



PROJECT UNDP / CUBA

Reduction of environmental vulnerability to coastal flooding through Ecosystem Based Adaptation (EBA) in the southern provinces of Artemisa and Mayabeque.

Corporate Thematic Area: MID TERM EVALUATION REPORT

MID TERM ASSESSMENT

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Evaluation Team

Néstor Windevoxel, Carolina Murcia y Lourdes Mugica



I.- EXECUTIVE SUMMARY

The mangrove ecosystem of the south coast of the provinces of Artemisa and Mayabeque has suffered a strong deterioration in recent decades due to the cutting of the red mangrove and anthropogenic changes in the hydrology of the region. As a consequence, the structure of the mangrove has been modified and this, in turn, limits its ability to protect the coast against erosion, sea level rise and extreme weather events. The manifestation of the mangrove degradation is the increase in the saline intrusion in the soil, the retreat of the coast of at least 150 meters and the severe floods during tropical storms, which put at risk human lives, the productive systems and the biodiversity on the south coast of Cuba. These manifestations will continue to be exacerbated by the sea level rise and extreme climatic events generated by climate change, in particular the increase in intensity and frequency of storms and hurricanes.

The UNDP Project entitled: "Reducing Environmental Vulnerability to Coastal Floods through Ecosystem Based Adaptation (ABE) in the southern provinces of Artemisa and Mayabeque", better known as the Living Mangrove Project, aims to "increase the Resilience of the inhabitants of the coastal municipalities of the provinces of Mayabeque and Artemisa to the effects of climate change ". To this end, the project focuses on mitigating and partially reversing the physical impacts of climate change in marine coastal areas through the Ecosystem Based Adaptation (EBA) principle. In this project, the EBA relies on the ecological restoration of the mangrove, especially the red mangrove strip and the swamp forests (component 1 of the project). In addition, it relies on the integration of the EBA principle into territorial management plans for coastal zones (component 2) and the creation of a favorable environment at the regional level for the implementation of these plans (component 3).

This report presents the mid-term evaluation of the project, which analyzed the three components described above and evidenced those aspects that require adjustments in future project designs, particularly in terms of their assumptions, experimental design and definition of indicators. This evaluation took place in the period between October 1 and November 15 and was based on analysis of documents and reports and a visit to the project (Oct 16-20, 2017) in which the relevant actors were interviewed in both the implementing entities as in the beneficiary entities of the project.

This evaluation concludes that, according to the performance indicators identified in the Logical Framework, the project has generally advanced satisfactorily, despite variations in its administrative context and personnel changes. This level of compliance is testimony to the adaptive capacity of the current implementing team and of the stakeholders involved in the process.

It was determined that, while some of the indicators have already been met satisfactorily, others have delays according to the schedule. On the other hand, the project has managed financial and material resources effectively to achieve the goals, despite a lag observed in



budget execution. These delays both in budget execution and in meeting targets are due to two important factors: First, there were major drawbacks and adjustments in the import system, which has generated delays in the process of acquisition of inputs and has mainly affected the compliance with component 1, which was the most dependent on imports. Second, the project has not had a good internal information management policy and strategy. This shortcoming became evident as a result of the change in project management personnel and their respective responsibilities at the beginning of 2017.

Variations in the administrative context and staff changes during this period and the corresponding level of compliance are testimony to the adaptive capacity of the implementing team and the stakeholders involved in the process.

In addition to the execution related to the indicators of the Logical Framework, in this evaluation it was observed during the interviews and workshops carried out in the two provinces and its 6 corresponding municipalities, that locally there is a high level of public participation and understanding on the part of the local actors of the origin of the deterioration of the mangrove, of the concept of ABE and of the benefits that this can bring to the region. This high level of public awareness is important for the long-term sustainability of the project, and is the product of the various communication tools and abundant training activities carried out by the project.

The interest of the provincial and municipal authorities visited for the development of the project and its potential impact was also observed. It should be noted, however, that compliance verifiers have some inconsistencies that must be resolved with an in-depth analysis of the primary information sources. It is recommended to move from the discourse or the indication in documents prepared by the implementing team to concrete actions that demonstrate both the impact of the interventions in the mangrove and the capacity of the provincial and municipal governments to apply by their own means the concepts and practices promoted by the the project.

Among the recommendations, the following stand out:

- a) A more formal job of managing project information is required, especially with respect to the verifiers of each indicator. As well as, the information of some verifiers for the activities and products presented by the implementing team are inconsistent and not available in an organized and easy to consult system. Therefore, specific recommendations were made to adequately document the results, especially with a view to the final evaluation of the project.
- b) Although a series of activities are being carried out to help the rehabilitation of the mangrove and the swamp forest, it is currently not possible to make a differential analysis between the methods used and their cost / benefit effectiveness of the different interventions. Therefore, we recommend that the design of the intervention strategy in the mangrove be reviewed using an experimental approach



to clarify the relationship between the effectiveness of each type of intervention and its final purpose. Additionally, it is necessary to determine the cost / benefit ratio of the application of the ABE with a view to extrapolating to larger spatial scales and transcending the local impact at the municipal, provincial level at the national level. Recommendations are made to develop impact indicators and an implementation design of the interventions that allows to quantify the cost / effectiveness ratio of each of them.

- c) The delay in executing the budget must be met. This may require the need for a temporary none cost extension.

The evidence shows that the project has mostly achieved the results and that the delays in the scope of some of its results and in the financial execution observed to date can be overcome with the follow-up of the recommended measures to ensure an evaluation mission successful ending.



ACRONYMS AND ABBREVIATIONS (*acronym in Spanish)

Acronym	Meaning
EBA	Ecosystem Based Adaptation
AF	Adaptation Fund
AI	Implementation Agency *
AMA	Environment Agency *
BASAL	Environmental Bases for Local Food Security*
CBD	Biodiversity Agreement*
CC	Climatic Change
CDR	Committee for Revolution Defense*
CEO	Director Executive office
CGB	Forest Guard Corp*
CITMA	Ministry of Science, Technology and Environment*
DPP	Direction of Programs and Projects from CITMA (AMA)*
DRI	Direction of International Relationships from CITMA*
EAF	Agroforestry company*
EE-MTR	Midterm Evaluation Team
EIF	Integral Forestry Companies*
EMDC	Staff of Civil Defense*
EMIDICT	Import, Export and Distribution Company for Science and Technology
ENPFF	National Company for Flora and fauna Protection*
FMC	Cuban Women Federation*
FONADEF	National Forest Development Fund*
FORMATUR	Center for Turism Training*
GAF	Agroforestry Group
GEF	Global Environmental Fund
ICIMAR	Institute of Sea Sciences*
ICRT	Cuban Institute of Radio and Television*



IES	Ecology and Systematics Institute*
IGT	Institute of Tropical Geography*
INAF	Institute of Agroforestry Research*
INRH	National Institute of Hydraulic Resources*
IPF	Institute of Physical Planning*
MEP	Ministry of Economy and Planning*
MES	Ministry of Higher Education*
MINAGRI	Ministry of Agriculture*
MINAL	Ministry of the Food Industry*
MINAZ	Ministry of the Sugar Industry*
MINCEX	Ministry of External Affairs and Investment*
MINED	Ministry of Education*
MINFAR	Ministry of the Revolutionary Army*
MININT	Ministry of the Internal Affairs*
MINTUR	Ministry of Tourism*
MTR	Midterm Review
OIN	Office of National Implementation*
POA	Annual Operative Plan*
PMU	Project Management Unit.
PPR	Project Progress Report
PRODOC	Project Document
SEF	State Forest Service*
SMART	Methodology to define objectives (specific, measurable, achievable, relevant and with definite time)
SNAP	National System of Protected Areas*
ToR	Terms of Reference
TTs	Tracking Tools
UA	University of Artemisa*
PMU	Project Management Unit*



UNAH	Agrarian University of Havana*
UNDP	United Nations Progame Development



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II.- INTRODUCTION

The Mid-Term Review Team (EE-MTR) of the UNDP has prepared this report Project entitled: "Reducing Environmental Vulnerability to Coastal Floods through Ecosystem-Based Adaptation (EBA) in the South of the provinces of Artemisa and Mayabeque "Manglar Vivo". The assessment mission was conducted between 15 and 22 October 2017, following the guidelines of the "Evaluation Guide UNDP GEF-funded projects" in its version for external evaluators.

The Mid-Term Review has the following main objectives:

1. To Achieve and understanding of the project's progress at its midpoint implementation.
2. To establish the circumstances, challenges and opportunities that the project has faced in its implementation and to propose actions for mitigating the challenges and leveraging opportunities.
3. To identify the lessons learned during the first half of the implementation process.
4. To provide specific recommendations to lay the foundation for a successful project completion.

The mission was carried out on the basis of a participatory, transparent and open process to allow all stakeholders to internalize these lessons and build their capacity towards a successful project completion.

This report's general objective is to present the evaluation team's vision/understanding of the project and the analysis and results of the review of documents, field observations and interviews of institutional and local stakeholders, in the context of the Logical Framework matrix and the description of the PRODOC. The process also identified the adaptive management actions taken during the project's first three years of implementation.

The methodology and the main tools used during the evaluation mission included, but were not limited to, the following activities:

- Briefing and debriefing meetings with UNDP-Havana follow-up team.
- Meetings with national and provincial representatives of the implementing agencies of the project. The list of participants is shown in APPENDIX 6.
- Field visits to observe the main activities of project implementation in the Mangroves and Coastal Forests in the provinces of Mayabeque and Artemisa.
- Visits or meetings with actors involved in project implementation processes (Universities, Mundo Latino, among others).



- Consultation workshops in each of the two provinces to identify the main benefits and challenges, as well as proposed actions to address the most important challenge in each of the provinces of Mayabeque (33 people) and Artemisa (30 people).
- Review of the documentation provided by the Project Implementing Unit.
- Review of administrative documentation at the project office that included, among other things; examples of agreements and MOUs, budget execution, purchase contracts and procurement procedures.
- Discussion of the main findings at the end of the assessment mission and review of any information gap with the Project Director and Advisor. This included a presentation of the proposed general structure of the MTR final report.

This MTR report was based on the "Guidance for conducting midterm reviews of UNDP-supported, GEF-financed projects". Below is a summary of its contents:

The "**home page**" presents information that identifies the UNDP project, followed by an "executive summary" and a section with "acronyms and abbreviations".

The "**introduction**" indicates the purpose of the evaluation, the key issues to be addressed and the evaluation's methodology, including the relevant actors interviewed and visits made to selected implementation sites of the "Manglar Vivo" Project. It also introduces the assessment team of the MTR and affidavits of ethical aspects of confidentiality and conduct.

The section "**project and its development context**" gives information about the beginning and duration of the project, the problems that the project proposes to address, the project's immediate objectives, key actors, expected results, as well as expenditure and financial information. It also includes a summary of the main achievements and expected results, as well as the activities and products of the project to be considered in the MTR.

The section "**achievements, challenges and results**" presents the findings and recommendations, and analyzes and evaluates the project's formulation and implementation progress (i.e., implementation approach, management model, logical framework and proposed indicators, technical team and key actors, the use of information technologies, inter-institutional working relationships and the technical capabilities associated with the project and its role).

Ratings are given to monitoring and evaluation, stakeholder participation and replicability (according to the guidelines established in the "Guidance for conducting midterm reviews of UNDP-supported, GEF-financed projects").

This section also analyzes the **financial planning and co-financing of the Project, contrasting programmed vs executed**; as well as compliance with the application of the concept of incremental costs. The sustainability and role of the project in improving the national/local staff skills are also evaluated.



The section "**conclusions, recommendations and lessons learned**" presents a synthesis project's progress and recommendations for corrective measures, if any, for the design, implementation, monitoring and evaluation of the project in the final phase.

A first draft of the report was expected to: i) provide the Project Management Unit and the evaluation team the opportunity to verify that they share the same understanding about the evaluation; ii) motivate a discussion and analysis between the Project Management Unit and the evaluation team of the MTR that allows adjusting the results of the evaluation where possible and necessary, based on facts and without compromising the evaluation team's criteria; and iii) improve the overall understanding of the "Manglar Vivo" and guide its progress towards achieving its goals at the end of the project.

The evaluation team consisted of three people listed below with a brief summary of their areas of expertise and backgrounds:

M.Sc. Néstor Windevoxhel (Venezuelan), Leader of the Evaluating Team, is an expert in wetlands and marine and terrestrial biodiversity in productive landscapes. He contributed to the mission his abilities in environmental management of marine / coastal zones, economic valuation of mangroves, management and evaluation of environmental projects and conservation of biodiversity.

Dr. Carolina Murcia (Colombian) is an expert in ecological restoration and conservation of tropical ecosystems. She holds a professional certification in ecological restoration awarded by the Society of Ecological Restoration. She contributed her expertise in project design and evaluation of landscape level ecological restoration, as well as management of integrated projects of biodiversity conservation and professional capacity building in conservation and restoration.

Dr. Lourdes Mugica (Cuban) is an expert in ecology of aquatic birds in anthropic and natural ecosystems of Cuba and Professor in the Faculty of Biology, University of Havana. She contributed with her expertise in conservation and biodiversity, as well as coordination and evaluation of biodiversity conservation projects. Furthermore, Dr. Mugica appraised the international evaluation team on the forms of organization and work of Cuban institutions at national and local levels.



III.- DESCRIPTION OF THE PROJECT AND ITS CONTEXT OF DEVELOPMENT.

3.1.- THE “MANGLAR VIVO” PROJECT

The project "Reduction of environmental vulnerability to coastal flooding through Ecosystem-Based Adaptation (EBA) in the southern provinces of Artemisa and Mayabeque" aims to reduce the vulnerability of communities in the southern coastal area of the provinces of Artemisa and Mayabeque (Cuba) to the coastal erosion, floods and marine intrusion caused by climate change. This region of the country is subject to a high vulnerability to climate change not only because of its condition as a tropical island but also due to the high degree of deterioration of mangrove ecosystems, which already lack the capacity to protect the coast from the changes caused by the sea level rise and hurricanes. Additionally, the intense use of the water resource in the basin, both for agricultural and livestock purposes and for human consumption, are contributing factors to the reduction of the ecological flow of fresh water necessary to maintain the health of the mangrove, which affected the conditions of the mangrove forest and reduced its resilience.

The project is financed by the Adaptation Fund and is implemented locally by the UNDP Office in Cuba. Its execution is in charge of the Ministry of Science, Technology and Environment (CITMA) and the Ministry of Agriculture (MINAGRI). This is an investment project with a budget of US \$ 6,067,320 and a counterpart of 1: 1 contributed by Cuba, mainly represented by staff salaries. The execution period is from October 1, 2014 to September 30, 2019.

The project seeks to reduce the vulnerability of the southern coast of the Provinces of Artemisa and Mayabeque, through the Ecosystem-Based Adaptation Strategy (EBA). In such a way that the project focuses on three types of activities (Components):

- a. Component 1. The recovery of coastal ecosystems, but mainly the outer fringe of the mangrove, dominated by red mangrove (*Rhizophora mangle*), and swamp forest ecosystems, which are floodable ecosystems located between the mangrove zone and the fringe. Mainland. This component is based on the planting of mangroves on 1,290.6¹ hectares between Surgidero de Batabanó and Punta Mora and the rehabilitation of 1,711.9 hectares of the mangroves between Majana and Surgidero de Batabanó, as well as the elimination of invasive alien species and enrichment with native species of 4,315.5 hectares of lagoon or swamp forests.
- b. Component 2. The inclusion of strategies based on EBA in the management plans of the coastal zone and the productive agricultural area, achieved through training and

¹ Values for both indicators planting mangrove Batabanó for rehabilitation of mangroves in Artemisa differ between Prodoc and logical framework. The values reported here are those of the logical framework.



- awareness campaigns for the community and decision makers. This component is expected to result in (a) plans for adaptation to the CC in both provinces and the six municipalities, (b) at least one group in four of the municipalities, which are made up of 15 members of the community, and that are focused on environmental and adaptation issues, and (c) 35 educational institutions (between primary, secondary, universities and pedagogical institutes) with study programs that incorporate topics of adaptation to CC. In addition, it is expected, according to PRODOC, that at least 17 audiovisual products, 3 local TV programs, 5 local radio programs and 2 newspaper articles on adaptation issues have been created and disseminated.
- c. Component 3. The creation of a favorable environment at the regional level for the effectiveness and sustainability of investments in adaptation measures. This component is based on the production of information on the costs and benefits of the EBA accessible to decision makers and planners and on the strengthening of institutions that allow the updating and implementation of action plans based on EBA. From this component, at the end of the project, at least 3 training activities for coastal technical activities and 3 activities for inspections of coastal areas by regulatory authorities and provincial / municipal governments are expected at the end of the project. In addition, three studies are expected to estimate the cost / benefit ratio of the application of the ABE approach.

3.2.- CONTEXT OF THE PROJECT

3.2.1.- Geography and environmental and social vulnerability

The Republic of Cuba is an archipelago located in the Caribbean Sea, on the Tropic of Cancer. This geographical position determines a tropical climate influenced by the trade winds and the warm current of the Caribbean. The country is made up of more than 1,600 islands, islets and keys, of which the largest element is the island of Cuba. The island of Cuba has an extension of 105,007 km², or 95% of the land portion of the country. The narrow and elongated shape of the island (1,250 km long and 31-191 km wide) gives it a large coastal extension of 5,746 km long ².

Because of its condition as an island nation, its shape and geographical location, Cuba has a double level of vulnerability to climate change. On the one hand, the rise in sea level (27 cm by 2050 and up to 85 cm by 2100) threatens coastal erosion, reduction of the area of the islands and marine intrusion in the coastal aquifers. On the other hand, the projected increase in the intensity and frequency of the hydro-meteorological events that take place annually in the center of the Atlantic Ocean and move in a general W-NW direction, subjects

² República de Cuba. 2015. Segunda Comunicación Nacional a la Convención Marco de las Naciones Unidas sobre Cambio Climático. La Habana. <http://unfccc.int/resource/docs/natc/cubnc2.pdf> consultado 28 Oct 2017



Cuba to the rigor of cyclones and hurricanes that put on a high risk the life and infrastructure of the country. For example, during the first ten years of this century, 78% of the hurricanes that have arrived to Cuba have been intense, in contrast to a historical figure of 26%.³

This extrinsic vulnerability is exacerbated by the management of natural resources in the last century that has damaged coastal ecosystems and their ability to stabilize the coast. The Cuban coast is divided into three types: rocky substrate coast with emerged marine terraces, rocky substrate coast with cliffs without marine terraces and sandy-silt-peaty substrate coast partially flooded and with mangroves⁷. This last type, typically populated by mangrove ecosystems, is the most extensive, but also the most sensitive to erosion and coastal management, since it has a soft, easily erodible substrate, which is maintained thanks to the characteristics of the ecosystem that occupies it. Therefore, the protection of the coastal strip of most of the country depends on the health of the mangrove ecosystem.

The mangrove is one of the most productive ecosystems on the planet, which provides both wood biomass with rates that reach 2 ton/ha/year as breeding areas and habitat for countless species of fish, waterfowl, crustaceans and mollusks. The mangrove ecosystem is dominated by several species of halophilic trees (tolerant to salinity), and distributed in homogeneous stands arranged in parallel bands to the coast (zoning).

The identity of these species varies from one region to another in the tropics and subtropics, but typically the species that is in direct contact with the sea belongs to the genus *Rhizophora* which is characterized by being very hardwood trees, short stature and having prop roots or pneumatophores over the water. At the same time these roots retain the mud and the substrate between them in such a way, that the mangroves are considered stabilizers of the coasts because they resist the onslaught of the waves and winds; without their presence the coasts erode, especially during the tropical storms⁴.

The other species that make up the mangrove ecosystem inhabit the innermost fringes, they are taller trees, but without adaptations that allow them to tolerate the effect of sea swells, and in the absence of the first strip of red mangrove, they are gradually knocked down by storms and the waves.

The mangrove ecosystem and particularly Red mangrove (*Rhizophora mangle*), is very sensitive to salinity changes caused by inappropriate management of water resources that help balance the coastal salinity, extraction of timber and pollution. In Cuba these 3 factors had contributed to its degradation and generated biodiversity lost, and reduction in fish and agricultural production in the coastal zones.

³ Prodoc..

⁴ Ellison, A. M. 2000. Mangrove restoration: do we know enough? Restoration Ecology 8:219-29.



Cuban mangrove forest cover 5,647 Km² nationwide equivalent to 5.1% of the total area of the country and 26 % of the forest area in 2002⁵, but it had been damaged by wood extraction and more extensively by inappropriate management of water resources that reduced the fresh water flow to the coast⁷. This is particularly evident in Mayabeque, Artemisa and Pinar del Rio provinces, in the south coast, with the first, Mayabeque, been the most affected⁷.

A recent project was developed in Cuba to determine the danger and vulnerability of the marine coastal areas, the current state of the coasts, and their risk level in relation to the possible impact of climate change. This analysis was the base for the scientific support to the Government Plan to face Climatic Change in the Republic of Cuba (approved on April 2017), known as “Tarea Vida”. The “Tarea Vida” established in the task number 5 the necessity to achieve the mangrove recovery, a clear objective of this project.

The Project focused on an 84 Km long stretch in the south coast of Artemisa and Mayabeque provinces covering 6 municipalities, Artemisa, Alquizar and Güira de Melena in Artemisa and Batabanó, Melena del Sur and Güines in Mayabeque. These 6 municipalities have a high strategic value as they contain the most productive regions in the country in relation to agriculture and fishery production³. Besides that their mangrove forest are highly impoverished^{2,2} and they have associated a high density of human settlements in nearby areas. Besides that they are located in the narrower segment of the island, where the land lost due to sea level rise may have more impact.

Mangrove mortality, particularly red mangrove (*R. mangle*), that occupies the most external coastal strips, had been mainly caused by water diversion to the agricultural district and the urban settlement associated, and for timber extraction without control to produce charcoal for domestic use. The mangrove disappearance has exposed the coast to erosion due to the wind and waves impact in a way that the coast line moved back until the next mangrove stripe, composed basically by black mangrove (*A. germinans*). But black mangrove is not an effective barrier against sea waves and storms, because its roots are not very deep and they have a monopodial structure; in this way a gradual mortality is observed in the second mangrove stripe in Mayabeque and Artemisa coastlines.

