

Environmental Improvement Awards Application

Award Category: **Mitigation**

Forest Restoration Program - SUAPE

1 – Summary

Population growth has made it necessary for man to increase his productivity, often at the expense of environmental quality, with interference in natural habitats.

The loss and fragmentation of natural habitats represents the extinction of several species of fauna and flora with changes in the dynamics of the forest remnants, which can cause an increase in the mortality rate of trees, formation of clearings within the fragments, microclimatic changes, and increased wind speed near the forest edges.

Especially in the last 30 years, man has been interfering in the Atlantic Forest biome to take advantage of its natural resources.

On the one hand, about 54% of the trees, 64% of the palm trees, 74% of the bromeliads, 40% of the mammals, butterflies, reptiles, amphibians, and birds and 80% of the primates existing in the Atlantic Forest biome are endemic, thus representing its high ecological importance. On the other hand, most animals and plants threatened with extinction in Brazil are species of this biome.

Historically, sugar cane and coffee plantations were largely responsible, in the Northeast Region, for the destruction of the Atlantic Forest. In the specific case of Pernambuco, sugar cane has taken on a large part of this burden; first to produce sugar and, more recently, to produce alcohol fuel, with only 144,000 hectares of Atlantic Forest remaining.

In the name of this same development, man begins to feel the need to reconcile productive areas with conservation areas to minimize the effects of environmental degradation.

In the 21st century economy, among the key components of any successful strategy is the internalization of socio-environmental sustainability in company management. Increasingly competitive companies will be those that, besides producing with quality, generate less environmental impact and contribute to the sharing of benefits and reduction of social inequalities.

In the Northeast, experiences of programs of this type are scarce. In Pernambuco, the Governador Eraldo Gueiros Port Industrial Complex - SUAPE intends to be in the vanguard by implementing an audacious Forest Restoration Project in its territory.

The Complex covers an area of approximately 13,500 hectares, subdivided into port, industrial, administrative, and ecological preservation zones. The SUAPE Ecological Preservation Zone covers a range of complex ecosystems such as mangroves, restingas, humid forests and tablelands, devoting approximately 59% of its territory to environmental preservation. This scenario is mixed with industries, farms, subsistence crops, and large sugar cane plantations, among others.

The organized effort to conserve natural resources, as an anchor for sustainable production, represents a current demand by society, and one that will only tend to increase in the future, and it is in this respect that SUAPE has implemented its forest restoration project in the SUAPE Ecological Preservation Zone.

2 - Goals and Objectives

- Objectives

The macro-objective of the Forest Restoration Project is to gradually rebuild the forest in the Ecological Preservation Zone of the SUAPE Complex, recovering its biodiversity, ecological function and sustainability over time and aiming at a macro planning of the territory to promote the formation of ecological corridors with the neighboring Conservation Units.

- Goals

In 2011, the SUAPE Company became a signatory to the Atlantic Forest Restoration Pact. The Pact goal is to restore 15 million hectares of forest by 2050, distributed in annual plans approved by its Coordination Council.

Specifically, for the SUAPE Ecological Preservation Zone, the target is to restore at least 4,348 hectares of Atlantic Forest located there.

3- Discussion

Background

According to the UN, the degradation of terrestrial and marine ecosystems compromises the well-being of 3.2 billion people and costs about 10% of all annual global income in lost species and ecosystem services. Key ecosystems that provide numerous services essential to food and agriculture, including freshwater supply, protection from hazards, and habitat provision for species such as fish and pollinators, are declining rapidly.

Ecosystem restoration is critical to achieving the United Nations Sustainable Development Goals (SDGs), particularly those on climate change, poverty eradication, food security, as well as water and biodiversity conservation.

Thus, the United Nations General Assembly declared the period 2021- 2030 as the "UN Decade of Ecosystem Restoration." These restoration actions can remove up to 26 gigatons of greenhouse gases from the atmosphere.

Thus, always seeking to contribute to the targets set by the UN Sustainable Development Goals, the SUAPE Industrial Port Complex has invested more and more resources to expand its environmental and social actions, becoming one of the most important frameworks of environmental assets in the Northeast and one of the largest in Brazil.

