TERMINAL EVALUATION OF THE UNDP / ADAPTATION FUND PROJECT

Reducing vulnerability to coastal flooding through ecosystem-based adaptation in the South of Artemisa and Mayabeque provinces of Cuba

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Evaluation report

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ACRONYMS

AF	Adaptation Fund
AMA	Environmental Agency (by its initials in Spanish)
AWP	Annual Work Plan
BASAL	Environmental Bases for Local Food Security
CDB	Convention on Biological Diversity
CGB	Forest Ranger Corps (by its initials in Spanish)
CITMA	Ministry of Science, Technology and Environment (by its initials in Spanish)
EbA	Ecosystem based Adaptation
EMIDICT	Specialized Import, Export and Distribution Company for Science and Technology (by its initials in Spanish)
FAO	Food and Agriculture Organization of the United Nations
FLACSO	Latin American Faculty of Social Sciences (by its initials in Spanish)
FONADEF	National Forestry Development Fund (by its initials in Spanish)
GCF	Green Climate Fund
GEF	Global Environment Facility
HVR	Hazard, Vulnerability and Risk
IAS	Invasive Alien Species
ICIMAR	Institute of Marine Sciences (by its initials in Spanish)
IES	Institute of Ecology and Systematics
INAF	National Institute of Agroforestry Research (by its initials in Spanish)
INRH	National Water Resources Institute (by its initials in Spanish)
M&E	Monitoring and Evaluation
Mi Costa	Adaptation to climate change in Cuba's coastal areas through an ecosystem-based approach
MINAG	Ministry of Agriculture
MINCEX	Ministry of Foreign Trade and Investment (by its initials in Spanish)
MTR	Mid-term review
OP-15	Capacity Building for Coordination of Information and Monitoring/Sustainable Land Management Systems in Areas with Water Resources Management Problems
PADIT	Articulated Platform for Integral Territorial Development (by its initials in Spanish)
PMC	Project Management Costs
PMU	Project Management Unit
PPR	Project Performance Report
SDGs	Sustainable Development Goals
ToR	Terms of Reference
UNDP	United Nations Development Programme
UNFCCC	United Nations Convention on Climate Change

UNEG	United Nations Evaluation Group

EXECUTIVE SUMMARY

Brief description of the project

The project entitled "Reducing vulnerability to coastal flooding through Ecosystem-based Adaptation (EBA) in the south of Artemisa and Mayabeque provinces", better known as Manglar Vivo (Living Mangrove), aimed to increase the resilience of coastal communities of six municipalities in the south of these two provinces to coastal erosion, flooding and marine intrusion caused by climate change primarily through the recovery and restoration of mangroves. The project was financed by the Adaptation Fund (AF), with an AF budget of USD 6,067,320. It was implemented by UNDP Cuba and executed by the country's Ministry of Science, Technology and Environment (CITMA by its initials in Spanish) and Ministry of Agriculture (MINAG by its initials in Spanish) for a period of 6 years, from 1 October 2014 to 30 September 2020 (the project, initially lasting 5 years, was extended by one year).

Objectives and scope of the evaluation

The objective of this consultancy is to carry out the final evaluation of Manglar Vivo. This evaluation analyses the relevance, design, effectiveness, efficiency, sustainability and impact of the project. It also identifies lessons learned and provides recommendations. The conclusions of the document are based on the review of relevant documentation and interviews with key stakeholders. The evaluation team consists of three evaluators. Only one of them was able to make field visits, and these were limited due to the pandemic caused by COVID-19. The evaluation team has triangulated the data collected to answer the evaluation questions.

Overall Project Rating

The evaluation concludes that Manglar Vivo was relevant, very effective and efficient. Monitoring and evaluation was moderately satisfactory. Implementation by the implementing agency was very satisfactory, while the performance of the executing agency was satisfactory. Sustainability is likely in financial, socio-political, institutional and political terms, and moderately likely from an environmental point of view.

Table 1. Evaluation results[1]

Evaluation Ratings:			
1. Monitoring and Evaluation	***rating***	**2. IA& EA Execution**	***rating***
M&E design at entry	MS	Quality of UNDP Implementation	HS
M&E Plan Implementation	S	Quality of Execution - Executing Agency	S
Overall quality of M&E	MS	Overall quality of Implementation / Execution	S
3. Assessment of Outcomes	**rating**	**4. Sustainability**	**rating**
Relevance	R	Financial resources:	L
Effectiveness	HS	Socio-political:	L
Efficiency	S	Institutional framework and governance:	L
Overall Project Outcome Rating	HS	Environmental:	ML
		Overall likelihood of sustainability:	L

Main findings

In terms of **relevance**[2], Manglar Vivo is consistent with the United Nations conventions on climate change, wetlands, and biodiversity, the international guidelines on EbA, and the objective, results, and outputs of the AF. The project is also in line with UNDP priorities at global, regional and national levels and Cuba's United Nations Development Assistance Framework 2014-2018. Furthermore, the project is in tune with national strategies and priorities in the areas of economic and social development, climate change and environment, and responds to the problems and needs of the provinces and municipalities where it focuses. All stakeholders were actively involved in the design and implementation of the project.

The **project design**[3] formulated a fairly clear and well-integrated structure, with a few exceptions. However, there are important gaps in relation to climate information; the connectivity of coastal ecosystems with terrestrial and marine ecosystems; the built environment; and the promotion of alternative livelihoods and the modification of practices of productive sectors other than forestry. These limitations are relatively understandable, given the relatively limited financial resources available, the time frame and the pilot nature of this project.

The targets are feasible and realistic within the budget, but not within the timeframe of the project. The results framework included in the project document does not allow the achievement of the goal or the key intermediate result to be measured. Overall, 80% of the indicators in the results framework are not specific and/or consistent. The identification of risks is moderately adequate, but their analysis is inappropriate.

The project document does not clearly integrate lessons learned from other projects. The project document does a good job at identifying and analysing complementary international projects and identifying synergies. During its implementation, the project had a high level of coordination with other international cooperation interventions and with work and research initiatives carried out by Cuban institutions.

[1] Following the rating scales provided in Annex D of the ToR and page 25 of the UNDP/GEF guidelines for final evaluations.
[2] For details, see section 3.1
[3] For details, see section 3.2

In terms of **effectiveness**[4], at the end of the project, all the final targets of the results framework in the project document have been met, and 8 or 50% have been exceeded. All the FA targets have also been met, and 5 or 25% have been exceeded. This analysis is based on important assumptions. Section 3.6 examines impacts in terms of vulnerability and ecosystem health based on available information.

To achieve these results, Manglar Vivo had to overcome some significant challenges. The risk mitigation strategies identified in the project document were adequate, although the strategy with regard to the import of goods was insufficient. During the implementation of the project, the actions to mitigate the risks that arose were appropriate. The project showed a high capacity for adaptive management.

From the point of view of **efficiency**[5], the project has spent the budget foreseen in the project document. Financial performance improved over time. There are important differences in the financial implementation by component, as the cost of goods and services was not accurate in the design. Project management costs are and are expected to be slightly lower than planned. Manglar Vivo was able to mobilize 382 percent of the co-financing committed in the project document. The co-financing, all in kind, helped mitigate the impact of the delay in importing some goods and exceed some of the targets. The project produced financial reports and audits with the required regularity, with room for improvement in terms of their quality.

The cost-effectiveness of Manglar Vivo was probably intermediate. Its management costs (6.5% of total costs) are below the FA ceiling (9.5%), but above the GEF and GCF ceilings for projects of this size (5%). Available information indicates that ecosystem restoration was cost-effective and that EbA is more cost-effective than adaptation through the construction of grey infrastructure.

An appropriate M&E plan is included in the project document. As indicated, the results framework has major shortcomings. During implementation, especially from the mid-term evaluation, the project strengthened the M&E system. Reporting has been appropriate in terms of quantity, but its quality is average: often reporting does not respond completely, directly or clearly to the system of indicators.

The project established effective partnerships with relevant actors. The Steering Committee, the Project Management Unit (PMU), the Environmental Agency (AMA by its initials in Spanish) and UNDP played their roles well and had a fluid dialogue. Despite all this, the project was extended by one year, at no cost.

The **sustainability**[6] strategy is sound, although more attention should have been paid to other connected ecosystems, the integration of sustainability into productive sectors other than forestry, and the promotion of alternative livelihoods.

From the point of view of the policy, regulatory and institutional framework, the necessary conditions have been established to make the project's results sustainable in the short, medium

[4] For details, see section 3.3.
[5] For details, see section 3.4.
[6] For details, see section 3.5.

and long term. From the financial point of view, the provinces of Artemisa and Mayabeque and the project's municipalities have already secured substantial resources to give continuity to the results of Manglar Vivo, especially those related to ecosystem restoration. In addition, the forests are insured. Furthermore, there is progress in mobilizing international resources. The project has provided equipment that will facilitate the continuity of the project's results. From a socio-cultural perspective, the project has strengthened the awareness and technical capacity of almost all relevant actors. There is also a strong political will to give continuity to the project's results and technical capacities and knowledge transfer mechanisms to do so. From an environmental perspective, the project results are subject to significant risks, including the occurrence of major extreme climate events; the expansion of Invasive Alien Species (IAS); and the degradation of connected ecosystems.

In terms of **impact**[7], in the short term, pressures on ecosystems have been considerably reduced, but are not negligible. These pressures are likely to be limited in the medium to long term. The economic blockade of the country and the COVID-19 do not help to reduce these pressures.

There is no comprehensive information on the health of coastal ecosystems. Available information suggests an improvement. In addition, available information indicates an improvement in the health of marine and terrestrial ecosystems. The health of these ecosystems is expected to improve over time.

There is little scientific evidence on the impact of the project in reducing vulnerability to coastal flooding. It is reasonable to think that the restoration of coastal ecosystems, the cleaning of ditches and channels, and the strengthening of planning, management and response capacities have reduced the vulnerability of target populations to these aspects. There is anecdotal evidence in this regard. Those who have benefited most are the populations immediately on the coast. A AMA study will assess vulnerability reduction more rigorously in 2021.

Manglar Vivo contributed to the Sustainable Development Goals (SDGs), had socio-economic benefits, respected environmental and social safeguards, and promoted gender equity and the inclusion of youth. The evaluation team has identified only positive unexpected outcomes.

The project provided public goods in the form of new knowledge, approaches and technologies and took steps to disseminate these public goods. There are excellent prospects in terms of replication and/or scaling up. The results of the project have informed the development of policies and strategies. During the project, the project approach was applied in other areas of the country. There are prospects for replication in the municipalities and, to a greater extent, the project provinces, and other provinces of the country. In addition, the lessons learned during the implementation of this project are being used in the design of other projects to be financed with international resources, of different scales. At the international level, there has been no concrete progress in replicating the lessons learned during the implementation of the project.

Recommendations

Based on the findings above, this evaluation has the following recommendations.

[7] For details see section 3.6.

Table 2. Summary of recommendations and responsible parties

No.	Recommendation	Responsible Party
1	Prepare a document describing the aspects to be taken into account in the preparation of an integrated management plan for the coastal basins that drain into the mangroves of southern Artemisa and Mayabeque (AMA) and submit it to the National Watershed Council	PMU, AMA
2	Organise a workshop to identify and characterise the lessons learned during the implementation of the project, and consolidate them, integrate them into a document and disseminate them	PMU, AMA, UNDP
3	Use these lessons in the development and implementation of new projects	AMA, PMU, AF
4	Promote that the vulnerability assessment planned for the project are is actually conducted and takes into account Manglar Vivo, and ensure that lessons learned are factored in in the design of new projects	AMA

1. INTRODUCTION

1.1. Objective of the evaluation

As indicated in the ToR, the objectives of this final evaluation are

- To evaluate the achievement of the results of the project "Reducing vulnerability to coastal flooding through Ecosystem-based Adaptation in the south of Artemisa and Mayabeque provinces"; and
- To develop recommendations and identify lessons learned that can improve both the sustainability of the benefits of this project and the overall programming of the activities of UNDP in Cuba.

1.2. Scope and methodology of the evaluation

1.2.1 Scope

The evaluation analyses the different phases and aspects of the project, namely

- The project formulation phase: project design, logical/results framework, assumptions and risks, management arrangements, complementarity with other projects and initiatives in the same field, expected involvement of stakeholders.
- The project implementation phase: management and coordination system, financing and co-financing, monitoring and evaluation (M&E) system, stakeholder participation, adaptive management.
- The project results: impact, country ownership, catalytic or replication effect, integration of other UNDP priorities, and sustainability (political and institutional, financial, socio-economic and environmental) of the project benefits

1.2.2 Methodology

The evaluation team is composed of two international evaluators (Jon Garcia, as team leader, and Joanna Velázquez-Acosta) and one national evaluator (Daysi Vilamajo). The evaluation has been carried out following a structured process that integrates data collection and analysis and is based on the evaluation matrix (see Annex 5.1). This was developed at the inception phase and forms the backbone of the evaluation. This matrix includes the evaluation questions considered for each criterion and details the most relevant qualitative and quantitative indicators that inform the evaluation questions, the information sources and the data collection methods.

The evaluation examines the relevance, effectiveness, efficiency, sustainability and impact of the project results. It provides conclusions, recommendations and lessons learned and qualifies the project results using the various matrix models and evaluation criteria recommended by UNDP. The project results are assessed against the expectations set out in the project's logical framework.