Both the recounts made by coastal inhabitants in Mayabeque and Artemisa and the remainder of mangrove wood submerged in the sea indicated that in some points the coastline had moved back at least 150 m. The life quality of many local populations had been reduced because some beaches that used to be summer resorts have disappeared⁷.

Besides that the absence of a life barrier protecting the coast from the battering of the waves during tropical storms, may cause infrastructure lost and risk locals life. Some hurricanes hitting Cuba in the current century had produced pushing in over the sea about 2 km inland.

⁵ Menéndez Carrera, L. & J. M. Guzmán Menéndez. 2002. Los manglares del Archipiélago Cubano: Aspectos generales, pp. 1-116, En Menéndez Carrera, L & J. M. Guzmán Menéndez (Eds), Ecosistema de manglar en el Archipiélago Cubano. Editorial Academia, La Habana, Cuba. UY/2002/SC/ECO/PI/2UNESCO/MAB



The coastal retreat has produced the saline intrusion through the aquifer in the underground Karst limestone rock⁷. According to the interviews made during the mission, saline intrusion reached 18 km inland. This is a high risk for agriculture, fresh water access for human consumption and the natural ecosystems with a low tolerance to salinity in the soil. The vulnerability is exacerbated by the practice of getting water from the aquifer to irrigate the cultures or for human consumption, a basic necessity if we consider that Artemisa and Mayabeque are the main food production provinces in this region of the country and that part of the water consumed in Havana comes from this aquifer as well. So there are projects focus on maximizing water uses to reduce the pressure on coastal ecosystems in the section about context below.

3.2.2.- Relevant political context.

Artemisa and Mayabeque are the smallest provinces in the country (with the exception of Havana). Traditionally, the zone had been the main source of agricultural food and water for an important part of the country (including La Habana) since colony times; With 6 years already, both provinces, that were originally part of Havana province, are the most recently created in Cuba. This separation was accompanied by a change in the local government administration that was known as “the experiment”. In the new administration the position of President of the provincial and municipal Popular Power are separated from their respective administration Councils. In this way they are trying to get more transparency in the government and decentralize the decision making process since the council define the government plan and the budget, the assembly approve it and the government enforce its accomplishment.

The colloquially called “experiment” was initially planned for 18 months, but it had been ratified several times, for the purpose to be replied in the rest of the country

3.2.3.- Institutional context:

The Project “Manglar Vivo” continue and contribute with several initiatives looking for increasing costal resiliency in the southwest of the country and its adaptation to climate change. Among them are the following;

- The project “Application of a regional approach to the management of marine and coastal protected areas in the southern archipelagos of Cuba”, financed by GEF/UNDP, was focus in the protection of the coastal marine protected areas.
- The project “Creation of capacities for the coordination of information and monitoring systems/sustainable land management in areas with water resource management problems”, financed as well by GEF/UNEP, is focus on the Habana-Matanzas plains, in spite of it does not have an ecosystem Based Approach, it is trying to alleviate the negative causes and effects of ecosystem degradation through the promotion of sustainable agricultural practices. This project is part of the association project of the country association program CPP-OP15 financed by GEF/UNDP which aims to "Support the Implementation of the National Action



Program to Combat Desertification and Drought in Cuba" that is aligned with the recommendations of the United Nations Convention to Combat Desertification (UNCCD). Its purpose is to introduce the Sustainable Land Management approach (MST) in the actions of prevention of degradation, recovery and rehabilitation of degraded lands, as well as in adapting to the extreme conditions of severely degraded ecosystems and in mitigating the effects of drought.

- The project "Environmental Bases for Local Food Security (BASAL)" financed by the European Unión/COSUDE, is focused in the strengthening of local capacities to monitor the climate and incorporate the environmental components in the socio-economic development plans. The target areas of the project are the municipalities Los Palacios (Pinar del Rio), Güira de Melena (Artemisa) and Jimaguayú (Camagüey).
- The project "Evaluation of the climate change potential impact on biodiversity and development of adapt strategies in 2 Cuban regions with fragile ecosystems" financed by EU/WWF seeks to develop national and local capabilities and assess the vulnerability of biodiversity and communities to climate change, as well as to establish adaptation strategies.
- The Project "Enhancing the prevention, control and management of invasive alien species in vulnerable ecosystems in Cuba" financed by GEF/UNDP included Havana Matanzas plains and specially the coastal zones in Mayabeque and Artemisa as intervention areas.

One of the basic premises and assumptions of the project, (which was not explicitly established in the PRODOC) but, was observed during the interviews and work meetings during the evaluation mission, was that the Logical Framework of the Living Mangrove project, considered only the coast and did not consider the root causes of the problem that are at the level of the basins that modulate the health (stability and resilience) of the mangrove. The main justification for not considering the issues of water management in the basin, precisely, was that the projects described above will ensure the restitution and conservation of the hydrological conditions of the basin.

The explanation is valid and acceptable in order to avoid duplication of effort, however, this approach requires a much closer relationship than that observed with projects such as BASAL, that allows greater certainty about, for example, the recovery of the flow of fresh water that drains superficially or underground to the mangrove, based on improvements in water use procedures that are clearly demonstrable.



IV.- ACHIEVEMENTS, CHALLENGES AND RESULTS

As indicated in the initial report, the results of the evaluation are summarized based on the findings and recommendations. These were supported on:

1. Analysis of relevant and available documentation. In general basic information of the project was ordered and available.
2. Interviews and work meetings coordinated and organized by the implementing team.
3. Field visits during the days of the evaluation mission carried out between October 15 and 21.
4. Workshops held with the actors in the provinces of Mayabeque and Artemisa, according to the results included in Appendix 4.
5. Meetings with strategic project partners, organized prior to the mission.
6. In response to requests for specific information, after visits, we got almost all the information but in few cases information was not available or in the format required. Due this reasons in some cases the findings have some level of uncertain which is not affecting the results neither the recommendations.
7. Follow-up meetings with members of the implementation team on specific topics.

It should be noted that, with the exception of indicators 1.1, 1.2 and 1.4, the Logical Framework does not have an expected progression of the scope of the results for the medium term. Therefore, based on the presentation of the project implementation team that showed the planning of results to the life of the project as a Gaussian curve, the consultant team assumed that it would be expected to achieve an execution of 50% of the results with respect to what is proposed in the PRODOC for the life of the Project.

The summary of the main findings made during the midterm evaluation is presented below.

4.1.- SUMMARY OF FINDINGS - PROVEN FACTS DURING THE MISSION-

General Findings

- The Project Management Unit is made up of a young team of well-prepared, cohesive and committed professionals.
- Change in the staff in particular at lead level of the Project Managements Unit (PMU). In March of 2017, after 2.5 years of the project, Mrs. Sheila Chang, Project Director, was replaced by Mr. Luis David Almeida, who until that point was in charge of the technical coordination of the project, these and other changes in directors of components have generated important challenges for the implementation and order in the available information.
- The approval of the National Plan to face climate change impacts "locally called "Tarea Vida" by the Central Government in Cuba, has established an unplanned opportunity to very effectively promote knowledge of the project and its importance



and has created an incentive for its gear in the local, provincial and national political agenda.

About the design of the Project;

- Design weaknesses in the Logical Framework. In particular on the coherence between Problem, Threats, Objectives, Activities, Results and Indicators.
- Imprecision in the experimental design of the interventions of mangrove ecosystems and swamp forest rehabilitation, which did not allow:
 - Discriminate the success factors of each strategy.
 - Establish mechanisms for replication.
 - Identify mechanisms for long-term sustainability.
 - Take into account opportunities to scale up, to use it as mechanisms of implementation of “Tarea Vida”.
- The objectives and indicators should be elaborated under the SMART methodology and focus on Impact Indicators rather than performance indicators.
- The interventions are very attached to the proposed tasks by the PRODOC, but there is no evidence of a clear and standardized protocol to select the most appropriate interventions in each intervention areas.

On the budgetary performance and the scope to the MTE of the implementation;

- The project has a delay of approximately 21% in financial execution. However, it is expected to increase its executive capacity in year 4, as long as supplies arrive in a timely manner.
- The budgetary counterpart has already been reached (142%), mainly due to:
 - At the beginning of the project in the absence of supplies, the implementing organizations provided them as a counterpart.
 - Salaries for work in the mangrove, went through a reclassification process, from 300 pesos to 1200 pesos per month.
- There was a high dependence on imports, which affects the speed of implementation of the project.
- The restructuring of the import system. During the second year, imports were transferred to a dependency of the Ministry of Science, Technology and Environment, EMIDICT, which had no experience with importing the necessary supplies for this project, which has generated a delay in the execution of the project budget as well as in the implementation of field activities and attrition in the personnel.

Compliance with the goals to the life of the project will require:

- Most project indicators are met with very few exceptions; however, in all cases it can be expected that the indicators will be met by the end of the project life, examples of these are:
 - Indicators 1 and 3 of Component 1.



- Indicator 3 of Component 2.
- Indicator 3 of Component 3.
- Specific references, quantitative data on the scope and comments on each indicator are presented in the evaluation table located in Appendix 2.

Project results verification and their performance.

While the team has a large number of files and documents accumulated, there is no clear and organized structure of their files and the information they contain, which allows access to information quickly and verify compliance of each indicator in the PRODOC.

It was not possible to obtain verifiers for all the indicators and results of the project.

- It was evidenced that there are discrepancies between the reports of the PPR and the records that the members of the implementing team have of the performance of the indicators annually.
- It was evidenced that the responsibility of monitoring the indicators and their due documentation is spread over the members of the implementing team.
- There is a lot of information that exists but that is not necessarily reflected in the written reports (for example, in the PPR).

About communication;

- There is abundant written/publish and video information (more than the amount expected for the MTE) that has been used and may continue to be used during future implementation.
- The communication and knowledge management strategy cited and shared as a product, describes in a similar way the logic of intervention presented by the team and was sufficient to make the evaluation. However, it was evident that there is no detail that allows identifying specific audience per strategy, the messages for each one and the adaptation of the communication products by audience.
- Communication is strongly oriented to the mangrove ecosystem. Without losing this strength, communication is required to be more explicit about the ecological importance of the swamp forest, the economic alternatives and their sustainable use.
- The stakeholders, local governments, forestry companies, and representatives of involved institutions, which indicate that the project has managed to communicate its achievements to these actors, evidenced a high level of satisfaction and participation.
- An institutional appropriation of the project and its activities by all the participants in workshops and interviews was evidenced, which indicates that the project has been effective in communicating its importance to these actors.
- There was great clarity in the members of the communities interviewed and participants in the workshops, of the importance of rehabilitation and conserving the mangrove as a mechanism to increase social resilience to climate change.



Project sustainability and its impacts.

The Logical Framework lacks indicators of impact and sustainability. Therefore, this evaluation does not allow determining these two parameters. However, the following was evidenced on this matter during the interviews and workshops:

- It was evidenced during the interviews, that unplanned activities have been carried out but that they are results of the work of the project and that they indicate an additional impact, for example:
 - Application of the method of restoration in the Province of Havana and in the Province of Guantánamo.
 - The development of new courses on Mangroves and EBA in the beneficiary provinces, but not with funds or other project resources.
- There is limited awareness on stakeholders about the role of swamp forests in the recovery of the mangrove ecosystem in the EBA approach.
- There is, based on the observed, a limited exposure of the economic alternatives used to promote the project, for example, coal production, honey production or fisheries, which are cited in the PRODOC and which were mentioned in workshops and interviews during the mid-term evaluation.
- There were evidences, during meetings and the workshops, of community knowledge and ownership of the project its expected impacts and the benefits obtained to date.

4.2.- PROJECT STRATEGY.

The Logical Framework Analysis.

The logical framework of the project shows in a simple and direct way the process of implementing the actions proposed by the project to achieve its goals. It was evident during the evaluation mission that this LF was created in the context of a series of interventions and parallel projects, cited in the context section, which imply a series of assumptions that were never made explicit in the LF, as would have been ideal.

In a similar way, it was identified that the LF did not have the general vision of a holistic strategy to approach the problems to be solved, focusing only on very specific aspects of the mangrove rehabilitation. In addition, their indicators were practically all indicators of short-term performance in all cases. This has resulted in several effects:

- First, the project reached by the time of the midterm evaluation, important results, but did not consider specific impacts that have already been achieved, such as the promotion of EBA's work in other areas of the country, specifically in (the Havana Bay area and in the coastal area of Guantanamo province).
- Similarly in terms of training and communication, it was identified during the MTE that Mundo Latino has used materials produced for the “Manglar Vivo” Project in



other national communication initiatives using the experience, footage and materials generated through the project.

- The second effect has been that local schools and circles of interest have also carried out training and promotion activities without direct project support, in a clear sign of long-term sustainability.
- Third, the indicators related to mangrove recovery focus mostly on mangroves planting, excluding indicators of the real impact on the persistence and resilience of ecosystems.
- Finally, it is perceived that the academic profiles and job profiles generated in the MINAGRI (INAF, EFI and SFS) could be applicable in the rest of Cuba. However, we make the caveat that this perception is not based on a rigorous analysis of the supporting documentation on academic and work profiles, as they were not available at the time of the evaluation.

The evaluation team suggested developing a complementary logical framework, not to change it but to improving it by the incorporation of elements that will allow the project implementation team to explore means to measure the possible impacts of their actions. Appendix 10 includes an example of such a revised framework.

Design Review

Based on the analysis of the Logical Framework, the documentation review and the interviews, workshops and visits during the evaluation mission, an interpretation of what could be the general intervention logic of the Project was constructed. It should be noted, however, that it is based on an observation limited to a few days and an incomplete set of documents that limited the possibilities of EE work and therefore is not intended to be exhaustive.

The products of the activities of the “Manglar Vivo” Project continue with the following sequence of intervention:

Background

The southern coast of the provinces of Artemisa and Mayabeque has a high degree of human intervention that has modified the landscape in fragments with the consequent elimination and degradation of mangrove forests, which means that they have the lowest rates of health in the Western region of Cuba. This intervention has historical elements; the capital of Cuba was originally founded and established in 1514 by the conquistador Pánfilo de Narváez (under the command of Diego Velázquez de Cuéllar) with the name of Villa de San Cristóbal de La Habana. Its original location was at the mouth of the Onicaxinal River near Mayabeque beach, on the south coast of Cuba, until in 1519 it was moved to its current location.



During the colonial period, the forest ecosystems in the project area received a very large impact due to the forestry and agricultural activity in the area. The forestry activity is the one that has impacted the most, particularly, due to uncontrolled logging in natural forests (mangrove, woodlands swamp and deciduous forests), effects that are still persistent, given that this is one of the most important agricultural regions in the country and the closest one to the city of Havana.

The introduction of invasive alien species (encouraged by being more productive) and the construction of canals that altered the water system, lead to an increase in coastal erosion, a problem that is compounded by the extraction of water for human and industrial consumption, mainly from the City of Havana and adjacent provinces. Due to the joint effect of these actions, the area is exposed to an increase in coastal erosion, salinity and high probabilities of flooding in the face of meteorological events such as hurricanes and cold fronts, and in general it is highly vulnerable to the effects of climate change (CC) and particularly to the rise in sea level.

The project area was identified in the analysis of the mangroves of Cuba as the most degraded mangrove of the coast of Cuba and therefore one of the most sensitive areas to the impact of the effects of climate change which compromises the resilience of the ecosystems as well as the social resilience in the coastal strip of 84 kilometers where the project decides to intervene.

The region in which the project is located has great demands for water for industry, agriculture and human consumption, and even supplies fresh water to the city of Havana. In this context it is evident that the management of the basin represents a precondition that allows specific investments in coastal wetlands and mangroves in particular, to be effective.

It is important to mention that freshwater flow and availability due rehabilitation on the hydrological patterns will be a precondition that can affect the chances of success of investments in the rehabilitation or restoration of the Mangrove or its ecological services. However, as was seen in the context section, “Manglar Vivo” project was deigned on the assumption that other associated projects that are operating in the region will guarantee that freshwater and other enabling conditions that make the results of the projects in the basing will ensure sustainability of “Manglar Vivo” project investments.



Intervention Logic

The optimal conditions for the mangroves development in the Neotropics are:

1. Tropical or subtropical temperatures between 15 to 40 degrees centigrade.
2. Variable salinities between freshwater and low salinity between 0 and 25 PPM.
3. High luminosity conditions, high radiation levels and sufficient hours of light exposure (10-14 hours of brightness).
4. Low coastal energy conditions located in the intertidal belt.
5. Edaphology dominated by alluvial origin sediments and dominated by organic material.
6. High nutrient content, nutrient capture or retention and export of organic material.
7. Low to moderate impact of consumption (depredation) by other organisms in particular of propagules.

These are values or average ranges of conditions in which the mangrove develops its biological potential, placing the major structural developments. These conditions are typically associated with the mouths of large tropical rivers and estuaries. The mangroves also determine a particular spatial distribution depending on many conditions and characteristics. The combination of the factors described above, determine a particular spatial distribution of the mangrove to which its structure and many of its functions can be associated.

Mangroves in the southern region of Cuba, according to the PRODOC, are characterized by a complex but clear structure, with an area facing the coast dominated by red mangrove (*R. mangle*). This coastal strip allows preventing the impacts of waves and tides in the coastal areas. This zone is followed inland by a range of variable amplitude of forests dominated by black mangrove (*A. germinans*) with occurrences of red mangrove (*R. mangle*) and white mangrove (*Laguncularia racemosa*). This second zone has periodic influence of tidal water and also seasonal influence of fresh water coming from the mainland, both underground and runoff. This zone is followed by a mixed forest strip, with variable combinations of black mangrove, red mangrove and white mangrove in areas with greater influence of fresh water, with the presence of mangrove buttonwood (*Conocarpus erectus*) in areas less subject to flooding. Associated with the mangrove, and not less important, is the swamp forest or woodlands swamps that border a wetland area located between the forests of the mainland or the agricultural crops and the mangrove swamp. This area is a reservoir of fresh water that provides greater hydraulic stability to the mangrove.

The structure described above was altered by all the uses and extraction of the mangrove, in particular the red mangrove, the derivation of fresh water, the degradation of the swamp forest and the effect of climate change. This situation as a whole led to a gradual loss of the red mangrove strip in the immediate area to the coast, as well as to the salinization of the soils and waters that favored the establishment and dominance of the black mangrove. As



a result, the ecosystem was transformed and becoming more sensitive to the effects of climate change that have led to the loss of the red mangrove strip and have made it more sensitive to coastal erosion and saline intrusion. As a consequence, the coast has been eroded quickly, even destroying the forest dominated by black mangroves, which is not able to withstand the swell of the waves and falls by mechanical effects, especially due to the impact of hurricanes and storms.

The project proposes to increase the resilience of the inhabitants to the effects of climate change through an ecosystem-based approach, through the recovery of the ecosystem and its protective function for which the natural zonation of the mangrove in this region of the South coast of Artemisa and Mayabeque. To do this, it is necessary to recover the composition and structure of the mangrove forest and the forest ecosystems of the adjacent wetlands in order to regain their function in the coastal zone and the ecosystem services that protect the coastal strip, increase the breeding sites for fish and shellfish populations, soil retention and reduction of the effects of CC in general.

The project aims to demonstrate that the recovery of the zonation of the mangrove with its associated structural profile is the most efficient approach in terms of costs / benefits to face the effects of CC at the country level and that Cuba has the appropriate social structure to carry out rehabilitation tasks in a sustainable manner, involve local communities and institutionalize and extend the lessons learned to other coastal communities.

With this purpose, in-situ rehabilitation activities have been carried out during the project, combined with training, education and extension activities, while involving local communities and decision-makers in both the productive and the productive sectors. the municipal and provincial governments. The measure of success of the project should then be oriented according to the PRODOC to the number of hectares of mangrove in which it has been possible to restore or rather rehabilitate the coastal profile on which the coastal protection functions of the mangroves in the Artemisa and Mayabeque regions depend.

The first component has focused on the restoration processes of coastal ecosystems, initiating their actions with hydraulic re-habilitation allowing the entry of fresh water into the mangrove forest and restoring the laminar flow. The project has focused on the sectors between Punta Mora and Majana, in order to reduce the impact of floods and in particular, the salinization of the forest with the consequent degradation of *R. mangle* and its replacement by *A. germinans*. However, the sector between Batabanó and Punta Mora entails a major intervention, since the whole coastal strip of red mangrove (*R. mangle*) that will be established again in front of the current strip of privet mangrove (*A. germinans*) has been lost.) in such a way as to establish an effective barrier against the onslaught of the sea and its corresponding erosion. Indicators to measure the success of this component are related to the area of restored forest, as well as the area of inland forest ("swamp forest"),



which borders on agricultural areas, as well as the control and use of species exotic species introduced for commercial purposes, in particular *Casuarina equisetifolia*.

Component two focuses on the integrated and participatory management of coastal ecosystems to increase resilience to CC and involves both local governments and the community as a whole. Hence, the first two indicators of the success of this component are related to the number of development plans that effectively include the ABE approach and the number of municipal and provincial governments with knowledge management systems that incorporate this approach. For the first time, local governments must include the ABE approach in their development plans for adaptation to climate change, they have included the concept in their plans, but progress is needed in information management processes for decision-making.

At the community level, work is being done to create support groups for the project that are capable of addressing climate issues and adaptation to CC in the 4 municipalities, and that local schools adopt CC topics and their adaptation in their study programs. Currently, it is perceived that progress has been made in this field and it is necessary to document the advances and impacts of this process, given that we do not have quantitative data available to verify them, which must be ensured by the time of the final evaluation. The educational and awareness-raising work of the community will be complemented with the creation of various audiovisual products and materials for the media in general that have already been produced and will allow the results and products of the project to be properly disseminated (fifth indicator) and to promote their extension to other coastal areas.

