

# Forest Landscape Restoration in the indigenous territory of Caramuru-Paraguaçu



**The project's goal** is the ecological restoration of the indigenous territory of Caramuru-Paraguaçu with the Pataxó HãHãHãe community. Through a variety of project components, such as reforestation with agroforestry systems and Atlantic rain forest, the change to sustainable agricultural cultivation methods, the ecosystem functions of the natural area are restored. Thus, new income opportunities are created for the families involved, while existing income sources are made sustainable.

**AMAP** is a German-Brazilian environmental organization dedicated to the conservation of the Mata Atlântica, the Brazilian Atlantic Rain forest. The golden-headed lion tamarin is as a flagship species of the region, the symbol of our mission. AMAP promotes the conservation of the Mata Atlântica through land acquisition, reforestation, the support of research projects and biodiversity-friendly cocoa cultivation. The base of our activities in the region is the association's own farm "Bom Pastor" not far from the Almada River.

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## **Cooperation partner**

[Projeto Kaapora](#) (Olinda and Samuel Wanderley)

Dehevehe Sapuyá

Flavio Fernandes Barbosa

**AMAP will realize a forest restoration in three pilot projects with three indigenous families starting in 2024. The project will implement a number of components, such as the establishment of agroforestry systems, reforestation of Mata Atlântica and sustainable forms of agriculture. Ecosystem functions should be restored and an income for the families involved should be generated. Areas not needed for own livelihood will be restored as future Mata Atlântica forest. The overall goal of the project is to achieve a comprehensive Forest Landscape Restoration of the indigenous reserve Caramuru Paraguaçu. Therefore many more families of the community have to be convinced to participate in the project. In this context, the pilot projects have the function of flagship projects. The FLR-Project time frame is estimated at 40 years. During the first year, the planning of the pilot projects, the construction of the first infrastructure and the implementation of environmental assessments will take place.**

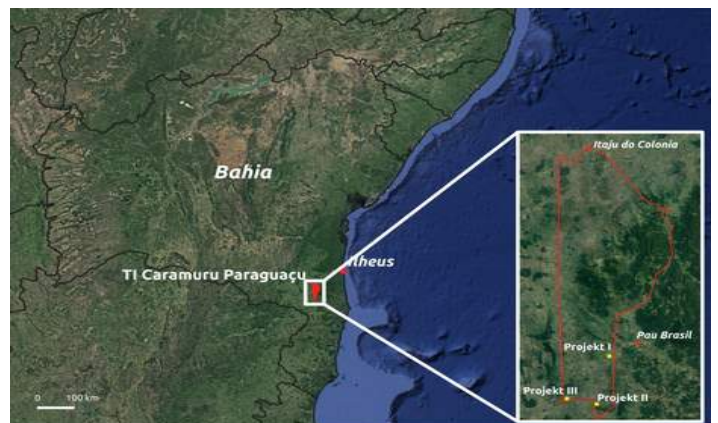
## I. Initial situation and background

The reserve of the indigenous community of the Pataxó HãHãHãe is located in the south of Bahia, in the Corredor Central of the Mata Atlântica, the Atlantic rain forest. It is bordered by the Rio Cachoeira to the north and the Rio Pardo to the south. The Mata Atlântica has shrunk to about 10% of its original area, due to increasing human impact, especially in the 20th century. (Ribeiro et al., 2009, 2011). Metropolitan areas such as Sao Paulo and Rio de Janeiro were founded on former Atlantic rain forest. But on the cocoa coast of southern Bahia the biodiversity could be preserved and the region represents still a hotspot of biodiversity (Myers et al. 2000; Shi et al., 2005). This is due to the circumstance of the unique cultivation method of cocoa, in a cabruca, a traditional form of agroforestry (Schroth & Harvey 2007; Schroth & Ruf, 2014).

In contrast to the Cocoa Coast of Bahia, the indigenous territory of Caramuru Paraguaçu, located only a few kilometers to the southwest, is characterized by dry soils with an almost treeless shrub vegetation. Responsible for the strong

change is the decades-long practiced cattle ranching. The Mata Atlântica was largely cleared and could only be preserved in remote hillside areas and the eastern region of the reserve, where cocoa was cultivated. Many years of cattle grazing resulted in increasing soil degradation, loss of nutrients, increased soil compaction and consequently decreased water holding capacity and increased soil erosion.