The evaluation process takes into consideration the guidelines and procedures set out in the UNDP Guide to Conducting Final Evaluations of UNDP-implemented AF-funded projects, as well as those

for UNDP/Global Environment Facility (GEF) projects. In addition, the evaluation has been conducted in accordance with the Code of Conduct for Consultants in Evaluation established by the United Nations Evaluation Group (UNEG). In this regard, the evaluation has adopted a participatory, consultative and gender-sensitive approach.

It is important to mention, however, that this evaluation has been implemented in a special context: the global health crisis related to the COVID 19. This crisis compromises the full application of the UNDP/AF guidance for conducting final evaluations, particularly as it relates to face-to-face meetings and field visits. The evaluation team, in coordination with UNDP, AMA and the PMU, has adjusted the methodology according to a changing context, as the health situation and the Cuban Government's actions evolved. While the evaluation team believes that it has had access to adequate information, in terms of both quantity and quality, to produce a robust, evidence-based evaluation report that is credible, reliable and useful, the inability of the international evaluators to travel to Cuba and the difficulties of the national consultant to travel to the field are limitations that are important to bear in mind. For example, the evaluation team has not been able to measure robustly and independently the health, at the end of the project, of the ecosystems where restoration activities have been carried out. This would be possible in a final evaluation with extensive field visits and the necessary technical capacity and equipment. In this assessment this has not been possible, as the international team has not been able to go to the field due to the pandemic. In that sense, at this point the team of evaluators has depended on the information provided by the project. As explained in section 3.3 on effectiveness, there is little information available on the health of ecosystems at the end of the project.

Data collection

Primary and secondary data have been collected. Secondary data has been obtained from project management staff (project team and UNDP offices in Cuba and at the regional level) and partners, as well as through review of project documents, general policy documents and others. Annex 5.2 provides the list of the documents that have been reviewed as part of this evaluation, comprising all the documents listed in Annex B of the ToR. Primary data have been collected mainly through semi-structured interviews conducted remotely (with donors, implementing and executing agencies, national, provincial and municipal partners, and beneficiary communities). As part of the evaluation, the national evaluator visited the field for two days, observing the project sites and talking to some key stakeholders. Annex 5.3 provides the list of the people who were interviewed.

Data analysis

The evaluators have compiled and analysed all the data collected. The quantitative data have been analysed with the appropriate instruments (e.g. percentages, average scores and perception indices). In order to ensure the consistency of information collected by various sources, triangulation of data has been an essential tool to verify and confirm the information collected. Conclusions have been drawn from the relevant information through interpretative analysis. This systematic approach ensures that all findings, conclusions and recommendations are supported by evidence.

1.3 Structure of the evaluation report

This evaluation report begins with an executive summary. Section 1 provides a brief introduction. Section 2 briefly describes the project and the development context. Section 3 presents the findings with regard to the project's relevance, design, effectiveness, efficiency, sustainability and

impact. Section 4 provides conclusions, lessons learned and recommendations. The annexes include the evaluation matrix, lists of documents and persons consulted, statements by the evaluators, detailed comments on the project results framework, and maps of the health of the mangrove in 2015 and 2020

2 DESCRIPTION OF THE PROJECT AND THE DEVELOPMENT CONTEX

2.2 Context of the evaluation

Cuba is one of the ten countries with the largest extension of mangroves in the world. In 2014, mangroves covered a total area of 5647 km^2 in the country, equivalent to 5.1% of its total area. However, the country's mangroves are suffering from high levels of degradation in many areas.

This is the case of the coastal and sub-coastal forests in the south of the provinces of Artemisa and Mayabeque. Since the beginning of the development of the shipbuilding industry in Cuba, more than 400 years ago, they provided timber to the shipyards in the then San Cristobal de la Habana. The development of this activity caused the gradual settlement of this territory, stimulating the development of other activities such as food production in areas close to the wetlands, and port activity and fishing on the coastline. Over time and up to the present day, the wetlands of this region have been severely affected by loss of extension, diversity and structural modification. For example, the protective strip of red mangrove on the coastline has disappeared in many places. Anthropogenic impacts that have affected the structure and functioning of coastal wetlands include the modification of hydrological flows through the construction of dikes, canals, and roads, the drying out of wetlands for agricultural activities, and the discharge of pollutants.

These modifications significantly degraded the health of the region's mangroves, reducing the quality of the ecosystem services they provide, particularly in terms of protecting the coast from erosion, sea level rise, and extreme weather and sea events. Mangrove deterioration has resulted in increased saline intrusion into underground aquifers. These are essential for the irrigation of the coastal plains, one of the most productive in the country, and as a source of drinking water for the city of Havana, which, with over 2 million people, is home to approximately 20% of the country's population. The degradation of the mangroves has also led to the retreat of the coast and severe flooding during tropical storms, putting human lives, productive systems and biodiversity at risk. These impacts will continue to be exacerbated by the effects of climate change, such as sea level rise and the increased intensity and frequency of extreme weather and maritime events, in one of the areas of the country most vulnerable to tropical storms and hurricanes.

Despite their protection since 1998, through the adoption of the 1998 Forestry Law, the health of mangroves in these two provinces was a concern in early 2010. An assessment of the health of the mangrove ecosystem in the entire northern and southern coastal strip of the large island of Cuba (Menéndez, 2013, University of Alicante) identified the strip comprised in these two provinces as one of the least healthy in the country. Restoration activities to improve the health of these mangroves, increase ecosystem services and increase the resilience to climate change of their direct and indirect beneficiaries were a priority.

2.2 Brief description of the project

The project entitled "Reducing vulnerability to coastal flooding through Ecosystem-based Adaptation in the south of Artemisa and Mayabeque provinces" aimed to increase the resilience of coastal communities in six municipalities in the south of these two provinces to coastal erosion, flooding and marine intrusion caused by climate change primarily through the recovery and restoration of mangroves. The project was financed by the AF, with a budget of US$ 6,067,320 from AF and co-financing from Cuba. It was implemented by the UNDP in Cuba and executed by the country's CITMA and MINAG for a period of 6 years, from 1 October 2014 to 30 September 2020 (the project, initially lasting 5 years, was extended by one year).

To achieve its objective, the project focused on mitigating and partially reversing the physical impacts of climate change in the coastal areas of these two provinces through the implementation of three components:

- Component 1: the recovery and ecological restoration of coastal ecosystems, especially the red mangrove and swamp forests, in order to strengthen their buffer function against extreme events and reduce saltwater intrusion.
- Component 2: the integration of the principle of EbA into territorial management plans for coastal areas and agricultural production zones, through training and awareness campaigns for communities and decision-makers.
- Component 3: the creation of an enabling environment at the regional level for the effective and sustainable implementation of these plans, based on the production of information on the costs and benefits of EbA accessible to decision-makers and planners and the strengthening of institutions.

3 FINDINGS

3.1 Relevance[8]

3.1.1 Is the project coherent with the objectives of international environmental and climate change conventions and EbA?

To what extent is the project aligned with the objectives of the international environmental (United Nations Convention on Biological Diversity (CBD)) and climate change (United Nations Framework Convention on Climate Change (UNFCCC)) conventions?

The project is consistent with the United Nations environmental conventions. It responds to the CBD and the Aichi targets for the restoration of degraded ecosystems that provide essential ecosystem services, as well as to the UNFCCC, which promotes the reduction of socio-environmental vulnerability to the impacts of climate change through the development of integrated

[8] To what extent was the project consistent with international environmental and climate change conventions, the strategic objectives of the Adaptation Fund and the UNDP and with local, regional and national priorities in terms of development and environmental protection and adaptation to climate change?

coastal zone management plans and the conservation and sustainable use of coastal, terrestrial and marine ecosystems. The project is also aligned with the Convention on Wetlands of International Importance (Ramsar), whose mission is to promote the conservation and rational use of these.

Cuba's international commitments on climate change, biodiversity, and wetlands were taken into account in the project's development phase. It is also planned to present the activities carried out in Cajio, a project intervention area, as a case study in Cuba's third national communication to the UNFCCC.

Does the project follow the international guidelines on EbA?

An EbA initiative must meet two requirements: i) the use of natural resources to provide a climate solution, and ii) the existence of an economic and/or social benefit for the vulnerable population. From this point of view, it can be claimed that, as argued in the project document, Manglar Vivo applies an EbA approach, although with some margin for improvement. Indeed, on the one hand, the project is committed to the rehabilitation of ecosystems to increase resilience to climate change. At the same time, the project provides economic and/or social benefits. As discussed in more detail in section 3.2.1, the promotion of economic benefits is, however, mostly indirect. In the medium term, the project provides benefits in terms of increased productivity of agriculture and fisheries, the key livelihoods in the area. In the short term there were positive impacts in terms of employment in the forestry and beekeeping sectors, but more work could have been done to promote alternative livelihoods, both in terms of the number of sectors and the depth of work in each sector, for example by identifying, analysing and promoting value chains.

It is important to mention that EbA is becoming increasingly important in the context of climate change and biodiversity conservation policies and it is promoted by both the UNFCCC and the CBD. When Manglar Vivo was designed in early 2010, guidelines on what constitutes an EbA solution and its differences with conservation or biodiversity protection solutions were just being standardized at the international level. The project played a pioneering role in this regard in the country and the region.

3.1.2 Is the project consistent with FA's strategic priorities?

The FA funds projects and programmes that help vulnerable communities in developing countries, parties to the Kyoto Protocol and the Paris Agreement, to adapt to climate change. To be eligible for resources from the Fund, any project or programme must comply with the Fund's results framework and contribute directly to its overall objective and results.

The objective of Manglar Vivo is clearly in line with the overall objective of the AF, in terms of reducing vulnerability to climate change. The project also contributes to three of the eight outcomes identified in the Fund's strategic framework, namely outcomes 2, 5 and 6. In addition, component 1 contributes to FA's output 5, component 2 to FA's output 6 and component 3 to FA's output 2.1. Annex VIII of the project document clearly indicates these links. The project also met the FA's requirements for community ownership and involvement at both the design and implementation levels (see Section 3.1.4). The project also meets the Fund's requirements for social and environmental safeguards. The project benefited from strong scientific support (in terms of species

to be eliminated, restored, replanted...). No negative social or environmental impacts were reported.

3.1.3 Are the objectives of the project in tune with UNDP priorities in the country and the region?

The objectives of the project are in line with UNDP priorities at global, regional and national levels. Although the project was designed and approved earlier, at the global level, it is aligned with UNDP's Strategic Plan 2018-2021, whose overall objective is "to assist countries in achieving sustainable development by eradicating poverty in all its forms and dimensions, accelerating structural transformation for sustainable development and building capacities for recovery from crises and shocks". Interviews suggest that the project is also consistent with UNDP priorities for the Caribbean sub-region, with UNDP focusing its action on the protection of coastal areas from the risks of sea level rise and intensifying hurricanes, prioritising EbA.

The project is also fully in line with UNDP priorities in Cuba. Specifically, the project contributes to results 4 and 31 of UNDP's Country Programme 2014-2018. Furthermore, the project is in line with the Cuban United Nations Development Assistance Framework 2014-2018. In particular, the project contributes to axis 4, environmental sustainability and disaster risk management, outcomes 7 and 8 and indicators 7.1, 7.2, 8.2 and 8.3[9].

3.1.4 Is the project in harmony with national environmental, climate change and sustainable development strategies and priorities?

As an island country, adaptation to climate change, ecosystem restoration and coastal zone management are key issues for Cuba, which are highlighted in many of the country's policy documents and strategies. To begin with, the project is consistent with the National Programme for Economic and Social Development to 2030, which seeks to reduce vulnerability to climate change and has a strategic focus on the protection and rational use of natural resources and the environment.

In addition, the project is in harmony with the country's climate change policies and strategies. Manglar Vivo is in line with the first two national communications to the UNFCCC, completed in 2001 and 2015 respectively, and the third national communication currently in preparation. More fundamentally, the project is in tune with the 2007 Cuban Civil Society Programme to Address Climate Change, which aimed to integrate the effects of climate change into development plans, involving the different levels of government, and even more fundamentally with the State Plan to Address Climate Change adopted in 2017, better known as Tarea Vida. This plan identifies 5 strategic actions and 11 tasks in the area of adaptation and mitigation. The project contributes

[9] Direct effect 7: Production and service sectors strengthen the integration of environmental considerations, including energy and climate change adaptation, into their development plans. Indicator 7.1 refers to investment in environmental protection; 7.2, to investment in climate change adaptation and mitigation. Direct effect 8: Governments and key sectors improve disaster risk management capacity at the territorial level. Indicator 8.2 refers to the implementation of studies; 8.3 refers to training in risk management.

directly to Task 5, which focuses on the recovery of the most affected mangroves in the country. It should also be noted that the project areas were explicitly prioritized in Tarea Vida.

In addition, Manglar Vivo is aligned with environmental laws and policies. In particular, the project is in line with the National Environmental Strategy established for the periods 2011-2015 and 2016-2020, which defines strategic objectives in terms of "rational management of natural resources" and "confronting climate change". Among the priority lines of action are the rehabilitation of mangroves to improve the provision of climate regulation services, as well as environmental education and communication. On this last point, the project is also consistent with the national education policy (2010-2015), which gives great importance to environmental education and issues related to climate change. In addition, the project responds to the National Biodiversity Programme 2016-2020, whose goal 10 seeks to reduce anthropogenic pressures on coastal and marine ecosystems, including mangroves. The activities carried out in the framework of the project were also consistent with the country's legal and regulatory environmental framework (Environment Law n°81 of 1997, Forestry Law n°85 of 1998, and Decree/Law 212 on coastal zone management of 2000).