Component three focuses on ensuring the effectiveness and sustainability of adaptation actions by establishing a favorable environment at the regional level. It focuses on institutional strengthening at the government level and its influence on the community. It is a fundamental component for the long-term sustainability of the project and its expansion to other areas. It has focused on providing training opportunities and technical support to coastal communities by local governments in order to incorporate the EBA approach, in addition this component is related to government activities of supervision and refers to the inspection activities carried out by the local enterprises or governments, both municipal and provincial, in order to incorporate the EBA approach.

The recent approval of the National Plan for confronting climate change (“Tarea Vida”) has served as an opportunity to position the project. Both the Government and civil society are aware of the “Tarea Vida”, so the project is being framed in this context. All the institutions involved in the project actions and the ABE approach (Provincial and municipal governments, Ranger Corps, Coastguard and Fisheries Inspection Office) are being strengthened with new concepts supported by case studies and new regulations and methodologies that allow them to recognize costs and benefits of EBA as new tool to make it available to decision makers.



4.3.- PROGRESS TOWARDS RESULTS.

4.3.1.- Component 1

Strategy.

This component seeks to recover coastal ecosystems to increase resilience to climate change and reduce the impact of coastal flooding. The component has four expected outputs: (a) The establishment of 1,290.6 hectares of red mangrove along the coast, (b) the rehabilitation of 1,711.9 hectares of mangrove ecosystem, (c) the production of a species management plan for invasive alien species (IAS) and their implementation in 7,318 hectares, and (d) the rehabilitation and enrichment of species in 4,315.5 hectares of marsh forest. This strategy is being implemented in the following way:

1.1. Restoration of the red mangrove coastal belt (*Rhizophora mangle*) between Surgidero de Batabanó and Punta Mora

Red mangrove in the coastal strip between Surgidero de Batabanó and Punta Mora (Prov. Mayabeque) presents one of the highest levels of degradation in the country. There, the outermost belt of mangrove towards the sea is almost gone, exposing Black mangrove trees, which are typically distributed in a second belt behind the red mangrove. Because of its architecture, the black mangrove does not withstand the onslaught of waves, especially during storms, nor does it retain sediment. Therefore, a persistent black mangrove mortality has been observed with a concurrent receding of the coastal line (Figure 1). In these conditions, the red mangrove does not recover on its own.



Figure 1. Black mangrove tree uprooted by the waves. Coast line is devoid of red mangrove.

Red mangrove mortality in the Mayabeque province was initially caused by uncontrolled logging and changes in the area's water regime, caused by the Mayabeque River channeling and road construction parallel to the coast (e.g., the road that communicated Batabanó with Mayabeque Beach), which interfered with nutrient and fresh water laminar flow into the mangrove. As of 2012, all the mangroves in Cuba are under the guise of coastal protection forests, which prohibit logging.



Figure 2. Channel feeding the mangrove with fresh water.



The coast of Artemisa's municipality was also affected by the construction of a dike parallel to the coastline (at an average of 200 meters inland), with the objective of retaining fresh water and avoiding saline intrusion into the soil. This dike is now traversed by several channels that allow fresh water passage towards the coast, with the purpose of reestablishing the mangrove's water balance. However, these channels have little flow and strength, thus they easily sediment and clog up, failing to fulfill their function.



Figure 3. Palisades established to reduce wave force and promote red mangrove establishment and growth.

Activities for the reestablishment of the red mangrove coastal belt include: (a) dredging and maintaining the freshwater channels towards the mangrove to lower the salinity to levels tolerated by the red mangrove (Figure 2), (b) establishing palisades in the sea a few meters from the coast to reduce the force of the waves on the substrate (Figure 3), (c) selectively removing black mangrove trees to partially open the canopy and (d) planting red mangrove propagules beneath the black mangrove forest. Seed sowing was initially carried out using individually spaced propagules. However, the staff of the implementation team indicated that the project advisor (Dr. Luz Esther Sánchez) recommended to sow them in groups of three (triads) and in aggregations of 15 to 25 triads (islands) to stimulate intra-specific competition and increase litter retention (Figure 4).



Figure 4. Red mangrove islands sowing system that involves planting the seeds in clusters of triads (three seeds sowed together),

1.2. Mangrove ecosystem restoration between Majana and Surgidero de Batabanó.

The red mangrove of the coast located between Majana and Surgidero de Batabanó (Prov. Artemisa) is at an intermediate degree of degradation. There is a strip of mangrove on the coastline, however, where it is partially degraded and rehabilitation is being carried out by sowing propagules.

In this sector, mortality was also caused by logging and by the establishment of a 54 km long dam, parallel to the coast (about 200 meters on average), which extends from Majana to Batabanó. The function of this dam is to retain the fresh water from the surface runoff coming from the north, so that it accumulates and by counter-pressure it prevents saline intrusion that previously affected agriculture and water quality. This saline intrusion is the



product of the low pressure of the aquifer, caused by water extraction in the agricultural region. Although the dam partially and temporarily solved the problem of saline intrusion, it caused a change in the surface water regime of the coastal zone, which negatively affected the mangrove. To counteract the negative effect of the dam, channels were cut to carry fresh surface water to the coast, but those require constant maintenance of sediment cleaning.

In this region, the recovery techniques described in the previous section are also applied, except that there are no palisades along the coast, and that mangrove is being planted in areas completely devoid of mangroves behind the black mangrove line (see Figure 5).



Figure 5. Red mangrove plantation. The tree behind Vicente Núñez, Chief of the “Brigada de Alquizar” grew spontaneously. Plants on the lower left corner were planted in 2016. The plant of the lower right corner was planted in 2015.

1.3. Elimination and/or control invasive alien species in coastal wetlands between Majana y Punta Mora to improve ecosystem resilience.

Flooded forests between the mangrove and the mainland have been colonized by several Invasive Alien Species (IAS), which include the Tropical Almond tree (*Terminalia catappa*), casuarina (*Casuarina equisetifolia*), leucaena (*Leucaena leucocephala*) and “marabú” (*Dichrostachys cinerea*). These species compete with native species and hinder their recruitment, which reduces their biological diversity and resilience. This strategy involves the formulation of a management plan, which initially was determined to be focused only on casuarina. Marabú and leucaena were not included as they are not considered a major threat in this region. However, the project is also controlling the Tropical Almond tree, because it was determined that its impact on the swamp forest ecosystems was even stronger casuarina’s. In addition, casuarina is experiencing high levels of mortality related to changes in the water table, anyway. Tropical Almond tree control is being carried out by cutting and harvesting adult trees (Figure 6).



Figure 6. Two workers in the process of cutting the trunk of Tropical Almond tree that had been felled.



1.4. Restoration and enrichment of woodlands along the landward limit of the coastal wetland belt.

To facilitate the recovery of the swamp forests that have been affected by logging and the invasion of alien species, enrichment is being carried out with native tree species in the swamp forests between Majana and Punta Mora. This management involves the creation and assembly of nurseries, domestication for mass propagation of native tree species and seedling planting.

Indicators

This components success will be measured by:

1. Area (measured in number of hectares) with mangrove planting established at the coast between Batabanó and Punta Mora. This value is reported by the local agroforestry companies, who are responsible for planting, and verified by the State Forestry Service-SEF three years after sowing based on measures of survival and vigor of the plants. This indicator is measured in hectares per year.
2. Area (measured as number of hectares) of mangrove rehabilitated by sowing propagules between Majana and Surgidero de Batabanó. This value is reported by the local agroforestry companies, who are responsible for planting, and verified by the State Forestry Service-SEF three years after sowing based on measures of survival and vigor of the plants. This indicator is measured in hectares per year.
3. Number of IAS management plans developed.
4. Total area of inland forests that limits the wetland with the arable land, which has been enriched with native species. This value is reported by the local agroforestry companies, who are responsible for planting, and verified by the State Forestry Service-SEF three years after sowing based on measures of survival and vigor of the plants. This indicator is measured in hectares per year.

Progress towards results

The evaluation of the progress of results for this component has several challenges. The first one is that a discrepancy was observed in the expected values per year between the PRODOC, the Logical Framework of the Project and the cumulative values expected in accordance with the PPR II. The differences between the PRODOC and the Logical Framework are due to an adjustment made a-posteriori to the Logical Framework and registered in the memories of the Start-up Workshop.

Also, discrepancies were observed between the values reported in the different information sources: i.e., their agroforestry company audiovisual presentations to the review team at the MTR, the values reported by the Coordinator of Component 1 during presentations and the values reported in the PPR II. For the purposes of the evaluation, only the values



reported by the managers of the Agroforestry Enterprises were used, considering that they are the primary source of information.

The third limitation is that there is no correspondence between the periods established by the Logical Framework and the report periods used in the Agroforestry companies (EAF)⁶ and the PPRS. In other words, the project goals are defined for project-years (i.e., September-August), while the period comprised by the advance reported by the EAFs is not clear and the PPRs are in periods that do not correspond to either (PPR-I covers the period September 2014-July 2015 and PPR-II covers the period August 2015-December 2016). In the case of the EAF reports and the PPRs, only global values are reported, not monthly, so that there is no way to establish a correspondence of the degree of progress to a certain date. Therefore, the degree of progress used is calculated relative to the value of the final indicator for year 5 and not with the expected values for the medium term.

Fourth, the EE-MTR has not had the SFS certifications at its disposal. Thus, the results presented by the UMP and the EAF could not be verified.

Additionally, the delivery of the requested documentation was either late or never occurred; specifically the management plans for the IAS (which was available in the cloud but in compressed format and thus not accessible) and the mangroves and swamp forest intervention plans were not available. This prevented a careful analysis of the relevant documents or the opportunity to clarify doubts with the implementing team. The PMU inform that the original proposed interventions only included red mangrove planting at the stands along the coast, but that other strategies were added later as proposed by the project's technical advisor. The implementing team indicated that there is no written work protocol to guide the implementation.

Finally, the time for evaluation and field visits was too short to personally corroborate and reconcile with the PMU, the EAF and the SFS the data provided by the different sources of the sown and planted areas and the project progress calculations for indicators 1.1., 1.2 and 1.4.

⁶ The first report of EAF Mayabeque (dated December 28, 2015) states that it presents results corresponding to the "first year of the project (2014-2015)". The corresponding report of the EAF Costa Sur, of the same date, establishes that it presents results corresponding to "Activities executed in the areas of intervention until date ...". Likewise, the report of EAF Costa Sur, dated December 2, 2016, presents "Activities executed in the areas of intervention until date ..." and that of the EAF Mayabeque dated December 28, 2016 reports results corresponding to "... second year of the project (2015-2016) ".



Indicator 1.1-

There has been red mangrove planting in Mayabeque; however, it is difficult to establish its progress relative to the project's midterm value because there are no official numbers of planting levels at the project's midterm. In addition, there are inconsistencies between the reports submitted by the Mayabeque EAF, the values reported in the PPRs and the values reported in the presentations during the MTE, as shown in table 1. It is possible that these inconsistencies are partly due to the fact that each report uses different cut-off dates (Table 1). However, according to the values reported for the first two years by the EAF Mayabeque, by December 2016, 94% of the goal for the first two years had been met. The two PRPs report higher values than the EAF reports, showing 102% compliance by December 2016. Values reported during the MTE presentations coincide with those of the EAFs. If the data presented during the visit, which have not yet been delivered to UNDP, is considered, the project would have accomplished almost 100% of what was expected by the end of year 3, according to the Logical Framework. This represents 60% of the 5-years project's total area (Table 1).

In contrast, SFS reported areas that do not correspond to the values of the other two sources. Taking the totals reported at the date of the visit, the observed implementation is 35% below PMU's reports. According to the PMU, these discrepancies are due to the fact that SFS figures only include the work done in the canals, the firebreaks and the palisades, but not the planted areas. This is because the first three years necessary to certify the establishment of the sown areas have not yet elapsed.

At the time of evaluation, the MTE team examined the signed reports of the forestry companies, which contained data on seeding and planting of the intervened areas. The MTE team also obtained data from the PMU that allowed intuitive evaluation of the restoration process. Verifiable data of the impact achieved should await certification from the State Forest Service (SFS), which is the authority responsible for determining the establishment of the forest plantations, at least 3 years after the initial intervention. **The differences in compliance exhibited by the different sources are relevant because, at the final evaluation the data from the different sources should be properly reconciled. In particular, it should be well established how many hectares are certified by the SFS as established plantations and how much area was intervened but not yet old enough to be certified.**

Indicator 1.1, of the project's logic framework, does not include other activities that were conducted in the intervention areas and that could be verified during the visit. Activities such as channel cleaning, palisade establishment, and black mangrove canopy thinning could increase the probability of success of mangrove establishment.



Table 1. Expected and reported number of hectares planted at Mayabeque each project year. Degree of compliance (in percent) of the values reported by each source, relative to values expected at the time of each report, and to the value expected for project's total.

Project year	Logic Framework indicator (ha)	% of total expected	Area reported by EAF-Direct ¹	Area reported by EAF-Stand ¹	Area reported in PPR-II Dec 2016	Area reported by PMU at MTR Oct 2017 ²	Area certified by SFS (ha) ³
1	74.8	5.8%	17.0	72.1	85	75	212.5
2	333.5	25.8%	62	311.7	333.5	312	117
3	498.8	38.6%				499	243
4	333.5	25.8%					
5	50.0	3.9%					
TOTAL	1,290.6	100.0%	79.0	383.8	418.5	886.0	572.5
% accomplished with respect to LF	Of value established by TORs (408.3ha.)			94.00%	102.50%	94.78%	80.70%
	Of Project's total			29.74%	32.43%	68.65%	44.36%

¹ Signed reports by EAF Mayabeque

Source ² PPT presentation: Felipe V. Cárdenas Crespo, Coordinator, EAF Mayabeque.

³ PPT presentation: Idania Padilla Cantillo. Chief, Servicio Estatal Forestal Mayabeque.

Indicator 1.2-

As in Mayabeque, mangrove sowing in Artemisa has progressed, albeit with a greater lag, at least until the second year. Data from the EAF and PPRs reports, as of December 2016, shows implementation of only 54% of the expected value to that date. If values presented by the PMU during the visit were considered, which have not yet been presented in a PPR nor verified with the reports of the EAF or the SFS, compliance at the end of year 3 would be 86.4%. This means that the project would be in the process of closing the gap, but still 13% below the indicator. The level of compliance to date is 67% of the total value of the project (Table 2).



Table 2. Expected and reported number of hectares planted at Mayabeque each project year. Degree of compliance (in percent) of the values reported by each source, relative to values expected at the time of each report, and to the value expected for project's total.

Project year	Logic Framework indicator (ha)	% of total expected	Area reported by EAF-Direct ¹	Area reported by EAF-Stand ¹	Area reported in PPR-II Dec 2016	Area reported by PMU at MTR Oct 2017 ²	Area certified by SFS (ha) ³
1	139.1	8.1%	13.9	148	143.8	148	148
2	618.7	36.1%	41.4	267.4	582.7	426.5	206.8
3	575.2	33.6%				577.7	Not reported
4	263.6	15.4%					
5	115.3	6.7%					
TOTAL	1,711.9	100.0%	55.3	415.4	726.5	1,152.2	354.8
% accomplished with respect to LF	Of value established by TORs (753.8ha.)			54.82%	95.87%	75.81%	46.82%
	Of Project's total			24.27%	42.44%	67.31%	20.73%

¹ Reports signed by EAF Costa Sur

Source ² PPT presentation: Engineer Rodrigo Fernández Moreno, Technical specialist, Artemisa.

³ PPT presentation: Engineer Amalia Ramos Mojena. Section chief, Servicio Estatal Forestal, Artemisa.

SFS reports sown areas consistent with the other sources for year 1, but only a value equivalent to 48.5% of the other sources for year two. There is still no certification for the third year. These data correspond to the years of the project. SFS also reports seedling survival ranging between 85 and 97%, according to the report of the Compañía Agroforestal de Artemisa (Power Point submitted to the Review Team).

Similar to Mayabeque, indicator 1.2 does not reflect other activities observed during the mission that have been carried out to increase the likelihood of successful establishment of the mangrove, such as clearing or restoration of canals and opening the canopy by removing black mangrove.

Indicator 1.3.-

The IEE Management Plan is not available for analysis and verification. However, Component 1's coordinator reported the production of such a management plan for 20 invasive alien species. He also reported control work on four invasive alien species carried



out in 65 hectares. During the visit, the PMU spoke of control tasks of Tropical Almond (*T. catappa*) and Casuarina (*C. equisetifolia*). The reports of the SFS do not mention verification of areas with eradication of EIS. However, the indicator would be fulfilled as long as there is a management plan and it is being implemented.

Indicator 1.4.-

Enrichment work in the coastal wetland forests has progressed, but also shows lag, as shown in table 3. Relative to the plan established by the Logic Framework, the degree of progress by December 2016 was between 84.4% and the 100%, depending on the source of information. According to PPR-II, execution at December 2016 was 100% of expected values, surpassing the values reported by the EAF and the PMU by 13-16%. Furthermore, it should be noted that there are inconsistencies within the PPR-II in the values reported for this indicator between the "rating" and "Project indicators" tabs.

According to the results presented during the visit (which have not yet been delivered to UNEP) 87% of the hectares expected at that time would have been implemented by the end of year 3; that is, there would be a 13% lag. On the other hand, the information provided by the SFS for this indicator in the presentations made during the MTE is incomplete because SFS only reported values for Artemisa in year 1. Reports for that province, indicate seeding of 16,939 seedlings of 18 native species in wetland forest. The EAF of Mayabeque did not report the corresponding data. Thus, verification of this aspect is lagging behind significantly.

Table 3. Expected and reported number of enriched hectares in the coastal wetland forests planted of Artemisa and Mayabeque each project year. Degree of compliance (in percent) of the values reported by each source, relative to values expected at the time of each report, and to the value expected for project's total.

Project year	Logic Framework indicator (ha)	% of total expected	Area reported by EAF-Direct ¹	Area reported by EAF-Stand ¹	Area reported in PPR-II Dec 2016	Area reported by PMU at MTR Oct 2017 ²	Area certified by SFS (ha) ³
1	99.9	2.3%	20.00	85.00	99.9	100	46.10*
2	1,301.3	30.2%	145.6	1097.5	1301.3	1157.9	Not reported
3	1,422.2	33.0%				1206.1	Not reported
4	1,075.8	24.9%					
5	416.2	9.6%					
TOTAL	4,315.5	100.0%		1,182.5	1,401.2	2,464.0	46.1



% accomplished with respect to LF	Of value established by TORs (1401.2ha.)	83.39%	100.00%	89.77%	3.29%
	Of Project's total	27.40%	32.47%	57.10%	1.07%

¹ Reports signed by EAF Costa Sur

Notes and source ² PPT presentations: Engineer Rodrigo Fernández Moreno, Technical specialist, Artemisa and Felipe V. Cárdenas Crespo, Coordinator EAF Mayabeque.

³ PPT presentations: Engineer Amalia Ramos Mojena. Section Chief Servicio Estatal Forestal, Artemisa and Idania Padilla Cantillo. Chief, Servicio Estatal Forestal Mayabeque

⁵ * Only reported for Artemisa

Comments to indicators 1.1, 1.2 y 1.4.

Both the PRODOC and the Logic Framework focus exclusively on measuring the project's result as the number of hectares intervened. It is also expected that, given a survival of 85%, this will translate in 85% of the area actually established. Thus, the indicator of forest establishment is also measured in hectares. The MTE-Review Team found that these metrics are inappropriate for the type of work involved, because they do not reflect an ecological reality.

It was observed that there is no explicit intervention protocol and that several techniques are combined without a prior design or standardized criteria applied among all the work teams. In this case, the interventions are specific, immersed in existing ecosystems; therefore, individual mortality does not really translate into an area metric expressed in hectares as intended. This finding is important, although it does not really affect the progress accomplished by the Project.

As far as the field inspection allowed, it seemed that each intervention affects an area of a few square meters and there is no regularity in its spatial distribution within the forest, nor is there any other form of standardization to ensure that the effort made for each stand is proportional to the stand's area. According to the PMU, the interventions are carried out in an "effective area" that corresponds to anywhere between 10 and 20% of the total stand. There is no standardization neither of the percentage of the area to be intervened nor of its location; except that all interventions are concentrated in the first 30 m from the beach inland. Therefore, it is difficult to determine if the intervention investment is appropriate for the conditions of each stand. In any case, absence of a protocol formally adopted by all the parties makes it difficult to consider these rather discretionary criteria. Thus, the recommendation to have an intervention protocol is important.

Likewise, in the coastal forest the interventions in the understory are distributed irregularly and unpredictably, depending on the location of the clearings. Therefore, to achieve greater precision during the final evaluation and to facilitate medium-



and long-term monitoring of the interventions, it is recommended to map carefully all the areas in which the interventions have been carried out.

On the other hand, it is not clear how seed or propagule survival and establishment are being quantified, given that these are not easily differentiated from those that are established naturally (except in cases where they have been planted in triads). It is important that all new seedlings planted in the remainder of the project are marked individually to properly quantify their survival and establishment.

Because it is not possible to independently evaluate the impact of each of the intervention strategies, nor is it possible to establish the cost-benefit values for each, it is recommended to adopt an experimental approach such as the one proposed in Appendix 8.

Finally, none of the indicators reflects the effort devoted to complementary tasks that are necessary for mangrove rehabilitation, such as channel cleaning, opening of black mangrove canopy, or black mangrove seedling removal. According to the PMU, the intervention plan for all the coast edge stands initially included only red mangrove planting. However, advice from the research institutes and from consultant Dr. Luz Esther Sánchez, the intervention activities were changed to include new strategies that would increase the probability of restoration success. However, to this report's date those interventions are not yet formalized in a protocol. Therefore, it is recommended that the PMU keeps a quantitative and spatially explicit record of these activities, in order to include this information in the cost/benefit analysis.

Adaptive management

The project demonstrates a reasonable level of short-term adaptive management in its formulation and implementation.