The reserve is 54,000 hectares in size and was granted to the displaced groups of the Pataxó HãHãHãe in the 1980s following a Supreme Court ruling. Subsequently, the descendants of seven groups of the Pataxó HãHãHãe settled in the reserve. This historical circumstance paints an untypical picture for Brazil, of a degraded and deforested indigenous territory. The indigenous people are well aware of this fact, but due to the lack of both knowledge and financial resources, small-scale farming structures, based on cattle farming, dominate the reserve. Former farms with cocoa cultivation in agroforestry are no longer managed due to a lack of expertise.



*The indigenous territory of Caramuru Paraguaçu is located in the state of Bahia, southwest of Ilheus. The three pilot projects are located in the south of the reserve.*

The role of indigenous territories in achieving the Paris climate change targets has been greatly underestimated (World Resources Institute & Climate Focus, 2022). In addition, the expansion of protected areas for biodiversity conservation (e.g. as Key Biodiversity Areas) by national governments has had little success, as the involvement of local communities, such as indigenous groups, has been lacking (Maxwell et al., 2020). Yet indigenous communities in particular are essential for forest conservation (Fa et al., 2021; Sze et al., 2022), including for the already heavily degraded Atlantic rain

forest (Benzeev et al., 2023). In particular, indigenous territories with secure land rights have significantly lower deforestation rates and higher reforestation rates than territories with uncertain legal status (Benzeev et al., 2023). For Brazil in particular, as a signatory of the Glasgow Leaders Declaration on Forest and Land Use (GDFLU fact sheet, 2022), engaging indigenous communities is essential to achieving the Paris climate goals (World Resources Institute & Climate Focus, 2022). This project in the Caramuru Paraguaçu Reserve addresses this issue and is based on the direct involvement of the indigenous community, starting with planning, followed by implementation and management of the land. The restoration process follows the IUCN and IUFRO concept of Forest Landscape Restoration (Maginnis and Jackson 2005; Stanturf et al. 2015), a key component of climate change mitigation and adaptation (Stanturf et al., 2015), which integrates the needs of the indigenous community as part of the natural environment into the process.

- Project components**
- Reforestation with agroforestry systems** for income generation and as a substitute for practiced cattle farming.
- Sustainable, organic agriculture** to replace conventional agriculture.
- Reforestation** of degraded areas with native tree species for the ecological restoration of the Mata Atlântica.
- Erosion control** through reforestation of at-risk areas, such as riverbanks and mountain slopes
- Participatory involvement of the stakeholders** in project design. An individual project plan is worked out with each family participating in the project (the local actor), which takes into account not only the environmental conditions but also the wishes and ideas of the families. The actors participate actively in the implementation and are empowered to carry out the management and cultivation of the land.

**Historical context of the stakeholders**

The indigenous territory of Caramuru Paraguaçu covers an area of 54,000 ha, extending over the borders of the three municipal districts of Pau Brasil, Itajú do Colônia and Camacã. The Pataxó HãHãHãe indigenous community is

heterogeneous and is composed of seven groups, including the Tupinambá, Sapuyá, Pataxó and Kamacan. These are only loosely connected with each other. The expression "Pataxó HãHãHãe" also means "community of the many". The traditional settlement area of the Pataxó HãHãHãe is the coastal region of Bahia.



*Dehevehe Sapuyá in portrait. The nurturing of the cultural identity of the Pataxó HãHãHãe is revived through the wearing of the traditional feather crown and the practice of indigenous dances, the Tohés. In the reservation's school, basic knowledge of the ancient tribal language is being taught again. This strengthens self-confidence and community cohesion.*

All groups were driven from their ancestral homelands and dispersed, in search of work, in Brazil, where they mostly worked as agricultural laborers on farms and cattle ranches. Fearing persecution, they mostly denied their indigenous roots. In 1926, the Pataxó HãHãHãe were assigned the reserve by the state because space was to be provided in the original settlement area for cocoa farmers and cattle ranchers, and little economic value was attached to the reserve area. Some groups then settled in the area of the reserve. However, almost 100 years passed before all legal titles were actually transferred to the indigenous community, as this land was also not free of ownership claims. Until that time, the area continued to be occupied by cattle ranchers and cocoa farmers. It was only after a Supreme Court ruling in 1980 and the cancellation of the last illegal land titles of cattle ranchers in 2012 that the process was finally completed. In the 1980s, the Pataxó HãHãHãe began to return to their land. This was not without conflict, and by 2012 there were violent confrontations with cattle ranchers and former ranch owners.

