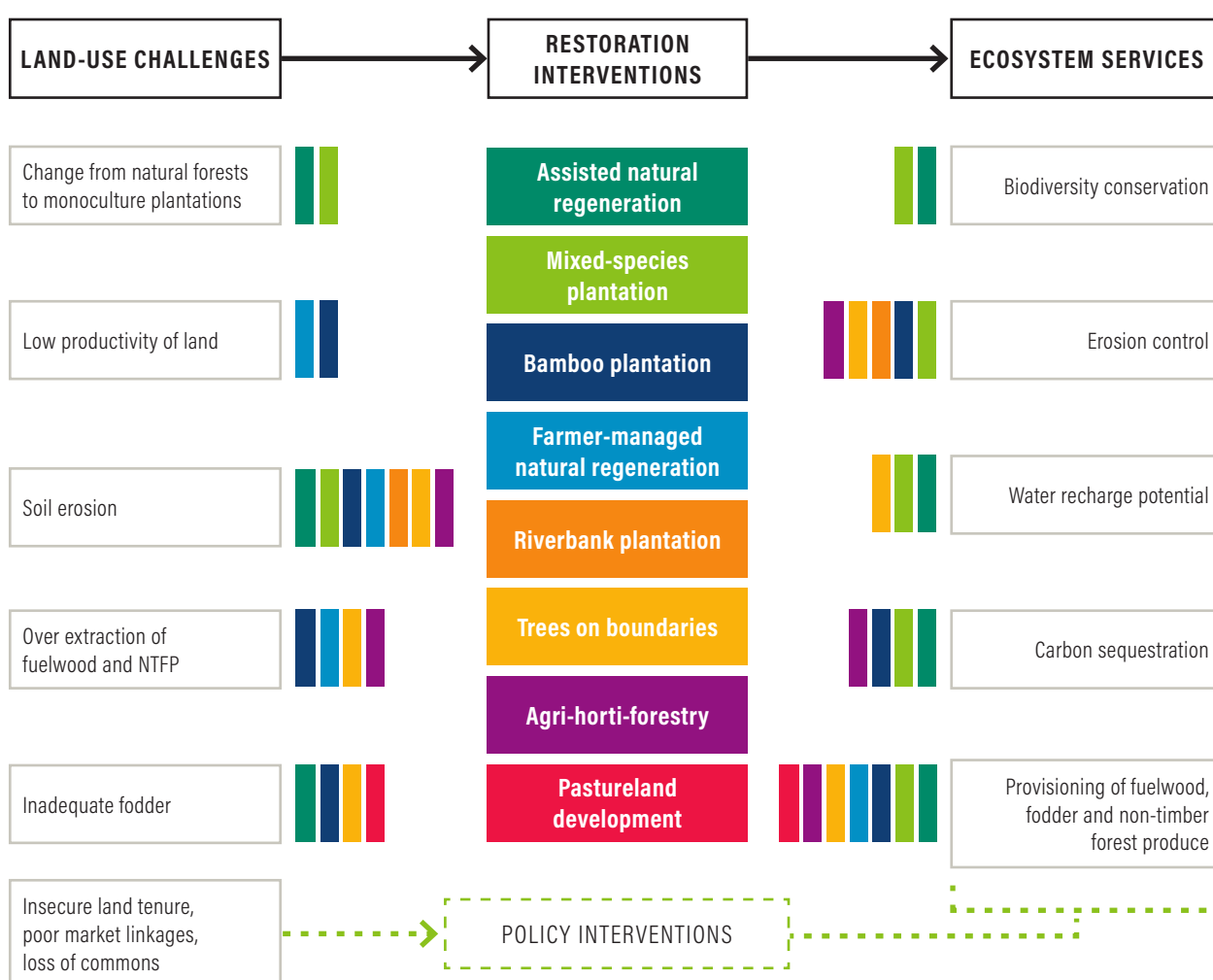
In addition to the physical restoration interventions, policy interventions will be needed to address insecure land tenure, poor market access, and loss of common resources such as trees that provide food, fuel, and other products.

It is estimated that restoration of Sidhi's forests could sequester more than 7 million metric tons of carbon over 10–20 years and increase forest carbon stock by 37 percent (FSI 2015), based on forest type and species planted.