In terms of project planning, the PPR-I indicates that changes were made in the formulation of the quantitative targets per year during the start-up workshop. This change was caused by a delay in approving the project and the lag that this caused relative to sowing periods that should coincide with the rainy season.

Finally, in year 2, the project hired Dr. Luz Esther Sánchez as technical advisor for component 1. According to the members of the Implementing Team, she made a series of recommendations on planting methods, the objective of which is to increase the competition between propagules and thus increase growth rates and vigor among the survivors. In addition, he made recommendations to increase leaf litter and substrate retention in between the developing seedlings.



4.3.2.- Component 2

The review of the existing documentation and the visits to the actors allowed to verify the general compliance of the results of component 2 in the project. A review was made based on the indicators of PRODOC finding the following.

4.3.2.1.- Number of development plans, provincial and municipal that incorporate the ABE.

Process that considered:

1. Review of development strategies.
2. Meetings of the productive sector and the government agencies that operate in the area.
3. Training for the participating groups (government representatives, political organizations, CAM, journalists, specialists) in the following topics:
 - Impacts and adaptation to CC
 - Strategic ecosystems
 - Adaptation Based on Ecosystems
 - Economic valuation
 - BASAL-PVR

This process according to the progress reports was completed in two provincial development plans and six municipal plans with the EBA incorporated. Of the copies of these provincial plans there is in fact mention of the EBA, however, considering the way in which the indicators of the PRODOC Logical Framework are defined, the mention in the provincial development plans of Mayabeque and Artemisa obtained after the mission demonstrates the fulfillment of the goal given that the mere mention of the conservation of mangroves as a measure of adaptation to climate change would allow the goal to be met.

Given that the plans mention the EBA but do not establish specific work activities, it is recommended that mechanisms be established to evaluate every six months the specific actions in the provincial and municipal plans that are carried out to implement the ABE approach in their respective territories as a better measure of the impact of the project in this sense, which is documented and compiled verifiers that can be shared during the final evaluation of the project.

One element that should be mentioned and highlighted is that the recent approval of the National Plan for tackling climate change locally known as “Tarea Vida” represented a huge opportunity for the project, because three of its five objectives speak specifically on issues related to the scope of the project “Manglar Vivo” and one mentions the mangroves as a means of adaptation and coastal protection. As the “Tarea Vida”, a National policy in Cuba was evident during all visits and interviews Assessment Mission, actors at all levels know



and understand the importance of the task LIFE and recognize that the project represents a means to implement at least some of the important principles of this initiative.

4.3.2.2.- Number of municipal and provincial governments with knowledge management systems incorporating the EBA.

The project has developed a model for monitoring and evaluating its management with all the information produced by the project, in order to ensure that local and municipal governments have access to all products produced. The evaluation team felt that these developments are very important and requested to know the knowledge management system, but due to time constraints it was not possible to access it.

According to the interview with the Project Manager about the management system, it was felt that the system that provides access to information is good and necessary, but not sufficient, since it gives the impression that it does not necessarily allow to made better inform decisions to the authorities of the municipal or provincial governments.

A knowledge management system should provide information to facilitate decision making and also provide training to technical representatives of provincial and municipal governments, training for use of the resources provided and established by the project once it ends. The evaluation team suggests:

- Develop a file of evidences or verifiers of each of these products.
- Study the possibility of transforming the current information database into a mechanism for the evaluation of status and decision making for provincial and municipal authorities.

As a reference, the products identified with the implementing team are presented as part of the achievements for this indicator include:

1. Instruments developed according to the inputs of the evaluation team.

- 2 Agreements (University UH-FCOM and UNAH)
- 4 Training classrooms (Batabanó, Cajío, Artemisa and Mundo Latino)
- 2 Educational-communicative workshops
- 2 Electronic bulletins
- Internet spaces (AMA, INAF, IES, and local sites)
- 8 Publications
 - Manual of Forest Nurseries for the Restoration of Wetlands (2017)
 - Manual of Forest Nurseries for the Restoration of Coastal Ecosystems (2017)
 - Forest Nursery Control Notebook
 - Article "Relocation of the fern *Maxonia apifolia*"
 - Article "Characterization of vegetation, coverage and salinity in mangrove forests south of Güira de Melena, Artemisa, Cuba".
 - Brochure "Planting Niches"



- Invasive Exotic Species management plan
 - *Abarema aureum* management recommendations.
 - EBA Brochure (in progress)
 - Characterization of the Regional Population Framework (ongoing)
 - 1 Educational Kit (book and board game)
 - 1 Database with documents and products reached by the Project at present.
 - Participation in 10 Scientific Events in Cuba.
2. Design of environmental knowledge socialization system (Master thesis FCOM)
 3. Elements for the design of the integrated knowledge management system that incorporates the EBA in each territory.
 4. Two Provinces (Mayabeque and Artemisa) and 6 municipalities with knowledge management systems report by the team. It could not confirm its existence, but it was clarified that the reference was to the database project outputs.
 5. Training in mangrove management and health issues for 33 workers, 15 forest technicians and 17 students.

4.2.2.3.- Number of community members (men and women) addressing environmental and adaptation issues (local volunteer groups).

The project implementation team or Project Management Unit (UMP), presented as its main results the following list of products related to this indicator;

1. 19 settlements and 9 Popular Councils promote the formation of volunteer groups and community leaders that deal with topics related to the mangrove forest or the management of swamp forests.
2. 4 groups of volunteers
 - Surgidero de Batabanó (with 16 members, 9 women)
 - Cajío (with 10 members, 2 women)
 - Mayabeque Beach
 - Fisheries Federation (Playa Majana) with 6 participants.
3. Training and prevention actions by coastal communities. The following events have taken place:
 - Climate Change Course and my community.
 - Preparation for volunteer activists.
 - Exchange with the members of the Local Development Groups.
 - Follow-up to the South Dock and the mangrove areas.
 - Preparation about the "Tarea Vida".

The number of activities presented allows concluding that the indicator would be fulfilled; however, it is recommended in light of the future final evaluation to take the following actions:



- Have a file with verifiers of these activities, including lists or memories of the actions taken by these groups or of the reports and materials presented during the trainings with the respective participant lists.
- It is recommended in the next two years to monitor the number of actions that these working groups, popular councils or settlements have carried out as a consequence of project management in favor of the application of the concept of Ecosystems base adaptation (EBA).
- Conduct a survey and compare with the survey originally made at the beginning of the project to assess the level of knowledge and public awareness through the ex-ante, ex-post evaluation method to measure the impact of the project.

Separately, the EE-EMT assessed the degree of understanding of the communities in the two provinces through participatory workshops in which representatives of various institutions, ages, with the inclusion of children of secondary education and primary and sectors in each province, related to the project. Details of the methodology, participants and results are detailed in Appendix 4.

Based on the level of interest of the participants in the workshop, their answers and the conversations that occurred when presenting the results, we concluded that there is a very good level of ownership of the project, a good level of knowledge about the benefits that would result from rehabilitation of mangroves as a measure to combat climate change. At the same time, there is awareness that there is still much to do, and their expectations and proposals are in line with the direction of this project. In such a way that fully completed the project, it is likely that communities feel empowered and receptive to continue incorporating EBA in their environmental management strategies.

4.3.2.4.- Number of local schools with study programs that incorporate the topics of adaptation to climate change.

It was not possible for the evaluation team to see all the education materials reported, although most of them, and the communication sources of the project that the PMU reported, therefore the information presented below was not verified in its entirety. According to the members of the PMU, progress in this component corresponds to:

1. 34 schools that include CC and ABE subjects in the curricula, namely:
 - 5 mix centers
 - 18 elementary schools
 - 4 secondary
 - 1 pre-university basic science
 - 6 municipal university centers
2. 62 teachers trained in schools in the provinces of Artemisa and Mayabeque, through methodological training on adaptation of CC and ABE subjects for the study program.



3. Plan of activities and methodological work in 11 elementary schools with "Circles of Interest" (promote vocational interests) in mangrove theme (5 in Artemisa and 6 in Mayabeque).
4. Environmental education workshop in Batabanó primary school, as a generalization pilot to other schools, to generate best practices and develop skills

During the assessment mission could visit and talk with at least two professors benefiting from school activities. In addition, one of the teachers that keeps circles of interest and several of her students participated in a workshop organized in communities. Regarding the participation of schools it must be said that the area has a range of schools organized by the Ministry of Education and coverage developed by the project includes 16 elementary schools, 15 secondary schools, 3 universities and municipal pedagogical institute. However, for reasons of time it was not possible to verify their work in all cases. The case of the Pedagogical Institute was analyzed and accepted by the evaluation team as an example of a higher education center.

It was considered that the work seems complete, but requires instruments to formalize the achievements to the present. For example, the project should have letters of commitment from schools that formalize the receipt of educational instruments or training, as well as the formalization of changes in the curricula of schools that should be formalized before the Ministry of Education or its provincial representative to ensure the sustainability of efforts.

4.3.2.5.- Number of materials for dissemination and awareness on issues of climate change adaptation, produced by the local media.

In terms of specific products were verify the existence and use of at least the following elements;

1. 6 audiovisual materials, which included:
 - "Cambio de Tiempo", 2015. This is rather a documentary for television about the project, its purpose and the expected benefits.
 - "Bosque Perdido", 2016, a television program focused on the social and environmental impact of the degradation of the mangrove forest and justifies the existence of the project itself.
 - "Creciendo", 2016 (diag. Social sensitivity, environmental education, mangrove planting, institutional strengthening). This television documentary shows the techniques of mangrove planting that the project does and the general importance of the ecosystem.
 - "A Leda", 2016 (Life and Work of Dr. Leda Menéndez), this television documentary focuses on life and work in the mangroves of the renowned Cuban scientist Dr. Menéndez and who has become a national inspiration about the importance of this ecosystem.



- Video Clip "Manglar Vivo". This is a “reggaeton” video clip of a Cuban artist that seeks to reach the community of young adults and adolescents about the mangrove, its importance and the effect of climate change, highlighting the protective role of the mangrove swamp.
 - Audiovisual material on mangroves and their protection, which is being incorporated by the Producer Mundo Latino into other initiatives and audiovisual projects in Cuba, for example, they are working on communication material on the "Life Task" and part of the "Footage" is being used "Raised with the Live Mangrove Project."
2. 4 local TV programs and 5 national broadcast programs produced.
 3. 13 local radio programs production, 2 of them in provincial stations, and 11 in local radios (6 in Mayabeque and 5 in Artemisa).
 4. 3 articles, 2 in the provincial press and one in the national press.

The evaluation team interviewed Mr. Omelio Borroto, Director of Mundo Latino, a Cuban television production house that already has more than 500 documentaries in various areas of knowledge. The interview was conducted in the classroom set up by the “Manglar Vivo” project at the headquarters of Mundo Latino, to promote these videos. The interview allowed knowing the perception of the producer about the project.

According to Mr. Borroto, the partnership with the Living Mangrove project has brought two important advantages. First, the project has provided a lot of information in an organized way to build good scripts. In addition, it is a project that integrates environmental and social issues. Finally, it is a project with resources and little bureaucracy so facilitate the rapid production of materials and create synergies with other projects for mutual benefit (for example, by joining resources to visit areas and make recordings).

During the interview some of the materials generated by “Manglar Vivo” , in particular two short documentaries and a video clip were shown. The materials seem very good quality and were suggested generally use more colloquial language to facilitate comprehension to all education levels. However, they are considered excellent communication tools.

If these results are compared with those expected life of the Project:

1. 17 audiovisual products (TV series, documentaries, multimedia)
2. 3 local TV programs.
3. 5 local radio programs.
4. 2 articles in the local press on adaptation issues

It is clear that in terms of specific results have been achieved almost entirely and resources originally programmed most of the results to the life of the project. If we consider the total of audiovisual and TV programs as audiovisual products, all the results would have been covered in the life of the project.



The only recommendation on this indicator is:

- To conduct a hearing audiences evaluation and make measurements via surveys of the impact by specific audiences that should be identified.

General comments on the evaluation process in component 2

There is no doubt that the project team has done a very effective effort in producing communication materials and stimulation of stakeholders to achieve the goals set by the project. However, it was evident during the mid-term evaluation process that an additional effort is required in the next few years before the completion of the project to have a successful final evaluation of the project. The MTR Evaluation Team set out therefore take the following measures follow:

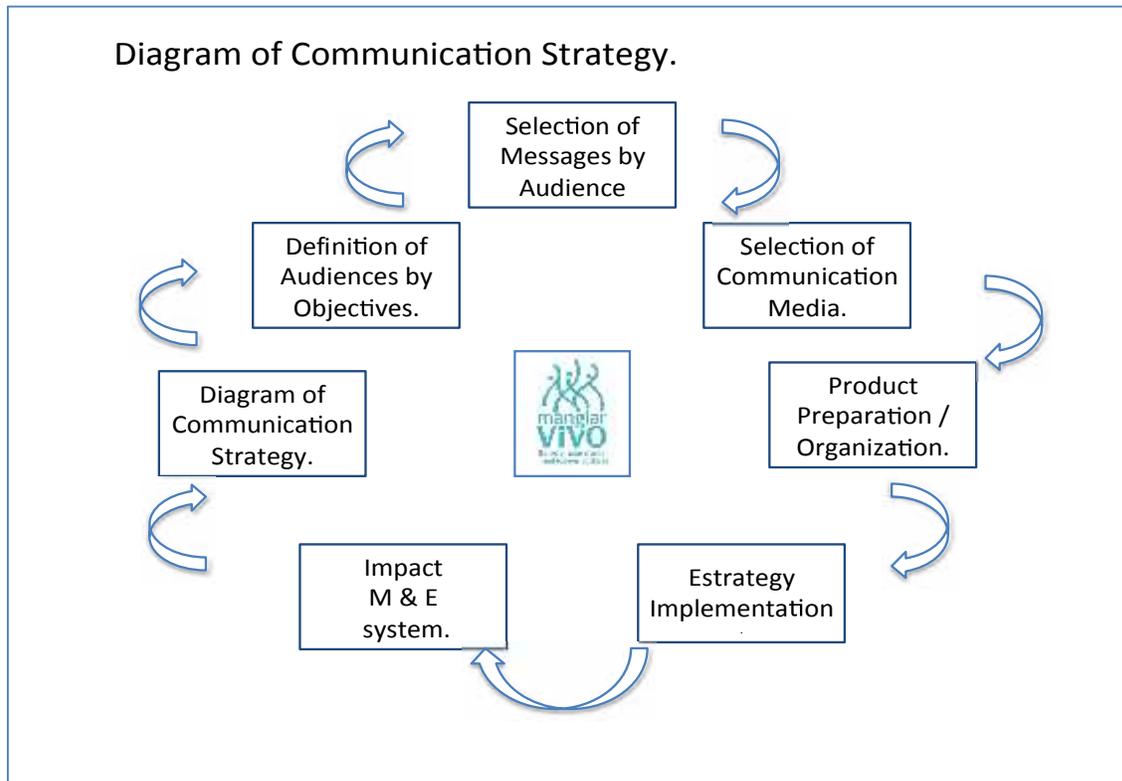
1. Make a strategic analysis for the communication and impacts of the project.

It requires retake existing information and document management process to identify project in the following order (Figure below):

1. Definition of communication objectives and training.
2. Establishment of the main audiences.
3. Establishment of messages by audience in particular.
4. Select the most appropriate means of communication per audience.
5. Selection of existing products or possible development of new products if deemed necessary.
6. Establish a monitoring and evaluation system to measure the results and their impacts



Figure 7. Scheme that illustrates the steps to follow in a suggested communication strategy for the Living Mangrove Project



A notable advantage to implement this recommendation is that the project already has a large number of mechanisms and products that can be used directly, as well as enough time to prepare new ones if identified as necessary. The ordering and use of these mechanisms will allow a greater efficiency and effectiveness of the communication and training process.

The existence of indications of unforeseen impacts was evidenced during the evaluation, for example the development of educational and training activities in the absence of the project team or without resources provided by the project. At the same time, it was mentioned during visits continued use of educational infrastructure, communication materials and preparations education offered by the project in activities that were not promoted or financed by the “Manglar Vivo” project. These are positive evidences of the impact of the project, however, they are not properly documented and systematized, possibly because the PRODOC indicators are exclusively performance indicators.

2.- Collect tangible evidences that show the achievements obtained by the project.

During the assessment mission verifiers commitments to communities and schools and universities they were requested to validate the results mentioned by team members or by



interviewees or workshop participants. In some cases, for example, universities mentioned that there are two cooperation agreements; however, in some cases appear to be missing specific verifiers.

The evaluation team interpreted this as a reflection of the enthusiasm of the team to progress with work and not consider each step the need to document the results with verifiers, which can be caused by one more of the following factors: (a) lack of human resources or time, (b) lack of training in project management, and (c) PRODOCs little consideration of this process during project implementation.

Product of this analysis was recommended:

- Design a monitoring system for PRODOC and its implementation that guarantees having verifiers for all indicators.
- To collect verifiers of all achievements to the present.
- To consider complementing the Logical Framework with viable performance indicators to obtain in the rest of the life of the project.
- To consider the possibility of AMA-CITMA collaborating by placing a part-time official (50% of its time), dedicated to ensure the follow-up of the matrix of project indicators.

Currently M & E monitoring is a function of project coordination, but in our opinion there should be additional support given the large number of activities that require operational follow-up to obtain verifiers can easily distract the coordination of the strategic or sacrifice the availability of all documentation that will be required in the final evaluation.

3.- Establish mechanisms to measure the impacts of communication strategies and project ownership.

To accomplish this, as explained above, it is recommended to supplement the ML PRODOCs with impact indicators and gather information to allow verification and measurement. Appendix 9 includes a ML suggestion that includes impact indicators.

4.3.3.- Component 3

This component seeks to ensure the effectiveness and sustainability of adaptation investments by establishing a facilitating environment at the regional level. With the fulfillment of component three, the effectiveness and sustainability of adaptation actions must be ensured by establishing a favorable environment at the regional level. It focuses on two fundamental products: institutional strengthening at the government level (six municipal and two provincial governments), control organizations and governmental supervision bodies (Rangers and Coastguard corps) and the productive sector (Fisheries Inspection Office and forestry sector mainly) and the estimation of the cost - benefit ratio of the application of the Ecosystem - Based Adaptation (EBA) approach by governments as



the main measure of adaptation. If the economic valuation is adequately achieved, this will be a fundamental component for the long-term sustainability of the project and its extension to other areas.

3.1 - Consolidated information about the costs and benefits of ABE available to decision-makers and planners

The economic valuation will be carried out to establish the costs and benefits of the EBA at the landscape level. There is a great gap in the knowledge of the economic value of ecosystem services of coastal ecosystems in Cuba, which makes it difficult to identify the potential economic cost of the impact of CC and human activities that degrade these ecosystem services and reduce the resilience of these systems, and its value is underestimated by decision makers and controlling entities.

The aim is then to carry out studies to fill these information gaps and thus to know the possible economic impact that the CC may have on local communities (by gender and age) and how this can be mitigated with an EBA approach. In addition, the study aims to establish a comparison between the costs and benefits of possible interventions to be developed in the coastal zone, including 1) EBA approach (current project) 2) Construction of retaining walls or other structures 3) Relocation of human settlements and associated infrastructure to the interior of the coast. This result will allow decision makers to be able to establish the ecological, social and economic costs of different management decisions, so that the EBA approach can be applied knowing its impact in the short and long term.

The information presented in these studies and the ability to conduct similar studies in the future will equip decision makers with tools to make decisions about the EBA approach to address the CC based on economic arguments and increase local support for these decisions.

3.2 - Strengthened institutions (municipal and provincial governments, Ranger Corps, Coastguards and Fisheries Department) that support ABE actions, within the structure of updated and actively implemented action plans.

Currently in Cuba provincial and municipal governments must include in their development plans measures to adapt to the effects of climate change. The project contributes effectively to the fulfillment of this governmental directive, contributing to the adequate support of the EBA approach in the coastal areas under its administration.

The development of knowledge management systems will also contribute to its effective implementation; this includes monitoring the progress and impacts and systematizing the lessons learned.



According to the logical framework, the project provides logistical support for the knowledge management by institutions in the academic sector (IES, INAF) to the productive sector (forestry companies) as well as the elements to determine the state of legal protection of the mangrove at national level and which will have strict protection at the local level.

The success of this component was established through three indicators:

- 1) The frequency of training activities and technical support to coastal communities carried out by the provincial and municipal governments to incorporate the EBA.
- 2) The frequency of the inspection activities to the coastal areas carried out by the provincial and municipal governments to incorporate the EBA.
- 3) Number of studies and methodologies carried out to estimate the cost - benefit ratio of the application of the ABE approach, available to planners and decision makers.

The first indicator takes into account the frequency with which the training and technical support activities to coastal communities are carried out by local governments in order to incorporate the EBA approach. The second is related to government control activities and refers to the inspection activities carried out by the municipal and provincial governments to incorporate the EBA approach.

All the institutions involved in the project actions and the EBA approach (Provincial and municipal governments, Ranger Corps, Coastguard and Fisheries Inspection Office) must come out strengthened and with case studies, new regulations and methodologies.

The third indicator of success will measure, because it has not yet been established, the acquisition of a new working tool, through the economic valuation that will allow them to estimate the costs and benefits of the EBA approach, to make it available to decision makers. There are no baseline precedents in any of the indicators.

Progress of results

Among the most relevant results are the following:

Indicator 1.-

- Elaborated guide for the inspections with EBA approach, which is in validation as a work instrument for the provincial and municipal governments.
- Concluded the legislative compendium related to the protection and sustainable management of coastal ecosystems.
- Three trainings related to the current regulatory framework, and 3 others in prevention and confrontation of forest fires were done.
- 113 prevention actions developed in coordination with local governments to prepare communities for the critical period of fires.



Indicator 2.-

- 3 comprehensive inspections were carried out, involving the regulatory authorities of the territory; as well as, 83 maritime and 180 terrestrial tours in function of supervision, all of them have been favorable to the ecosystem restoration process and the sustainability of the ABE with the alliance of the Ranger Corps, Coastguards, State Forestry Service and the Fisheries Departments.