The SUAPE Industrial Port Complex is one of the largest development projects in Brazil, offering opportunities in various sectors, attracting investments, and generating income for the state and for Brazil. SUAPE, which is 40 km from Recife, is interconnected to more than 160 ports on all continents and is the most strategic public port in the Northeast, because 90% of the region's GDP is found within a radius of 800 km from the port, making it a concentrating port and a distributor of cargo not only for the Northeast but also for the North of the country.

Incorporating a port-industry concept, the SUAPE Complex came into being as a public institution in 1978 through State Law No. 7,763, which created the SUAPE - Port Industrial Complex company, designated to lead the implementation of the industrial district, the development of the works and the exploration of the port activities. Through an agreement signed on April 9, 1992, by authorization of the Federal Government, the port is administered

by the state-owned company called SUAPE – Governador Eraldo Gueiros Port and Industrial Complex, linked to the Pernambuco Department of Economic Development.

SUAPE, with an area of 13,500 hectares, divided into Port, Industrial, Administrative and Services, Ecological Preservation and Cultural Preservation Zones, SUAPE earmarks 59% of its entire territory for the practice of preservation activities, protection, and control of natural resources, located in the zone called Ecological Preservation Zone. Since 2010, SUAPE has been carrying out forest restoration projects in the Ecological Preservation Zone, covering the mangrove, restinga and dense ombrophilous forest ecosystems.

The environmental adaptation of the Ecological Preservation Zone basically corresponds to the establishment of strategies and actions that result in the conservation, management and restoration of its area and the protection of remnants of native vegetation, in accordance with the limits established by the SUAPE Master Plan.

It is also justified in some situations that, due to the characteristics of the environment, such as areas of corridors interconnecting fragments, areas of shallow soil with low agricultural aptitude and others, should also be recovered with native vegetation.

SUAPE has six State Conservation Units in its territory, a veritable mosaic of protected areas, four of which are in the Full Protection category and two in the Sustainable Use category.

The first to be created was the SUAPE State Natural Park, by Decree 6,727/80, with 1,608.66 hectares. Today, most of its area is included in the Bita and Utinga Ecological Station, created in 2012, with 2,467.10 hectares, both of which are fully protected.

In this same management category, there are two other State Parks: Mata do Zumbi with 292.40 hectares and Mata de Duas Lagoas with 140.30 hectares, created in 1987 and recategorized in 2011, all four Atlantic Forest Conservation Units.

The other two of sustainable use, are: The Estuarine Environmental Preservation Area of the Jaboatão and Pirapama Rivers, created in 1986 with 1,284.5 hectares, and the Area of Relevant Ecological Interest Ipojuca-Mererepe, created in 2014 with 1,488.81 hectares, both for the conservation of the mangrove ecosystem. In the latter two, a small part of their areas is outside the lands of the SUAPE Company.

Not yet created, but already with studies, diagnostics, category proposition, and with the creation process in progress, SUAPE will have two more Conservation Units in its territory, one in the Tiriri Mill and another in the Martins Island Mill.

Besides these units that have already been mentioned, for protecting terrestrial ecosystems, SUAPE is investing resources to prepare a study for creating another Conservation Unit, this time for protecting aquatic ecosystems, the Estuarine Environmental Preservation Area.

SUAPE, with its forest restoration project, aims to promote the interconnection between the Conservation Units for the formation of ecological corridors, thus amplifying the benefits arising from this practice.

Depending on the characteristics of the existing situations, different restoration systems can be adopted, including the possibility of one system encompassing the others over time, to potentiate the forest restoration of the referred situation, which is the major objective of all these actions.

Thus, the following general strategies can be adopted:

- Inducing and Conducting Natural Regeneration

Natural regeneration" is understood as the occurrence of juvenile individuals of native shrub and tree species. This strategy is used in areas with a lower level of disturbance, where the ecological processes are still active and able to maintain the condition of self-recovery of the area, provided that the degradation factors are identified and stopped.

