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The social engagement in the forest landscape restoration (FLR): An experience with Restoration Opportunity Assessment Methodology in Minas Gerais, Brazil

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Abstract

The Northern Gualaxo watershed in the Rio Doce basin in Minas Gerais State, Brazil, directly affected by the rupture of the mining tailings dam in 2015, among the actions to mitigation and compensation to reduce the impacts the Renova Foundation has applied the Restoration Opportunity Assessment Methodology (ROAM). ROAM is a toolbox that aims to support forest landscape restoration (FLR) planning process. The approach includes the engagement of local actors through discussions about motivation factors to join FLR efforts and the current situation of enabling conditions in the territory. All the analysis conducted under the ROAM application process had been validated by stakeholders and through these activities the governance local has strengthened. The results identified that income generation, water quality improvement and engagement were the three main motivational factors. From that, a spatial analysis identified the estimated areas that could support each of these factors that could support the establishment of the priorities in a land use planning process in the region. Also, based on the collective discussions the main identified gaps to implement FLR activities were the products commercialization, technical assistance, social engagement, and scalability. Based on this experience, strategies for solutions are being proposed and implemented in order to provide an enabling environment FLR agenda with a strong social engagement in the process.

Keywords: governance, forest landscape management

Introduction, scope and main objectives

There are about 2 billion hectares of degraded areas around the world. Coincidentally, 2 billion hectares is the area needed to be expanded by 2050 to achieve global demand for food and fiber, if the growing rates of productivity and population follow the standards of the last two decades. In this context, the restoration of landscapes and forests is the smartest, most efficient, and urgent way to supply fundamental needs to ensure human well-being. But global efforts are nothing more than the sum of actions that can only take place in local landscapes. The Northern Gualaxo watershed, in Minas Gerais, with an area of 143,000 hectares, is perhaps one of the most important Brazilian regions that could lead the restoration of its local landscape. Hit by the Fundão dam rupture in November 2015, the region suffered from the dumping of almost 45 million m³ of iron ore tailings, causing, in addition to irreparable immaterial damage, a profound change in the landscape.

To coordinate the reparation and compensation efforts was instituted in 2015, by determination of the Brazilian Public Ministry, the Renova Foundation, which is structured in 42 socioeconomic and socio-environmental programs. Several actions have been conducted since then, including support for agricultural productive restructuring and forest restoration at Permanent Preservation Areas (APP) and water recharge areas in the Doce watershed. The partnership of The Renova Foundation with WRI Brazil began in 2018 through the

“Landscape Renovation” Project, which also had the partnership of World Agroforestry – ICRAF and Ecological Farm. The idealization of the activities considered the demand for a socioeconomic and environmental restructure project of the affected properties through technologies that ensure income generation, sustainable production and environmental services.

Considering that the return of local economic activities combined with the generation of environmental services required an approach of sustainable landscapes and nature-based solutions, planning process started from an integrated vision, which considered the gaps and challenges faced by the landscape condition, as well as the potentialities generated by these conditions. For this, the Restoration Opportunities Assessment Methodology - ROAM was adopted, promoting the effective participation of key actors in meetings and workshops where issues associated with the theme of restoration, diagnostics, spatial analysis and scientific technical data were discussed. The results of these discussions supported decision-making processes for local communities’ well-being, based on technical information on the restoration.

The main objective of this work is to present the results of this dialogue process in partnership with the local community and how ROAM can be a good base for decision-making processes and restoration planning in other landscapes.

Methodology/approach

Through the interests convergence identification that can enhance the participation of people and institutions in the promotion of restoration, a set of activities was carried out intending to collect information and validate results, combining i) realization and analysis of focus groups, ii) conducting and analyzing personalized interviews and, iii) conducting workshops and meetings so that participants could list their contributions to the construction of one and long-term restoration strategy for the region.

In the methodology application preparation stage, were carried out the mapping and planning of the collection of existing and available spatial information for the development of spatial analyses of restoration opportunities in the Northern Gualaxo watershed.

The governance for the methodology application process was led by Renova foundation and WRI Brasil teams in partnership with World Agroforestry - ICRAF, with the objective of supporting and strengthening institutional relationship to leverage restoration, facilitating and mobilizing the local participation in the planning process and promoting a representative channel favorable to discussions and contributions. Thus, the activities in the Northern Gualaxo watershed started from the mapping of institutions and people who are operating and connected locally, with the capacity to articulate with families and rural communities, organizations involved in the Renova Foundation programs that focus on the region and committed to processes of formulation and implementation of policies and initiatives related to the theme. Considering the active sectors in the involved municipalities and functions and gender aspects, invitations were widely disseminated for a qualified participation.