Strengthening enabling conditions such as tenure and resource rights, institutional mechanisms, and market linkages will help realize the benefits of restoration

Local commitment to landscape restoration in the district can be seen in ongoing government initiatives and by the willingness to engage shown by farmers, champions, and local leaders. Laws,

Figure ES-2 | Land-Use Challenges, Restoration Interventions, and Ecosystem Services in Sidhi



Note: The colored bars in columns one and three correspond to the colors of the interventions and indicate which intervention can address which type of land-use challenge or support which ecosystem service.

Source: WRI India.

policies, and programs that can support restoration are in place but need strengthening and local actors and communities need to be more aware of them. For instance, agroforestry systems that support food security and livelihoods are core to implementing agroforestry (GoI 2014a) and could be popularized. Awareness of legislation and policies related to tenure and resource rights, for instance, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights Act 2006; GoI 2006) need strengthening.

Local knowledge and management practices have already enabled regeneration of degraded bamboo forests. Governance and management of these regenerated degraded bamboo forests could be strengthened by clarifying benefit sharing mechanisms and the underpinning tenurial security aspects. Several local institutions, such as self-help groups and farmer producer organizations, could potentially provide support and channel restoration benefits to communities. However, most of these groups are inactive because of the absence of sustained benefits and a lack of projects with definitive action plans that could bring local user groups together. Additionally, Sidhi has poor market access and lacks infrastructure, such as cold storage for produce, which is a barrier to developing value chains.

Local champions and actors on the periphery of the Sidhi's social landscape can steer landscape restoration

Our social network analysis indicates that the district's network of actors is large but lacking in diversity. The district collector, the divisional forest officer, and the president of the zilla panchayat emerged as critical actors to implement and scale landscape restoration in Sidhi. Dissemination of information, which is currently scattered and haphazard, might be done more quickly through local champions, given the reach of their social networks. At the state level, several key actors—including research institutions, financial institutions, NGOs, and the media—are at the periphery of Sidhi's network. Connecting them to core actors and to sources of finance, would create a cohort of stakeholders that could amplify successes and accelerate restoration.

Realizing Sidhi's restoration opportunity will generate additional employment for an estimated 30,000 persons and generate INR 710 million in wage income

Sidhi's livelihood analysis, undertaken by the Institute of Livelihood Research and Training, Bhopal indicates short-, medium-, and long-term benefits from implementation of landscape restoration. To achieve the full restoration potential, 39.5 million saplings would need to be planted, creating employment opportunities of 3.75 million person-days over two years. This would result in estimated wage income of INR 710 million (\$10 million) and revenue of an additional INR 592.3 million (\$8.46 million) from the sale of saplings.⁵ Over the medium and long terms (five to seven years), value chain interventions could lead to development of micro-enterprises around six tree species: aonla, bamboo, jackfruit, mahua, moringa, and palash. These micro-enterprises could generate informal jobs for 30,000 people, including women, unemployed youth, and landless people.

The cost of landscape restoration can be met by consolidating funding streams and collaboration among agencies

Multiple existing and potential sources of financing exist but the current flow of funds for restoration is fragmented and may prove suboptimal for achieving environmental and development outcomes. Many government departments are structured in ways that inhibit consolidation of financial resources. However, it is critical that agencies collaborate to agree on common landscape restoration plans and look for possible synergies and cofunding opportunities.

We estimate that the costs of implementing the identified landscape restoration interventions in Sidhi are between INR 4.4 billion (\$65 million) and INR 7.5 billion (\$111 million) over 3 to 10 years. The wide cost and time range is explained by factors including the type of land ownership, the implementation agency, the type of intervention, and the tree species planted. Costs could be met through a combination of public and private sources such as government budgetary allocations, multilateral and bilateral funding, commercial and development banks, and corporate social responsibility funds, as well as funds available from international climate finance sources such as the National Adaptation Fund for Climate Change.

Recommendations for Implementing Landscape Restoration in Sidhi

Our restoration opportunity assessment for Sidhi sets out a pathway but, to turn the assessment into action, we recommend a series of “accelerators” to bring together cohorts of actors who can catalyze successful implementation of landscape restoration.