Indicator 3.-

- Completion of the information survey for the baseline of the economic valuation studies of the entire coastal strip and a map with the information required to carry out the economic valuation studies.
- 4 trainings were carried out 2 in provincial governments and 2 in municipal governments for specialists from different institutions, increasing the number of people trained at the provincial and municipal levels.
- No studies and methodologies have been made available to planners and decision makers to estimate the cost-benefit of applying the EBA approach, reflecting some delay in the scope of this indicator. It is recommended that in the planning of the third year of implementation, special attention should be paid to the progress of this aspect.

Adaptive Management

With the objective of encouraging the accomplishment of the 3 component in the second PPR (2016), a new indicator is added: "Number of studies and methodologies carried out to estimate the costs and benefits of implementing the EBA approach available to decision makers, already identified as a result of PRODOC.

The activities for the consolidation of the information on cost benefits, despite the fact that the country has identified it as a priority, are behind schedule. It is necessary to build capacities at all levels, with greater emphasis on territories, which will be the future users and beneficiaries of this important tool to make decisions in the territories they administer.

The process of gathering information is complex, which requires time, which is why the training of personnel has been given a higher priority, the accompaniment by national institutions, strengthening the integration with the academy and stability of the work team.



4.4.- FINANCIAL AND ADMINISTRATIVE MANAGEMENT.

Execution of the Budget;

According to PRODOCs budget it is programmed component with a high level of intervention in Component 1 (72%), component 2 (12%), component 3 (9%) and management component approximately 6%, as shown in Table 4.

Table 4 .- General Budget Summary PRODOCs.

COMPONENT	PRODOC	PERCENTAGE (%)
Component 1	4,020,000.00	71.89
Component 2	700,000.00	12.52
Component 3	500,000.00	8.94
Management 4	372,000.00	6.65
TOTAL	5,592,000.00	100.00

The review of budget execution by component based on the data provided by the implementation team (Table 5) shows that;

- Component 1 is the most under-executed.
- Components 2 and 3 are executed above the PRODOC programming.
- To carry out the aforementioned points, it is recommended to make a strategic reprogramming process as a result of this EMT.

Table 5. Progress of the financial execution of the “Manglar Vivo” Project.

COMPONENT	Spent 2014	%	Spent 2015	%	Spent 2016	%	Cumulative 2014-2016	%	AOP 2017	%	Balance PRODOC	%
Component 1	0.00	0.00	334,890.33	50.40	417,722.61	54.31	752,663.34	51.78	1,218,100.00	73.76	2,049,236.66	82.40
Component 2	7,039.95	35.29	143,836.58	21.65	147,254.07	19.15	298,187.54	20.51	163,600.00	9.91	238,212.46	9.58
Component 3	6,577.27	32.97	101,931.04	15.34	166,350.04	21.63	274,906.66	18.91	202,500.00	12.26	22,593.34	0.91
Management 4	6,332.24	31.74	83,745.77	12.60	37,771.53	4.91	127,893.89	8.80	67,200.00	4.07	176,906.11	7.11
TOTAL	19,949.46	100.00	664,403.72	100.00	769,098.25	100.00	1,453,651.43	100.00	1,651,400.00	100.00	2,486,948.57	100.00

The project, in spite of its delays in financial execution, due to the evaluation team's opinion to external factors, has successfully managed to adapt and progress in the performance of its activities; therefore it is not considered that this compromises the results to the life of the project, rather represents a good opportunity to exceed the expectations of implementation in the remaining years.



It is worth considering the fact that even though the counterpart has not been valued for each component separately, according to the data of the counterpart contributions discriminated by their sources, it can be concluded that these are more focused on Component 1. In contrast, components where the counterpart is presumably lower have higher levels of performance.

The information reported by the Implementing Team on the counterpart is not discriminated by component. However, because it mainly covers salaries of forestry companies and the State Forestry Service and inputs for planting mangrove, we assume that this contribution corresponds mainly to component 1.

This means that by 2018 the implementation by component will have to be reviewed and the necessary arrangements made to guarantee the authorization of UNDP to have sufficient resources for the normal execution of the project in all its components from now until the end of the project. For which a strategic reprogramming exercise would be very useful.

The administrative management of the project in general is good but not escape limitations and administrative challenges mentioned in section 4.1. Two issues in particular draw attention during the mid-term evaluation, the first related to budget sub-execution at the time of the evaluation and the second related to over-execution of the counterpart budget.

Budget sub-execution;

There is a high budget sub-execution. In May 2017, latest data log on ATLAS system, show execution of US \$ 1,453,451 was recorded, this represents a sub-forecasting on programming and disbursements for the year 3 approximately 2,491,278. 2017 execution of US \$ 1,300,000 was estimated. If the PMU manages to run the entire budget for this year, according to contracts and acquisitions in progress, the underspend would be reduced to approximately US \$ 1,171,329 in accordance with the contract and procurement records displayed by the PMU. By September 2017, they were executed approximately US \$ 727,834.00 according to ATLAS (information provided by UNDP) and approximately 840,000 US dollars according to contracts and procurement process, reviewed the implementation team. If these data are confirmed and recorded in ATLAS execution for 2017 to approximately 21% of the total budget will be reduced.

They have justified the delays in implementation in several facts that could be checked, for example:

1. The start of the project outside the fiscal year created difficulties for the initial implementation.



2. The agreements with the institutions responsible for the implementation of the project in the field took more time than expected.
3. The adjustments for the revision of the mangrove technical worksheets, nonexistent before the project, took time to be formulated and formalized.
4. Some particular equipment costs were overestimated during the design PRODOCs and resulted in significantly lower costs for the project, for example, tractors, boats, engines or vehicles.
5. There was a change in the importing agency during the course of the project, which required an initial period of training and learning both in the new importing agency that had no experience with the equipment and supplies for this project, as well as in the administrative personnel of the project, which generated arrears. In addition, the agency that initially handled acquisitions had both workload inevitably delayed procurement for this and other projects in the country. This greatly affected the purchase of inputs in 2014 and 2015.

In the year 2015-2016 there was a change in procurement policies. This change established that each government organization, including AMA-CITMA would be responsible for having their own import agency. The import agency of the AMA-CITMA, (EMIDICT) had no experience in the procurement of products and supplies that the project needed, for example, agricultural and forestry products and equipment, boats or other high-cost inputs that were not cataloged. All this process of transition and learning has directly impacted the possibility of implementation in the years 2015 to 2017. For example, with the PMU, the documentation of purchase of a boat, water quality measurement equipment, as well as various materials for firefighting and the challenges involved were verified.

Even though specific recommendations have been made to overcome these challenges and speed up execution, it is clear that a delay of this magnitude is difficult to overcome by the end of the project date, so it is recommended to explore the possibilities of a free extension for the project from 6 months to a year. However, the PMU in recent conversations, after the evaluation and before the delivery of this report, has insisted that with the proposed purchases and accelerating implementation can achieve the full execution of the budget at the scheduled time. This recommendation is consistent with the possibilities of extending the time or financial effort to implement technical recommendations, especially in component 1 and 2, through a proposed strategic reprogramming.

Co-financing Implementation.

The first fact that drew attention was that the counterpart was not established in detail in the PRODOC. Throughout the document, especially the budget disaggregated with narrative was mentioned in multiple lines that the funds would be supplemented with sources such as; (a) human resources, (b) partially fueled, (c) office facilities and equipment, as the main



elements. However, the PRODOCs not establish a concise summary table and the amounts for institution counterparts.

To the date of mid-term evaluation it was identified that all of the funds offered in return, were already implemented and exceeded. Based on the documentation, a counterpart of US \$ 5,044,400 was established for which no specific source was established. The PMU reported contributions for a total amount of US \$ 7,184,567.93 (Table 6).

Table 6. Detail of the value and types of counterpart contributed by Cuba, discriminated by institution

Co-financed Entity Name	Type of co-financing	Amount co-financed at the date of authorization CEO (US \$)	Amount actually contributed to the Mid-Term Review Date (US \$)	Actual percentage (%) of the expected amount
Institute of Agroforestry Research (INAF)	90% salaries and 10% goods		\$ 93,872.00	1.31
State Forest Service Artemisa (SFS ART)	90% salaries and 10% goods		\$ 1,920,482.23	26.73
State Forest Service Mayabeque (SFS MAY)	90% salaries and 10% goods		\$ 4,623,200.00	64.35
Environment Agency (AMA)	90% operations and 10% Wages and goods		\$ 196,313.70	2.73
TOTAL		\$ 5,044,400.00	\$ 7,184,567.93	142.43

The counterpart was contributed in different proportions by the following agencies: (a) Institute of Ecology and Systematics (IES) approximately 4.88%, (b) Institute of Agroforestry Research (INAF) approximately 1.31%, (c) Artemisa Forest State Service approximately 26.73 %, (d) State Forestry Service Mayabeque approximately 64.35%, (e) Environmental Agency (AMA) approximately 2.73%.

The data shows that forestry companies and the Ministry of Agriculture were the main contributors of co-financing. Additionally, due to the distribution of costs in these cases, forestry companies and their supervisors spend the most time on project implementation.

The main justifications for the advance execution of the counterpart were:

- State companies, faced with delays in acquiring equipment at the beginning of the Project, frequently provided support in equipment, machinery and labor.
- Salary reclassification prepared by the Forest Technical Service for workers in the mangrove. During the formulation of the project, the personnel working in the agricultural and forestry sector earned average of between 250 and 300 CUP per month. The reclassification of the work in mangroves, which obeys to the demands



of the work and to the difficulty of access to the mangrove, reviewed the technical data of work reaching a value of up to 1200 pesos per month. By quadrupling the salary for field labor, cofinancing was increased in particular for the positions that work in the field, for example of forestry companies, which represent a high proportion of the co-financing of most institutions except the AMA, this mainly in salaries

It is recommended that the support provided by the organizations involved continue to be provided during the second phase of the project in order to continue with the achievements so far reached and multiply them. Therefore, even though the counterparty has been exceeded, resources and inputs provided are as important to the successful implementation that will require by the end of project implementation.

4.5.- STEPS TO FOLLOW FOR THE IMPLEMENTATION.

This project presents a seemingly paradoxical situation has achieved a satisfactory compliance despite significant budget underspend. The following describes the factors that have contributed to creating these conditions, as well as the proposed measures to ensure the total execution of the committed budget within the established period.

The answer is complex and long because it has multiple factors. Although throughout the evaluation process evidence is given as to the reasons and follow-up measures are recommended, it is pertinent to summarize below the considerations discussed with the PMU in this particular regard.

In the first instance, budgetary under-execution is primarily due to the delay in the importation of equipment, which is coupled with over-execution of co-financing. It is correct to expect a higher level of field achievements if some equipment had been available for work, as an example, the chainsaws have not yet been acquired and had done so when the elimination of invasive alien species and rehabilitation of the forest were planned. of swamp would have gone faster. However, the active participation of government organizations, forest companies and local actors have compensated for this lack of equipment and justify the goals achieved to date are well justified. Moreover, some Cuban entities have lent their stocks teams to advance some of the activities.

The initial planning was made taking into account the major costs are incurred in years 2, 3 and 4, to face possible delays in procurement systems. To date, the project has had significant changes in expenses, for 2016 there was an execution of 769 thousand US \$ and for 2017, base on PMU Information, it rose between 1,258 and 1,300 thousand US \$, for more than 160% increase, readjustments of the plans for the following years ensure the expenditure of the remaining budget.



Recently, the project implementation unit informed the evaluation team leader at the end of December 2017 that most of the equipment has already been acquired and only delivery is pending to record the expense. It is very important that UNDP verify these levels of execution to formalize these progresses.

Considering, all the described aspects, as well as the additional considerations made by the evaluation team, which will represent additional expenses, it is expected that the changes produce the necessary acceleration to improve the budgetary execution and, if possible, increase the expected results in key indicators of some components, for example those related to the rehabilitation of swamp forests and communication issues. This is an urgent strategy for the implementation of a strategic re-planning to incorporate the recommendations proposed during MTE.

The Midterm Evaluation team has not had access to the specific details of the readjustments proposed by the PMU for the year 2018, because they are in the process of being approved. The interpretation of the PMU answers to questions related to project performance once acquired the equipment described above is to achieve at least;

- Have a communication strategy with better materials and better-established audiences, therefore with a greater impact than originally expected.
- An increase in the number of hectares under management of the Swamp Forest.
- Development of an intervention protocol for the rehabilitation of mangroves.
- Establish which interventions are most effective for the rehabilitation of mangroves.
- An increase in the number of rehabilitated hectares of mangroves.
- A better integration of the concept of EBA in the municipal and provincial development plans with specific actions.
- Have a record of impacts of different project outputs.

To confirm these expectations and to define more clearly the expected achievements, it will be necessary to develop the strategic re-planning process.

4.6.- EXECUTION OF THE PROJECT AND ADAPTIVE MANAGEMENT.

4.6.1.- *Management Mechanisms*

The Project has taken place in a highly variable environment. For example:

- The “Manglar Vivo” Project is immersed in a novel process called “experiment of public administration of the Artemisa and Mayabeque provinces”, which is pioneer in the country. At the same time, it must coordinate with the central administrations due to its funding nature (UNDP/AF).
- The project has gone through decisions and institutional changes that include changes in administrative and importing procedures. The latter is quite important



because most of the project's inputs are imported due the lack of suppliers in the country.

- The project team itself has undergone changes such as the change of director, the incorporation of a consultant and the entry of new technical personnel. Some of these changes happened only 6 months or less ago.
- Due to administration and project management mechanisms in Cuba, the project's technical staff is assigned a job and responsibilities in the project, but they also maintain work responsibilities in the agencies where they belong to. Therefore they must continually balance the demands of the project needs and those of their own institutions.

In this context, it should be noted that the response and adaptation capacity of the project team is impressive and positive. The team's adaptive capacity in the field, to address the challenges associated with the restoration of the mangrove, has also been evident. However, the recommendation to make a more formal process in component 1 is reiterated. This formalization will allow a better quantification of the individual effects of each of the field treatments that are being progressively incorporated.

In a similar way, work with the communities and with the organizations and forest companies has shown the team's capacity to organize along the way the plantation technical specifications, and other administrative and technical processes necessary for the performance of the project tasks.

The adaptive and learning capacity shown by the project and its actors must be widely recognized and stimulated, as well as guided by close technical support from the participating agencies, particularly the AMA, CITMA and MINAGRI. This condition is a notorious advantage during the monitoring of these MTR recommendations.

4.6.2.- Project Planning.

According to the PMU and some of the project's beneficiaries, the planning of project activities stems from each project component manager's leadership. Component managers are responsible for engaging stakeholder representatives, with whom they coordinate directly.

The approach currently used is important but not sufficient and it is recommended that, to create sustainable conditions for the project's management, an annual workshop with stakeholders be conducted. Such workshop would have two phases:

- A first phase for presenting and showing the previous years' results and validating the scope of the results,
- A second phase for sharing, adjusting and validating the proposed work plan for the following year that has been prepared by the component leaders with their respective field partners.



The purpose of doing these exercises is to achieve full ownership of the process, create conditions for long-term sustainability and set commitments for the execution of the project and for the participation of stakeholders in monitoring and evaluation.

4.6.3.- M & E systems or project management.

The Project Management Unit indicated that the project has a database that compiles most of the documents and products completed or produced thus far. The database also grants team members access to work instruments and tools. However, there is no formal system for project monitoring, evaluation or adaptive management. Nor was it possible to access the database.

Importantly, despite the lack of a formally established M&E system, it is notorious that the project team prepared very well for the mid-term evaluation mission, framing its management and results in the PRODOC's terms and indicators. This was achieved in spite of the short time that several of the PMU members have in their current roles.

It is recommended in the MTE that a project M&E system be established. Such system should be based on the PRODOC's indicators, with the collection and organization of result verifiers being summarized by project objective as established in the PRODOC. But it should also expand to include and measure its impacts, as recommended in the proposed extension of the Logic Framework. Furthermore, it is recommended that a Knowledge Management System (KMS) is put in place and that both the M&E and the KMS are used in the project's adaptive management.

4.6.4.- Involvement of the interested parties.

It was observed and verified during the MTE that there is a broad understanding of the stakeholders of the issues promoted by the project and the relationship of the same with the national policies and with their own management.

Particularly in component 2 emphasis is placed on efforts to promote materials, classrooms and other communication mechanisms to achieve an important understanding of the parties. However, beyond the communication instruments, the level of participation and understanding of the project was evident during the consultation workshops held in the two provinces (Appendix 9).

The responses and proposals of the participants of these workshops demonstrate an important level of involvement of the actors. It will be important to deepen in this process. For example, that local actor becomes more actively involved in the formulation of work



plans in the future and in the monitoring of their implementation and results, as well as in monitoring and evaluation tasks.

The UNDP is an active and constructive actor in the development of the project, it was evident during the meetings and interviews, in addition to the observations of the evaluation team, that the administrative team in particular the person in charge of budget and procurement, has a very close relationship with the UNDP team.

The representatives of UNDP showed a clear management of the project, its terminology and the importance of institutional relations and their functioning mechanisms.

4.6.5.- Information and Communication.

It is evident that there are numerous communication tools and activities to promote the work of the project, both from the point of view of providing information in different formats, such as the provision of facilities for education and communication.

With the purpose of improving the efforts of using each of these available tools, through the design of a communication strategy process that allows to identify the following elements:

1. Definition of communication objectives and training.
2. Establishment of the main audiences.
3. Establishment of messages by audience in particular.
4. Select the most appropriate means of communication for each audience.
5. Selection of existing products or possible development of new products if considered necessary.
6. Establish a monitoring and evaluation system to measure the results and their impacts

Based on this process, it is recommended that in the years to complete the project, the use of the products that need to be developed to complete the work will be designed as well as the most effective use of the existing products

4.7.- SUSTAINABILITY

4.7.1.- Environmental Sustainability (component 1)

In the long-term national scale, it is anticipated that the activities of this project will mesh with those of the implementation of the Tarea Vida. Should this synergism come to fruition, the project would have the enabling conditions and the necessary support to give continuity to the restoration activities. In fact, the project has already worked on the implementation of mangrove restoration practices in Havana and in the province of Guantánamo. On the



other hand, this project should be more formally coordinated with the BASAL project and in the near future with other projects designed to restore the mangroves aquatic component, since these are fundamental for the balance and sustainability of the region's fishing resources.

At the local level, project components have been transforming the mindset of the region's inhabitants and the authorities to continue to rehabilitate the red mangrove and swamp forests. For example, according to Engineer Fernández Moreno, EAF Artemisa Technical Specialist, strategies for sustainability in your province are to (a) continue the work contained within the project by the EAF, (b) maintain within the Economic Technical Plan restoration activities; and (c) maintain the institutional support that guarantees the continuity of the financing for all the restoration work.

It is important to note that there is a greater awareness of the importance of the mangrove and IAS than of the coastal forests. Therefore, unless efforts are increased in the project, to raise awareness on the importance of coastal forests, actions on the latter are unlikely to be sustainable. These efforts should be included as part of the fulfillment of indicator 1.4 for the restoration of coastal forests, which is the indicator with less progress towards its goal in component 1. In particular, it is worrisome that the project is currently looking to generate income from the IAS harvest but there is no exit plan for when both Tropical Almond and casuarina wood is exhausted and villagers choose to harvest the saplings of those species of interest that have been planted and are under development in the coastal forests.

Another important aspect for sustainability is the incorporation of the dimension of adaptation to climate change in combination with mitigation strategies. An important product marketed by forestry companies is coal (especially from wood harvested during this project), which produces carbon emissions during both production and consumption. Therefore, it is very important to explore the possibility of quantifying the carbon balance of environmental restoration and the impact of emissions of its by-products as a first step towards producing and marketing carbon-neutral products.

4.7.2.- Social (component 2)

Component two is aimed at creating enabling conditions based on information on the development of ABE concepts for the effect of climate change in the southern area of the provinces of Mayabeque and Artemisa, as well as on local knowledge by both interested social groups, and by the authorities responsible for resource management in the two provinces and their six coastal municipalities.



It was clear from the review of the material and documentation provided by the project team that has largely fulfilled the purpose of developing tools for information dissemination.

There are means of work, classrooms established and / or equipped and in addition to audiovisual media, such as print materials. PPR reports and information provided by the project team said it has met and even exceeded the number of training events in the project area. They were a good knowledge and understanding of the authorities interviewed, technical institutions and interviewed enterprises and participants of the workshops and during field trips on the importance of mangroves, their functions and value to protect further evidenced of climate change.

An important aspect for sustainability, however, is the verification of overall achievement, for which a series of surveys is required to compare the results of the initial surveys, carried out by the project to determine the change in knowledge as a direct effect of project interventions.

On the other hand, it is very important that the municipal and provincial plans mention, the EBA and the importance of the mangrove, as confirmed in the documentation reviewed after the evaluation mission. However, it is necessary to verify that the actions and decision making of the authorities, as well as the activities and management practices of the different stakeholders in the project implementation area have changed. It is necessary to ensure that the project team monitors these changes and has verifiers prior to the final evaluation of the project.

4.7.3.- Institutional (component 3).

The social and institutional sustainability of the EBA approach to mitigate the effects of the CC is based firstly on the integration of this approach into the government development plans at the municipal and provincial levels, which promotes that the government is the first responsible for achievement among the agencies involved. This should contribute to the creation of a knowledge management system supported by the research centers linked to the project which guarantees an adequate flow of information for decision making from the government headquarters until the community.

Sustainability is based on the fact that they will be carried out by well-established permanent institutions in Cuba, which include the provincial and municipal governments, the Ranger Corps, the Coastguards and the Fisheries Inspection Office, while the existing community organizations will be the channels through which the information should flow.

An important premise for the sustainability of the project is the demonstration that the EBA approach has a better cost / effectiveness ratio, which is mentioned in components 2 and



3. Once the economic valuation has been carried out and its results have been duly widespread, it must be an extremely valuable tool for decision-making both in the intervention area and in other areas of the country with a similar situation.