The indigenous territory of Caramuru-Paraguaçu has been extensively deforested by small scale cattle farming. This has greatly changed the landscape and the regional climate. There has been a transition from a tropical rainforest climate to an arid savanna climate. The landscape type can now be compared with the typical thornbush savanna of the Caatinga Biome located north of the Mata Atlântica.



Only on mountain slopes and in the very east of the indigenous territory forest fragments could be preserved. For many decades, cacao cultivation was practiced in the cabruca agroforestry system in the east of the reserve. The biodiversity of the Mata Atlântica could be preserved in these areas of the reserve. After the resettlement of the Pataxó HãHãHãe, this form of cultivation was no longer practiced due to lack of expertise.

## II Introduction of the stakeholders

### Project I

**Olinda** and **Samuel Wanderley** founded [Projeto Kaapora](#) in 2016 and have made it their life's work to restore and sustainably manage their land. The aim is to enable the return of the lost biodiversity of the Mata Atlântica.



*Olinda, whose indigenous name is Yawar Tupinamba, is a journalist and documentary filmmaker. She has been advocating for her people for many years and is president of the NGO Socioambiental Uruçu. Samuel is an anthropologist and came into contact with the Pataxó HãHãHãe community in 2002 through a project of the Universidade Federal da Bahia, (UFBA) and the FNMA (Fundo Nacional do Meio Ambiente). Since that time, he has been involved in the Pataxó HãHãHãe community for the enforcement of indigenous rights. He is the director of sustainable development at the indigenous NGO Uruçu.*

Olinda and Samuel believe that many families feel similarly and want to demonstrate to the community that alternative land use models that preserve biodiversity are economically viable. Therefore, the cattle ranching that is still practiced is to be gradually replaced by an agroforestry system. Since 2016, Olinda and Samuel have started to restore the first 1.2 hectares. 1200 native tree species, 600 cocoa trees and 300 other fruit-bearing tree seedlings have been planted. The reforestation technique consists of the initial construction of a border barrier, a "living fence" as erosion control and protection of free-roaming cattle. This is followed by the planting of fast-growing shade plants such as cassava and banana to suppress the growth of the dominant grass vegetation. In 2019, the indigenous community on the project area decided to establish the first environmental protection area, APA (Área de Proteção Ambiental) Kaapora, within Terra

Indígena. Currently, APA Kaapora covers the entire 27 hectares of the project area. The goals of the project are not limited to the restoration of their own land; the Kaapora project is intended to act as a flagship project for the entire community. Olinda and Samuel believe that indigenous roots and the idea of forest conservation are still present in the community and that many families just need to be shown possible alternatives to current agricultural practices. A second project goal is to make the farm to a location for environmental education, specifically for the indigenous community. A start has already been made in the last two years. A campground has been built, a covered outdoor kitchen and sanitary facilities have been created. Further expansion is planned in the coming years, so that school classes from the local indigenous school can be offered excursions to the biodiversity of the Mata Atlântica. In the future, the two initiators plan to endow Projeto Kaapora to the indigenous community.



*In 2016, Olinda and Samuel traded their land for this 28-hectare farm to start the Projeto Kaapora reforestation project. The farm is located at km 3.5 on the BA 270 and is characterized by decades of cattle farming. First plantings were already done in the last years around the small house.*

## Project II

**Dehevehe Sapuyá**, lives with his family in a small house not far from Pau Brasil, just behind the border of the reserve. Dehevehe is a math teacher at the reserve's indigenous school.



*Dehevehe Sapuyá lives with his wife Tati Barbosa, their three children and their first grandson near Pau Brasil, on the edge of the indigenous territory.*

His land is located in the extreme southeast of the indigenous territory on the Rio Pardo and is about 64 hectares in size. Here he wants to restore the biodiversity of the Mata Atlântica. Part of the land is to be planted with an agroforest system, part with native tree species. His land is degraded, the soil is heavily compacted and leached by cattle grazing. In his free time, he works on his land to make his vision a reality. He has already built a small house and laid a water pipe to the river. Now he is starting to fence in 7.5 hectares, the first agroforest is to be planted here.