3.1.5 Is the project consistent with provincial and municipal needs and plans in the intervention area of the project?

The project operated in an area that was both very strategic and fragile. According to the interviews and the review of documents, the provinces of Artemisa and Mayabeque are of great importance for the national economy. On the one hand, they represent 25% of the country's food production area, mainly for food, vegetables and grains. The plains which stretch from coast to coast include some of the most productive agricultural land in the country. In addition, their underlying aquifers are the main source of water for the capital, Havana. In addition, one of the project's intervention municipalities, Batabanó, includes a strategic port, as the main exchange point between the island of Cuba and the country's second largest island, the Isle of Youth, which is heavily dependent on imports from the former.

The southern provinces of Artemisa and Mayabeque are however highly vulnerable to tropical cyclone surges and sea level rise, exacerbated by climate change. Cuba is in one of the most active parts of the Atlantic/Caribbean hurricane region, and the two provinces under consideration are a critical point for extreme weather events (hurricanes, anticyclones). Therefore, the project intervention area faces the risk of coastal flooding, which regularly affects communities and settlements. In fact, before the project, the possibility of relocating a large part of the population in the intervention area, especially the inhabitants of Batabanó, was considered, with major social costs and economic costs that are difficult to bear for an economy burdened by an economic, financial and commercial blockade. The project's area of intervention is also faced with the penetration of the salt wedge, which threatens food production and the supply of drinking water to both the area and Havana.

The environmental fragility of this area is accentuated by natural causes such as coastal erosion and strong anthropogenic changes. The mangrove ecosystem has been heavily modified in recent decades by the cut of the red mangrove and by infrastructure works such as the construction of drainage channels, a retention wall (the "Dique Sur", built at the end of the 1980s) and a coastal road. According to the impact summary document, these different investments were also the result

of the lack of vision and integrated management of the coastal zone and of the awareness of the value of the ecosystem services provided by the mangroves by the productive enterprises and local communities that used the mangrove for its medicinal properties and for obtaining charcoal. These pressures have led to the degradation of mangroves, negatively affecting their function of protection against extreme events and saltwater intrusion, as well as their ecological value in terms diversity of flora and fauna, which was significant in the past (the area includes a protected area).

In this context, the objectives and activities of Manglar Vivo fully respond to the problems and needs identified in the two provinces. According to the interviews, the project design was also based on Hazard, Vulnerability and Risk (HVR) studies, which had been carried out in this area in 2007. The six municipalities considered in the project were identified as the most vulnerable to sea level rise and extreme events in these studies. It should be noted that the start of the project coincided with the process of updating the HVRs of the two provinces, which allowed the introduction and training of government leaders in the concept of EbA, as a new approach to addressing environmental problems, with a more holistic vision. The interviews confirm the relevance of the project in addressing socio-environmental issues in the area.

Manglar Vivo was also very relevant from an institutional and political-administrative angle. In fact, the project accompanied and strengthened an experimental phase of decentralization, which took these two provinces, previously attached to Havana, as a spearhead for greater territorial autonomy. In turn, the transfer of competencies led to a more direct dialogue with the provincial governments, favouring the consideration of their needs.

3.1.6 Have all relevant stakeholders been involved in the design and implementation of the project?

The project document details the consultative process followed throughout the project design (organisation of workshops, working sessions, field visits). The interviews confirm that almost all stakeholders were involved in this process, both national and local (central government ministries and entities, research centres, provincial and local governments, civil society organisations). Consultations with community-based organisations and local communities were also carried out during the project preparation phase.

This high level of participation and involvement of the various stakeholders was maintained during the implementation of the project. Many of the interviewees highlighted the active participation of governments and communities in activities not only to raise awareness but also to restore and monitor mangrove ecosystems through the formation of five volunteer groups, training classrooms and interest groups in schools. Actors from the productive sector, particularly agroforestry companies, were the main implementers of the mangrove rehabilitation activities (component 1). Within the framework of components 2 and 3 of the project, 2,916 training activities were carried out for different types of actors and key members of the communities (community leaders, teachers and children, leaders of productive enterprises and journalists). One of the strengths of the project was the linkage of the country's scientific and academic sectors.

The project appears to have maintained an approach to integrate relevant stakeholders throughout implementation. The interviews indicate that some key institutions, which were not involved in the

design or the early implementation phases, were incorporated during implementation once they were identified as relevant, such as the Batabanó Gulf protected area, some research institutes, such as the Institute of Marine Sciences (ICIMAR by its initials in Spanish), and ApiCuba, a beekeeping company that belongs to MINAG, both from 2017.

The interviews conducted with a very broad representation of actors highlighted the collaborative and interactive nature of the process, in which different actors worked together. In this sense, the communities indicate that their opinions were heard and taken into account in the workshops, and that there was always a dialogue between people's experience and scientific knowledge, integrating different knowledge. This confirms the analysis of the mid-term evaluation, which highlights the high level of public involvement.

3.2 Project design[10]

3.2.1 Assessment of the logical/results

¿How clear and integrated were the objectives, outcomes, outputs and activities of the project?

The objective, outcomes, outputs and activities of the project are quite clear and well-integrated. The outputs contribute to achieving the objective. The promotion of ecosystem restoration to reduce vulnerability is, as mentioned above, very relevant and, as will be discussed later, probably effective. Also positive is the integration of restoration activities on the ground, including different ecosystems and linking the planting of native species with the removal of IAS. It is also important to highlight the integration of these on-the-ground activities with awareness-raising and training activities for community and government actors, institutional strengthening and knowledge management. The integration of a cost-benefit analysis, which actually contributes to components 2 and 3, is interesting. In general, the sequence is also appropriate in terms of conducting diagnostics before intervening in the field.

That said, the structure of outcomes and outputs is not very common. Typically, AF and/or GEF-funded projects have fewer outcomes than outputs, with the latter contributing to the former. In contrast, in the logical framework of this project there are 16 outcomes and 9 outputs. This creates confusion, although it is probably because the outcomes were actually formulated as targets.

In addition, it is not very clear where and how the integration of EbA into provincial and municipal planning is included. The project document is confusing. In the summary presentation of the logical framework (pp. 20-21) there are two references, the clearest reference being in component 3. In the detailed presentation of the logical framework (pp. 62-64) there is only one reference, and it is located in component 2. The interviews suggest that the location of this aspect was not very clear during implementation. However, as detailed in section 3.3.1 on effectiveness, this shortcoming

[10] Was the project internally coherent and robust in its design?

did not prevent the project from achieving its expected goal in terms of integration of EBA into provincial and municipal planning.

On the other hand, there are some important gaps. Firstly, insufficient attention is paid to climate information. This is important because without climate projections it is difficult to know whether the EbA measures will be sustainable in the long term and whether they will actually increase climate resilience. Although the project builds on the projections previously made in the macro-project, in particular the HVR studies that resulted in the prioritisation of this area, it would have been appropriate to include some specific actions in this regard, for example in terms of early warning systems. In Cuba the Institute of Meteorology and Civil Defence centralises the information, integrating all the entities and projects.

Secondly, although, as mentioned, it considers the coastal ecosystem in an integral manner, considering the mangrove forest, the swamp forest and the bordering forest, Manglar Vivo does not directly consider the relationship of this ecosystem with the terrestrial ecosystems, particularly the corresponding hydrographic basin, nor the marine ecosystem, especially the sea grasses and corals. Manglar Vivo worked with other projects that sought to improve watershed and water management (see Section 3.2.4), with room for strengthening this aspect. Manglar Vivo did not clearly address the marine aspect. This is important in a project that focuses on ecosystems and must address their connectivity. Indeed, the health of coastal ecosystems is partly dependent on the quantity and quality of freshwater provided by rivers, and this is vulnerable to climate change. Similarly, the health of coastal ecosystems depends partly on the ability of corals and seagrasses to dissipate wave energy, among other contributions. From another perspective, the rehabilitation of coastal ecosystems contributes to the restoration of terrestrial and marine ecosystems. This is in any case a complex issue and one of the big questions in EbA projects, where a balance has to be found between the connectivity of ecosystems and the availability of funds and efficiency in implementation.

Thirdly, the project does not comprehensively address aspects linked to the built environment / human settlements. The project includes the cleaning of ditches and canals, which is very relevant. It has also worked on waste management a few times. However, the project has not addressed aspects of grey infrastructure that are important for reducing the vulnerability of the target populations. This is particularly important in Surgidero de Batabanó, where urban resilience actions are required, including the redesign of the canal system. Although UNDP does not have a comparative advantage in this regard, and AF projects cannot cover all vulnerability drivers, it would have been important to consider this dimension at least indirectly, for example by supporting the development of plans to be implemented later by the government.

Fourth, the project does not sufficiently address the promotion of alternative livelihoods that can reduce pressure on ecosystems. The project document refers to economic benefits derived from the sustainable use of ecosystems, but there is no sufficiently clear and robust strategy in this regard, beyond the indirect benefits in agriculture and fisheries and the direct benefits in the forestry sector and, on a very limited scale, in the use of removed IAS and beekeeping. Furthermore, despite some efforts in this regard in conjunction with complementary projects, Manglar Vivo has not worked sufficiently with productive sectors other than forestry, such as farmers and fishermen.

It is important to mention that these limitations are relatively understandable, given the relatively limited financial resources available, the implementation time and the pilot nature of this project. The formulation of Manglar Vivo began in 2011 and culminated in 2013, although implementation began in 2014. Almost a decade ago, knowledge about EbA in the country and the region and even globally was much more limited. In ten years, the science has evolved. In fact, this project helped significantly to enrich that knowledge. It should also be noted that both UNDP and AMA are aware of these deficits and have sought to address them, especially with regard to the integration of terrestrial, coastal and marine ecosystems, in the formulation of new projects, particularly the project Adaptation to Climate Change in the Coastal Zone of Cuba with an Ecosystem-based Approach, better known as Mi Costa, which has a much larger Budget. In this sense, Mi Costa builds on the lessons learned in the implementation of Manglar Vivo.

How feasible and realistic were the project objectives, outcomes and outputs within the available budget and time frame?

All targets are feasible and realistic within the budget. However, the targets are not feasible and realistic within the 5 years. In general, the project is exposed to significant challenges in terms of implementation, particularly because of the need in Cuba to import inputs and the difficulty of doing so due to the economic and commercial blockade, which implies uncertain and lengthy contracting and procurement processes (see section 3.3.1 for details).

Within this general framework, three targets in particular were neither feasible nor realistic in terms of time. This is the case for targets relating to the number of hectares (ha) of forest restored with 85% survival three years after planting. As the target is formulated, at the end of the project the hectares planted in the previous two years cannot be considered, simply because the required three years have not passed. This makes it impossible to meet the target set by then in the final year, as a full assessment must be made within three years of the end of the project. This points to the debate between performance and outcome targets, and what outcome targets to consider for living systems such as ecosystems, given that in principle the positive results of restoration actions become more apparent over time. It makes sense to consider the outcome of restoration activities, but it is unrealistic for a project to measure them three years after it has closed.

It is important to emphasize that, while realistic, all three targets for restoration of the coastal ecosystem were ambitious. On the one hand, the level of degradation of the ecosystem was high, with a significant presence of IAS. On the other hand, it was a complex social environment, with significant anthropic pressures. The use of the surrounding communities was a challenge, which the project was going to address. However, there were also anthropic and climatic pressures on connected ecosystems, in terms of the watershed and marine areas, where the project would not substantially intervene. In addition, the institutional context was complex, with many actors not fully coordinated.

The very high level of achievement of the targets after one year's extension (see section 3.3.1) attests to the fact that the targets were feasible and realistic with the budget but required more time.

How effective was the M&E system (indicators, baselines, targets, methods and sources of verification) in measuring the progress/results of the project? Were they SMART and consistent with the project objectives, outcomes and outputs?

The results framework included in the project document has major shortcomings. Some of these were identified in the mid-term evaluation. To begin with, although the project's objective is to reduce vulnerability to coastal flooding, the results framework does not include any indicators to measure this. It is simply assumed that people living in the areas of direct and indirect influence of coastal ecosystems will see their vulnerability to coastal flooding reduced if the health of these ecosystems improves. This is a reasonable assumption. However, such a project should measure its results more concretely and robustly, with specific indicators of vulnerability to specific coastal flood risks. This is particularly important for indirect beneficiaries who are not very close to the coastal ecosystems in which the project intervenes. This analysis should also consider climate projections in the medium and long term. This is not easy to measure, but methodologies could have been defined with the participation of Cuban research institutes and AMA's HVR studies unit, as well as international good practices with the support of UNDP (e.g. experimental and control groups).