A pragmatic element of ROAM is the identification of motivational convergences that could enhance community participation and governance over restoration, called "Motivational Factors for restoration". This activity was carried out in a workshop with local actors, using the wheel of monitoring (Picture 01) to identify the factors that could motivate landscape restoration in Northern Gualaxo watershed. The next step was the construction restoration opportunities map, which considered the selected motivational factors. The process of integrating motivational factors is done through the overlap of each theme separately (water, land use, income, engagement). The result of this operation shows for each pixel the factor(s) mapped with its respective attribute. Thus, where there is no overlap, only the motivational factor mapped to that class is identified and, where there are two or three overlaps, it is reported in which category such pixel was classified.



Picture 01. Monitoring Wheel used for identification of motivational factors. Source: Buckingham *et al*, 2019.

The next step is the identification of restoration typologies from the experiences that already occur in the territory. Options that consider the legal aspects, as well as their economic viability and social adequacy in the region, were also analyzed. After defining the typologies and evaluating the legal limitations, a cost-benefit analysis of some of these typologies was performed to define more efficiently, according to the established parameters, each suitable area in the landscape for each restoration type. The cost-benefit analysis considered the Expected Land Value (VET), which indicates the maximum land value that would allow the producer to have a positive cash flow if he needed to buy the land to invest in restoration. Finally, the map of restoration opportunities results from the intersection of these layers and represents a possible adequacy of land use at the landscape, which considers biophysical, legal and economic constraints.

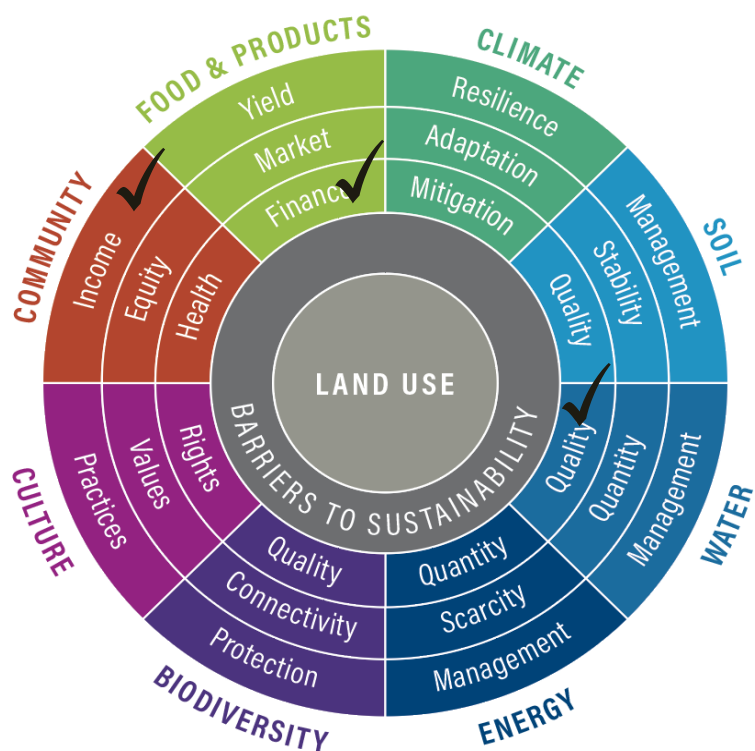
The last stage of mapping restoration opportunities considers another benefit: the carbon potential to be removed by each of the restoration typologies considered in the previous analysis. Thus, using the data collected during the application of ROAM and using Afolu Carbon Calculator (USAID, 2017), was estimated the potential of each of the typologies.

The contents generated under the project were organized in a publication entitled "Report of Restoration Opportunities in Northern Gualaxo watershed, Minas Gerais, Brazil". The document gathers content oriented to a wide public such as: decision makers interested in land use planning, researchers, teachers and rural extensionists, implementers of socio-environmental projects interested in technical resources and tools that support their actions, as well as associations and cooperatives of farmers and individual farmers who demand technical support for the development of sustainable production and forest restoration activities.