*Dehevehe's land is an abandoned cattle pasture. Last year he built a small shelter to store materials. A water pipe to the nearby Rio Pardo has also been completed.*

The fence protects against the free-roaming cattle of the neighbors, so the first bushes will soon provide some shade. His vision is that one day his land will be restored with an agroforestry system that can generate a sufficient income for his family.

## Project III

**Flavio Fernandes Barbosa** runs a small farm on the Rio Pardo, the border river, in the very southwest of the reserve. The south is completely dominated by cattle breeding; there are hardly any forest fragments left here. Flavio came to the reserve in 1984, and he has been cultivating the farm for 12 years. Cultivation is not limited to annual crops for sale, vegetables, pumpkin and corn are also grown for home consumption. In addition, there are pigs and cattle, and a fish pond completes the stock. Flavio and his family can live off the farm's income.



*Flavio Fernandes Barbosa runs a small farm on the Rio Pardo, the southern border river of the reserve. Here he wants to establish an agroforestry system to substitute agriculture and cattle farming.*

In the future, however, Flavio would like to make the way he farms more sustainable. He has realized that the way of cattle farming deteriorates the soil fertility and reduces the water availability in the region, which has a negative impact on his agricultural yield. The plan is to replace 16 hectares previously planted with annual crops with an agroforest. Areas on the riverbank are to be reforested. In the long term, agroforestry could also substitute cattle ranching, thus restore ecologically degraded pastureland.

### III Realization

The project planning will take place in 2024. From 2024, the three-year pilot phase begins, during which the three pilot projects are implemented. The expansion phase of the project follows in 2027 after the pilot phase and aims to implement follow-up projects.

#### Forest Landscape Restoration (FLR)

Reducing forest loss and degradation was recognized by the Bonn Challenge and the New York Declaration on Forests as a key component of reducing carbon emissions and conserving biodiversity (Stanturf et al., 2015). In this context, reforestation was the most important tool to address CO<sub>2</sub> emissions through sequestration. These actions have been mostly small-scale and often aimed at restoring ecosystem conditions based on the past (Lamb et al. 2005). In contrast, FLR is a long-term and large-scale process to restore ecological functionality, explicitly considering human activities and requirements (Hanson et al., 2015).

FLR aims to improve ecosystem functionality through a variety of approaches within a landscape:

- Development of organic agriculture
- Development of agroforestry systems
- Reforestation of not used land
- Supporting the natural regeneration of existing forests and abandoned farmlands
- Protection of existing forest fragments
- Erosion control in at-risk areas
- Environmental education programs

FLR enables the restoration of ecosystem functions and services in a landscape, provides natural resources for local people, and contributes to climate change adaptation and mitigation. FLR can be described as a socio-ecological system that combines forest regeneration with local community adaptation. Successful forest ecosystem restoration must be designed and implemented with the participation of all relevant stakeholders.

#### 2024 – Project planning of the pilot projects

The already existing Projeto Kaapora, project I, will be assisted in setting up the infrastructure and logistics to realize its own goals and to enable the implementation of project II and III. A rural worker will be hired to assist in the maintenance of the already planted area. At the same time the planning of pilot projects II and III will start with environmental assessments.

#### Project I

In Project I, the expansion of the infrastructure is planned in order to be able to carry out the restoration activities of the three pilot projects from 2024 onward. Project I will be developed into a logistical base to supply the community's other projects with needed materials, such as seedlings, seeds and compost. Also, the required labor force will be hired by the Kaapora project. If possible, many work steps should be carried out by the stakeholders involved in the project themselves. However, this will often not be possible, especially in the initial phase of the projects, as all those involved in the project have to earn their living. Therefore, the labor needed to support the projects will be hired in order to be able to implement the projects within a reasonable period of time. Training in reforestation methodology and agroforestry systems will be provided in advance by a project partner. The first employee will be hired as early as the project starts and will be responsible for the maintenance of the already planted areas of the Projeto Kaapora and the reforestation will be continued in cooperation with Olinda and Samuel.