In addition, the results framework does not provide a robust measure of whether the health of coastal ecosystems has improved as a result of the project. Indicator I refers to the health of mangroves, but does not clearly indicate which indicators are considered, does not provide a concrete baseline, and does not indicate which values are expected (it says high level of health, but not which values would be high (50% or 90%?)). Furthermore, the indicator refers only to mangroves, and not in an integrated manner to coastal ecosystems, leaving aside swamp forests and bordering forests. The indicators in component 1 attempt to address this partially by considering the number of hectares restored with high survival rates and the existence of an IAS elimination plan. This is an improvement over indicator I, but it is still insufficient as a system for measuring the health of coastal ecosystems. As indicated in the previous section, indicators 1.1, 1.2 and 1.3 have a serious deficiency in terms of temporality. In addition, the health of water resources and, more importantly in terms of reducing vulnerability to marine flooding, the health of marine ecosystems, particularly corals and seagrasses, are not considered.

Indicator systems (indicator, baseline, target, method and source of verification) are more appropriate in components 2 and 3, although there are notable limitations. On the one hand, there is no correspondence between the results mentioned in the summary logical framework (pp. 20-21) and the detailed logical framework (pp. 61-63). Some results mentioned in the former disappear in the latter, and not only in those where there is overlap (such as in the integration of EbA into plans). The summary logical framework includes as a result "21,502 people from 6 popular councils (men and women) receiving economic benefits resulting from sustainable use and conservation of coastal ecosystems (e.g. mangrove honey)". This disappears in the detailed results framework. This is not a minor omission, as it seems to address one of the most important gaps, that of promoting alternative livelihoods. In this regard, it should also be noted that the results framework includes a reference to the impacts of climate change on economic activities, but in an imprecise manner. The summary logical framework also includes a target on implementation of adaptation measures by 28 communities that is not included in the detailed results framework. In both the detailed and summary results frameworks, the creation of a community level knowledge system is not well covered by the M&E system. Indicators for schools and dissemination materials are not sufficient. In addition, many of these indicators, particularly those for training, are

performance indicators (how many dissemination materials) rather than outcome indicators (how awareness, technical knowledge and behaviours have changed as a result of those materials). The project has made efforts to measure this through a survey, but this is not captured in the results framework.

Generally speaking, a good percentage of the indicators for the objective and the 3 components (80% or 12 out of 16) are not specific and/or consistent. There are also other shortcomings, such as having two sub-indicators, which suggests that the indicator is not specific enough. Annex 5.5 provides detailed comments for each indicator.

3.2.2 Assumptions and risks

The project document does not present assumptions but includes a section (pp. 55-56) on risks to project implementation. Seven risks were included, two of an environmental nature, four of an institutional nature and one of a social nature. The impact and likelihood of these risks are low or medium in the project document. The risks of greatest impact and likelihood in the project document are extreme weather events and fires affecting the survival of seedlings, and changes in the ownership of EbA by decision-makers. The other risks included in the project document are changes in climate affecting the phenology of the trees, negatively impacting the nursery; slow processes of equipment acquisition by local governments; limited availability of inputs and equipment on the national market; and short-term needs outweighing medium- and long-term considerations associated with EbA at both local government and community levels.

The project document identified almost all relevant risks but did not give due weight to all of them. The probability and risk of three of the seven risks should have been higher than considered in the project document. Extreme weather events, particularly hurricanes, many of them category 3 and 4, are highly probable in the intervention area and their impact would have been severe, not only on the ecosystems (it could have wiped out everything planted), but also on the ditches and canals cleared and, more generally, the infrastructure needed to reach the work sites. The risk of affecting communities' housing and livelihoods was also high and could have compromised the ownership of EbA or at least the availability of time to participate in project activities. These hurricanes are often devastating. It was very likely that the international market would have to be tapped and that procurement processes (by the national government or UNDP, not local governments) would be slow and difficult, with significant impact. On the other hand, the project document did not consider three major risks: national challenges in the supply of essential goods, such as fuel, needed to go to the field; lack of manpower to carry out project tasks, especially ecosystem restoration and canal cleaning; and institutional change in terms of the innovative process of decentralisation that the two provinces were undergoing. The project document also failed to consider the risk of global health pandemics, such as COVID-19, but this was largely unsuspected by all, not only in 2013, but even in early 2020, even though there had been smaller-scale multi-country epidemics previously. Furthermore, the project document did not explicitly consider sea intrusion in certain months of the year, due to the predominance of the so-called "south winds" which cause a rise in sea level due to wind drag, although in this case it can be considered implicit in the risk of extreme weather events.

Of the risks that were considered, those that took place were those of having to go to the international market and facing long, difficult and uncertain procurement processes (beyond the

change of importer - for a more detailed discussion on this point, see section 3.3.1). This had a large impact, larger than anticipated in the project document. The impact was partially mitigated by national co-financing. The other expected risks did not materialise or did not have a significant impact. The non-occurrence of an extreme weather event in the intervention area is rather exceptional. Forest fires were few and of limited extent, largely due to community surveillance and training in firefighting. No phenological impacts on seedlings were evident during the project. The risks in terms of ownership of EbA by decision-makers, local governments and communities did not took place due in part to the accumulated awareness between the design and the start of the project and in part as a result of the project's efforts in this area. The formulation process and the approval in 2017 of Tarea Vida also contributed to the project's articulation with the other sectors.

Of the risks not considered in the project document, institutional change did not have an impact, but the lack of manpower did, especially at the beginning. It could be managed by increasing the salaries of the forestry workers. The lack of fuel also occurred, affecting the project in an important way, especially with regard to inspections. Finally, project implementation was also affected by COVID 19, which did not allow field visits and reduced face-to-face meetings.

3.2.3 Lessons from other relevant projects integrated in project design

The project document mentions relevant previous or ongoing initiatives, both national and international (for analysis of complementarity and coordination see section 2.3.4). It is generally indicated that lessons learned from some of these initiatives will be used in the implementation of Manglar Vivo, but it is not detailed what these lessons are or how they are specifically integrated. That said, the interviews suggest that external lessons learned, particularly at the national level, were taken into account during the implementation of the project, especially when closely involving the research institutes. The main project mentioned is a UNDP/GEF project which worked in two systems in the Sabana de Camagüey in the north-east of the Cuban archipelago.

3.2.4 Complementarity with other interventions

Were other relevant interventions clearly identified in the project document?

The project document identifies in Annex VII the other projects carried out in the intervention provinces of Manglar Vivo, or adjacent areas, in the areas of climate change adaptation, ecosystem preservation and sustainable management of natural resources (soil and water) (8 in total), as well as potential areas of synergy. The document describes five of them in more detail and explains through a map and an outline the relations and complementarity between the existing initiatives and Manglar Vivo. This section does not identify nationally funded and developed initiatives and interventions, although these are mentioned more generally in other sections of the project document.

To what extent does the project support (and not duplicate) activities and objectives not addressed by other donors?

The project had a high level of complementarity with other initiatives developed in the area in the same field. The interviews conducted highlighted two in particular: i) The "Environmental Bases for Local Food Security" (BASAL) project, financed by the European Union and the Swiss Agency for Development and Cooperation (SDC), which focused on strengthening local capacities for incorporating the environmental component into socio-economic development plans (with particular attention to the issue of food security), in the agriculturally important municipalities of Los Palacios (Pinar del Rio), Güira de Melena (Artemisa) and Jimaguayú (Camagüey); and (ii) the project "Capacity Building for Coordination of Information and Monitoring/Sustainable Land Management Systems in Areas with Water Resources Management Problems", better known as OP-15, financed by the GEF and implemented by UNDP, which aimed to introduce the sustainable land management approach into actions to prevent degradation, recover and rehabilitate degraded land, and mitigate the effects of drought. It was developed in the provinces of Artemisa and Mayabeque, but inland, in agricultural production areas.

Available information indicates that Manglar Vivo, BASAL and OP15 worked in a complementary manner towards the common purpose of increasing the resilience of the area's populations to climate change, natural disasters and environmental degradation, through ecosystem rehabilitation actions and support to territorial planning and local capacity building. These three projects were complementary because of their different but connected geographical areas of intervention (the lower part of the coast in Manglar Vivo and the upper part of the agricultural plains of Havana-Matanzas in BASAL and OP-15) and because of the type of ecosystem targeted (mangrove for the Manglar Vivo and land and water resources for the two other projects). Manglar Vivo was also a pioneer in adopting an EbA approach, which the other projects did not promote (they focused rather on promoting alternative agricultural practices, improving water resource management and knowledge about climate change).

It is also worth highlighting the complementarity with the project "Application of a regional approach to the management of marine and coastal protected areas in the southern archipelagos of Cuba", funded by GEF/UNDP (2009-2014), which focused on the preservation of marine and coastal protected areas in southern Cuba, concentrating its activities on the restoration of coral reefs and sea grasses, as the first line of protection against extreme events, although this ended (in September 2014) almost when Manglar Vivo began. The interviews also noted that the project built on lessons learned and results from other projects, such as the GEF/UNDP-funded project "Improving the prevention, control and management of Invasive Alien Species in vulnerable ecosystems in Cuba," whose inputs led to improved identification and management of IAS under component 1.

Has the intervention been coordinated with other donors to seek complementarity and synergies?

The project also had a high level of coordination with other international cooperation interventions, both in its design and implementation phases. There is generally good coordination at an institutional level, as AMA coordinates an International Projects Desk where the activities of the different projects are discussed to avoid duplication and ensure efficiency in funding. Many of the international projects identified in this area of the country, with a fairly similar objective, were financed and/or managed by the UNDP, which facilitates coordination and the exchange of information and good practices. Similarly, the limited staff rotation in Cuban institutions and the high ownership and involvement of these institutions favour inter-institutional and inter-sectoral

coordination, as well as the integration of the results of different projects. Likewise, CITMA was involved in both Manglar Vivo, BASAL and OP15.

In more operational terms, Manglar Vivo and BASAL jointly developed training activities on environmental issues. A classroom was created, where training courses and workshops were provided for the beneficiaries of both projects, allowing them to share an integral vision of the environmental problems of the agricultural and coastal zones. The interviews indicate that the promotion of honey production by Manglar Vivo was incorporated by some producers who were beneficiaries of BASAL and who followed the training given by Manglar Vivo. In the same way, joint water management and monitoring activities were developed with the OP-15 project, which contributed to the objectives of both projects. This included the cleaning of water channels in Artemisa, and common hydraulic analysis in Mayabeque. To this end, three water quality monitoring stations were established, managed by specialists from the National Institute of Water Resources (INRH by its initials in Spanish).

Finally, it should be noted that the project activities were carried out in coordination with different research initiatives carried out by Cuban institutions in the agricultural, water and forestry fields. According to the interviews, the project was linked in Artemisa to a national project carried out by the Grain Research Institute on the production of grains more resilient to the new climate, which are better adapted to the salinisation of soils and warmer temperatures. In Mayabeque, the project was coordinated with the Agrifood Innovation Programme led by the National Institute of Agricultural Sciences. There was also synergy with projects of the National Forestry Institute and the National Botanical Garden in the categorization of plant species.

3.3 Effectiveness

3.3.1 Has the project been effective in achieving its expected objectives, outcomes and outputs?

The results framework of Manglar Vivo includes three indicators at the objective level and 13 indicators at the outcome level. Manglar Vivo has been very successful in meeting the targets set out in this results framework. At the end of the project, all final targets have been met, and 8 or 50% have been exceeded. The fulfilment of the targets at the objective level has been satisfactory: the three targets at this level have been met satisfactorily. The fulfilment of the targets at the outcome level has been very satisfactory: in eight of the 13 targets at this level the fulfilment has been very satisfactory; in the remaining five, satisfactory. Table 3 provides details, including the rationale for the ratings.

Performance is also very satisfactory using the FA Result Tracker. From the Fund's results framework, 9 targets were set at the impact level and 11 targets at the outcome level. All impact targets have been met, and 2 have been exceeded. All outcome targets have been met, and 3 exceeded. Annex 5.6 provides details.

This analysis is based on important assumptions. As detailed in section 3.2.1, the project results framework has significant limitations at both the objective and outcome levels. In that sense, the

above analysis does not imply that the project has clearly achieved the objective of reducing the vulnerability of its direct and indirect beneficiaries, or even that its intermediate outcome of improving the health of coastal ecosystems has been unequivocally achieved. The information available to analyse these aspects is insufficient. Section 3.6 examines these impacts based on available information.

Table 3. Progress Towards Results Matrix (Achievement of Outcomes against End-of-Project Targets)

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
Objective: To increase the resilience of populations living in the coastal zone of the provinces to Mayabeque Artemisa and the effects of climate change.	I. Areas with high rates of health and the conditions of the mangroves (soil and salinity of the water, the density of the canopy, the existence of local regimes of protection).	Coastal ecosystems that cover 7 318 ha are degraded, have excessive levels of salinity due to seawater intrusion and the obstruction of channels and have a limited protection regime.	Rehabilitation actions have been developed in 7770.2 ha (in mangrove forests - 3402.2 ha and wetland forests - 4368 ha). For details on health, kindly see the last column and the impact section.	7 318 Ha (total area where reforestation of mangrove, restoration of the mangrove ecosystems, and the enrichment of the forested areas inland was carried out) Note: the rates of coastal mangroves and wetlands must be nominated in the methodological documents to be developed at the start of the project.	As mentioned, the indicator, baseline and target system is not consistent. The target refers to hectares where restoration actions have been carried out; the indicator, to the result of these actions, in terms of high health indexes. The target in terms of number of hectares has been slightly exceeded (by 6%). There is not enough robust information to assess the health component of the indicator, as the results framework does not indicate what level should be considered high, does not provide a clear baseline, and there is no results information for most of the variables mentioned in the indicator. Existing information suggests that good health has been achieved in terms of water salinity (interstitial water was found to average 36 g/l in 2019) [11]. The existing information also suggests a decrease in soil salinity[12], and an improvement in the growth rate	S

[11] This figure is an average of the measurements taken at 244 monitoring points: 210 in the mangrove ecosystem and 34 in the southern dyke speed bumps. These 244 monitoring points include the plots inherited from the Southern Archipelago project and the macro project from 2013 and the plots and stations set up by Manglar Vivo from 2015 to 2019. In the monitoring points of the southern dyke, the monitoring was carried out in cooperation with project 2 of the OP15 programme, and from 2019 it was carried out with the INRH Artemisa.