A native seed bank is the seed stock that exists in the soil of the site to be restored. Certain degradation processes can eliminate the forest without destroying the germination potential of the species that are stored as seeds in the topsoil, and some species can remain in this condition for decades. Through appropriate management of this soil, the germination of the seeds stored there can be induced.

In the process of forest succession, the species that make up the seed bank are mainly those from the initial stages of succession, which remain in the soil waiting for some disturbance, resulting from changes in environmental characteristics (light, temperature, and humidity), to then germinate and occupy the area.

This situation can be considered the simplest to restore, since its effectiveness consists only in isolating the disturbance factors and in adopting subsequent and sequential management actions to enhance the self-recovery of these areas.

Among the actions planned for this strategy are control of competitors, fertilization of regenerating individuals and control of predators (leaf-cutting ants, among others).

The conduction of natural regeneration is an important method of restoration of native vegetation because of its low cost, by ensuring a contribution of species diversity in the area to be restructured and by preserving the regional genetic heritage.

An action that has resulted in improved development of natural regeneration is the mulching of the regenerant, decided based on technical parameters. Thus, the regeneration should be treated as if it were a planting of seedlings, but at a much lower cost since it was not necessary to produce the seedling and perform the planting.

- **Densification:**

Densification is used in situations where the occurrence of native tree species from the initial stages of succession has been verified. This occurrence can be in the form of clusters of remnant or regenerating individuals, or even from the presence of seed banks of native species, which can be induced and used in the recovery. The densification/enrichment action consists in filling the gaps not naturally occupied by natural regeneration, representing the increase in density of natural regeneration aiming for a more homogeneous filling of the area. Generally, species that have already expressed themselves in natural regeneration are used, or even other species earlier in the succession that contribute to the total and rapid occupation of the area under forest restoration. In all cases of densification/enrichment, both the individuals present in the area, from natural regeneration, and the planting are conducted through fertilization and control of competing species (grasses and lianas).

- **Enrichment:**

This method is used in areas with an intermediate stage of degradation, in situations where the area to be recovered is already occupied with remnant vegetation, but with low species diversity. This situation may have been generated by: a) areas of remaining native vegetation that were historically subjected to intense processes of selective extractivism; b) areas with frequent disturbance events, which end up favoring some species and eliminating others, such as periodic recurrence of fire, cattle grazing, etc. ; c) abandoned agricultural or pasture areas, close to disturbed forest fragments, in which the expression of low diversity natural regeneration is observed; d) reforestation with native species, but whose method has favored the use of low diversity of species, not guaranteeing the sustainability of the

area. In general, all these situations culminate in the formation of homogenous forests, with a predominance of a few species, almost always at the beginning of the succession that, if not enriched naturally or artificially, will return to the degraded condition, because they are not sustainable. The introduction of new species in these areas (enrichment) can favor the reestablishment of ecological processes and, therefore, their perpetuation. This introduction of new species can be done by planting seedlings, direct seeding, introducing an alien seed bank, or transplanting seedlings.

Enrichment can be carried out through seedlings and/or seeds, although the methodology for direct seeding is still under development. Enrichment by direct seeding in savannah formations is not recommended, given the particularities of the dynamics of this formation, where there is a high formation of regenerating individuals.

- Total planting:

In total planting, species are combined in modules or planting groups, aiming the implementation of species from the final stages of succession (late secondary and climax) together with species from the initial stages of succession (pioneers and early secondary). This practice composes successional units that result in a gradual replacement of species of different ecological groups in time, characterizing the succession process.

This system is normally used in areas where the original forest formation has been replaced by some highly technified agricultural activity, thus compromising the expression of the local self-recovery potential. In this system, forest species should be introduced, and this is done with native species that occur regionally. The species should be combined according to their successional characteristics, so that the initial species promote the rapid occupation of the area, changing the environmental characteristics, creating the necessary conditions for the establishment of the final species. The latter gradually occupy the place left by the initial species in the senescence process. Each method described above considers a series of parameters that determine its use.