The following activities are planned:

- Purchase and construction of the greenhouse for growing and storing seedlings
- Construction of a rainwater collection and storage system
- Construction of a composting plant for the production of organic fertilizer
- Development of infrastructure for the accommodation of workers and environmental education
- Purchase and cultivation of seedlings

On the project area the fencing of the reforestation areas will be completed to protect it from cattle grazing. Here the reforestation of an agroforest system will start.

#### Project II und III

[Baoba Florestal](#), a company specialized in restoration activities will assess Project Area II

and III to determine the ecological condition and degree of degradation. Based on the expertise, appropriate restoration methods will be developed.

The assessment will include:

- Assessment of the degree of degradation of the project area.
- Identification of the causes of degradation
- Recording of edaphoclimatic conditions
- Survey of soil and climatic conditions
- Recording of the potential of natural regeneration
- Identification of vegetation in the project area and adjacent areas
- Preparation of appropriate maps of the project area
- Development of proposals for ecological restoration
- Estimation of the required manpower and equipment for the implementation of the measures

The results would be discussed with the stakeholders and based on that a development plan would be prepared.

### **2024-2027 - Pilot phase**

In the pilot phase, three restoration projects of three indigenous families will be implemented. The pilot projects act as flagship projects for the integration of other areas and stakeholders into the FLR-Project.

**Pilot Project I:** In the Kaapora project about 20 ha will be reforested with agroforest. The cultivation of seedlings for the own project and the two other pilot projects will begin.

**Pilot Project II:** Restoration of a degraded former cattle pasture. The first 7.5 hectares are expected to be reforested with an agroforestry system. Baoba Florestal will identify the optimal reforestation methodology, most suitable tree species and needed additional activities. The establishment of the agroforest will be supported by hired labor.

**Pilot project III:** On the smallholder farm, 16 hectares of agricultural land are being restored to an agroforestry system as a first step toward sustainable cultivation. The aim is to create a source of income that can replace cattle farming in the long term. Necessary seedlings will be grown in the Kaapora project. The reforestation methodology, tree species to be used and possible further activities will be determined by Baoba Florestal. The establishment of the agroforest will be supported by project workers, if necessary. The maintenance and management of the restored project areas will be carried out independently by the stakeholders.

### **Agroforestry-Systems**

#### Agroforestry

Agroforestry is a complex, multi-layered agricultural system with a forest-like structure. A land use system dominated by trees with two or more layers of trees or shrubs and a high degree of structural complexity within at least one of the layers. Agroforestry is a traditional form of tree crop cultivation in many parts of the humid and subhumid tropics and in some savanna areas (Schroth and Mota 2007).

Four basic types can be distinguished:

- Based on shade-tolerant crops such as cocoa, coffee, or tea, grown under a species-rich canopy of native and/or planted trees.
- Based on canopy crops such as rubber or durian grown under extensive management, allowing for the development of species-rich vegetation that forms most of the understory and intermixes with the crops.
- Mixed understory and canopy tree systems, such as forest gardens, where vegetation complexity is the result of a wide variety of planted species, often under intensive management.
- Disturbed natural forests that are locally supplemented with crops, but in which the original vegetation predominates.

Agroforestry systems are characterized by high levels of biodiversity, consisting of either cultivated species and varieties or native plant and animal species, or sometimes both. These traditional systems protect important ecosystem functions and are characterized by high resilience to environmental fluctuations.





*The elementary school of the indigenous territory of Caramuru Paraguaçu. For a long time, it was not possible for children to attend school outside the reservation due to hostility. Therefore, the indigenous people began to teach their children themselves. Later, the school was integrated into the public school system, but the teachers there still earn only a quarter of the regular salary. In the foreground is a traditional assembly area that is regularly used for cultural gatherings.*

## **Extension phase**

The FLR-Project is now to be continuously expanded to include further families so that a landscape-wide process of restoration can be carried out. At the moment it is not yet foreseeable how many families/stakeholders can be motivated to participate in the project. The stakeholders of the pilot projects, especially the Kaapora project, have aimed to actively motivate more families and people in the community to become part of the project. The pilot projects have a flagship function and serve as project examples for the substitution of cattle farming by agroforestry systems and sustainable agriculture. Within Projeto Kaapora, environmental education opportunities are being established through which the FLR-Project opportunities are communicated within the community.



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