[12] The project has 17 soil salinity monitoring points. The data show a downward trend: from 39 ppm in the areas surrounding the canals and 47 ppm in the other areas in 2015 to an average of 34 ppm in 2019 (in the dry period).

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
					of forest cover. The normalized vegetation index did not change during the project's duration[13]. Other health indexes not considered in the indicator suggest an improvement in the health of the mangrove ecosystems, such as the return and/or appearance of certain endemic and threatened species of flora and fauna. There are also improvements in the health of adjacent marine and terrestrial ecosystems, although this is not considered in the indicator. For details see section 3.6.1 on impact.	
	II. Numbers of people (men and women) with reduced vulnerability due to proximity of functioning mangrove forest and wetland ecosystems.	17,524 People in 47 communities are directly affected by coastal flooding.	Vulnerability of 21,502 inhabitants of the communities (46% women) directly benefited from the work of the project was reduced. The increase in the health of ecosystems together with their ability to reduce waves is a fact verified by research institutions. This capacity will continue to increase as the actions consolidate and the first strip of red mangrove reaches the desired structure	21 502 People (of which at least 45% are women) directly affected by the reduction of coastal flooding.	The target in terms of people has been achieved. This statement assumes that restoration actions have improved the functioning of ecosystems and that they protect the people mentioned.	S
		270,705 People are indirectly affected by the impacts of the phenomena	Vulnerability of the 270 705 inhabitants of the communities (50% women) was reduced. The increase in the health of ecosystems indirectly benefits the entire population of the	270,705 People (at least 45% are women) benefit indirectly by the reduction of the impact	The target in terms of people has been achieved. This statement assumes that restoration actions have improved the functioning of ecosystems and that they protect the people mentioned.	S

[13] This analysis was carried out at 235 points throughout the mangrove, where NDVI values were monitored from 2000 to 2019. In 2014 the average NDVI was 0.80, while in 2019 it was 0.81. Values between 0.6 and 1 are considered in the literature as indicators of healthy vegetation.

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
		associated with the CC on economic activities.	municipalities. In addition to this, the strengthening of knowledge (material and knowledge) of the institutions of the territory has increased their resilience to natural phenomena such as hurricanes and fires.	of the phenomena associated with the CC on economic activities.		
	1.1 Area (ha) of red mangrove is established along shore between Batabanó and Punta Mora.	533 ha	Rehabilitation actions have been conducted in 1527.9 ha of red mangrove forest (includes restoration of ditches and canals, management of natural regeneration and sowing of propagules). Of these, the State Forest Service certified 895.7 ha with more than 90% survival. It is anticipated due to the evolution it has had to date and the effectiveness shown by the actions that are certified with more than 85%.	1290,6 ha of which 85% survived* (1097 ha) *Survival can only be measured 3 years after planting	The target has been exceeded by 18%, if the number of hectares where restoration actions have been carried out is taken into account. As mentioned in section 3.2.1, this indicator is deficient. If one considers the number of hectares where 85% of the seedlings have survived three years after planting, the target has not been met (70% have been achieved), given that what was planted at the end of 2018 and in 2019 and 2020 cannot be added up, as three years have not passed. It is reasonable to expect that at least 85% survival of planted seedlings will be achieved in that period, following the past example.	HS
	1.2 Cumulative area of mangrove ecosystem restored between Majana and Surgidero de Batabanó.	144 ha	Rehabilitation actions have been conducted in 1874, 3 ha of the mangrove ecosystem (includes restoration of ditches and channels, management of natural regeneration and sowing of propagules). Of these, the State Forest Service certified 1152.2 ha with more than 90% survival. It is expected due to the evolution it has had to date and the effectiveness shown by the actions that are certified with more than 85%.	1711,9 ha of which 85% survived* (1455,1 ha) *Survival can only be measured 3 years after planting	The target has been exceeded by 9%, if the number of hectares where restoration actions have been carried out is taken into account. As mentioned in section 3.2.1, this indicator is deficient. If one considers the number of hectares where 85% of the seedlings have survived three years after planting, the target has not been met (67% have been achieved), given that what was planted at the end of 2018 and in 2019 and 2020 cannot be added up, as three years have not passed. It is reasonable to expect that at least 85% of the planted seedlings will survive in that period, following the past example.	HS

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
	1.3 Cumulative area of landward edge woodlands restored and enriched.	939 ha	4,368 ha of landward edge woodlands were enriched by planting native species and encouraging natural regeneration. Of these 2727 ha were certified with more than 90% survival by the State Forest Service. It is expected due to the evolution it has had to date and the effectiveness shown by the actions that are certified with more than 85%.	4315,5 ha of which 85% survived* (3668,2 ha) *Survival can only be measured 3 years after planting	The target has been achieved, if we take into account the number of hectares where restoration actions have been carried out. As mentioned in section 3.2.1, this indicator is weak. Considering the number of hectares where 85% of the seedlings have survived three years after planting, the target has not been met (63% have been achieved), given that what was planted at the end of 2018 and in 2019 and 2020 cannot be added up, as three years have not passed. It is reasonable to expect that at least 85% of the planted seedlings will survive in that period, following the past example.	S
	1.4 Numbers of IAS management plans developed.	0	The Invasive Exotic Species Management Plan (EEI) by the Institute of Ecology and Systematics (IES) and the Agroforestry Research Institute (INAF) was completed, published and disseminated. This plan has been applied in the 7318 ha where the Project has intervened.	1, covering 7,318 ha	The target has been achieved.	S

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
Outcome Indicator	2.1 Numbers of provincial and municipal development plans that make specific provision for EBA.	2 provincial and 6 municipal governments are preparing development plans that do not include EBA.	In total, EbA has been integrated into 26 plans, as follows: - 2 provincial development plans 2020/2025 - 2 provincial environment strategies - 2 provincial economic plans - 2 provincial adaptation plans - 6 municipal development plans 2020/2025. - 6 municipal economic plans - 6 municipal adaptation plans In this sense, under the policy of the "Life Task" within the plan of the economy of the two provinces for a period of 2020-2025 (5 years), a budget of 20,000.0 MP was approved only for the recovery of coastal forests considering actions with an EbA focus. This budget includes not only the project areas but other areas in the north of the province.	2 provincial plans and 6 municipal plans	The target has been significantly exceeded.	HS
Outcome Indicator	2.2 Numbers of provincial and municipal governments with EBA-related knowledge management systems in place.	0	Knowledge Management was consolidated into a system made up of: research institutes and universities, as generators of knowledge and information regarding EBA; and decision-makers at the territorial level (local governments, media, actors from different branches and ministries) as users and propagators of this knowledge to communities (children, youth, state, private workers, and housewives). The main tangible elements of the system are the training classrooms (5) created by the project and a digital information system (documentary and geographic)	2 provincial and 6 municipal governments	The target has been achieved. This statement considers that the systems created in terms of information flow and tools can be considered as sufficient elements of a knowledge management system.	S

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
			available to local governments and the classrooms themselves.			
Outcome Indicator	2.3 Numbers of community members (men and women) belonging to local voluntary groups addressing environmental and adaptation issues.	0	5 working volunteer groups with a total of 94 members, of them 44 women (47%) and 50 men (53%) have been created, distributed as follows: - One in Guanímar (with 18 members, 10 are women), - One in Surgidero de Batabano (with 16 members, including 9 women), - One in Cajio (with 20 members, including 12 women), - One in Playa Mayabeque (with 35 members, of them 13 women), and - One at Majana beach (with 5 members, all fishermen). These groups support: the inspections and controls carried out on the project, the transfer of the trunks to make the palisades, the dissemination of the work of the project in the area.	1 group with at least 15 members (of which at least 45% are women) in four municipalities	The target has been exceeded in terms of number of groups, persons and percentage of women.	HS
Outcome Indicator	2.4 Numbers of local schools with study programmes incorporating adaptation issues.	0	35 schools in the two provinces include CC and EBA in their study programs, of which: 16 primary schools, 15 secondary schools and 4 municipal university centres, including one teacher training institute, which is part of the Agrarian University of Havana (UNAH).	16 primary schools 15 secondary schools 3 municipal universities 1 teacher training institute	The target has been achieved.	S

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
Outcome Indicator	2.5 Numbers of dissemination and awareness raising materials on adaptation issues, produced by local media	0	19 audio-visuals were produced and broadcasted on several occasions by national and local television stations, related to the objectives and advances of the project, the mangroves and the importance of their protection. 47 reports were broadcasted by local (26), national (17) and international (4) television stations about the project, its actions, progress and perspectives as well as the importance of mangroves and other coastal wetlands. 39 reports and interviews were disseminated on national (7) and local (32) radio. 18 articles were published in national (4), local (9), web (4) media, and international (1). Many with access via internet.	17 audio-visuals 3 local television 5 local radio 2 articles	The target has been significantly exceeded.	HS
Outcome Indicator	3.1 Frequency of training and technical support visits carried out by provincial and municipal governments to coastal communities in support of EBA	0	2916 training and technical support actions were carried out with the coastal communities. These activities were led by the local government (153), the forest ranger (2729) and research institutes and universities (34). 2014: 3: Gob:1 CGB:2 2015: 144: Gob: 13 CGB: 127 Ins+Uni: 4 2016: 134: Gob 16 CGB: 115 Ins+Uni: 3 2017: 177: Gob: 14 CGB: 150 Ins+Uni: 13	3 training and technical assistant activities undertaken per year by technical authorities to coastal areas.	The target has been significantly exceeded.	HS

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
			2018: 1265: Gob: 4 CGB: 1247 Ins+Uni: 14 2019: 1193: Gob: 105 CGB: 1088			
Outcome Indicator	3.2 Frequency of inspection visits to coastal areas by provincial and municipal governments in support of EBA	0	The Council of the Provincial Administration of Artemis and Mayabeque CAP led 25 Comprehensive Inspections to the coastal area of the Project. Integral inspection year 1 2014 2 2015 4 2016 5 2017 7 2018 6 2019 0 2020 In these inspections were participating representatives of all the regulatory institutions of each municipality: the CAP and CAM, SEF, CGB, TGF, PNR, and implementation office.	3 inspection activities undertaken per year by provincial municipal government and other regulatory authorities	The target can be considered to have been exceeded, except when major causal factors external to the project have not allowed it (in 2014, 2015 and 2020).	S
			In the 6 years, 2319 sea and land tours were carried out, led by the CGB and cooperated with PNR, SEF, TGF and the OIN. CGB / coop tours year 10 2014 70 2015 180 2016* 566 2017*		The target can be considered to have been exceeded, except when major causal factors external to the project have not allowed it (in 2014, 2015 and 2020).	HS

Type of Indicator	Indicator	Baseline	Progress as June 30, 2020	Target for Project End (Sept 2020)	Rating	
					Justification	Rating
			987 2018* 357 2019** 149 2020*** 2319 * Repair of the southern dike road, improving traffic and surveillance capacity ** Recurrence of the Blockade and reduction of fuel, from September to December, in 2020 also affected by shortages of fuel in all provinces *** Only the first quarter of the year with COVID 19 is reported.			
Outcome Indicator	3.3 Number of studies and methodologies carried out to estimate the cost - benefit from the implementation of the approach ABE, available for planners and policy makers.	0	A Methodology for Monetary Assessment of Wetland ecosystem services was developed, which served as the basis for: • The realization of 4 studies of economic valuation (3 in the mangrove ecosystem and 1 in the swamp forest at municipal levels of the two provinces) carried out by students of the Agrarian University of Havana. • Two economic valuation studies were also carried out: One in the Mangrove ecosystem in the Project intervention area with the corresponding Cost Benefit analysis and using two different discount rates. The other economic valuation study was conducted in the Cienaga Forest in the project work area. In total, a methodology for Monetary Valuation in Wetlands and 6 studies on economic valuation were completed.	3	The target has been exceeded.	HS

To meet the targets set out in the project document, and to exceed some of them, Manglar Vivo had to overcome some important challenges. One of the most substantial challenges was the need to import many inputs, from fuel to heavy equipment via light equipment, and the difficulties of doing so given the trade blockade to which Cuba is subject. Indeed, many of the inputs needed for the project do not exist on the national market, so they have to be imported. This is difficult because of the economic, financial and commercial blockade, which makes very few suppliers available and involves long, complex and uncertain import processes with these suppliers. The whole chain is complex: identification of goods and suppliers, procurement, shipping and payment, even for UNDP, which assists in this matter. Cuban actors try to anticipate and are creative, but there are often negative surprises. In addition to these general difficulties, which apply to all international projects implemented in Cuba, there were exceptional challenges relating to imports during the implementation of Manglar Vivo. In Cuba there is no free import market - import companies are assigned to certain institutions. In 2017, CITMA and the Ministry of Foreign Trade and Investment (MINCEX by its initials in Spanish) changed the institution in charge of importing to the executing agency of Manglar Vivo (AMA). EMIDICT, the newly appointed importing company, was not technically prepared to assume the rigours of this type of acquisition. Among other things, it did not know the technical specifications of the goods to be imported for Manglar Vivo. These factors resulted in significant delays in the acquisition of basic goods, including fuel. The impact of not having these goods was partially mitigated by the commitment of the agroforestry companies in Artemisa and Mayabeque, who made some of the missing equipment available to the project as this arrived. In any case, these companies lacked some of them, as they generally did not exist in the country. This contributed to the delay in the implementation of the project, and the consequent one-year extension of its duration.

