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PRACTICE NOTE

Agrarian reform settlements in the Amazon: lessons learned to scale up restoration

Practice notes provide rapid analysis of experiences related to a particular project. The analysis and recommendations are limited to the specific context presented in the note and should not be construed to apply more broadly.

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HIGHLIGHTS

- The Amazon plays a key role in the restoration scenario, with great potential for natural regeneration.
 - Agrarian reform settlements show favorable conditions to drive restoration through techniques such as Assisted Natural Regeneration (ANR), as they encompass 15% of the areas covered by secondary vegetation in the biome.
 - This publication describes the planning, participatory knowledge building and implementation stages of restoration arrangements involving ANR and Agroforestry Systems (AFS) in five settlements in the state of Pará.
 - The integration of social, environmental and economic benefits and the strengthening of local organizations were important drivers of community engagement and adherence.
 - The accumulation of technical knowledge, combined with participatory planning, allowed for the structuring of an approach that is adjustable to the specificities of each settlement, enabling interventions with greater potential for autonomy and continuity.
 - Experience has shown that agrarian reform settlements are strategic to scale up restoration, although the restoration process requires adaptation to the specific historical, ecological, sociocultural and organizational context of each settlement.
 - In addition to local leaders and community organization, access to technical and material resources was essential to enable implementation, reiterating the importance of projects and policies that facilitate this access for small farmers in agrarian reform settlements.
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Executive summary

Context

Assisted Natural Regeneration (ANR) is a set of practices aimed at improving and accelerating the recovery of ecosystems (Chazdon et al., 2023).

To this end, techniques are employed to remove or reduce barriers to natural regeneration with minimal human intervention, such as the installation of fences or enrichment planting (Shono et al., 2020), positioning ANR as a promising solution for landscape and forest restoration at scale, especially in view of its low implementation cost.

Agrarian reform settlements, with significant presence in the Amazon, emerge as key components of restoration efforts in the region, both in terms of challenges faced and potential solution. These settlements concentrate about 15% of secondary vegetation areas mapped in the Amazon (Pinto et al., 2021; Guimarães et al., 2025), which highlights the strategic potential of these territories to boost natural regeneration through practices such as ANR.

To ensure the success of restoration initiatives that provide lasting benefits for both people and nature, the restoration process must incorporate social and economic aspects, with a participatory approach that addresses local motivations (Tedesco et al., 2023). With this focus, a partnership has been established between the project Promoting and Implementing Assisted Natural Regeneration in the States of Mato Grosso and Pará (*Promovendo e Implementando a Regeneração Natural Assistida no Mato Grosso e Pará*) and the Landless Workers' Movement (*Movimento dos Trabalhadores sem Terra - MST*), aiming to promote forest restoration in agrarian reform settlements. The project – jointly carried out by WRI Brasil, Instituto do Homem e Meio Ambiente da Amazônia (Imazon) and Instituto Centro de Vida (ICV), with support from Norway's International Climate and Forest Initiative (NICFI) – aims to restore degraded forests in the Brazilian Amazon through the implementation of ANR in selected municipalities in these states. Additionally, MST is already committed to planting 100 million

trees by 2030 and strengthening the production of healthy food in agrarian reform settlements and camps in Brazil, as established by the movement's National Plan to Plant Trees, Produce Healthy Food (*Plano Nacional Plantar Árvores, Produzir Alimentos Saudáveis*), launched in 2020.

With common objectives, the partnership is focused on promoting restoration in five settlements in the state of Pará (Figure ES1), adopting two approaches based on the specific conditions of each territory: Assisted Natural Regeneration (ANR) and Agroforestry Systems (AFS¹). These approaches, even when applied in different contexts, can complement each other in the promotion of social, economic and environmental benefits. The settlements already included several AFS areas before the beginning of the project, while natural regeneration (NR) areas, although numerous, lacked systematic ANR actions, such as enrichment with

Figure ES1 | **Location of the five settlements involved in the project**



Source: created by the authors.

native species, protection against external interference and management aimed at accelerating ecological succession. Thus, the settlements showed potential for expansion of productive agroforestry arrangements and dissemination of ANR, enhancing these areas with technical and material contributions — such as training, inputs and infrastructure (fences, nurseries, etc.) — generated by the project. The partnership prioritized the adoption of a participatory approach that promoted an efficient and sustained restoration process, incorporating local objectives and motivations and integrating national or subnational restoration goals with benefits for local actors.

About this practice note

This practice note describes the three steps undertaken under this partnership — planning, participatory knowledge building and implementation. It also presents the key success factors for restoration identified throughout the process, as well as lessons learned about the implementation process of the AFS-ANR approach. The initiative involved five agrarian reform settlements located in the state of Pará, in the municipalities of Belém, Santa Bárbara do Pará and Castanhal, in the Belém Metropolitan Mesoregion, and in the municipality of Irituia, in the Northeast Pará Mesoregion. The intention is to inspire other settlements and actors engaged in the restoration of landscapes and forests, contributing to the construction of viable paths adapted to the Amazon reality.

