

SUMMARY

The purpose of this plan was to define mitigation and adaptation strategies against climate change of approximately 50 km of beaches and 860 hectares of land and thus promote adaptation processes that reduce vulnerabilities and promote the resilience of socio-ecological systems in the coastal area of the departments of Sucre and Córdoba (Gulf of Morrosquillo), area close to indigenous communities such as the Zenúes. Coastal erosion is considered one of the problems with the greatest impact on both indigenous communities and marine ecosystems in Sucre, about 20 km of beaches have been lost in the Gulf of Morrosquillo thanks to erosion mainly due to human causes. The urban, industrial, residential, tourist, aquaculture, road and port infrastructure that was built in the coastal beach-dune system, generated various impacts, from the alteration of a part of its structure, to its total loss. Constructions are obstacles that interrupt or divert the flow of water and sediment, which modifies the sedimentary balance. The decrease in the availability of sediment and the interruption of natural transport between the coastal dunes and the beach favors processes of erosion and retreat of the coastline. Through this plan that had a duration of 3 years, we encouraged the protection and planting of coastal vegetation of 50 km of beach impacting about 860 hectares of the Zenú indigenous territory; that benefits 400 families by enabling their resilience to climate change. protecting the dunes that constitute natural deposits of beach sands. At the same time we created an education plan for institutions on the main causes of erosion and other effects of climate change in indigenous communities of the coast through informative, promotional and testimonial talks, we created educational projects for the transfer of good practices where a work team composed of science teachers, biologists, employees of the municipal administration and experienced fishermen. We also assess the conservation status of the species that are victims of this effect, and thus record their populations on the biodiversity conservation red lists. We have the support of the Zenú indigenous community.

Introduction

In Colombia, about 1400 km of coastline have been lost in recent years due to human causes which are based on the destruction of coastal dunes and extractions of beach sand to carry out construction projects which are supported by the national government which has authorized this type of actions as commercial activities, affecting not only marine-coastal ecosystems but also indigenous populations and their infrastructures. The NATIONAL University, the Zenú community and our corporation formed a work team to coordinate multilateral and multifunctional conservation projects to stop the advance of this type of activities which gradually affect local populations preventing their survival.

The Gulf of Morrosquillo has an approximate length of 50 km and its naturally protected areas that are composed of approximately 860 hectares of mangroves and dry forests were tools that allowed us to carry out conservation studies to marine, coastal and terrestrial ecosystems, which facilitate ecosystem connectivity. They are geographically delimited

territories that, in addition to ensuring the protection of biodiversity and scenic beauty, allow the development of 400 families of local indigenous communities from the different ecosystem services they provide, such as producing oxygen, filtering water, CO2 capture, soil and nutrient retention, pollination, as well as the provision of resources ranging from food to construction materials and medicines. In addition, these areas are of great economic importance, as they allow the maintenance of livelihoods, the production of food and handicrafts, fishing and tourism.

In recent years the Gulf of Morrosquillo has lost about 40% of beaches thanks to erosion and the destruction of dunes for the installation of commercial establishments and both public and private constructions, this has caused much of the coastal area to lack vegetation cover as canavalea -rosea making the area unstable and thus producing the deterioration of the natural deposits of sand that act as a retaining wall towards the loss of beaches.

In this sense, the Agreement of mitigation and resilience actions against climate

change Gulf of Morrosquillo AEG-GM was presented, where as a corporation we seek to ensure the preservation of maritime, coastal and terrestrial ecosystems for the benefit of the indigenous families that inhabit it, which subsist on what is produced by crops, fishing and other resources delivered by nature but that in recent years has been affected by human activity. The study area includes from the mouths of jars to the island of San Bernardo, in this area protected nature reserves such as the Sanguare nature reserve, mangrove ecosystem, lagoon ciénaga la caimanera and macaw mouth are included. This plan was designed based on the Ecosystem-Based Adaptation approach, promoting the sustainable management, conservation and restoration of coastal-marine ecosystems to facilitate communities such as the Zenúes to adapt to the adverse effects of erosion in order to allow an increase in their resilience, reduction of their vulnerability and continue to subsist on the resources produced by nature.

In view of the impact that climate change has had on the development of daily activities in

Zenúes communities, our organization seeks to



address this problem by creating mitigation strategies, adaptation and educational programs for their subsistence, as well as for species that are in danger due to environmental problems.

- 1.Support and facilitate decision-making for adaptation to climate change in the territory of the Gulf of Morrosquillo, to contribute to reducing the vulnerability of socio-environmental conservation objects, human populations and coastal-marine ecosystems.

- 2.Raise awareness of the relationship between climate, ecosystems, human well-being and affected species in a context of climate change.

3. Impact 40 Km of beaches



4. Propose measures that encourage adaptation and mitigation based on ecosystems that can be implemented by the various users of the territory, which lead to an increase in socio-ecosystem resilience, better governance schemes and sustainable management of natural resources.

5. Design and have dissemination material that incorporates the corporate image of prevention, with messages alluding to participation and protection, with a strong emphasis on social participation.

6. Create an instance for a coordination and dissemination meeting with municipal officials.

7. Create an instance for a coordination and dissemination meeting with leaders and representatives of peasant communities, Zenú

communities, Afro communities, forestry



companies, among others.

8. Regulate the progress of the project and measure the impact for decision making focused on the improvement of results.

ELABORATION PROCESS

The development of the AEG-GM involved around 36 months of work, involving 54 participations from the academic, private, governmental and community sectors. Its



construction developed from three stages

Stage 1: Community workshops and visits to national protection areas, Formation of the working group, Definition of the sector, Climate analysis, Identification of threats, risks and impacts and Vulnerability assessment.

Stage 2: Construction and prioritization of measures, Monitoring indicators, means of verification and investment portfolio



Stage 3: Implementation of the measures proposed by the agreement in which participants from the ecoceanos corporation, the national university and personnel of the administration of the municipality of Tolú and Coveñas and the government of Sucre were involved.

Stage 4: Validation of adaptation measure and presentation of the AEG-GM Meetings with Advisory Councils of the ANP,

Preparation of final document and lessons learned.

Stage 5: Analysis of results based on the impacts that the proposed measures influenced the preservation of the study and impact areas.

Stage 6: Creation of an instance to determine the evolution of the benefits obtained by the indigenous communities with which the developed project was carried out.

Proposed adaptation measures and activities designed by AEG-GM to deal with erosion of the Gulf of Morrosquillo.

- Conservation education strategy, aimed at all sectors for the reduction of pressure factors in the face of climate change, mainly erosion
- Promote integrated coastal management as a barrier to the increase in the intensity and frequency of storms and hurricanes.
- Strengthen the link between institutions for comprehensive care in the face of erosive effects.
- Implementation of tourism activities with low ecological impact

- Identification of dunes that present a state of environmental degradation and that require a restoration process.
- Restoration by increasing the vegetation cover that can be combined with the installation of a palisade to decrease the wind speed, it is recommended that the fixing of dunes be limited to the primary dunes, which is dominated by waves and tides (astronomical and storm), and is carried out mostly with barriers of branches or native grass.
- Restoration of vegetation cover: Canavalia rosea and Ipomoea pes-caprae because they are easy to germinate, grow with dense foliage relatively quickly and are dune formers.
- Sediment balance estimation: There are several methods for determining the annual net sedimentary balance in an area, such as monitoring the position of the coastline using satellite imagery, volumetric analysis, and numerical measurement or modeling of transport rates.
- Imagery monitoring consists of comparing satellite images from different years, in which the

coastline is usually identified between the frontal dune and the suprabeam.

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