The limited environmental awareness of the communities close to the intervened ecosystems was another important challenge. Before the project, these communities were not aware of the importance of these ecosystems and their illegal use, partly due to their own vulnerability, contributed to their degradation, in a vicious circle. The conservation and restoration of these mangroves was disruptive and there was some resistance to change. In this sense, there was a certain mistrust at the beginning, having to convince communities not only that it was a project for them, but also that it was with them. Awareness raising, training and communication activities, including work with children, participatory processes and the very positive results of ecosystem restoration changed this awareness. In this respect it was very important to develop an identity manual and to undertake communication in a professional manner, with the help of experts. Indeed, the project involved the Design Institute in the participatory development of a visual identity and the Faculty of Communication of the University of Havana in communication tasks, including visits to schools, the development and dissemination of life stories, the regular production of newsletters, and the development and dissemination of perception studies (for more details on communication, see section 3.5.2).

The mindset of agroforestry enterprises was also a challenge. These enterprises were economic actors used to timber extraction who were unaware of the medium- and long-term benefits of protecting, conserving, and/or restoring wetland forests. In this sense, the companies were unaware of the ecology of mangroves and did not recognize them as ecosystems, but rather as productive forest cover. One of the two agroforestry companies was newly created, so its capacities were even more limited.

In addition, Manglar Vivo had to deal with limited knowledge, given the innovative nature of the project. Although the project was rooted in many years of experience, the approach was novel, so some details were unknown and had to be learned on the fly, with a significant learning curve in different areas. Before the project, agroforestry companies and communities were unaware of how the coastal ecosystem worked and what it was made up of. For example, the differences between mangroves, swamp forest and neighbouring forests were not well understood. The rehabilitation and restoration of coastal ecosystems was also a challenge. It was necessary to identify the species to be repopulated and to characterize and propose a site-specific germination strategy, of which neither the project team nor the specialists from the research institutes nor the forest workers were entirely sure. In addition, once the species had been identified, the seedlings had to be procured. It was necessary to search all over the country to find the species that make up parts of the bordering forests and were no longer south of Artemis and Mayabeque. In the training rooms, the trainers themselves had to be trained and awareness materials produced. The economic valuation studies were also very innovative. The country had little experience in this area, although another UNDP initiative, BioFin, had started environmental accounting at national level. In this context, it was difficult to set up a working team and find relevant information on environmental economics, as evaluations had not been carried out with the required depth and specificity. Also, when some of the equipment that was scarce or non-existent in the country, such as GPS, arrived, many people did not know how to use it. Another key point was the institutional one. The country lacked references of such multidisciplinary teams in coastal ecosystem restoration for climate change mitigation and adaptation.

Another of the challenges was the state of degradation of the ecosystems where work was being done, which had been greatly reduced not only by the cutting of trees and the inadequate functioning of the canal system, but also by the massive presence of IAS. Eliminating these was a difficult task. In addition, the coast had been affected by a recent hurricane, so the restoration work was made difficult in many areas by the presence of many objects of all kinds. Many of the roads were also blocked, making access to the work areas difficult.

Related to the above, as mentioned, it was not easy to secure the labour needed to carry out the restoration activities of the project. At the beginning of the project, the agroforestry companies did not have enough staff, and existing staff was unmotivated and lacked the necessary equipment (shoes, chainsaws, transport) for field work. The project solved this difficulty by increasing the salary of those working in rehabilitation from 300 to 1300 CUP/month, through the improvement of the technical work sheets, getting the workers to do more tasks and each of them being better paid.

Finally, COVID-19 stopped the project's activities. Its impact was relatively limited because the restrictions took place at the end of the project, when many of the targets had already been met, but they were not negligible, even for this final evaluation, whose modality was re-evaluated because of the pandemic and because the two international evaluators could not travel to the country.

3.3.2 How were risks managed and mitigated?

In general, the risk mitigation strategies identified in the project document were adequate. However, the sequence of activities was not fully taken into account in two respects. On the one hand, the survival of seedlings can in many cases only be analysed after a certain period of time, so there is a risk that areas where there is no survival in the last two years cannot be replanted. On the other hand, in the project document, awareness raising relies decisively on the dissemination of the results of economic assessment, but since this is produced rather late in the project, this strategy contributes more to the sustainability of the project once it is completed than to its appropriation during implementation. In addition, the strategy with regard to the acquisition of goods is insufficient. The project document focuses on the development, approval and early implementation of procurement plans. Although this is a desirable strategy, it does not address structural problems, such as reducing imports to the essentials and training importing companies on the technical specificities of the goods to be imported.

During project implementation, actions to mitigate the risks that were presented, whether or not identified in the project document (see section 3.2.2 for details), were appropriate. The multidisciplinary composition of the steering committee and work teams helped to identify risks and define and implement strategies to mitigate them. For example, this included updating provincial and municipal disaster risk reduction plans in light of new AMA studies, conducting very frequent inspections, or taking a more active, though insufficient, approach to promoting alternative livelihoods. Similarly, in early 2016, the risk of ineffective mangrove restoration was identified, and the design changed. It was also felt that more time was needed to see the results and a one-year extension was requested. The project was also able to adapt to the new and unsuspected situation generated by COVID-19. Perhaps, if anything, more could have been done with respect to the transition of the importing company, although the project team, AMA, CITMA, MINCEX and UNDP supported and held permanent exchanges and meetings with the new importing company to facilitate the process. The Progress Reports to the Donor (PPR) indicate precisely how the risks were managed.

3.4 Efficiency

3.4.1 Adaptive management

As mentioned above, the project was able to identify obstacles and risks and design and implement strategies to overcome those obstacles and mitigate those risks. In this sense, the project was able to adapt and respond to different needs as it was implemented, showing a great capacity for adaptive management. To this end, collaborative work was very important, in terms of the participation of many actors, valuing the information and ideas of all of them.

The most important recommendations of the mid-term evaluation focused on information gathering, including documentation of coastal ecosystem restoration. To this end, it was suggested that an expert be hired. Following this recommendation, the project hired an international expert with this profile and refined, in the light of her recommendations, both the restoration techniques (use of staking, planting in garden style...) and their documentation, applying methodologies for experimental work in mangroves. Based on the recommendations of the Steering Committee, the project included new actors, such as the protected area, the flora and fauna institution, hydraulic

resources, or ICIMAR, to monitor the maritime zone. The adaptive management was documented in the PPRs and shared with all relevant partners.

3.4.2 Financing and co-financing

Is there a difference between planned and actual expenditure and why?

As of May 2020, the project had spent US$5,367,258, or 96% of the total budget foreseen in the project document. Financial information provided by the UMP and interviews suggest that the rest is committed. For details, see Table 4.

By year, the project had an extremely low financial implementation in 2014 (3% of what was foreseen in the project document and 19% of what was foreseen in the budget revision), and low in 2015 and 2016 (50% of what was foreseen in the project document each year, although in 2016 74% of what was foreseen in the budget revision). Financial performance was good in 2017 (76% of what was planned in the project document and 97% of what was planned in the budget revision), but was again low in 2018 (57% of what was planned in the project document and the budget revision). Financial implementation was relatively good in 2019 (87% of what was planned in the project document and the budget revision) and good in the first five months of 2020 (43% of what was planned in the project document and the budget revision). It should be noted that this analysis uses the data provided by the PMU, but that the totals provided for this part are higher than those included in the project document for the whole implementation period. This point is discussed in more detail later in this section.

Several factors explain this evolution. The start of the project outside the Cuban fiscal year created difficulties for implementation in 2014. In 2015, institutional arrangements were negotiated with the institutions responsible for project implementation in the field and this took longer than expected. The revision of the mangrove work sheets, which did not exist before the project, also took time to be formulated and formalized. In addition, the agency that initially handled international procurement had such a large workload that procurement was delayed for this and other projects in the country. This greatly affected the procurement of inputs in the years 2014 and 2015. Subsequently, as mentioned, there was a change in procurement policies from 2015 to 2016. This change established that each government organization, including AMA-CITMA, would be responsible for having its own import agency. The AMA-CITMA import agency (EMIDICT) was not technically prepared. This process of transition and learning directly impacted the possibility of implementation in the years 2015 to 2017.

As of May 2020, there were significant differences in financial implementation by component: in component 1, around 10% of the total budget foreseen in the project document for this component was still to be implemented, while approximately 20% more than the total budget foreseen had been spent in components 2 and 3.

The main reason for the financial underperformance in component 1 is that the prices of several machines were lower than expected. For example, the tractors had a planned cost of 35,000 CUP, and had an actual cost of 17,000 CUP; the crawler tractor, a planned cost of 150,000 CUP and an actual cost of 65,000 CUP; and the backhoe loaders, a planned cost of 250,000 CUP, and an actual cost of 78,000 CUP. The reason for this was the agreement with a brand that supplies this

machinery, which is represented in Cuba and is not significantly affected by the economic blockade on imports. In light of this, a budget revision was made in 2018 and 2019, directing the surplus to printing guides, brochures and other documents. It is estimated that by the end of the project, implementation of this component will be 5% lower than foreseen in the project document.

The main reason for the financial over-execution in components 2 and 3 was the increase in the price of services for workshops and printing. These were done with national providers. Although this is quicker and more strategic from an impact point of view in the country, prices in Cuba are much higher than in other countries due to the increase in the price of raw materials abroad as a result of the US economic blockade. Table 6 provides details of the financial execution by component.

With regard to project management costs, as of May 2020, actual cumulative expenditure amounted to USD 304,889, which is equivalent to 82% of the total planned costs. It is estimated that at the end of the project the management costs will be 3% lower than foreseen in the project document. Actual cumulative implementation costs as of May were 5.7% of total cumulative project costs, a slightly lower percentage than foreseen in the project document (6.7%). At the end of the project they are estimated to represent 6.5% of total project expenditure. These expenditures are analysed in detail below in this section.

Table 4. Cumulative finance of the project

	Cumulative Actual (June 2014-May 2020)	Total (June 2014 - Sept 2020) planned in the prodoc		Cumulative (June 2014 - May 2020) based on UMP data			
				Planned		Percentage	
		Total	% over total	Prodoc	Revision	Over prodoc	Over revision
Outcome 1	3,647,582	4,020,000	91%	6,683,469	5,645,669	54.6	64.6
Outcome 2	819,552	700,000	117%	1,126,584	867,461	72.7	94.5
Outcome 3	595,234	500,000	119%	797,868	742,023	74.6	80.2
PMC	304,889	372,000	82%	559,868	479,368	54.5	63.6
Total	**5,367,258**	**5,592,000**	**96%**	**9,167,789**	**7,734,521**	**58.5**	**69.4**

Table 5. Finance per year

	2014					2015					2016					2017				
	Previsto			Porcentaje		Previsto			Porcentaje		Previsto			Porcentaje		Previsto			Porcentaje	
	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión
Outcome 1	228,300	29,500		0%	0%	752,200	752,200	334,890	45%	45%	1,147,400	647,400	417,723	36%	65%	1,218,100	879,100	877,363	72%	100%
Outcome 2	211,200	40,500	7,233	3%	18%	237,300	237,300	143,837	61%	61%	197,500	121,477	147,254	75%	121%	163,600	151,200	138,630	85%	92%
Outcome 3	146,600	15,000	6,577	4%	44%	158,400	158,400	101,931	64%	64%	162,300	238,323	166,350	102%	70%	202,500	202,500	175,122	86%	86%
PMC	99,000	18,500	6,139	6%	33%	127,100	127,100	83,746	66%	66%	38,500	38,500	37,772	98%	98%	67,200	67,200	67,321	100%	100%
Total	**685,100**	**103,500**	**19,949**	**3%**	**19%**	**1,275,000**	**1,275,000**	**664,404**	**52%**	**52%**	1,545,700	1,045,700	769,098	**50%**	**74%**	1,651,400	1,300,000	1,258,436	76%	97%

	2018					2019					2020 (31 de Mayo)				
	Previsto			Porcentaje		Previsto			Porcentaje		Previsto			Porcentaje	
	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión	Prodoc	Revisión	Actual	Sobre el prodoc	Sobre la revisión
Outcome 1	1,829,663	1,829,663	938,139	51%	51%	1,204,306	1,204,306	943,517	78%	78%	303,500	303,500	135,951	44.8	44.8
Outcome 2	210,290	210,290	168,493	80%	80%	106,694	106,694	214,107	201%	201%	-	-	-	-	-
Outcome 3	114,068	113,800	112,266	98%	99%	14,000	14,000	32,987	236%	236%	-	-		-	-
PMC	48,600	48,600	41,953	86%	86%	90,900	90,900	36,587	40%	40%	88,568	88,568	31,372	35.4	35.4
Total	**2,202,621**	**2,202,353**	**1,260,850**	**57%**	**57%**	**1,415,900**	**1,415,900**	**1,227,198**	**87%**	**87%**	**392,068**	**392,068**	**167,323**	**42.7**	**42.7**

Table 6. Project finance per component

	Cumulative Actual (June 2014- May 2020)	Planned for the whole duration of the project *	Total (June 2014 - Sept 2020) planed in the prodoc	Percentage	
				Mayo 2020	Final project
Outcome 1	3,647,582	3,815,131	4,020,000	**91%**	**95%**
Outcome 2	819,552	819,552	700,000	**117%**	**117%**
Outcome 3	595,234	595,234	500,000	**119%**	**119%**
PMC	304,889	362,085	372,000	**82%**	**97%**
Total	**5,367,258**	**5,592,002**	**5,592,000**	**96%**	**100%**

* This corresponds to the addition of actual expenditure in the period 2014-2019 and the expenditure planned for 2020.