Objectives and methodology

The specific objective is the execution of the Forest Restoration Program in SUAPE's Ecological Preservation Zone, monitoring the progress of environmental recovery and the stage of natural regeneration in areas of Atlantic Forest, environmental compensation of the Port of SUAPE, and to size the interventions to be carried out in maintenance work in these areas.

The proposed methodology takes into consideration firstly the survey of the reforestation areas, with the same being georeferenced, with its perimeter located on the cartographic base of the region's hydrography. The geographic coordinates of the water courses and eventual associated environmental liabilities will be registered, thus starting the elaboration of the Executive Project for Flora Recomposition.

This project will be a guiding document for the re-composition activities, where the most appropriate methods and techniques for the areas will be described, considering the peculiarities of the different areas and the degree of degradation.

The definition of the restoration strategies will always seek the highest efficiency and will prioritize methods and techniques that can accelerate the restitution of the ecological succession dynamics.

In addition, the monitoring reports on the forest development of the environmental compensations made in the Atlantic Forest resulting from the implementation of the Port of SUAPE will be carried out. Knowledge of the situation of the areas in recovery will provide the subsidy for decision-making regarding the silvicultural interventions required to achieve full development of the flora in the areas under the SUAPE Port domain.

How the project fulfills the Award Criteria:

1. The level and nature of benefits to environmental quality, beautification, or community involvement

The process of Reforestation comprises the re-establishment of an ecosystem that has been degraded or destroyed, bringing an improvement in environmental quality to the site, with the goal of bringing diversity, restoring its ecological function and sustainability over time.

To amplify the benefits brought by reforestation, ecological corridors should be prioritized through the interconnection of forest fragments and conservation units, thus promoting the connection between different areas, with the goal of providing the displacement of animals, seed dispersal and increased vegetation cover. Thus, the ecological corridors will make it possible to reconcile SUAPE's port and industrial development, seeking to circumvent the consequences of habitat fragmentation and thus connect them in such a way as to provide the flow of biodiversity in space.

With the restitution of the region's ecosystems, which are known for their diversity of fauna and flora, it is also possible to restore income-generating activities for the population living near these protected areas, by obtaining fruit for

marketing the famous sweets and liqueurs of the SUAPE region, as well as obtaining feed for livestock, among other benefits that contribute to increased income generation for the population.

2. The level of independence involvement and effort by the port

SUAPE, together with the Northeast Environmental Research Center (CEPAN), the Federal Rural University of Pernambuco (UFRPE), the Luiz de Queiroz College of Agriculture (ESALQ/USP) and DBF Planning and Consulting, drew up a diagnosis of the use and occupation of the Ecological Preservation Zone, which resulted in the Forest Restoration Project for this Zone, a document that guides the recovery projects of the native vegetation and flora of the Atlantic Forest. The Ecological Preservation Zone, in turn, was established in accordance with Article 13 of Decree No. 37,160 of September 23, 2011, which established the Master Plan - SUAPE 2030 and provides for the land management of the Company SUAPE - Governador Eraldo Gueiros Port and Industrial Complex.

All the forest restoration is carried out with seedlings produced at the SUAPE Forestry Nursery, so that there is effective control over the type and quality of the seedlings. The SUAPE Nursery has the capacity to produce about 450,000 seedlings per year and to maintain 700,000 seedlings of Atlantic Forest species and has a list of 125 endemic species approved for use in reforestation projects and is currently actively producing 78 of these species. This is also evidence of the commitment and relevance that SUAPE gives to this project since everything is done in-house.

In addition, the SUAPE Complex created in 2015 the Directorate of Environment and Sustainability, always thinking of prioritizing the development of environmental actions and projects, namely the Forest Restoration Project of the Ecological Preservation Zone. Thus, this directorate presents a multidisciplinary technical staff, specialized in environment, promoting socio-environmental actions and environmental control, meeting the demands of social responsibility, meeting the requirements of environmental agencies and the demands of internal conservationist initiatives.