Results

Motivational Factors for Forest Restoration

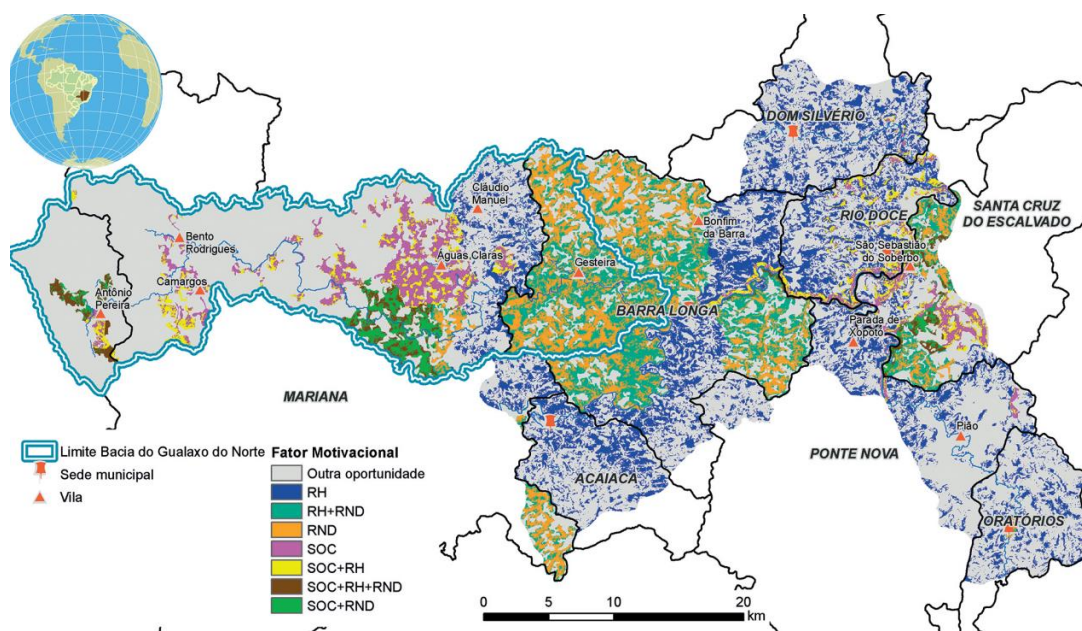
Based on contributions from stakeholders and following the guide to identify priorities and restoration monitoring indicators (Buckingham, K. et al. 2019), several factors were selected to motivate people to engage in restoration actions in the Northern Gualaxo watershed. At the workshop, the participants defined as main motivational factors: water resources (water quality), income generation and opportunity to strengthen community ties (social engagement) (Picture 02).



Picture 02. Result of the motivational factors to restoration in Northern Gualaxo watershed

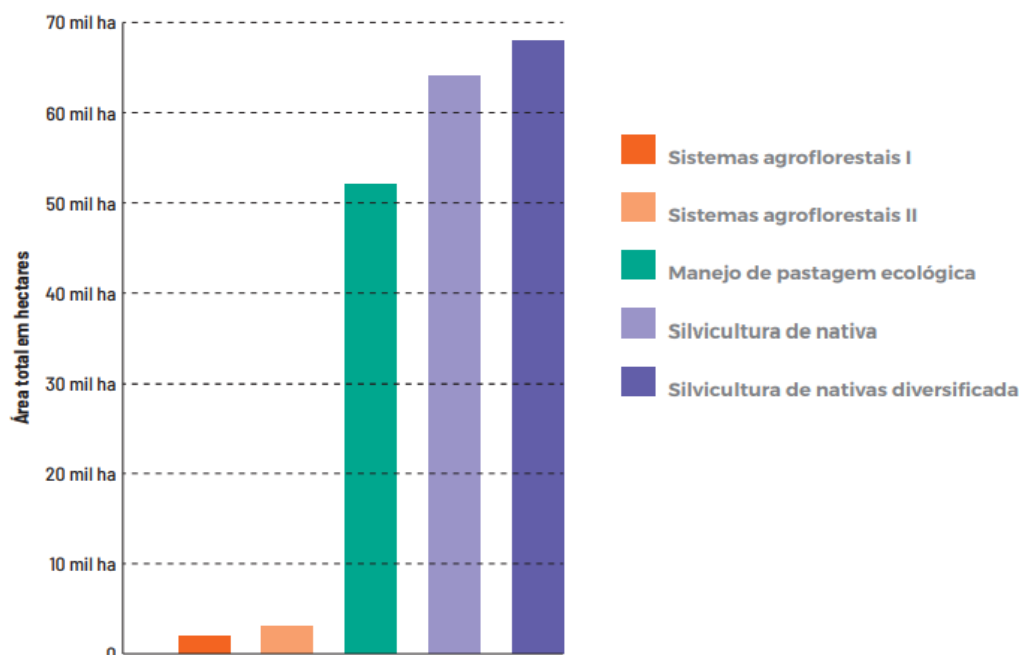
Mapping Restoration Opportunities

The mapping of restoration opportunities, after spatialization of the different layers of data, identified 1,685 hectares with potential to meet at the same time the three prioritized factors. The areas linked to the water resources factor, which represent 37% of the identified opportunities, include issues related to the potential for erosion and aquifer recharge, which represents 22,121 hectares of the basin. Restoration opportunities related to the motivational factor "income generation" total 12,206 hectares and "social engagement" represent 5,617 hectares. The location of the areas with greater water infiltration capacity, sediment production, as well as the areas of greatest poverty – where the increase in income is most impactful – and the cultural reference areas make up the full motivational factors map.