Did the leverage of funds (co-financing) occur as planned?

According to the data provided by the UMP, Manglar Vivo managed to mobilize CUP 19,238,611 in co-financing. This represents 382% of what was committed in the project document, which, as highlighted by the EMT, does not provide a concise and clear table in this regard.

The main source of co-financing is the National Fund for Forestry Development (FONADEF by its initials in Spanish), with resources from the Ministry of Agriculture. In addition, co-financing was provided by AMA, the National Institute of Agro-Forestry Research (INAF by its initials in Spanish), the Institute of Ecology and Systematics (IES), ICIMAR, Mundo Latino and the Forest Rangers Corps (CGB by its initials in Spanish) attached to the Ministry of the Interior, among other institutions. The co-financing was in kind and consisted specifically of the salaries of the specialists, technicians and workers involved in the project, as well as expenses related to fixed telephone services, electricity, premises and other expenses associated with the operation of offices, work areas and laboratories.

An important factor in increasing FONADEF's co-financing was the refinement of the technical specifications. The project improved their wording, thus being able to mobilize more resources by engaging more workers and quadrupling their salaries. As noted above, the co-financing helped to mitigate the impact of the delay in importing some goods. As noted in the MTR, it can be concluded that co-financing concentrated on component 1.

Were the accounting and financial systems established for the management of the project and the production of accurate and timely financial information adequate?

The project produced financial reports with the required regularity. This included combined expenditure reports and the financial sections of the PPRs. In terms of audit, financial controls exceeded the requirements of the AF. In fact, audit reports were made by up to four institutions. Financial management followed the donor's budget lines and complied with their rules. The deviations mentioned above in terms of allocation to the various components were authorized. Nevertheless, the quality of the financial reports can be improved. In the financial information provided by the UMP to the evaluation team, the subtotals (as of May 2020) were higher than the planned budget for the whole project (as of September 2020). This is partly explained by differences in the fiscal year between the project document (September - September) and Cuba (January - December) and by delays in procurement due to the US blockade. In this regard, the financial year budgets include the outstanding purchases from the previous year, the planned purchases for that fiscal year and part of the purchases for the following year. Although relevant, this explanation is insufficient. In order to plan finances properly, the total in project finances should consider the project document. On the other hand, there are also deficiencies in the monitoring and reporting of co-financing, which is either not disaggregated or, as in PPRs, is provided incompletely or inconsistently[14].

Have financial resources been used efficiently?

[14] The evaluation team prepared a co-financing table along the lines of the TOR, but the PMU did not complete it.

It is very difficult to compare the cost-effectiveness of Manglar Vivo with other projects working on EbA in terms of cost versus results achieved. For example, it is not clear which indicator to use (cost per hectare where restoration work has been carried out? cost per hectare restored? cost per person with reduced vulnerability as a direct result of the project?) It seems more appropriate to make a qualitative analysis, considering the important factors in that aspect. The distance between the capital city and the intervention areas, the distance between human settlements and workplaces, the distance between the workplaces themselves (degree of concentration), the salary of the labour force, the cost of inputs/equipment/machinery and the level of consolidated knowledge can be highlighted. Considering these factors, compared to other international projects, the cost-effectiveness of Manglar Vivo was probably intermediate. The proximity of the intervention areas to the capital, to the human settlements and to each other favoured the cost-effectiveness. However, labour wages were probably higher than in other countries, particularly the least developed countries, where per capita income is lower and where there are likely more wage disparities, resulting in lower wages for jobs performed by communities. Similarly, the US economic, financial and trade blockade resulted in higher input prices than in other countries. On the other hand, as explained, the EbA was very new in Cuba, so there was a learning curve. Projects that are not pilot and build on those are more efficient. In Cuba, Manglar Vivo worked on 84 km in 6 years; in a project that extends it and gives it continuity (Mi Costa) they are looking to work on 1,300 km in 8 years. Not only is there a difference in scale, but also in capacity and effectiveness thanks to the lessons learned from the implementation of Manglar Vivo.

In terms of management costs, Manglar Vivo is not particularly efficient. As mentioned, in Manglar Vivo these costs represented 5.7% of the total project expenditure as of May 2020 and are expected to represent 6.5% by the end of the project. This is below the ceiling set in the AF policy (9.5%)[15] and the percentage indicated in the project document (6.7%) and approved by the AF. However, it is above the ceiling set for this type of project by the GEF and the GCF[16], in both cases 5%. A comparison with some other projects at the international level suggests that the management costs of Manglar Vivo are reasonable, with projects with both higher and lower management costs than Manglar Vivo.

Manglar Vivo developed a cost-benefit analysis of coastal ecosystem restoration interventions. In terms of costs, the study considered restoration and maintenance activities, expendable assets, equipment and fuel. In terms of benefits, five provision services were considered (agricultural production, beekeeping, livestock, fishing and water purification) and seven regulation and support services (disaster damage reduction, air quality and gas regulation, water regime regulation, pollution control/waste regulation, erosion regulation, nutrient cycling and biodiversity). Note that there is no explicit, direct or comprehensive consideration of reducing the vulnerability of the populations of the area to coastal flooding as a result of climate change (not all relevant aspects

[15]The AF management cost policy does not distinguish between projects by their size. https://www.adaptation-fund.org/generic/costs-and-fees/#:~:text=The%20project%20execution%20cost%20(B,to%20day%20activities%20of%20projects.

[16] The GEF and GCF management cost policies distinguish projects by their size, with different ceilings: the GEF differentiates between projects less than or equal to and more than USD 2 m, while the GCF differentiates between projects less than or equal to or more than USD 3 m. For the GEF, in projects over USD 2 m, management costs should not exceed 5%; in medium-size projects, of less than or equal to USD 2 m, management costs may be higher than 5% but should not exceed 10%. For GCF, in projects of more than USD 3 m, management costs should not exceed 5%; in projects of less than or equal to USD 3 m, these costs should not exceed 7.5%. GEF Guidelines on the project and program cycle policy. GEF/C.52/Inf.06/Rev.01 (2017) and Policies on fees for accredited entities and delivery partners GCF/B.19/29 (2018).

are considered), although implicitly and partially the above-mentioned regulating services contribute to reducing vulnerability (some of those included are relevant). At the same time, the study considers aspects which, although they do not directly contribute to adaptation, are important, such as biodiversity and, in a more complex manner, the regulation of greenhouse gases. The analysis concluded that the cost-benefit ratio was greater than 6.8; in other words, for every CUP invested in the restoration of coastal ecosystems, a gain of more than 6 CUP was obtained[17]. This study does not demonstrate, as argued in some project communications, the cost-effectiveness of applying the EbA approach, but rather the cost-effectiveness of restoring coastal ecosystems in general. The part of reducing vulnerability to climate change is not fully integrated into this analysis.

Furthermore, the project document provides concrete indications on the cost-effectiveness of EbA against hard or grey infrastructure investments. The project document estimates that the cost of hard or grey infrastructure in the intervention area would be USD 141/m. In contrast, the cost of EbA is just over 62 USD/m, which is only 44% of the cost of a grey infrastructure approach. In total, the savings would be more than USD 6.5 m over 84 km of coastline[18].

3.4.3 Monitoring and Evaluation (M&E) System

Did the project have a robust M&E system to measure the achievement of results? Did it have sufficient financial resources? Was the logical framework used during implementation as a management and monitoring tool?

The project document includes an M&E plan in line with UNDP and AF procedures. The plan clearly defines roles and responsibilities and specifies the tasks to be undertaken. These tasks include an inception report; bi-annual monitoring to inform the Steering Committee; and annual monitoring and reporting, using the AF templates. The M&E plan also includes annual field visits. The M&E plan in the project document also includes an MTR and a final evaluation. A final project report would also be prepared during the last three months of the project. The monitoring and evaluation plan also includes audits, which would be conducted annually or at other frequencies according to UNDP audit policies. The monitoring and evaluation plan is comprehensive and robust. Sufficient financial resources are allocated to implement the plan.

As noted in section 3.2.1, the results framework has significant weaknesses at both the objective and outcome levels. During implementation, especially since the MTR, which recommended strengthening scientific monitoring, the project put in place a much more comprehensive and robust M&E system than suggested in the results framework in the project document. This is particularly true regarding the health of the mangrove, marine ecosystem and water resources - no progress was made in monitoring the swamp forest and the bordering forest. This was mainly done through co-financing of the country's research institutes and other international projects, but also relied on the support of volunteer groups. With INAF and IES, M&E methodologies were

[17] According to the study, the total monetary value of the ecosystem services in the mangrove areas of the project intervention zone reached a value of more than 120 million CUP per hectare per year. The reference to 6.8 is the low range. The cost-benefit ratio ranged from 6.81 to 15.25.
[18]The project document provides a more detailed analysis by taking data from the Caribbean. The costs offered here are based on data from the South Dike for related coastal infrastructure investments, but not identical to those that would be required to address flood risk.

established to assess the conditions of the mangrove and its response to restoration activities. To this end, salinity meters were acquired and used and permanent monitoring plots and photo points or quick visits (no more than 5 minutes at each point) were established in a larger number of areas. These visits were combined with satellite images. Together with the IES, forest workers and technicians from the protected area monitored the flora and fauna, particularly birds (resident and migratory), butterflies and dragonflies. They had a baseline from previous studies, which were completed with new zoological studies. In addition, with ICIMAR, the health of marine ecosystems began to be monitored. Additionally, Manglar Vivo worked with OP15 and the National Institute of Hydraulic Resources to monitor water quality, establishing 3 monitoring stations. On the other hand, the project made efforts to monitor the communities' perception, as an indicator of the results of the awareness and training activities. In collaboration with the Latin American Faculty of Social Sciences (FLACSO by its initials in Spanish), the project designed a survey. This was implemented in 2014, 2017 and 2019. Although the same people were not surveyed, the available information suggests that the same questions were asked to the same population groups, allowing for commensurability. All this implied a substantial increase in the number and frequency of field visits by not only the PMU but also other relevant actors. This was helped by the provision of transport by Manglar Vivo.

What was the frequency and quality of reporting?

Reporting has been carried out in accordance with the monitoring and evaluation plan included in the project document. In fact, more types of reports have been produced and a greater number of reports than foreseen in the project document. In fact, in addition to five PPRs, covering the entire implementation period, the PMU has produced several types of quarterly and annual reports, for different national institutions. The MTR was completed in November 2017. This document constitutes the final evaluation.

The quality of project reports, in particular the PPRs, is however medium: it improves what is required in the project document, but additional information is not always relevant (e.g. survey) or clear (e.g. inspections), while relevant information that should exist (e.g. water) is not provided. Indeed, the report often does not respond completely, directly or clearly to the indicator system. For example, the number of hectares where restoration activities have been carried out is reported, but not their impact in terms of ecosystem health (indicator I) or seedling survival (indicators 1.1, 1.2 and 1.3). In addition, the results of the survey are reported as an indicator of vulnerability (indicator II), when such a perception indicator only indicates the impact in terms of awareness and training. Indeed, these anecdotal perceptions can be influenced by several factors, making accurate measurement and analysis difficult. The progress report is also not clear regarding the knowledge management system, the surveys (it is not the total number that counts, but their distribution), or the cost-benefit analysis (it matters how many methodologies and studies, but not how many ecosystem services were considered). The lessons learned section could also be expanded and deepened. On the other hand, the document summarizing the impact of the project is undated and the progress document as of May does not provide consolidated information. Despite these important areas of improvement, the PPRs followed the general guidelines of the AF.

3.4.4 Institutional arrangements and stakeholder involvement

To what extent were effective partnerships established for project implementation with relevant stakeholders at different levels?

This section draws on previous sections. Section 3.1.6 explains the involvement of stakeholders during project design and implementation. Section 3.2.4 assesses the complementarity and coordination with other national and international initiatives, reporting on synergies with them. In this section it is therefore only appropriate to point out that effective partnerships were established with relevant actors, particularly with some ministerial portfolios (environment, foreign affairs, agriculture, education, interior), research institutes, academia, provincial and municipal governments, communities, schools, agroforestry companies, the forest ranger corps and some international projects, especially BASAL and OP15. As noted, partnerships expanded over time, with new institutions being added as their relevance was identified. From this perspective, the Steering Committee had a wide and diverse representation and worked well in terms of dialogue and exchange, and strategic leadership. As indicated above, these partnerships also helped to minimise project challenges, particularly in terms of the delay in inputs for component 1, mitigated by the contribution of agroforestry enterprises. These interactions not only strengthened the design and implementation of the project, but also constitute a positive impact of the project which is likely to continue when the project closes.