Thus, within the scope of the Forest Restoration project, SUAPE's main environmental actions and assets are the maintenance and Preservation of Native Forest Areas (remnants of the

Atlantic Forest Biome); implementation of forest restoration processes; protection of genetic heritage (biodiversity); production of 450,000 seedlings and maintenance of 700,000 seedlings in stock; implementation of barbed wire fences around the perimeter of the restoration areas to protect from degradation processes; patrimonial vigilance to curb

environmental damage; placing informative signs for environmental preservation with legal information, among other actions.

3. The creativity of the solution or programs

The forest restoration project can be given in many ways. This particularization of forest restoration actions ensures that the potential for self-recovery of these areas, defined by current and historical use and by the characteristics of the local landscape (surroundings) will be properly used, reducing costs and increasing the possibility of success of the restoration actions.

In this context, SUAPE has prioritized reforestation actions in a creative way, focusing on the territory's potential for self-recovery, to allow natural recovery processes to be triggered and conducted.

The fact that the project considers natural recovery and continues to promote this type of technique ends up bringing an innovative aspect within what is objectively a forest restoration project, in that, preferably, natural recovery always ends up being the first option.

Thus, it is possible that at least part of the native vegetation is reestablished from actions of induction and conduction of its own potential for self-recovery. This has as a consequence not only the reduction of environmental adaptation costs, but also a greater guarantee of success of these actions.

Another point of relative importance is the project, albeit embryonic, to enter the market of marketing the "green credit" thanks to the carbon sequestration performed by the consolidated forests through the forest restoration project.

In addition, as previously mentioned, in the case of planting, the SUAPE Complex produces all its seedlings for this purpose in its own Forest Nursery. And, seeking increasingly less polluting alternatives SUAPE has allied the production of Atlantic Forest native seedlings to the generation of clean and sustainable electric power, in the Forest Nursery's physical installations, showing the commitment of the Public Company in implementing environmentally correct and sustainable actions. Because it is clean, abundant, renewable energy, with quick and easy installation, it stands out for producing self-sustainable electrical energy and, above all, for fully preserving the environment for future generations SUAPE installed a photovoltaic system of distributed energy generation.

4. Whether the project or program results are apparent

It can be stated that SUAPE has successfully applied techniques and strategies for the restoration of the Atlantic Forest since 2010, besides seeking to re-establish the ecological functions of the environments according to their peculiarities. To date, the Port has implemented more than a thousand hectares of restoration of the Atlantic Forest biome, covering the mangrove, restinga and dense ombrophilous forest ecosystems.

SUAPE is currently continuing to implement new restoration areas, with ambitious targets for reforestation of a further 261 hectares in 2021 and carrying out maintenance activities on more than 945 ha, in order to ensure the development of the seedlings planted so that they reach forest status and are considered ecologically recovered areas.

5. The cost effectiveness of the program

SUAPE's investment in the Forest Restoration project was R\$40,000.00, with invaluable gains in maintaining the balance of the region's ecosystems, with great importance in combating climate change, sequestering CO₂, maintaining fertile soils, and cleaning the air, among others.

Thus, in addition to all these direct benefits to the natural ecosystems, also contribute to potentiate and form an economic base that allows the population to be sustained by the environmental services that these regions provide to humans, such as the fomentation of the economy by the sale of regional products (such as the sweets, liqueurs, and handicrafts famous in the region) and by the increase in ecological tourism that ends up generating income for various economic sectors in the region.

6. The transferability of the technology or idea to the port industry

This project is fully replicable and necessary in other Ports with retro-areas in processes of vegetation cover degradation.

The success of its replication will depend exclusively on the level of effort and commitment dedicated by the human resources assigned to the project, in the essential axes of

- Planning of the region of the territory to be reforested;
- Interconnection of fragments of forest areas to foster the creation of ecological corridors;
- Prioritization of natural reforestation processes;
- Production of endemic seedlings for planting;

- Monitoring and maintenance of the reforestation process.

These are some of the factors that, if successfully implemented as they were in SUAPE, will aggregate multiple benefits for the environment, society and the economy of the region affected by the project.