4.8.- RISKS FOR THE SUSTAINABILITY OF THE PROJECT.

4.8.1.- Financial.

The main financial risks that were found were:

- Local organizations do not have the financial or technical possibility to maintain equipment purchased with project resources.
- Local governments or the organizations involved in the implementation do not have the necessary resources to maintain the equipment and replace it when necessary.
- Given that labor cost increase as result of the technical data sheets for mangrove workings, there is a risk that they will later be changed for different reasons, which could generate discontent among forest workers. This should be established with the relevant authority.
- The disproportion in the levels of financial execution by component found in the PMU could cause disproportion in the achievement of results in the rest of the life of the same.

4.8.2.- Economic Partners.

- There is a risk that a fall in the prices of export products such as coal discourages sustainable management and encourages the unsustainable use of the forest resources of the swamp forest or mangrove forests.
- It seems that the technical data sheet for work in mangroves has a fairly high remuneration compared to other fieldwork and even to professionals of higher academic level in Cuba. This has been one of the success factors in stimulating work on these issues and in these areas, but also poses risks to the sustainability of the project and its interventions if these conditions are not maintained.

4.8.3.- Risks faced with the legal institutional framework.

- As indicated in the corresponding section, mangrove management through EBA is a very long-term process, which must be adopted through an explicit institutional agreement that is currently non-existent at the national and provincial levels.
- In municipal or provincial development plans for mangrove conservation through EBA, we do not have evidence that there is a requirement for an operational work plan that clearly defines the activities, its associated budget and its verification and monitoring program.
- Continuous use of the knowledge management tool is required, which at this time is not available for decision making. Their absence jeopardizes the work in the mangrove forest by decisions taken without considering these criteria.



4.8.4.- Environmental.

- There are potential catastrophic climate change-related events such as storms or hurricanes that are becoming increasingly intense, and which could jeopardize the investments made by the project.
- Methods used to-date to rehabilitate or restore the mangrove has not been tested under current conditions. Therefore, there is a possibility that their effectiveness is not as expected.
- Due to the slow growth and natural stabilization of the mangrove forest, there is the risk that, after the project ends (i.e., 5, 10 or 15 years later), the essential conditions for their establishment cannot be ensured, thus there is uncertainty about the recovery of their resilience and fulfillment of their expected function of stabilizing the coast and reducing floods and other negative effects of CC.

4.9. RATINGS FOR PROGRESS TOWARDS SUCCESS.

Ratings were made based on the criteria established in the Guide for the Preparation of the Mid-Term Review in Projects Supported by UNDP and financed by the Adaptation Fund (AF). This table complements the table of performance indicators according to PRODOCs and the ML located in Appendix 9.

Criteria:			
1. 1. Monitoring and Evaluation	Ratings	2. Execution of the IA and EA	Ratings
Design of M & E at the beginning	MS	Quality of UNDP implementation	S
Implementation of the M & E Plan	S	Quality of execution of the Executing Agency	S
General quality of M & E	S	Overall quality of implementation / execution	S
3.Evaluation of Results (Outcomes)	Ratings	4. Sustainability	Ratings
Relevance	HS	Financial resources:	P
Effectiveness	S	Socio-political:	HP
Efficiency	S	Institutional framework and governance:	HP
Overall Results Rating (Outcomes)	S	Environmental	P
		Overall probability of sustainability:	P

Note: Ratings are based on 6-points scales as follows: Highly Unsatisfactory (HU), Unsatisfactory (U), Moderately Unsatisfactory (MU), Moderately Satisfactory (MS), Satisfactory (S), and Highly Satisfactory (HS). In terms of project sustainability, ratings are based on a 6-points scale that ranges from Highly Unlikely (HU) to Highly Probable (HP).

Overall, the design of M & E project is satisfactory and the performance of project implementation is satisfactory to highly satisfactory, while in terms of results is satisfactory (Table 7), based on the criteria of the evaluation team. Specific details on the performance of the activities can be seen in Appendix 9. On the other hand, sustainability is considered



highly probable or probable in all cases. Of course this does not mean that no lessons learned or specific recommendations to improve performance to ensure that all results are met by the date of the final evaluation.



V.- RECOMMENDATIONS AND LESSONS LEARNED.

Following is a synthesis of the project's level of progress towards results and recommendations for corrective measures (if any) in the design, implementation, and monitoring and evaluation in the project's final phase.

5.1.- RECOMMENDATIONS

Below are the main actions proposed by the MTE evaluation team and aimed at reinforcing the project's benefits, along with guidelines for achieving the main objectives and an analysis of best practices to address the issues of relevance, performance and success. These recommendations have not been built by project components but rather by the most important processes for achieving the project's goals for the final evaluation with a criterion of excellence.

5.1.1 Measures to improve project design

- Complement the logical framework by adding broader assumptions, linking SMART objectives with threats and incorporating impact indicators.
- Carefully map all intervened areas in each stand and individually mark all planted or sowed propagules to improve monitoring and evaluation of plant survivorship and establishment and quantification of the effectiveness of the interventions, and to guarantee transparency at the time of the final evaluation.
- Hire an expert in experimental design to assist in the formulation of activities (project interventions), to allow:
 - Evaluating the most effective and efficient treatments and practices.
 - Determining criteria for each intervention.
 - Discriminating the success factors of each strategy.
 - Establishing mechanisms for replication.
 - Identifying mechanisms for long-term sustainability (see Appendix 8).
- Keep a quantitative and spatially explicit record of all other tasks performed in the mangroves, such as clearing channels and crown thinning and seedling removal of black mangrove, in order to incorporate this information into the management, monitoring and control protocols and in the cost-benefit analyses of the interventions.

5.1.2.- Measures to improve financial performance through;

- Make an effort to achieve acquisitions in the next two years to accelerate execution during 2018.
- Determine, in the fastest and most expeditious manner, the convenience of strategic re-planning based on the PMU and with a view to finalizing it.
- Ensure the review and adjustments of budget execution by components (strategic replanning), which allows achieving without limitation;
 - Accelerate the execution of Component 1, particularly indicators 1 and 3 without neglecting the scope of the rest of the indicators.



- Excel the development of the execution of Indicator 3 of Component 2 without neglecting the monitoring of compliance of all the indicators to the life of the project.
- To Speed up the agreement with the Agrarian University of Havana, to achieve the execution of indicator 3 of Component 3, without neglecting the monitoring of compliance of all the indicators to the life of the project.
- Look for mechanisms to accelerate results with external technical assistance in specific areas such as:
 - Establish a working protocol for interventions in the mangrove.
 - Design of the communication strategy,
 - Economic alternatives to increase social resilience
 - Mangroves Economic valuation and its application.
- Explore by the end of 2018 the possible need of a no-cost extension of the project.

5.1.3.- Measures to ensure compliance with the goals of the project life:

- Maintain the pace of work of all the components, but make sure to promote the following goals:
 - Harmonize and update the compliance data of indicators 1, 2 and 4 of Component 1, to determine in which it is necessary to accelerate the interventions.
 - Accelerate the development of the execution of indicator 3 of Component 2.
 - Accelerate the agreement with the Agrarian University of Havana, to achieve the execution of indicator 3 of Component 3.
- It is proposed to hold at least an annual meeting between the project team and the groups of interest or participants in order to:
 - Analyze the performance of the previous year
 - Formulate the POA for the following year.
 - Promote the commitment of the participating actors to the implementation of the POA and the monitoring of their actions.

5.1.4.- Measures to improve performance and verification.

- Obtain an expert in the formulation, administration and evaluation of projects that trains personnel on M & E systems, but that collects, at least, the following documents:
 - Files of all the documentation produced by the project.
 - Files of verifiers of the scope of all the results achieved by the project.
 - Files that document those results and impacts of the project interventions, which were not anticipated by the project nor were they produced by direct project investments.
- Ensure that each PPR report has verifiers for each indicator in a physical and digital manner.



- Appoint a member of the implementing team as responsible for maintaining an updated file of all the verifiers of each project indicator with a view to the final evaluation.
- Keep copies of all your files, products and verifiers in printed and digital format in at least two separate sites or servers, to guarantee the integrity of the information and make updates of the minimum information every two months.

5.1.5.- Measures to improve the impact and its verification.

- Formulate a communication strategy, based on the recommendations of this MTE and reorient the use of existing means and materials, as well as the development of new products and means to communicate the scope and results of the Project.
- Measures to improve the understanding of the value of the ABE approach in the mangrove and its adjacent ecosystems through:
 - Relationship of the project works with the goods obtained from the mangrove or its adjacent ecosystems, particularly fishing, coal, forest and non-forest resources of the ecosystem.
 - It is necessary to develop a greater awareness of the value of swamp forests to achieve mangrove conservation objectives as part of the ABE approach, reinforcing associated products such as the production of honey, charcoal and other forest and non-forest forest products.
 - It is recommended to use economic valuation as an instrument of communication to impact the decision-making sector and local communities.
 - Use the results of the economic assessment to compare the ABE method with other coastal protection methodologies in Cuba.
- It is recommended that the team maintain copies of all its files, products and verifiers in printed and digital format in at least two separate sites or servers, to guarantee the integrity of the information and make updates of the minimum information every two months.

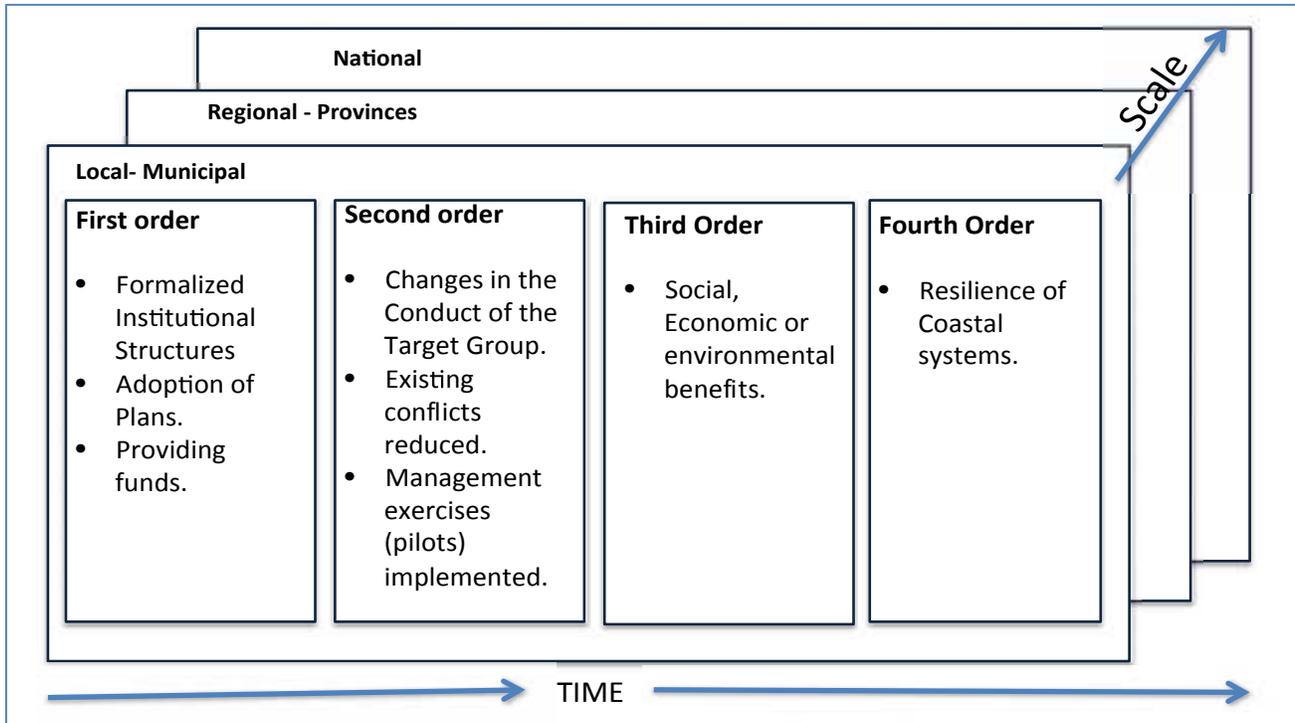
5.1.6.- Measures for the sustainability of the project impacts.

- It is required to formalize the intervention protocols to ensure the possibilities of replication and increase in the scale of implementation:
- Find that the “Manglar Vivo” Project is established as an useful experience for the implementation of the TASK LIFE and streamline its management.
 - It is recommended that economic alternative activities contribute to the carbon neutral balance. For example:
- Develop alternative productive activities in swamp forest with a neutral carbon footprint, which can be compensated with the recovery of the basal forest area.
 - Increase the efficiency of coal production to reduce its carbon footprint, and planting the mangrove until there is carbon produced with a carbon neutral footprint will mitigate the residual footprint. This carbon neutral footprint



could be certified and exported with an over-price that pays for mangrove planting or enrichment of the swamp forest.

- Incorporate the social resilience concept, which involves the economic alternatives that the project is currently working almost imperceptibly.
- It is recommended to make a classification of results according to the MCI methodology.



5.2.- LESSONS LEARNED

The main lessons learned and their value to reinforce the adaptive management actions that were identified as part of the project's mid-term are summarized below.

5.2.1.- About the project design.

- It is very important that the project formulation considers the upstream and downstream management effects of the intervention area; regardless of whether they are considered in the design of the interventions.
- Project indicators should include impact indicators to improve understanding of long-term sustainability potential.



5.2.2.- On the management and administration processes.

- The project must align the years of execution with calendar years from the beginning of its implementation.
- Procurement processes and their scope must be considered in planning.
- Communication materials and actions should be part of a strategy guided by the messages that you want to send and the audience that will receive them.
- Maintaining a physical and digital file with at least two copies minimizes the risks of information loss.
- It is important to maintain and update the data periodically, at least every 2 months.

5.2.3 On the implementation of the project.

- Revision of labor technical files (salaries) was a success factor to achieve the interest of the productive groups.
- Social resilience is not limited to the protective nature of ecosystems against climate change; it also incorporates attention to aspects related to the adaptation of the livelihoods of local people.
- The mangrove has shown a great adaptive capacity and has shown to respond positively to interventions for restoration.

5.2.4.- On aspects of coordination and ownership.

- Consulting with the organizations responsible for the management of resources such as (MINAGRI,) provincial and municipal (EAFs) during the design phase of the project results in a better understanding of the reality and more realistic and successful intervention proposals.
- Management problems must be addressed immediately, to avoid delays in technical execution.
- Having liaison with official appointment of specific representatives of the project in institutions and territories results in a better follow-up and appropriation.
- Regular meetings between UNDP, MINCEX, CITMA and the Project Management Unit have resulted in better management.
- Close financial monitoring by AMA and UNDP allows mitigation measures to be taken before the project ends.
- On-site monitoring and exchange with participating agencies (MINAGRI) by the PMU to ensure the achievement of the Project's objectives and control of the resources delivered
- The delivery of economic incentives by relevant government institutions to their workers to restore mangrove ecosystems and swamp forests has resulted in more effective fieldwork.



VI.- .GENERAL CONCLUSIONS

The Mangrove Vivo project has great relevance, given the significant threats posed by climate change, sea level rise, saline intrusion and hurricanes, whose consequences are accentuated in coastal areas with high deterioration of coastal ecosystems, such as the case of the coasts of the provinces of Artemisa and Mayabeque. That is why greater efforts are focused on rehabilitating mangrove ecosystems and swamp forests and thus the recovery of the environmental services they provide, as protectors of the coastline, which should involve many actors ranging from the productive sector and regulatory bodies, even governments and local communities. The results obtained so far have strong social, political, economic and environmental implications.

Country ownership is high, and is expected to increase in the future with the implementation of “Tarea Vida”, there is broad participation of key stakeholders in the two provinces in the project and has achieved a strong interagency collaboration between industry productive, regulatory agencies, universities, local governments and community. The high level of involvement and commitment of stakeholders is one of the reasons for the project's effectiveness, sustainability and broad impact to date.

The Environment Agency (AMA) has fulfilled its role as Executing Agency in a satisfactory manner. Despite the changes of direction and youth of the team, the Project Management Unit (PMU) has maintained its focus on the expected results of the project, has carried out monitoring and evaluation activities diligently, has faced and managed the risks of effectively and have provided timely support and advice to the actors involved. UNDP has also fulfilled its functions as implementing agency effectively and continuously working with the PMU to face the challenges represented change import agency and the enormous difficulties in obtaining project inputs abroad.

It should be noted that the financial execution of the project at the half of its execution period is approximately 21% behind schedule due to the previous causes, it is expected that project execution can be completed in the life of the project, but the possibility of a Temporary extension without cost. Moreover, the need for financial re-planning is a need to establish the budget by components in the light of the recommendations of this MTE. By the other hand, it was identified that all of the funds offered in return, were already executed and exceeded (142, 34%), however the continuity and success of the project required as part of strategic re-planning to continue the co-funding commitment

The evidence shows that the project has mostly achieved the results committed according to the PRODOC. With an unspecified progress of impacts, in spite of the delays suffered in the budget execution that can be overcome with the follow-up of the recommended measures. However, there are still some important challenges: (a) complementing the logical framework, (b) modifying the experimental design in the formulation of project



interventions to evaluate the most effective and efficient treatments and practices, (c) discriminating the factors success of each strategy and establish the intervention protocols, (d) improve the communication strategy, (e) organize the information in a systematic way to ensure that the compliance verifiers of each component have greater visibility and (f) complete the studies of economic valuation of the services offered by the mangrove among other recommendations.

As detailed in the report, there are already many elements established to promote institutional, socio-political, financial and environmental sustainability, since Cuba has the appropriate social structure to carry out rehabilitation tasks in a sustainable manner, involve local communities and institutionalize and extend the lessons learned to other coastal communities.

The results of the Mid Term Evaluation, therefore, indicate that the project is well on track to achieve its strategic products and generate significant environmental benefits that should be extended to the country level.



VII.- APPENDIXES.

Appendix 1.- TDR without annexes
Electronic Version Attached.



Appendix 2.- Evaluation matrix.

Project Strategy	Indicator	Initial reference level	Goal to project life	Level in the 1st and 2nd PPR (self-reported)	Level in the 2nd and second PPR (self-reported)	Progress from the third period to the evaluation date.	Mid-Term Goal Level	Mid-Project Evaluation	Evaluation of the achievements obtained	Justification of the evaluation
COMPONENT 1	Mangrove area (ha) established along the coast between Batabanó and Punta Mora.	533	1290.6	85	418.5		645.3	503.5	Yellow	It is very close to compliance with the goal to the EMT, it is very likely that when documenting the progress of the third year is fulfilled, it is required to maintain this level of activity to complete the goal of the Project life.
	Total restored area of mangrove ecosystems between Majana and Surgidero de Batabanó	144	1711.9	143.8	726.5		855.95	870.3	Green	It is very close to compliance with the goal to the EMT, it is very likely that when documenting the progress of the third year is fulfilled, it is required to maintain this level of activity to complete the goal to the Project life.
	Total area of inland forests that borders the wetland with cropland	939	4,315.50	99.9	1401.2		2157.75	1501.1	Yellow	It requires a greater effort to reach the goal but it is possible to accelerate and increase the actions already begun.
	Number of IAS management plans developed.	0	1	0	0		0.5	0	Green	There is a proposal document for a management plan for 20 invasive species and control measures have been taken. However, the management plan committed as a result has not yet been completed, it is reported that it is 80% upfront.
COMPONENT 2	Number of development plans, provincial and municipal that effectively incorporate the EBA	8	8	0	8		4	8	Green	It was possible to integrate into the strategies of two provincial plans and the 6 municipal development plans that include measures to adapt to climate change and specifically EBA measures. Specific activities need to be incorporated from MTE to the end of the project
	Number of municipal and provincial governments with knowledge management systems implemented that incorporate the EBA.	0	8	4	0		4	4	Green	We have actively worked on the development of training and training materials and a monitoring system to monitor the activities. It is required to have a system that provides data on the management of the ecosystem for decision making, and how the information is transmitted to the inhabitants and decision-makers of the province or municipalities.
	Number of community members (men and women) belonging to local volunteer groups that address environmental and adaptation issues.	0	60		26		30	26	Yellow	There are 4 groups with 26 groups (the proposed gender ratio is not yet reached) and it is necessary to build two more groups, it is considered very close to half of the project's duration. There is more data that has not been provided but was requested.
	Number of local schools with study programs that incorporate the topics of adaptation to climate change.	0	Elementary 16, secondary 1, University 3 and 1 pedagogical institute		34 Elementary Schools (22), Secondary (9), Local Universities (6), 0 Training Institute (1)		Elementary 8, secondary 1, University 1 and 1 educational institute	34 Elementary Schools (22), Secondary (9), Local Universities (6), Training Institute (1)	Green	The goal to the life of the project has almost been completely concluded, the challenge will be to continue at this level with its implementation and increase it if possible and where possible.
	Number of materials for dissemination and awareness on issues of adaptation to climate change, produced by local media.	0	27	7	33		13.5	40	Green	The goal was reached average and exceeded is entirely feasible to achieve the project's life.
COMPONENT 3	The frequency of training activities and technical support to coastal communities carried out by the provincial and municipal governments to incorporate the EBA.	0	15	3	9		7.5	12	Green	The goal of training in the different components of the Project has been exceeded, mainly in Regulatory Framework, forest management and rehabilitation of mangroves and in natural resource management or eradication of invasive exotic species (ISS) and fire control..
	The frequency of inspection activities to coastal areas carried out by the provincial and municipal governments to incorporate the EBA.	0	15	6	3		7.5	9	Green	The Medium Term goal has been exceeded. It is very difficult to reach the life of the project.
	Number of studies and methodologies carried out to estimate the cost - benefit ratio of the application of the ABE approach, available to planners and decision makers.	0	3	0	0		1.5	0	Yellow	No methodology was presented for the valuation of this indicator, a draft methodology has been developed to establish the cost benefit analysis of the application of the ABE methodology, a study and methodology is being completed, not available at the time of the evaluation. , but used in two exercises in third countries. Meetings and workshops were initiated to begin the collection of

Color Code for the evaluation of indicators

Green = Achieved Yellow = Way to be Achieve Red = Not on track to be achieved



Appendix 3.- Interview guiding questions

The MTE technical team of Manglar Vivo selected the following guiding questions for the evaluation:

- How relevant is the project and its objectives to Cuba's national priorities? Were the project's objectives and the components clear, feasible and realistic given the scheduled time?
- Do the indicators meet the expected values according to the work plan and the schedule?
- To what extent did interested parties participate in the project design process? For example, local communities, local authorities, project implementers and affected groups or project beneficiaries.
- Were the capacities of the executing institution and the counterparts properly taken into account when the project was designed? Were they taken into account for the training and institutional strengthening plans of the participants in the implementation?
- Were the relevant lessons learned from other projects duly incorporated in the project design? What lessons and how are they reflected in the design? Could you indicate which other projects served to improve it?
- Were the association agreements duly identified and the roles and responsibilities negotiated before the approval of the project?
- Were the counterpart resources (financing, personnel, and facilities) and the project management mechanisms agreed upon at the beginning of the project? Was there legislation and regulation of support and support?
- Were the assumptions and risks of the project correctly articulated within the Project Document?