Throughout this publication, the term *AFS-ANR approach* is used to refer to the joint experience of implementing these two strategies in the five settlements studied, regardless of whether both have been applied in an integrated manner in the same area.

The results reflect practical experiences, challenges faced, and solutions built collectively in the selected settlements, thus reinforcing the importance of proposing restoration models that consider the social, economic, and environmental dynamics of each agrarian reform territory in the Amazon.

Implementation of the AFS-ANR approach

Data collection took place through participatory workshops with farmers, developed in accordance with the Pedagogy of Alternation², including technical visits, community meetings and practical activities, such as participatory mapping, field training and implementation of local structures (such as nurseries and AFS demonstration areas), in addition to the enrichment of AFS and ANR areas already existing in the territories.

Following data collection and systematization, the information was organized into three stages of implementation of the AFS-ANR approach in the five settlements: (i) restoration planning; (ii) participatory construction of knowledge on ANR and AFS and (iii) implementation of ANR and AFS areas.

In the planning stage, working in collaboration, the project's technical team and community members developed a supervised classification model to identify ANR and AFS areas within the settlements. For this purpose, a georeferenced database with land use and cover maps was created for each settlement. This material was subsequently validated through a field survey, conducted by a collective of young community members trained to collect georeferenced points with the support of drones.

The ANR and AFS knowledge construction stage was carried out through ten 3-day workshops held in two cycles. The first cycle addressed theoretical aspects, while the second discussed the construction of agroforestry arrangements and included a practical AFS implementation activity. The workshop program was built jointly with the settlers, which ensured the inclusion of their knowledge, experiences and demands. Easy access to the training spaces and adaptation to the families' daily activities were important to ensure participants' adherence. By understanding the principles of the ANR and AFS approaches, families were able to adapt them to their traditional cultivation practices, strengthening local ownership of restoration strategies. Following this stage, 147 families were engaged in the project.

The implementation stage oversaw the restructuring of five nurseries. The inclusion of these nurseries in the project, ensuring the supply of inputs to expand production, and the participation of farming families, were strategic contributions for the implementation of AFS and ANR. The identification of potential points for seed collection in the planning stage, as well as the work of an organized association or cooperative that legally represented the group and mediated access to financial resources, were essential factors that contributed to this stage. The project also provided in-depth training for nursery workers. The families involved in the project participated in the nurseries' activities through joint efforts, contributing to the production of 88,186 forest and fruit seedlings in the five settlements over a period of nine months.

A visit to the plots of 120 participating families, carried out 2 years after the beginning of the partnership, identified 114 AFS areas (253 hectares) and 62 ANR areas (99 hectares) supported by the project. Enrichment techniques were applied in these areas, contributing to the maintenance and expansion of restored areas. The extreme and atypical drought that occurred during the project hindered the implementation of new AFS and ANR areas, leading to a focus on the maintenance and enrichment of existing areas. The settlements adopted different strategies in the establishment of ANR areas, influenced by their territorial characteristics, including the distribution and size of plots and strategic areas, such as springs and water bodies.

Key factors in the AFS-ANR approach

The systematization of key factors was based on the Diagnostic Framework developed by Hanson et al. (2015), which proposes an analysis under three major themes: (i) Motivate – investigates what drives people to get involved in restoration; (ii) Facilitate – refers to the conditions of surrounding areas, enabling or hindering restoration (iii) Implement – refers to the practical resources required for the execution of actions.

Motivational factors for restoration include social, economic and environmental aspects and awareness of them, all of which were discussed in the workshops and participatory processes carried out in the planning stage. Restoration actions strengthen MST's culture and commitments, increase the commercialization of products resulting from the expansion of productive areas, and promote improvement in soil quality, protection of water resources and increased biodiversity, especially in settlements with a history of degradation.

Enabling conditions include social, market, ecological and political aspects. Social mobilization and community participation in the project's stages engaged people in the process and strengthened the organizational arrangements used to execute the actions, including the nurseries, which also played an important role in the supply of seedlings and inputs. Trade and value chain structures and the alignment of different policy guidelines committed to achieving restoration goals – such as the National Plan for Native Vegetation Recovery (Planaveg), the Native Vegetation Recovery Plan of the State of Pará (PRVN-PA) and MST's National Plan to Plant Trees and Produce Healthy Food – were also identified as enablers of restoration in the context of the partnership. Different ecological conditions in the settlements (greater or lesser availability of water, forest fragments and soil degradation) enable or hinder different restoration practices.

The factors that influence the implementation of restoration include the presence of committed local leaders, access to material, financial and technical resources and dissemination of results, publicly recognizing the efforts of the communities and sharing lessons learned with other territories.

