

SUMMARY

In this plan we will propose strategies for the conservation and sustainable management of 1200 hectares of mangrove forest and the repopulation and enrichment of 570 hectares on the Caribbean coast of Colombia, specifically in threatened areas of the department of Córdoba, in the municipality of Moñitos. This region is under stress due to the influence of threats of anthropic origin in the area: Deforestation for agricultural and livestock activities; and climate change.

Currently, the Zenú indigenous community that coexist in these ecosystems have shown interest in implementing conservation strategies and healthy productive practices with the environment, for which, the ECOCEANOS Corporation, together with representatives of the indigenous community, formulate this as a starting point in the mangrove conservation agenda. In this plan, we propose educational activities and conservation programs. The proposed afforestation and reforestation processes would be with 3 species in danger of extinction: *Avicennia germinan* (mangle de humo), *Rhizophora mangle* (mangle rojo) and *Laguncularia racemosa* (mangle bobo).

The results obtained from this project contain extensive information and contribute significantly to the necessary changes in the environmental culture of populations that for several generations have exploited the mangrove and its resources without clear awareness of the need, of its replacement for its sustainability and for the very life of all the biodiversity present in said ecosystem.

1. INTRODUCTION

The coast of Córdoba is located between 09°26' N and 75°42' W in Coveñas and 08°54' N and 76°26' W in Punta Arboletes. The hydrography and hydrodynamics of the department, especially the coastal area, have undergone significant alterations as a result of changes in the position of the Sinú River delta in the last 300 years, which has favored the colonization of the estuarine area with mangrove forests. The department has a subhumid climate, with temperatures above 27°C and an average annual rainfall of 1,425 mm/year. The economy of the coastal zone is based on extensive agriculture and livestock, the use of hydrobiological resources, the shrimp industry, mangrove exploitation and tourism.

When we talk about coasts, we have the case of the beaches of Moñitos that are located 78 kilometers from the city of Montería, capital of the department of Córdoba and in its geography dominates the Bahía Rada and the Golfo de Morrosquillo. The beaches of Moñitos over the

years have been affected by the illegal logging of mangroves, resulting in rapid erosion of the beaches and increasing tide. Due to their high capacity to absorb and store organic and inorganic nutrients, mangroves support a complex ecosystem of species of all taxonomic levels, from microorganisms to species of mammals, insects, reptiles, amphibians, birds, crustaceans and fish.

The value of the mangrove not only lies in the goods that are obtained from it, but it is also a social and cultural reference of the communities around which their life, their sense of belonging and their identity have been articulated.

It is a source of income for the inhabitants of the indigenous community of Moñitos, where they can obtain daily sustenance through fishing and selling fish, crustaceans, mollusks, forest products, such as: ranch rods, coal, etc. They also use the mangrove as a medicinal source. In some cases it gets the energy and fuel as firewood for cooking and smoking.

Other products that can be obtained from the mangrove, but that in Colombia little is practiced are the preparation of cooking oil, vinegar, fermented beverages, bark seasonings, honey, wood for furniture, glues, gums, dyes and tools for fishing such as pots and buoys.

In Colombia, mangroves are disappearing due to indiscriminate use of agrochemicals, oil spills, garbage dumps, and sand extractions by the indigenous community.

The coastal and marine region of Moñitos is recognized nationally for its biological and cultural wealth, its intense fishing and aquaculture activity, its potential for nautical development, and unfortunately, also for its complex ecological and social problems, where, the disorganized and indiscriminate use of coastal marine resources, mainly due to the prevailing disorder due to not complying with forestry or fishing regulations, nor environmental, causes the use of techniques and gear, such as fishing and mangrove extraction, which impact the ecosystem and are reducing the fishing, timber and tourism potential of the region. The

management plan "COMMUNITY RESTORATION PLAN OF THE MANGROVE IN THE BEACH OF MOÑITOS, COLOMBIA." aims to ensure that all beneficiaries of mangrove products can receive the products derived from it to meet their needs in a rational way.

The management plan will be constituted as a base document that serves the environmental authorities of Córdoba as a guide for decision-making when issuing a criterion on the mangrove resource in a certain area or when damage to the ecosystem occurs and sanctions or compensation measures have to be imposed.

2. METHODOLOGY

The Plan: "COMMUNITY PLAN FOR THE RESTORATION OF MANGROVE FORESTS IN MOÑITOS, COLOMBIA.", was built from the selection, evaluation and analysis of three components, which together offered the necessary arguments to identify and prioritize areas with restoration potential (Convertino et al., 2013; Edwards, 2010; INVEMAR, 2013a).

The components evaluated were:

2.1. State:

This component allowed to make a diagnosis of the ecological integrity and health of each of the areas evaluated, based on the selection and qualification by ecosystem of indicators of key attributes that represented the categories landscape context (dominant environmental regimes and processes), condition (biotic and abiotic interactions) and size. According to the state of these categories (poor, regular, good, very good) the marine-coastal areas in need of restoration were identified by department.