These questions had the purpose of framing an analysis of the feasibility of implementing the intervention model and its hypotheses or premises, between 2015, 2016 and the first half of 2017. It is proposed that the questions evaluate the following general aspects:

1. The project's progress extent and its potential fulfillment during its final phase.
2. External and internal limiting factors and their impact on implementation.
3. Possible gaps in its initial design.
4. Emerging strengths and potential synergies with other processes that can magnify the impact of the project
5. Effects and impacts generated in the time elapsed from its inception to half of its execution (in 2017).

The questions were posed according to the interlocutor and their role in the Project in order to have an adjusted view of the added value of the current phase of the project, as part of the intervention strategy of the Government of Cuba to achieve processes to reduce the environmental vulnerability to coastal flooding through Ecosystem Based Adaptation (ABE) in the southern provinces of Artemisa and Mayabeque.



Appendix 4.- Purpose, methods and results of local stakeholder consultation workshops

Given the evaluation's limited time and the large number of stakeholders in the project, we chose a collective work methodology that optimizes time and encourages the contributions of the participants in an organized and horizontal manner. This methodology consisted of grouping the local actors in two workshops, one for each province, and through a facilitation process, the perceptions of the participants about the project were extracted and prioritized. The methodology used is called Nominal Group Technique⁷. The workshop facilitation format ensures that all participants in the process have the same opportunity to speak and maximizes the number of people that can be consulted in a given period. In addition, it is a dynamic process that yields a concrete product in a short time and that benefits all participants by fostering a true exchange of information, unlike the unidirectional nature of individual interviews.

The workshops objective was to identify, from the perspective of the local stakeholders, what were the main achievements and challenges of the Manglar Vivo project. This allowed us to validate the perceptions about the impact of the project on institutions, actors and ecosystems to date. In each workshop, three questions were asked: (a) what do you think has been the greatest achievement of the project to date? (b) what do you think has been or remains the greatest challenge in the implementation of the project?, and (c) what is the most important action to tackle the most important challenge identified by the group?

Each question was solved separately using a dynamic which the participants worked individually and prepared between 1 and three answers to the question. Next, each individual presented their main response, which was recorded on a board with a consecutive numbering. The presentations were made in order and without allowing discussion or opinions of third parties about the contributions, to guarantee participation in a horizontal environment free of trials. Once a first round of contributions was completed, the process was reiterated as long as there were new contributions. The second part of the process consisted of a silent vote, in which each participant individually chose the 4 or 5 ideas that seemed most important to him/her and registered his/her vote, not knowing how the others voted. In the end the ideas with the highest votes were read out identified.

The workshops, held in Güira de Batabanó (Mayabeque) and in Cajío (Artemisa), were attended by 33 and 30 people respectively, representing 38 institutions. It should be noted that the Artemisa workshop was attended by five children from grades 10 and 11 of the "Circle of Interest on Mangroves"), who participated in some of the activities with the rest of the group or separately from the adults. The full list of attendees and their respective

⁷ https://en.wikipedia.org/wiki/Nominal_group_technique



institutions can be found in Appendix 6. Both workshops lasted 4 and 5 hours (1.5-2 hours more than scheduled), reflecting the high level of interest of the participants.

For the exercise on the main achievements, 56 different answers were obtained (24 in Mayabeque and 36 in Artemisa), of which 16 stand out, which collectively obtained 50% of the votes in each site (Table 1).

Table 1, List of the main achievements identified in the workshops at the two provinces.

Province	Main achievements	% votes
MAYABEQUE		
	Mangrove ecosystem conservation	8.3%
	Integration with the institutional and territorial framework	8.3%
	Building of the classroom	6.6%
	Fusion among different perspectives for wetland restoration	5.0%
	Guarantee of life for coastal ecosystems	5.0%
	Knowledge exchange between scientists and workers	5.0%
	New projects	5.0%
	Change of mentality from exploitation to conservation	4.1%
	Reduction of vulnerability to coastal flooding	4.1%
ARTEMISA		
	Access to the means for doing the job	8.7%
	Favored mangrove and coastal forest ecosystems.	7.8%
	Coastal protection strengthening	6.8%
	Integration among all sectors and the community	6.8%
	Including youth in the importance of coastal and mangrove management	6.8%
	Reforestation and restoration of the coast outermost zone	6.8%
	Strengthening of the forestry sector with government's presence	5.8%

In order to make a comparative analysis between the two provinces, the 56 responses were categorized into six groups and the number of responses corresponding to each group in each province was quantified. The two provinces differ in their perception of achievements (Table 2).



Table 2. Percent of the answers on main achievements that were identified by the workshop participants and that correspond to each category. Bold indicates the most noticeable differences between the two provinces.

Category	Mayabeque	Artemisa
Change in mentality and learning	38.8%	19.4%
Institutional strengthening		14.6%
Governance	17.4%	14.6%
Infrastructure and quality of life improvement	14.9%	5.8%
Ecosystem recovery and conservation	24.0%	17.5%
Risk reduction	5.0%	28.2%
Grand Total	100%	100%

Among the actors of Mayabeque's workshop, the main achievement has been the change in the mentality of the actors and what they have learned about the value of ecosystems to protect them from climate change and biodiversity. In addition, there is a perception that their living standards have improved and that ecosystems are recovering. In contrast, for the local actors of Artemisa the greatest achievement has been the reduction of fire and flood risks, which affect them and ecosystems. They also consider the change of mentality and learning important, but at the same time they observe the institutional strengthening, especially of the ranger corps, as an important achievement. It should be noted that several members of the Forest Ranger Corps participated in the Artemisa workshop, while in Mayabeque more workers from agroforestry companies participated.

Regarding the past and future challenges of project implementation, the Mayabeque and Artemisa stakeholders identified 50 challenges (26 and 24 respectively). Of these, 6 and 9 challenges stand out respectively with a collective voting of approximately 50% (Table 3). It is highlighted that in Mayabeque, the group of attendees selected as their main challenge the construction in record time of the ecological classroom in which the workshop was held. However, it was not considered in the subsequent analyses, since it was a very specific matter and it had already been overcome.

Table 3. List of the main challenges identified in the workshops of the two provinces.

Province	Main challenges	% votes
MAYABEQUE		
	Building of the ecology classroom in record time (21 votes)	
	Resistance to change in ways of thinking in the coastal region	11.4%
	Lack of knowledge of novel restoration techniques	10.6%
	Producing comprehensive technical projects	6.5%



Province	Main challenges	% votes
	Rising awareness among decision-makers in the territory	6.5%
	Mangrove forests are trash dumps	5.7%
	Difficult access to restoration areas	5.7%
	Hard working conditions in the restoration areas	5.7%
ARTEMISA		
	Control of invasive alien species	9.6%
	That ecosystems may not get back what humans took from them	8.7%
	Lack of bibliographic resources on the mangrove project for the use of Circles of Interest groups	8.7%
	Educating people to avoid forest fires	7.7%
	Achieving recovery and conservation of native species in the area	6.7%
	Delivering [working]supplies on time	6.7%

A comparative analysis of the answers shows different points of view expressed between the two provinces (Table 4). For the Mayabeque stakeholders, the biggest challenge represents the change of mentality of different sectors of society; this includes decision makers, groups and individuals. For Artemisa stakeholders, this is also the most important challenge, but almost as important is the long-term sustainability of actions and ecosystems. In Artemisa, they are also aware of the challenge represented by the current state of the ecosystems for their recovery. The weakness in governance structures, on the other hand, seems to be a greater concern in Mayabeque than in Artemisa.

Table 4. Percent of the answers on main challenges that were identified by the workshop participants and that correspond to each category. Bold indicates the most noticeable differences between the two provinces.

Answer category	Mayabeque	Artemisa
Climate change and risk	4.1%	1.0%
Current ecosystem conditions	0%	9.6%
Work conditions	11.4%	6.7%
Governance weakness	15.4%	4.8%
Institutional weakness	5.7%	2.9%
Lack of information	16.3%	20.2%
Stakeholder way of thinking	40.7%	29.8%
Long-term sustainability	6.5%	25.0%

Participants proposed actions to face the most important challenge of their province were varied. In Mayabeque, the most important challenge is the resistance of the actors to change their way of thinking about the coast and participants proposed 14 different



activities to face it (Table 5). Four of these proposals received 50% of the votes. A fifth of the votes focused on a long-term vision, framed within the government plan called Tarea Vida. The other three proposals focused on the transfer of knowledge in different modalities and to different sectors of the population.

Table 5. List of actions proposed by Mayabeque workshop participants that would serve to tackle the challenge of changing the way of thinking of coastal inhabitants. Bold indicates those that add about 50% of the votes.

LIST OF PROPOSED ACTIONS	% votes
Implementing the TAREA VIDA	21.1%
Strengthening environmental education, outreach and community work	15.6%
Teaching everyone on the need to recover the mangrove	11.1%
Knowledge management for incorporating EBA (ecosystem based adaptation)	6.7%
Convincing stakeholders by showing concrete results	6.7%
Strengthening strategic alliances among decision-makers and communities to care for ecosystems	5.6%
Creation of audiovisual programs on the project's accomplishments to incentivize community participation	5.6%
Integrate restoration and monitoring activities	5.6%
Teach decision-makers about the tasks underway	5.6%
Find and disseminate multidisciplinary evidence on how the coastal zone works	4.4%
Give higher visibility to studies on risk and vulnerability and of the benefits of the mangrove	4.4%
Demonstrate the mangrove's recovery	2.2%
Create new ways for personal and family income that are nature-friendly	2.2%
House-to-house or family-to-family introduction of the 'project's benefits	1.1%
MOU with the 10 to fine contraveners	1.1%
Improve sources of employment	1.1%

For the challenge of controlling invasive alien species, Artemisa actors proposed twelve different types of actions. However, those that received the most votes focus on the felling and use of IAS (Table 6).



Table 6. List of activities proposed by Artemisa’s workshop participants to tackle the challenge of controlling Invasive Exotic Species (IAS). Bold indicates those that add about 50% of the votes.

LIST OF PROPOSED ACTIONS	% votes
Increase educational methods on sustainable management (that includes economic use) of IAS among Circles of Interest	14.3%
Log EIS and plant native species	12.5%
Incentivize use of IAS to satisfy population needs	12.5%
Create brigades and outfit them for exploiting IAS	10.7%
Clean Access channels	8.9%
Provide resources (tools, chainsaws)	8.9%
Carry out better management and eliminate EIS from forests	8.9%
Minimize IAS regeneration	7.1%
Eliminate Tropical Almond tree to give room to Cuban species	7.1%
Manual or mechanical control	5.4%
Ring trunks	1.8%
Manual Tropical Almond tree control (Vincent’s method)	1.8%

Based on the level of interest of the participants in the workshop, their responses and the conversations that were given when presenting the results, we conclude that there is a very good level of ownership of the project, a good level of knowledge about the benefits that would be derived of mangrove rehabilitation as a measure to combat climate change. At the same time, there is awareness that there is still much to be done, and their expectations and proposals are in line with the direction of this project. Thus, should the project be completed in earnest, it is very likely that the communities will feel strengthened.



Appendix 5.- Itinerary of the Evaluation Mission.

Date: 15 - 22 October 2017

1st Stage from 15 to 16

Detailed Work Program for the Mid Term Review Mission of the "Manglar Vivo" Project					
Day	time	Activity	Place	Content and details of the activity	Participants
15	Nestor (13:15), Marcia (Y)	Pick up evaluators at the airport and transfer to the Hotel.	Internacional Airport José Martí (terminal 3)	Lodging in hotel, exchanges on Program, delivery of folder with materials made by the Project, map with location of the proposed areas to visit and complementary information.	Luis David, Reinier, Representative from MINCEX José (driver)
16	9:00 – 10:00 am	Initial meeting of the evaluation team (EE) with officials of the UNDP Office.	UNDP Office	Pick up at the hotel at agreed time and accompaniment to UNDP	Government employees, Oficinas UNDP office, EE
	10:00 – 12:00 am	Meeting of the EE with officials counterparts of the project.	UNDP Office	Presentation of the national entities where they explain the role they play in relation to the Project	PMU, MINCEX, CITMA (DRI, AMA), UNDP, local governments, CNGB, GAF, EPFF, IPF, UNAH
				General explanation of the project: Project conditions in its implementation, operation of the project, spatial scope of the impacts of the project and the beneficiaries, impacts so far, relevance with respect to national priorities	PMU, MINCEX, CITMA (DRI, AMA, UMP), UNDP, local governments CNGB, GAF, EPFF, IPF, UNAH
	12:00 – 2:00 pm	Lunch		After the meeting, the evaluators are accompanied to the bank branch to get cash. Time for lunch	Reinier, José (driver)
2:00 - 5:00 pm		Meeting of EE with the Project Management Unit (PMU)	Meeting room AMA	Welcome by the director of AMA	Dra. Maritza García
				Intervention of scientific institution that is inserted in the tasks of the NP: Training staff and advice on forestry activities	INAF



		Role played by the CGB in the Project. (Impacts of the Project in the territory, actions carried out, sustainability of the Project).	Forest rangers
		Presentation of Mayabeque province results (Impacts of the Project in the territory, actions executed, sustainability of the Project)	Provincial Government Mayabeque
		Results presentation province Artemisa (Impacts of the Project in the territory, actions carried out, sustainability of the Project)	Provincial Government Artemisa
		Presentation of the work of the Mayabeque Agroforestry Company	EFI Mayabeque
		Presentation of the work of the Artemisa Agroforestry Company	EFI South Coast
		Presentation of the work of SEF Artemisa	
		Presentation of the work of SEF Artemisa	
		Presentation of the work of the Artemisa Agroforestry Company	EFI South Coast
5:00 PM			



2nd Stage from 17 to 18

Day	Time	Activity	Place	Content and details of the activity	Participants	
17	5:30	Pick up evaluators	Hotel		Javier (driver)	
	7:00 am	Arrival of EE to Mayabeque Province	Municipal Government	Wellcome at Government Municipality Melena del Sur Welcome at Mayabeque Beach (Melena del Sur)	EFI, PMU, Representatives of the project in the territories	
	8:30 -1:00 am	Visit to the intervention areas	Melena del Sur, Güines and Batabanó	Mangrove: areas in the process of restoration, areas certified by SEF (west and east of Mayabeque beach) Elimination of exotic species: Areas of elimination and control of EE (Embarcadero) Swamp forest: Areas under enrichment work with native species (Embarcadero, Los patos)	Ivan (Coordinator of the project in the territory), Cárdenas (EFI), Gualberto (EFI), members of the brigade (EFI), SEF, CITMA, PMU, CNGB, IES, INAF	
	1:00 -2:00 pm	Lunch				
	2:00– 2:30 pm	Presentation of the protected Area "Golfo de Batabanó"	Classroom for training in Batabanó	General characteristics of the area, general activities of the protected area (Impacts of the Project in the territory, actions carried out, sustainability of the Project).	Actors of the productive sector, the community, the protected area and the municipal and local government	
	2:30 – 5:00 pm	Interviews with local actors according to the method suggested by the evaluators	Classroom for training in Batabanó	Activity proposed by the EE, where a group work workshop will be held with actors and beneficiaries in the territory so that everyone will have the opportunity to express themselves.	Members of the communities, students of schools, workers of the Company, CITMA of the 3 municipalities, popular council, PCC, groups of volunteers, forest rangers, teachers, nursery brigade, fishermen and ICRT	
	5:00 pm	Back to Havana				
18	5: 30 am	Pick up evaluators	Hotel		PMU	



7:00 am	Arrival of EE to Artemisa province	Municipal Government Forest Unit Cajío	Welcome at Government Municipality Güira de Melena Welcome in Playa Cajío (Güira de Melena)	EFI, PMU, Representatives of the project in the territories
8:30 -1:00 am	Visit to the intervention areas	Güira de Melena, Alquizar, Artemisa	Mangrove: areas in the process of restoration, areas certified by the SEF (west of Cajío, Cajío Viejo, east of Guanimar) Elimination of exotic species: Areas of elimination and control of EE (Cajío Viejo, alboretum, plan carpa) Swamp forest: Areas under enrichment work with native species (San Miguel, alboretum, plan carp)	Argudin (Coordinator of the project in the territory), Cárdenas (EFI), Gualberto (EFI), , members of the brigades (EFI), SEF, CITMA, PMU, CNGB, IES, INAF
1:00 -2:00 pm	Lunch (CNGB Cajío)			
2:00 – 5:00 pm	Interviews with local actors according to the method suggested by the evaluators	Training classroom in Cajío	Activity proposed by the EE, where the second group work workshop will be held with actors and beneficiaries in the territory so that everyone will have the opportunity to express themselves.	Members of the communities, students of schools, workers of the Company, CITMA of the 3 municipalities, popular council, PCC, groups of volunteers, forest rangers, teachers, nursery brigade, fishermen and ICRT



3rd stage from 19 to 22

Day	Time	Activity	Place	Content and details of the activity	Participants
19	8:00 am – 12:00 pm	Interchange between the EE and the PMU	Classroom Mundo Latino	Welcome by Omelio and presentation of several audiovisuals related to the project	Omelio Borroto, PMU
				Presentation of each component. Financial management. Point out of aspects that remained pending .. Clarify doubts and discussion of what was seen by the EE	PMU
	12:00 pm	Lunch			
	2:00 pm 6:00 pm	Exchange of the evaluation team with the PMU Preparation of the report of main findings	Classroom Mundo Latino Hotel	Presentation of each component. (cont) The EE works based on the preliminary findings report	PMU EE
20	10:00 am	Mission Wrap-up meeting	PNUD offices	Presentation of the EE	Staff members of PNUD, CITMA DRI, AMA and PUM
21	All day	Analysis of the information necessary for the preparation of the final report	Hotel	The EE Works for the final report	EE, PUM
22	All day	Organization of work for the preparation of the final report Evaluators return to their respective countries (pick up at 3:00 PM)	Pick up at hotel	The EE Works for the final report	EE (driver to pick upevaluators)



Appendix 6.- Listas de personas participantes de la Evaluación.

List of people interviewed during the EMT mission of the Mangrove Vivo project

Sitio	Fecha	No participantes	Comentarios
PNUD	16 de octubre de 2017. Hora 9:00	4	
AMA	16 de octubre de 2017. Hora 11:00	21	
AMA	16 de octubre de 2017. Hora 3:30	22	
Grupo acompañante durante la visita a provincia Mayabeque	17 de octubre de 2017	8	Todo el día
Gobierno Municipal Mayabeque	17 de octubre de 2017	3	
Obreros de la forestal entrevistados	17 de octubre de 2017	8	En el camino mientras trabajaban
Area Protegida Golfo de Batabanó	17 de octubre de 2017	33	Participantes del Primer taller
Grupo acompañante durante la visita provincia Artemisa	18 de octubre de 2017	7	Todo el día
Gobierno Municipal Guira de Melena	18 de octubre de 2017	4	
Brigada forestal Cajío	18 de octubre de 2017	19	
Niños escuela primaria	18 de octubre de 2017	5	Participantes del taller
Cuerpo de Guardabosques y actores de la provincia	18 de octubre de 2017	27	Participantes del taller



Mundo Latino	19 de octubre de 2017	7	Documentales y presentación de los componentes del proyecto
PNUD	20 de octubre de 2017	7	Presentación de las conclusiones preliminares

A complete list of all the information with specific by participants was reported in the excel file delivered separately by 13-11-2017.