Picture 03. Integrated motivational factor map represented by the components: Water Resources (RH), Income Generation (RND) and Social Engagement (SOC) for the Northern Gualaxo watershed. Source: Renova Fundation, 2020.

The economic purpose restoration typologies defined for the study were agroforestry systems, native species silviculture with *Eremanthus incanus* (two types of arrangements: diverse and monoculture) and ecological pasture management. With the information of investment costs of each typology and the expected land value, spatial analyses indicated that native forestry is the type of restoration with economic purposes that presents greater extension as an opportunity for restoration in the Northern Gualaxo watershed, with about 67,000 hectares. The second most found typology is the restoration by ecological pasture management, with almost 57,000 hectares. Picture 04 illustrates the possible options for restoration implementation in the Northern Gualaxo watershed identified with the analyses.



Picture 04. Options for restoration implementation in the Northern Gualaxo watershed. Source: Renova Fundation, 2020.

As to the potential for carbon sequestration, the replacement of degraded pastures by these restoration methods can generate US\$ 4.16¹ million per year of added value distributed by 8 municipalities and reduce 281,200 tons of greenhouse gas emissions in the atmosphere, whose monetary values have not been estimated.

Discussion

Spatial analyses following exposed criteria indicate that Native Forestry is the typology that represents the largest opportunity for restoration in the Northern Gualaxo watershed, with about 67,000 hectares. It is important to highlight that the premises used to determine the typology focus on the supply side, assuming the existence of local conditions that are already being worked by several institutions working on the restoration agenda, with the objective of establishing and allowing the commercialization of products from the restored area. The study shows that opportunities exist, but it is of great importance that there are financial incentives for the proposed arrangements to be established.

The ROAM application aimed at understanding the motivations for promoting the restoration, as well as which institutions work on the subject. Observing the network and highlighting important connections is essential in this process of bringing answers about the reality of the Northern Gualaxo watershed that contribute to the construction of a larger and long-term restoration strategy.

The restoration of landscapes and forests is only justified and successful if the local community recognizes its relevance and, more than that, has motivations to lead and engage in this purpose. In the Northern Gualaxo watershed, communities have clearly expressed that restoration needs to increase water quantity and quality, increase income and, at the same time, promote social engagement. These are motivations that would make farmers and other decision makers engage in activities that lead to landscape restoration, starting with their own lands.

Based on the group discussions, the main gaps identified to implement the activities of the forest landscape restoration were the commercialization of forest products, technical assistance, social engagement, and scale gain capacity. The lack of rural technical assistance in the territory results in a low degree of dissemination and adoption of new or more sustainable technologies. Thus, restoration efforts should prioritize partnerships with technical assistance providers that have high capillarity and local knowledge about restoration options.

To advance over these gaps and achieve greater community involvement, the main mapped strategies were: integrate typologies that aim at income generation to farmers; capacity building at local institutions, mainly at cooperatives and others related with the young such as family-based farming schools; adopt women's oriented policies; facilitate access to financing funds or investments that support nature-based solutions.

Conclusions/ wider implications of findings

The ROAM application is a strategy that supports integrated restoration planning in a given landscape. By analyzing broadly, including biophysical, economic and social analyses, dialogued with the different local actors working in the territory, the approach supports the structuring of a restoration governance, where the gaps and challenges for strengthening the restoration chain are already identified, allowing the possible solutions and institutional arrangements necessary for a change in the form of production, the recovery of native

¹ October 29, 2021 - Quote (US\$1.00 = R\$5.65)

vegetation is already shared with stakeholders and local governments. The involvement of people from the territory in the planning of restoration activities is essential for medium to long-term success.

The promotion of restoration on the landscape scale should also involve cultural changes through the cherish of local production, not only of food products, but also of timber products that may eventually be produced commercially.

Finally, the creation of collaborative networks with people involved in the restoration can serve as a form of recruitment and training of community leaders, expanding the possibilities of establishing partnerships and consequent attraction of resources.

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