2.2. Problems and Threats:

With this component, the causes of anthropic and natural origin that alter the composition, structure and function of marine-coastal ecosystems were identified. Based on the adaptation of the Integrated Relevant Criteria method (Buroz, 1994), the Restoration Potential (PR) was calculated for each area analyzed to establish the feasibility of mitigating or removing

the causes of degradation and loss from the implementation of restoration activities.

2.3. Ecosystem Services:

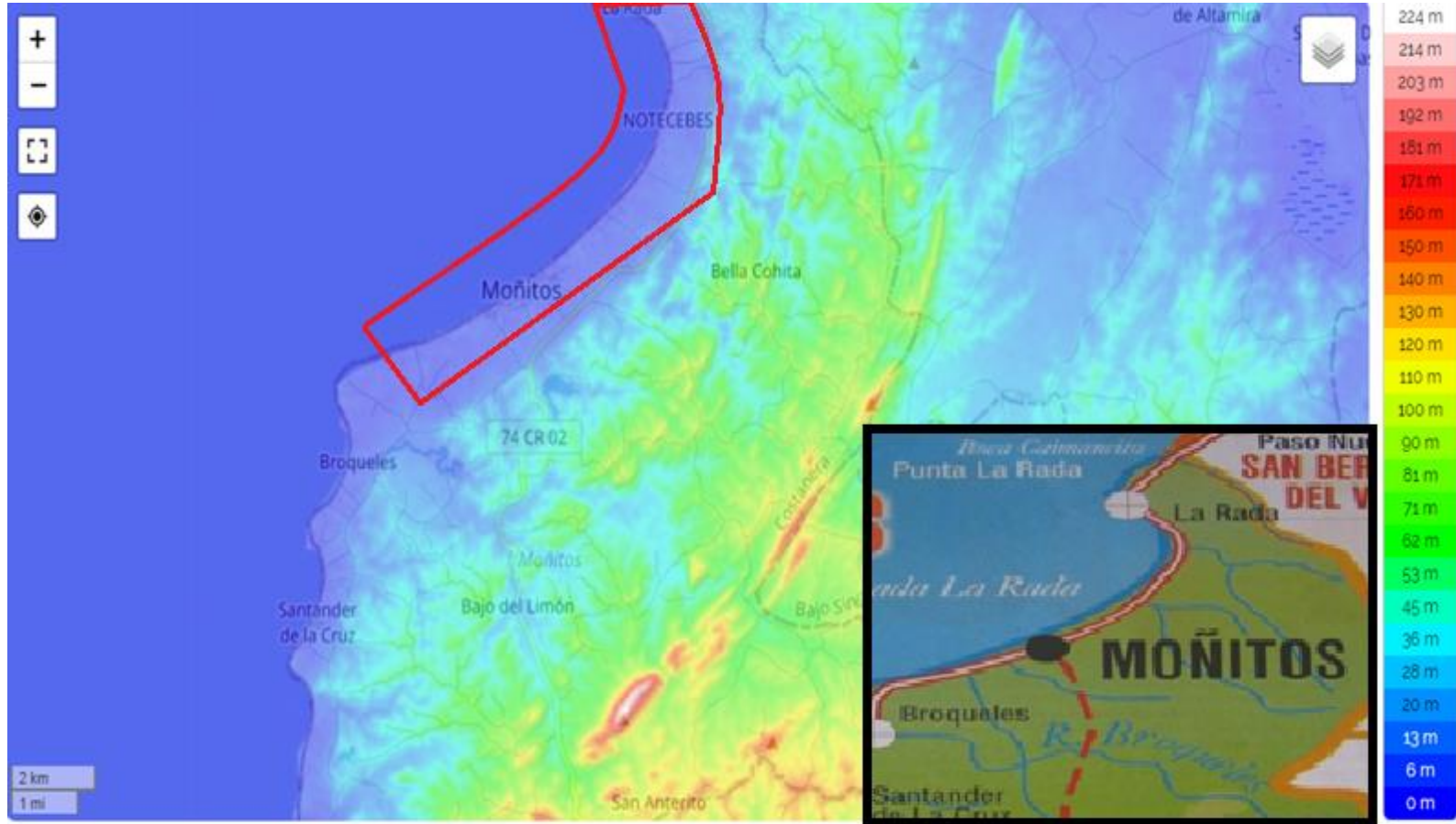
This component represents the direct and indirect benefits that human communities receive from ecosystems and therefore the permanence, sustainability and quality of these services are the main objective of restoration. For each area evaluated by ecosystem, the perception of the use (demand) that local communities make of the provision, regulation and cultural services was estimated on a scale of 1 to 3, giving higher priority of restoration to those sites with the highest demand for services.

2.4. The reference information to evaluate the components was obtained from:

1. The consultation and analysis of secondary information (technical reports, degree thesis, articles, etc.).
2. Visits to documentation centers of coastal CAR and universities.