PNUD 9:00 am

NOMBRE	ORGANISMO
1. Grisel Acosta	PNUD
2. Tomas Escobar	PNUD
3. Pedro L. Ruiz	DRI CITMA
4. María R. Moreno	PNUD

AMA 11:00 AM

1. Maritza Gonzalez	DPP-AMA
2. Mercedes Arellano	DPP-AMA
3. Maritza García	DPP-AMA (Presidenta)
4. José Manuel Guzmán	Coordinador Técnico de proyecto OIN
5. Grisel Acosta	PNUD
6. Yaiser Ávila	Coordinador Componente 1 OIN
7. Juliette Diaz	Coordinador Componente 2 OIN
8. Iván Martinez	CITMA AP Mayabeque
9. Alexis Argudín	CITMA Artemisa
10. Marta María Fleitas	Dirección CITMA Artemisa
11. Juan C. Perez	Coordinador EAF Costa Sur
12. Salvador Fortge	Empresa Forestal Mayabeque (Director)
13. Fara S. Carreras	Instituto de Planificación Física
14. Edel Elías Hernández	Cuerpo de Guardabosques
15. Wilfredo Muevi	Grupo Empresarial Agroforestal
16. Pedro Ruiz	DRI-CITMA
17. Tomás Escobar	PNUD



- | | |
|---------------------|---------------------------|
| 18. Reinier Samón | Administrador de proyecto |
| 19. Pablo Bachiller | CITM Artemisa |
| 20. Luis David | Director de proyecto |
| 21. Felipe Cárdenas | Empresa Forestal |

AMA 3:40 PM

- | | |
|--------------------------|---|
| 1. Juliette Diaz | Coordinador Componente 2 OIN |
| 2. Yaiser Ávila | Coordinador Componente 1 OIN |
| 3. Aralis Ramos | SEF Componente 3 |
| 4. Iván Martínez | CITMA AP Mayabeque |
| 5. Elio Lázaro Amador | UNAH Mayabeque |
| 6. Rodrigo Fernández | EAF Costa Sur Componente 1 |
| 7. Juan C. Pive | EAF Costa Sur Componente 1 |
| 8. Dialys Borroto | CITMA Alquizar (Jefa de sección) |
| 9. Juana Teresa Suarez | INAF Coordinador en INF de componente 1 |
| 10. Edel Elías Hernández | Cuerpo de Guardabosques |
| 11. Fernando Jimenez | DFFFS Coordinador DFFFS |
| 12. Fara S. Carreras | Instituto de Planificación Física |
| 13. Gilberto Gonzalez | EAFM |
| 14. Julio C. Alvarez | HAC, IES, Componente 1 |
| 15. Maritza Gonzalez | DPP-AMA |
| 16. Pablo Bachiller | CITM Artemisa |
| 17. Reinier Samón | Administrador de proyecto |
| 18. Gloria Porma | SEF Mayabeque (Jefe) |
| 19. Mercedes Arellano | DPP-AMA |
| 20. Luis David | Director de Proyecto |
| 21. Teresa Suarez | Coordinador INAF |
| 22. Felipe Cárdenas | Empresa Forestal |

Field trip to intervention sites. Date October 17 Time 7:30 - 7:00 PM

Field Trip participants

- | | |
|-----------------------|-------------------------------------|
| 1. José Manuel Guzmán | Coordinador Técnico de proyecto OIN |
| 2. Luis David Almeida | Director de proyecto |
| 3. Marta Prado | DRI-AMA |
| 4. Teresa Suarez | Coordinador INAF |
| 5. Juliette Diaz | Coordinador Componente 2 OIN |
| 6. Felipe Cárdenas | Empresa Forestal |
| 7. Julio C. Alvarez | HAC, IES, Componente 1 |
| 8. Yaiser Ávila | Coordinador Componente 1 OIN |



Municipal Government Melena del Sur

Taima Jimenez

Vicepresidenta Admon Municipal

1. Carlos A. Ofarrill Funcionario Comité Municipal del PCC
2. Grace Gil Especialista CITMA Melena

Laborers of the forester interviewed on the road

1. Yamil Bello Director UEB
2. Gualberto González obrero
3. 6 obreros (se desconocen los nombres)

Gulf of Batabanó Protected Area (First workshop)

1. Yamila Alfonso Activista
2. Raul Gómez Cine Batabanó
3. Lázaro Suarez Activista
4. Idania Pavines SEF Mayabeque
5. Teresa Suarez Coordinador INAF
6. Lázaro Lliteras Flota marina
7. Saray Rodriguez Técnica de mangle
8. Elena Leyva Flora y Fauna
9. Pedro Vines Punto de Control
10. Yaneisy Febles Técnico Recursos Humanos
11. Zuleimis Marín Técnico Jutía
12. Jorge Luis Perez Técnico Ecosistemas Marinos
13. Felipe Cárdenas Empresa Agroforestal Mayabeque
14. Rosabelis Angotes Operario de Reptiles
15. Elaine Relona Económica
16. Maricela Pascual Dtra UGB Guines
17. Gualberto Gonzalez Especialista EAF
18. Madelyn Pau Técnico Areas Protegidas
19. Juliette Diaz OIN-AMA
20. Paulino Columbí TT CGB Melena
21. Zenaida Vazquez Tt CGB Batabanó
22. Bárbara Leyva Técnica avifauna
23. José Batista Especialista Flora y fauna Mayabeque
24. Martha prado Especialista Relaciones Internacionales AMA
25. Grace Gil Especialista CITMA Melena
26. José M. Gonzalez CT Mayabeque
27. Yaiser Ávila Coordinador componente 1
28. Rosalidia Aro Flora y Fauna



- | | |
|-------------------------|-------------------------------------|
| 29. Julio Álvarez | HAC IES |
| 30. Marcia E. Rodriguez | Flora y fauna |
| 31. Oneisy Aguilar | Pescahabana |
| 32. José Manuel Guzmán | Coordinador Técnico de proyecto OIN |
| 33. Luis David Almeida | Director de proyecto |

Field trip to intervention sites. Date October 18, 2017

Field Trip participants

- | | |
|-----------------------|-------------------------------------|
| 1. José Manuel Guzmán | Coordinador Técnico de proyecto OIN |
| 2. Luis David Almeida | Director de proyecto |
| 3. Mercedes Arellano | DRI-AMA |
| 4. Teresa Suárez | Coordinador INAF |
| 5. Juliette Diaz | Coordinador Componente 2 OIN |
| 6. Julio C. Alvarez | HAC, IES, Componente 1 |
| 7. Yaiser Ávila | Coordinador Componente 1 OIN |

Municipal Government Guira de Melena

- | | |
|----------------------|---|
| 1. Alexis Argudin | Esp. Medio Ambiente Gov. Prov. Artemisa |
| 2. Caridad Rodriguez | Jefa de Colaboración Gov. Municipio Guira de Melena |
| 3. Jorge L. Barrios | Defensa Civil. Gob. Municipio Guira de Melena |
| 4. Alain Duque | Director Agricultura Municipio Guira de Melena |

Cajío forest brigada

- | | |
|-----------------------|--|
| 1. Ana Chavez | Especialista |
| 2. Ester Quintana | Jefe Brigada no 4 |
| 3. Odelys Sanchez | Especialista Agroforestal |
| 4. Jesús Rodriguez | Jefe Brigada |
| 5. Hiosvany Marin | Obrero |
| 6. Fabiola Perez | Especialista SEF municipal |
| 7. Juan Ortega | Especialista Silvicultura |
| 8. Leandro Lázaro | Circulo de Interes de manglar |
| 9. Dialys Borroto | CITMA Alquizar |
| 10. Alain Duque | Director Agricultura Guira de Melena |
| 11. Vicente Nuñez | Jefe de Brigada Forestal Guira de Melena |
| 12. Juan Perez | Coordinador EAF Costa Sur |
| 13. Yeliannis Pereira | Auxiliar de limpieza |
| 14. Daymi Piedro | Vivero Forestal |
| 15. Caridad perez | Vivero Forestal |
| 16. Kenisleidi Alonso | Vivero Forestal |



- | | |
|-------------------|-------------------------|
| 17. José E. Alba | Obrero |
| 18. Reinier Godoy | Obrero Agropecuaria |
| 19. Ricardo Pozas | Chofer Proyecto Manglar |

Ranger Corps Cajío (second workshop)

Niños escuela primaria

- | | |
|-------------------------------|--------------------|
| 1. Stephanie Rodriguez | Circulo de interés |
| 2. Marlon Gonzalez | Circulo de interés |
| 3. Victoria de la C Rodriguez | Circulo de interés |
| 4. Dianet Almenares | Circulo de interés |
| 5. Cinthia García | Circulo de interés |

Adultos

- | | |
|-----------------------|---------------------------|
| 6. Mercedes Arellano | AMA |
| 7. Ana Ibis Chavez | EAF |
| 8. Mercedes Ramirez | Maestra escuela primaria |
| 9. Jesús Abrante | Obrero |
| 10. Fidel | Obrero |
| 11. Fabiola Perez | SEF Municipio |
| 12. Rodrigo Fernandez | EAF Costa Sur |
| 13. Osmany Marin | JD Cajío |
| 14. Kenisbidy Alonso | Vivero Forestal |
| 15. Esther Quintana | Jefe brigada |
| 16. Dainy Piedra | Vivero Forestal |
| 17. Leandro L. Marin | Círculo de Interés |
| 18. Teresa Suarez | Coordinador INAF |
| 19. Edel E. Hernandez | Coordinador CGB |
| 20. Juan C. reyes | Coordinador EAF Costa Sur |
| 21. Alaxis Rosales | EAF Costa sur |
| 22. Odelys Sanches | EAF Costa Sur |
| 23. Mayelmo Perez | Técnico CGB |
| 24. Lázaro García | Técnico CGB |
| 25. Odalmis Mujica | Técnico CGB |
| 26. Alexis Argudin | CITMA provincial |
| 27. Alain Duque | Dtor Agricultura Guira |
| 28. Juan A. Ortega | Esp Silvicultura |
| 29. Jesús Rodriguez | Jefe Brigada Alquizar |
| 30. Sandro Álvarez | CGB |
| 31. Carlos Rodriguez | CGB |
| 32. Roger Peña | CGB |



Date October 19, 2017

Mundo Latino audiovisual producer (all day)

1. José Manuel Guzmán Coordinador Técnico de proyecto OIN
2. Luis David Almeida Director de proyecto
3. Mercedes Arellano DRI-AMA
4. Juliette Diaz Coordinador Componente 2 OIN
5. Julio C. Alvarez HAC, IES, Componente 1
6. Yaiser Ávila Coordinador Componente 1 OIN
7. Omelio Borroto Director Mundo Latino

Date October 20, 2017

UNDP Debriefing (Presentation of the preliminary findings)

1. Grisel Acosta PNUD
2. Tomas Escobar PNUD
3. José Manuel Guzmán Coordinador Técnico de proyecto OIN
4. Luis David Almeida Director de proyecto
5. Maritza Gonzalez DPP-AMA
6. Maritza García DPP-AMA (Presidenta)
7. Pedro J. Ruiz DRI CITMA



Annex 7.- Lists of Revised Documents.

Main documents requested by the Midterm Evaluation Team.

A. National context documents

- National Biodiversity Strategy and Action Plan 2014-2020, Cuba. Document of CITMA / UNDP (2016)
- V National report to the CBD. 2016
- Second National Communication to the United Nations Framework Convention on Climate Change
- Working document prepared and published by the Directorate of Programs and Projects of the AMA, January, 2017
- Iturralde, M. & H. Serrano (2015): "Dangers and vulnerabilities of the marine and coastal zone of Cuba: current state and perspectives for climate change up to 2100"
- MACROPROJECT: Evaluation of the impact of sea level rise on the coastal zone, for the years 2050 and 2100
- Project 2 of the UNEP/UNDP Country Pilot Program (CPP) on Sustainable Land Management ("Creation of capacities for the coordination of information and monitoring systems / sustainable land management in areas with water resource management problems") and its most recent report, if it is already running.
- BASAL Project (Environmental Bases for Local Food Security) and its most recent report, if it is already in execution.
- Project "Project for the Prevention of Saline Intrusion in Aquifers of the Southern Catchment Mayabeque and Artemisa provinces", and its most recent report, if it is already in execution.
- Project "Activities in support of the preparation of the Second National Communication by the Republic of Cuba to the UNFCCC", and its most recent report, if it is already in execution.

B. Project context documents (ecological, social and political)

- Results of the UNDP Environmental and Social Diagnosis. Documents reviewing the institutional framework and legal framework during the formulation if they exist.
- Documents of the "TAREA VIDA" and publication of the corresponding baseline study.
- National Goals for Biological Diversity, 2016-2020.

C. Project design documents

- Logical framework and theory of change of the project intervention.
- PRODOC Project Document. Logical Framework
- Project beginning meeting report



D. Documents related to the project technical implementation

- Annual Operating Plans (POAs)
- Progress reports (quarterly, semi-annual, or annual) with project work plans and corresponding financial reports
 - a. Project Performance Reports (PPR) by year of project execution
 - b. Quarterly progress reports and work plans of the various task forces responsible for the execution
- Summary list of formal meetings, workshops, etc. that have been made, indicating date, place, subject treated and number of participants
- Individual reports of workshops and visits
- Maps of the places of execution of the project were requested but were not presented during the field trip.
- Electronic copies of project products: bulletins, brochures, manuals, technical reports, articles, etc.
- Any available information on the monitoring data of the restoration component, beyond what is available on indicators in the logical framework of the PPRs:
 - a. Vegetation surveys prior to the intervention (lists of species), extension of the ecosystems in their different degrees of conservation, or their historical changes, etc.)
 - b. Sources of plant material (provenance and quantities)
 - c. Activities of propagation and collection of material for planting
 - d. Schemes and sowing campaigns: Planting places, quantities, densities, local participation.
 - e. Survival and evaluation activities and monitoring of other variables
 - f. Activities of evaluation and monitoring of the change of the coastal vegetation outside the zones of intervention
 - g. Activities of evaluation and monitoring of extreme hydrological events
- Any relevant monitoring data in socio-economic matters, such as average income / employment levels of interested parties in the area of activity, changes in income related to project activities.
- Data on economic valuation of protected or restored ecosystems, as well as data on goods and services and their assessment, if they exist in the project area or in Cuba or in other reference areas. Reference data from any country in the Greater Antilles or the Central / South American Caribbean coast could also be considered, if available. A methodology was developed that was indicated by the team but it was not possible to have the document because the specific agreement with the University that developed the methodology was not complete.
- List of related projects / initiatives that contribute to the objectives approved / initiated after the approval of the project.
- List of Project Beneficiaries in the criteria of the implementing team, a list of specific beneficiaries was not reviewed, but general data and interviews with actors representing the direct beneficiaries were presented.



- Information on the relevant users of the project's website over a certain period of time, if available: number of unique visitors per month, number of visits, periods for updating the information, responsible for the handling of the web page, etc.

E. Project management and finance documents

- UNDP Initiation Plan
- Project Initiation Report.
- UNDP Final Project Document and final approval documents (request for authorization from the CEO, etc.).
- List of project personnel, their position and functions and the summary description of their areas of expertise or experience.
- Audit reports (electronic copies if possible)
- Electronic copies of the finalized and relevant Tracking Tools of including the authorization of the CEO in the middle of the cycle (indicate the specific TTs for this area of action of the project)
- Project supervision reports
- Minutes of the Project Board meetings (name of the project and any other related bodies (eg meetings of the Project Preliminary Evaluation Committee)
- Project financial reports, reconciled with UNDP.
- Budget execution reports and adjustments presented by the PT to the finance area of the UNDP.
- Other related management documents: adaptive management reports and management memoranda's from the direction , etc.
- Actual expenses by project result, including management costs, as well as the documentation of any significant budget revision.
- Establishment of the programmed budget by Project Objective.
- Establishment of annual expenses, or other temporary unit of reporting, by Project Objective
- List of contracts and items purchased for a value greater than \$ 5,000 US \$ (Specific examples of purchases were reviewed, for example, tractors, boats, fire attack equipments, computers and office equipments, among others).
- Second. Co-financing table with a breakdown of expected and actual totals in cash and in kind, as well as by origin.
- Confirmation of the list of names and titles of the interested parties related to the project and in their opinion the EMT Mission must meet (there were specific meetings with personnel of all institutions directly involved in the project, and participation lists of each meeting were maintained).



Appendix 8.- Proposed experimental design for mangrove interventions

Currently the EET is using several methods to rehabilitate the red mangrove strip. These consist of:

1. Improving the hydrology of the ecological system in an effort to recreate the original conditions of flood pulses. This is accomplished by cleaning and dredging the channels to allow more fresh water to enter the mangrove and from there to the sea.
2. Given that, regardless of the current level of forest degradation, there is still a mixed natural regeneration that enables natural recovery; additional conditions are created to improve the reestablishment of the mangrove. That is accomplished by eliminating black mangrove trees (*Avicennia germinans*) and thus thinning the black mangrove canopy to favor the growth of the naturally established red mangrove propagules and seedlings in the understory
3. Creating conditions to promote the accelerated regeneration of the red mangrove through sowing with the following techniques:
 - a. Planting red mangrove propagules in groups of three individually (triads) to promote growth accelerated by the effect of competition between seedlings.
 - b. Planting red mangrove propagules in groups of three, but in "islands" that contain a variable and non-predetermined number of triads that can vary between 10 and 25 triads - a process that allows the accumulation of organic material and leaf litter in the mangrove in areas where the soil is predominantly clay,- Island size is not consistent
 - c. Building a small dike around the islands to increase water retention in the soil during the dry season.
 - d. Establishing small basins or trenches in the sandy coastal bank areas, where the tide has established a sandy and dry strip, these trenches allow retaining water and forming areas for the regeneration of red mangrove on the coastline where it is currently dominated by black mangrove.

These different techniques seem to be effective in the generation of seedlings, however, a systematic methodology is required to prove its success of implementation and to be able to evaluate it in the light of effort and cost in the future. Currently, the application of the different techniques does not follow systematic criteria and they are used jointly or in isolation according to the recommendation of the head of the brigade.

This absence of explicit criteria to define the use of different techniques has two limitations. The first is that there is no way to discriminate the effectiveness of each technique or combination of techniques to produce a protocol that guarantees the effectiveness of the intervention in other sites; a precondition for replication. Secondly, there is no way to



establish the cost/benefit ratio for each technique or combination of techniques, a precondition for up scaling.

Therefore, it is recommended that, for the rest of the life of the project, interventions should involve the following:

1. Establishing control plots in similar conditions and without any intervention to allow comparing results with the intervened plots,
2. Adopting a pilot study strategy with an experimental design in which the techniques are applied and evaluated separately and in pre-agreed combinations and thus measure their effectiveness and cost-benefit ratio independently for each treatment or in combination.
3. Engage the institutional commitment to this approach of the AMA and CITMA together with the MINAGRI (forestry sector organizations).

Below is a proposal for a basic experimental design that could be useful, just to illustrate in a simplified manner what is required. The final design must be done with the support of an expert who can analyze the location and conditions of the stands in a specific way.

The experimental design could be done in the following way:

Plots of 25x25 m are established and the recommended treatments are applied in the central plot of 20x20 located 5 m from the edge of each plot. This design seeks to eliminate the edge effects that may influence the results. In each plot a single planting technique is applied; for example: (a) planting of red mangrove in simple propagules regularly spaced every 50 cm in parallel rows separated by 50 cm (this gives a density of 4.14 individuals per m²)⁸, (b) planting of red mangrove in islands of a standard diameter of 2 meters and with 25 propagules per islands, (c) only natural regeneration- This is the control.

It is recommended to use only two methods of sowing plus control, at least at this scale, as the design becomes very complex if additional methods are added. In the plots in which propagules are sown, all should be marked, so that when evaluating the survival it is done only on the basis of the marked material and it does not mix with the propagules that have been dispersed and established naturally. Finally, half of the plots are subjected to clearing of *A. germinans* (black mangrove) and the other half are left without thinning. Figure 1 illustrates a suggested spatial design for the experimental units. Each unit is repeated at least once or twice in each stand and in each repetition the order of the two sowing treatments and their control is changed, as well as the location of the plots with or without thinning.

It should be noted that this design is only an example of how to make the experimental design and is only for illustrative purposes. The final design must be carried out with the

⁸ Ferreira, A.C., Ganade, G. and de Attayde, J.L., 2015. Restoration versus natural regeneration in a neotropical mangrove: effects on plant biomass and crab communities. *Ocean & Coastal Management*, 110: 38-45.



support of an expert who can analyze the location and conditions of the stands, so as to verify if this design is appropriate or if it requires modifications. A design like the one presented here, allows statistically separating the effect of each treatment (clearing vs. no clearing, regular sowing versus sowing on islands and sowing versus natural regeneration) and their combinations and interactions. In this way it will be possible to determine the cost-benefit ratio of each treatment in order to prepare a replication proposal in other parts of the country.

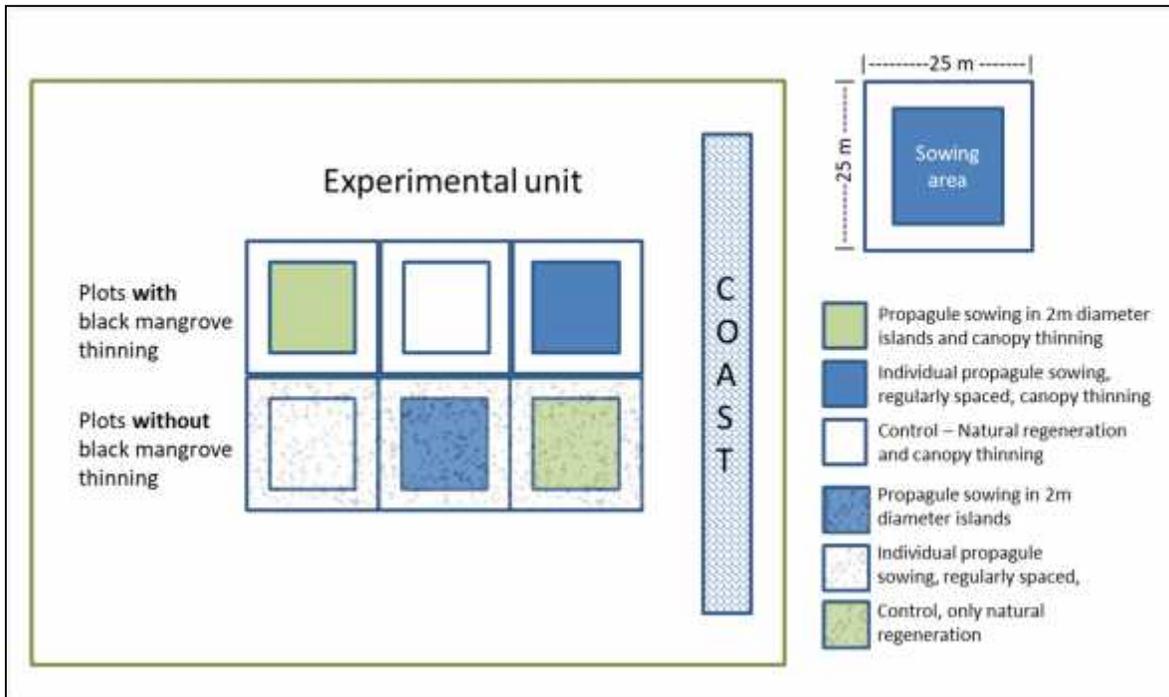


Figure 1. Suggested experimental design for different mangrove sowing and management treatments. Own creation.