Lessons learned

ANR proved to be a flexible technique that can be adapted to the settlements' different realities and contexts. Participatory processes at all stages strengthened community autonomy, with people playing a leading role in the planning and monitoring of areas undergoing restoration.

The workshops played a key role in knowledge building on ANR and AFS and community engagement. The application of the Pedagogy of Alternation, integrating theory and practice, generated benefits such as coordination of the families' daily routine with training activities, exchange of knowledge between technicians and the community, continuous adaptation of the methodology and alignment with the reality and dynamics of each settlement. Active listening in all processes was also crucial to adjust the approach and ensure greater effectiveness in execution and community engagement.

The strengthening of community movements, combined with local capacity building at all stages of the process, proved to be a promising path to ensure the continuity of restoration in the territories. The participation of young people in the planning stage showed that activities involving technological tools can be used strategically to engage this portion of the settlements' population in restoration initiatives.

The experience revealed climate adaptation challenges, as most of the plots suffered significant seedling losses due to the intense drought observed in recent years in the Amazon. Thus, future efforts should include monitoring of ecological aspects, and new projects should consider water availability to ensure the feasibility and sustainability of restoration processes.

The project has shown that, while the restoration process must be adapted to each agrarian reform settlement's historical, ecological, sociocultural and organizational context, these territories offer strategic opportunities for scaling up restoration, especially when pre-existing community goals, community engagement and technical and material contributions are integrated. The accumulation of technical knowledge, combined with participatory planning, allowed for the structuring of an approach that is adjustable to the specificities of each settlement, enabling interventions with greater potential for autonomy and continuity.

Conclusions and recommendations

The lessons learned from this experience reinforce the idea that restoration in agrarian reform settlements in the Amazon should be understood as a social and ecological process, in which collective mobilization, knowledge acquired through dialogue and local adaptation are as important as technical aspects. Accordingly, the following recommendations are provided to inform future initiatives:

- Strengthen local social organizations to support the implementation and continuity of restoration actions;
- Adapt methodologies, such as the AFS-ANR approach, to the context of each settlement;
- Integrate social, environmental and economic benefits to strengthen local engagement and outcomes over time;
- Develop participatory training processes to empower local leaders on restoration and enable greater integration with pre-existing community agendas;
- Create collectives to monitor areas, enhancing community involvement in the actions.

Considering the potential for large-scale restoration in the Amazon and broader ANR adoption, the alignment between a pre-existing MST plan, community engagement and technical and material contributions proved to be a powerful path to promote the adoption of techniques with local legitimacy.

Sustaining this initiative will require additional efforts to expand access to markets, attract financial resources and develop mechanisms that enable the advancement and continuity of actions over time. Therefore, monitoring the success of this initiative and understanding the factors that contributed to the continuity of the approach is essential to strengthen restoration in the long term, in environmental, social and economic terms.

Finally, this case contributed to the growing experience in the implementation of restoration practices in Brazil, reinforcing that agrarian reform settlements are part of this equation - especially in the Amazon, where they encompass 15% of the areas covered by secondary vegetation mapped in this biome, with high potential for natural regeneration.

Endnotes

1. Agroforestry Systems (AFS) are forms of land use that synergistically integrate trees, crops and/or livestock, promoting ecological and economic benefits. These systems increase biodiversity, improve soil conditions and contribute to agricultural resilience (Gonçalves et al., 2021).
2. This approach is characterized by integrating theory and practice, alternating learning spaces between the school environment and communities, promoting a continuous exchange of knowledge. Thus, technical knowledge is integrated with local experiences, making learning more relevant and applicable to the daily lives of the people involved (Gonçalves et al., 2024).

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About Imazon

Imazon is a nonprofit research institution founded in 1990 and headquartered in Belém, Pará. Its mission is to promote conservation and sustainable development in the Amazon through research, support for policymaking, broad dissemination of information and professional training. Since 2006, Imazon has held the qualification of a Civil Society Organization of Public Interest (Oscip), granted by the Brazilian Ministry of Justice. In 31 years of research in the Amazon, Imazon has published approximately 1,000 papers, about a third of which in international scientific journals, in addition to technical studies and strategic documents to support policymaking. For more information: www.imazon.org.br.

About MST

The Landless Rural Workers' Movement (MST) is an independent peasant social movement that unites and organizes rural workers and society to promote land reform and develop a project for the masses in Brazil. Present in 24 states, MST brings together approximately 450,000 families who have gained land tenure through collective struggle and organization.

The popular land reform project, which guides MST's actions, proposes a structural transformation of the Brazilian countryside. Its objective is to democratize access to land, oriented toward the production of healthy food, agricultural cooperation, food sovereignty and stewardship of natural resources - water, forests, seeds, biodiversity, minerals, among others. The movement also fosters the development of emancipated human relationships, enabling individuals who are capable of building new, solidarity-based relationships between rural and urban areas.

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