3. Online surveys completed by specialists, researchers and technicians, who were massively convened through internet messages and trades sent by mads.
4. Personal interviews with specialists and researchers.
5. Field trip to the municipality of Moñitos to verify information on seagrass meadows and accompaniment to five field trips to monitor the water quality of the mangroves.
6. Reviewing information in the Google Earth browser

2.4. Map of the studied area:



Moñitos, Córdoba, Colombia (9.19958 -76.12560)



COMMUNITY PLAN FOR THE RESTORATION OF MANGROVE FORESTS IN MOÑITOS, COLOMBIA

Moñito topographic map, elevation, relief.

Coordinates: 9.08525 -76.19293 9.31329 -76.04379

Maximum altitude: 239 m Average altitude: 30m

3. COMMUNITY PLAN FOR THE RESTORATION OF MANGROVE FORESTS IN MOÑITOS, COLOMBIA.

In order for the restoration activities in Moñitos to favor connectivity between ecosystems and populations of species, for the restoration portfolio, the identification of ecosystem mosaics was used as a spatial analysis tool, with the purpose of grouping coastal marine areas with restoration potential. Therefore, given the synergy and connectivity that these mosaics represent, it is critical that the selected restoration actions are designed on a landscape scale. Finally, a chapter on research needs was elaborated, where the topics that require the collection of basic information were listed by ecosystem, with the purpose of:

1. Complete the evaluation of the areas that were discarded due to lack of baseline information.

2. Include other indicators to complement the status assessments for the four ecosystems
3. Analyze the historical effect of the causes of deterioration and loss of ecosystems.
4. Understand the dynamics of supply and demand of ecosystem services.

The proposal was to carry out an ecosystem assessment work that included: analysis of the nature of existing use conflicts and the main impacts caused to mangroves by human activities; promotion of sustainable fishing activities; afforestation; uses for recreation and passive recreation; construction of national bases to promote the multiple use of these areas; and, carrying out education, training and public awareness campaigns to create a support base for mangrove conservation and the environment.

Action 1.1.1: Training of personnel from the community of Moñitos with the support of government experts and execution of joint research projects in areas of workshops and other training activities.

Action 1.1.2: Formation of the Mangrove Working Group as a team dedicated to studying the problems related to the knowledge and management of that ecosystem. The group will be made up of about 20 technicians belonging to selected governmental, academic and non-governmental institutions.

Action 1.1.3: Strengthen public awareness of the importance of mangroves, identify site-specific problems, document changes in the ecosystem and create the appropriate environment for integrated management.

Action 1.1.4: The tools to be used would be: dissemination by the public media (television, radio, press and social networks); posters, brochures and books; exhibitions, conferences and competitions; visits to mangroves and other events, to highlight current forms of use and the need to change them. The programs will be aimed at very diverse audiences for their role in the use of the resource, their socioeconomic and educational level, and for their participation in management decisions. The authorities, planners, communities, traditional users,

entrepreneurs, the education sector, the press, etc. would be present.

Action 1.1. 5 : The initial idea is to generate in the population a consensus on a set of priority issues such as: the economic and ecological importance of the resource, the consumerist nature of the predominant use, and the need to reform the inadequate practices of the use of the mangrove and to organize groups of users as a basis for executing the actions of a rational management of the ecosystem. One of the efforts will be directed towards the formal sector of education, especially at the school level. There, the issue of mangroves is sought to be included in the curricula and that teachers are involved in coastal management activities.

Action 1.1. 6 : Another important activity carried out throughout the coast is the Environment Week, which is held annually in the first week of June, in which contests are held on coastal issues, cleaning campaigns, parades and talks on environmental issues. Mangrove protection is a topic normally included in these activities.

General objective.

Conserve, use and increase the number of mangroves existing in Moñitos with the help of the Zenú indigenous community, in order to preserve the existing biological diversity, which have great ecological, economic, social, environmental importance for the region of Córdoba and the country.

Specific Objectives.

1. Improve the quality of life of mangrove users by scientifically taking advantage of the associated resources (wood, fishing, mollusks, shells, etc.), provided by the mangroves of Moñitos.
1. Submit to sustainable forest management the mangroves of Moñitos, using as a basis the different zoning modalities defined with the Community Groups, according to the importance of conservation and sustainable use of these mangroves.
2. Conserve the flora and fauna existing in the mangroves of Moñitos, through programs, projects and activities that guarantee their conservation.
3. Promote ecological tourism in the mangroves of Moñitos and its surrounding areas, protecting the scenic values, providing and facilitating the conditions and means for the development of recreation, education and environmental interpretation activities.
4. Recover through repopulation actions and natural regeneration, very affected areas of these mangroves.
5. Develop research and basic monitoring on the environmental conditions and dynamics of the system and its area of influence on a permanent basis.
6. Contribute to maintaining ecological processes and genetic resources through

connectivity with other forest areas in
the area.



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