Policy accelerators

Sidhi’s restoration potential will require collaboration among government departments, including those managing forests; horticulture, farmer welfare, agriculture, rural development, and water resources, as well as panchayats (village councils). Additionally, there is a need for greater convergence of existing programs, namely the Mahatma Gandhi National Rural Employment Guarantee Scheme, the Madhya Pradesh State Rural Livelihoods Mission, the National Bamboo Mission, and the National Agroforestry Mission. These programs could support the development of project pipelines and help overcome the barriers of poor market access and the lack of infrastructure that stymie the development of product chains.

Land tenure and resource rights must be clarified and secured. For instance, Sidhi has 42,000 hectares of deemed-undemarcated forest where survey and settlement requirements are incomplete. Additionally, the buffer zone of the Sanjay Dubri Tiger Reserve has been expanded, which has curtailed forest access and resource rights for local communities. Community rights over

forests and their resources have been recognized in legislation; however, the laws are not fully implemented in Sidhi. Clarification of tenure and resource rights would support implementation of the restoration interventions identified in this assessment. Policy accelerators in this area could target the forest, revenue, and tribal welfare departments of Madhya Pradesh.

Knowledge accelerators

Building local awareness and knowledge about laws, programs, and resource rights, strengthening network and peer-to-peer learning, and raising awareness of best practices from other parts of the state and country could foster implementation of landscape restoration in the district. The incentive for restoration is greater when tenurial rights and resources are clear, and local populations anticipate real livelihood benefits flowing from restoration activities. Thus increasing local knowledge about enabling policies, laws, and regulations; engaging local media in environmental reporting; and spreading best practices could provide a way forward for better management of resources by the local population.

Technology accelerators

Technology accelerators can build the technical capacities of farmers, user groups, and self-help groups in multiple aspects of landscape restoration, including tree nursery development, people-led restoration monitoring using state-of-the-art technological advances, landscape restoration techniques like farmer-managed natural regen-



eration. These accelerators should create a cohort of stakeholders who will build technical capacity to undertake restoration, strengthen mentoring and learning, and support the supply of high-quality planting material.

Market and business accelerators

Market and business accelerators can support development of value chains, address poor market access, and encourage the flow of restoration benefits to the local population. Many financial incentives for restoration depend on the development of markets for tree-based products. Value chains around the identified six tree species – aonla, bamboo, jackfruit, mahua, moringa, and palash— could be developed by nurturing micro-enterprises that trade, process, and retail products from these trees. There is potential to set up over 3,000 microenterprises, 65 cluster federations, and 5 farmer producer organizations in the district. Market accelerators could support these developments, but this report does not address the process of establishing revenue-generating models for local businesses.

If the restoration interventions identified in this assessment are implemented, they can strengthen the flow of ecosystem services and enhance the livelihoods of local communities, and particularly women, unemployed youth, landless people, and small and marginal landholders. Achieving these goals requires a strategic, collaborative plan of action along with a commitment to address issues of unclear tenure and resource rights, and poor market access. Continuing on a business-as-usual pathway is likely to leave the land and its people severely vulnerable to climate change impacts by mid-century. By contrast, investments in landscape restoration can put Sidhi on a development path that is inclusive and environmentally sustainable.⁶

ENDNOTES

1. The NITI Aayog (National Institution for Transforming India; aayog is Hindi for policy commission) is a policy think tank of the Government of India, established to achieve the Sustainable Development Goals and to enhance cooperative federalism by fostering the involvement of state governments of India in the economic policymaking process using a bottom-up approach.
2. The Transformation of Aspirational Districts Program aims to accelerate improvement to the socioeconomic indicators of 117 poorly developed districts across 28 states in India.
3. Panchayats are three-tier locally elected bodies at the district, block, and panchayat (cluster of villages) levels. Panchayats are the lowest tier of self-governance in India according to the Article 243G of the Panchayati Raj Act, 1992.
4. An agronomy practice that integrates fruit trees and timber trees with crops.
5. The exchange rate used to convert INR to \$ was INR 71.
6. Marginal farmers are those with landholdings below one hectare. Small-holder farmers hold one to two hectares and semi-medium farmers hold two to four hectares as per the Agricultural Census in India.

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ABOUT WRI INDIA

WRI 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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