In addition to strengthening links with stakeholders, Manglar Vivo contributed to two key national processes. The project established a strategic alliance with the Third National Communication to the UNFCCC, materializing the theoretical concepts and political approach of this communication. Manglar Vivo also contributed to Tarea Vida.

3.4.5 Management system

Quality of execution and implementation

The implementation and execution of the project has been adequate. The PMU experienced a change of personnel in 2017. Information available as of August 2020 suggests that the internal information management deficiencies highlighted in the MTR were resolved. The PMU is a young, but technically robust, responsible and committed team. Monthly and quarterly meetings were held to follow up on technical and administrative aspects. Interaction with stakeholders was also appropriate. However, there have been some gaps in reporting and perhaps in the integration of the EbA into planning, an area where the team could perhaps have been stronger.

AMA has played its role well as the executing entity. It is an institution with a lot of experience in the execution of multilateral cooperation projects (it currently executes 10 m USD per year with seven international projects), with strong technical and administrative capacities, capable of mobilising the expertise required, and a solid administrative structure. However, as explained, its importing agency was not prepared to assume such a role for this project. AMA also has proven experience in collaborating with other institutions in the country, at the sectoral and territorial levels, which, on the other hand, can at times slow down decision-making processes. AMA committed sufficient human resources to the project and provided close and daily support to the PMU. The interaction with UNDP was also continuous.

For its part, UNDP fully complied with its role as implementing agency. At the regional level, there was a change in technical supervision, but this does not seem to have affected the implementation of the project. UNDP Cuba provided the required technical and administrative assistance, despite being a team with a high workload, given that much of the multilateral cooperation to the country flows through UNDP. Its technical soundness is well recognized. Administrative and financial support has also been important, since UNDP makes all the payments. In 2015, UNDP took over importing to address the lack of capacity of the new importing company, giving it time to settle in. The UNDP team has played an active role, participating in workshops, making field visits and overseeing consultancies and publications. Their contribution in the latter aspect is highly valued, not only from a technical point of view, but also to avoid typographical errors and to ensure that it is accessible to different audiences and that all institutions are well represented. UNDP appears to have fulfilled its supervisory role, in terms of lobbying and demanding compliance with donor guidelines, but providing assistance and showing a practical, constructive and collaborative attitude to achieving this. The dialogue between PNDU, AMA and UMP was fluid.

Have the tasks scheduled in the project's Annual Work Plans (AWP) been completed and has the project experienced any delays in implementation? If so, why?

As noted, the project has experienced delays. An extension of one year was requested. The delay is due to delays in imports and slow institutional start-up. In the first two years there was little progress. The delay is also explained by the introduction of new methodologies following the MTR. Once these methodologies were in place, they improved implementation, which, as detailed in section 3.4.1, accelerated from the third year onwards, but it took some time to understand and refine these methodologies. The arrival of specialized equipment and the cumulative results of training also gave a boost to implementation. The extension is also justified by the times involved in mangrove restoration. The impact of the pandemic has been relatively minor, as significant progress had already been made on almost all fronts.

3.5 Sustainability

3.5.1 Are there political, regulatory, institutional, financial, socio-cultural and environmental risks to the sustainability of the results of the project?

Did the project devise a sound sustainability or exit strategy, and did it implement it?

Components 2 and 3 can be understood as the exit or sustainability strategy of Manglar Vivo. In particular, this strategy is based on the integration of EbA into the policy framework and planning of governments and productive sectors (output 2.1); raising the awareness and training of stakeholders (output 2.2) based on sound knowledge management (output 2.3), including a cost-benefit analysis of EBA (output 3.1); and strengthening coordination (output 3.2). The project document adequately highlights this orientation of the two components, although it perhaps places too much emphasis on component 3 as an exit strategy. The sustainability strategy is sound, although more attention should have been paid to other connected ecosystems, with interventions that ensure ecological flow; the integration of sustainability into productive sectors other than

forestry (particularly agriculture and fisheries); and the promotion of alternative livelihoods. As the exit strategy is fully integrated into the project, it is well represented in the results framework. In this regard, section 3.3.1 on effectiveness assessed the extent to which the project exit strategy was implemented. The consequences of progress on these indicators in terms of risks to the sustainability of project results are discussed below.

Sustainability risks from the point of view of the political, regulatory and institutional framework

The available information suggests that from the point of view of the political, regulatory and institutional framework, the necessary conditions have been established to give sustainability to the project results in the short, medium and long term.

To begin with, Cuba is a signatory to international conventions that oblige it to give continuity to the processes and results of Manglar Vivo. Indeed, as noted in section 3.1.4, Cuba is a party to the UNFCCC, the CBD and Ramsar, among others.

Some national policies, strategies and laws, many of them in harmony with the country's international commitments, will also contribute to the sustainability of the results of Manglar Vivo. Among these, the National Economic and Social Development Programme to 2030 stands out as the country's main roadmap for the medium term (one of its five axes is environment and natural resources and the third general objective is adaptation to climate change). It also highlights Tarea Vida, with a horizon up to 2050, which, as indicated, gives EbA a key role in the coastal areas, stressing the need to protect and restore mangroves (this is one of the 11 tasks considered, in particular Task 5), and prioritizes the area of intervention in this respect. The environmental laws, policies and strategies mentioned in Section 3.1.4 (particularly the national environmental strategy and the national programme for the conservation of biological diversity) will also facilitate the continuity of the processes and outcomes of Manglar Vivo.

At the provincial level, as a result of the project's efforts, EbA has been included in eight plans. In particular, the provinces of Artemisa and Mayabeque have integrated EbA and, more specifically, the protection and restoration of their mangroves and the cleaning of ditches and canals, into their development plans, their economic plans, their environmental strategies and their adaptation plans. At municipal level, the six municipalities in the intervention area have included EbA in their development plans, their economic plans and their adaptation plans. The time frame for these plans is 2020/2025. Interviews suggest that EbA is also being inserted into the land use plans, which are currently under review. The insertion of EbA in the aforementioned provincial and municipal plans will contribute considerably to the sustainability of the processes and results of Manglar Vivo, although the absence of a comprehensive management plan for the coastal basins that drain the intervened mangroves compromises sustainability.

In addition, the institutional networks formed as a result of Manglar Vivo are likely to continue, given the importance attached to it by stakeholders and the collaborative attitude prevailing in Cuba.

Sustainability risks from the financial angle

From a financial point of view, Cuban institutions have already secured substantial resources to give continuity to the results of Manglar Vivo. In particular, in their economic plans, the provinces of Artemisa and Mayabeque have jointly allocated 20 m CUP to the protection and restoration of their coastal forests for the period 2020/2025 (10 m CUP each province), with resources from Tarea Vida. Although this heading also includes the forests on the north coast, a high percentage will go to the forests in the south where the project has intervened. Additionally, as mentioned above, the six municipalities involved in the project have allocated resources to give continuity to Manglar Vivo in their economic plans.

In addition, the agro-forestry companies in Artemisa and Mayabeque will mobilize resources from FONADEF. Thanks to the project, these companies have improved their capacity to develop data sheets and thus make use of the resources of this fund. Under the aegis of MINAG, this fund gives high priority to mangroves and their restoration. In fact, the economic plans of these two companies have already incorporated actions to sustain the results of Manglar Vivo. In general, these budgets also include the cleaning of ditches and canals for which these companies are responsible for maintenance.

The state forest services of these two provinces have approved a budget for 3 years (2021-2023) to train forest workers in restoration, through theoretical/practical actions, and to follow up and maintain the results of Manglar Vivo. The Mayabeque Forest Service has committed 500,000 CUP per year for 3 municipalities in the mangrove zone.

The National Company for the Protection of Flora and Fauna (ENPPFF by its initials in Spanish) will also mobilize resources not only from FONADEF, but also from the Fund for Other Budget Transfers, which allows for the leverage of resources for the conservation of flora and fauna. Its work will focus on the "Golfo de Batabanó" Protected Area of Fauna Refuge, which has had a historic budget of half a million CUP a year.

The forests in the area of intervention also have insurance, contracted with banks, to cover possible impacts such as hurricanes, fires or pest attacks. Although it has never been claimed to date, it can be an important financial resource. For its part, the Dique Sur has financial resources for engineering works to improve water flow.

Additionally, there are advances in the mobilization of international resources. This aspect is detailed in section 3.6.5. Here it is important to note that the resources are substantial. The most advanced and ambitious project is known as Mi Costa and seeks to mobilize 24 m USD, a part of which would be allocated to the intervention zone of Manglar Vivo. The PMU is also working on a proposal for the Caribbean Biodiversity Fund to monitor and slightly expand the coverage of the results of Manglar Vivo, building on its lessons and those of BASAL. Although not directly targeting the Manglar Vivo intervention area, the Food and Agriculture Organization of the United Nations (FAO) is attempting to mobilize resources for ecosystem restoration actions on the northern coast of Artemisa and Mayabeque. There would be positive indirect effects on the Manglar Vivo intervention area.

Resources for dimensions of Manglar Vivo other than coastal ecosystem restoration appear less secure. However, there are good prospects in some areas. The national strategy to strengthen local governments and communications includes financial mechanisms to support decentralization and community media.

On the other hand, from a material point of view, it is important to note that the project has provided equipment that will facilitate the continuity of the project results both in the forest and in the canals. This includes heavy machinery, such as backhoes, and light machinery, from chainsaws to computers, as well as means of transport. The interviews suggest that Cuban institutions have the technical capacity and financial resources to maintain this equipment. The risk in this regard may be the supply of parts or pieces when repairs need to be made, if they have to be imported.

From a financial point of view, the prospects are not so promising in terms of livelihoods. Although there has certainly been progress in the forestry sector and the project has made some efforts in some other areas, such as beekeeping and ecotourism, the impact in this area has been rather limited. Section 3.6.1 on anthropic pressures elaborates on this point.

Risks to sustainability from a socio-cultural perspective (country ownership / institutional and community capacity building)

The project has strengthened the awareness and training of almost all relevant actors, especially at local and community level, including adults, youth and children, male and female, and different productive occupations, on the importance of protecting and restoring ecosystems, particularly coastal ones, and their benefits, including reducing vulnerability to climate change. The interviews confirm the results of the 2019 survey, which reflected considerable awareness of the project's benefits and the need for their continuity. Indeed, 98% of the 689 people interviewed considered the protection of coastal ecosystems to be positive. This empowerment is fundamental to the sustainability of the project's results.

There is no indication that there can be any reversal in this regard. The conservation of natural resources and the EbA has been included in the education system. The work with schools and their circles of interest also continues on its own. They organise activities, such as the Mangrove Day. In addition, the training classrooms are well placed to continue, as they have physical spaces, methodologies and outreach materials, and trained, committed staff who are paid by the Artemis library, the forest ranger corps and the Batabanó Gulf protected area. In Artemisa, a project is being developed in coordination with CITMA to obtain resources for an environmental chair at the information centre. The universities were also strengthened with tools and materials. The project has made an important effort to document processes and lessons, which can be used as reference material.

The interviews also suggested political will on the part of representatives of national, provincial and municipal institutions. The results of the cost-benefit analysis, only recently published, will contribute to this.

Beyond awareness, sufficient technical capacities seem to exist to give continuity to the processes and results of Manglar Vivo. In this regard, it is essential not only the capacities built in local actors, including forest companies and workers, but also the links created between them and research institutes, which will be able to solve doubts as they arise and allow the updating of the knowledge needed to sustain the results of Manglar Vivo. From a monitoring point of view, the good relationship between communities and foresters will also contribute to sustainability.

The health of the ecosystems is expected to improve over time, increasing the ecosystem benefits. This is expected to further strengthen the environmental awareness of the relevant actors, contributing to the sustainability of the processes and results of Manglar Vivo.

From a social point of view, alternative livelihoods to those related to mangrove degradation have been promoted, although there is room for improvement in this regard (see Section 3.6.1 for an in-depth analysis).

Risks to sustainability from the environmental point of view

The results of the project are subject to significant risks from an environmental perspective. On the one hand, although the restoration dynamic is positive, and the health of the ecosystems appears to have improved considerably (see Section 3.6.1), it should not be lost sight of the fact that the coastal ecosystems were seriously degraded and the presence of IAS was very widespread before the project. In this sense, despite the fact that the project developed and disseminated an IAS Management Plan, in coordination with the IES and INAF, there is a non-negligible risk, especially under conditions of climate change, that these species will once again gain ground at the expense of native species, degrading the coastal ecosystems where work was carried out.

On the other hand, it is important to consider the connectivity with other ecosystems, particularly with inland water resources and marine ecosystems. There is a significant risk that the recovery process of coastal ecosystems will be reversed if the ecological flow to the region's mangroves is not improved, and/or if the marine ecosystems continue to be degraded, among other aspects by climate change. Implemented by UNDP, the Mi Costa project integrates these aspects. On the other hand, the FAO project incorporates the water dimension, thus contributing to the sustainability of Manglar Vivo. Having said this, it would be advisable to guarantee a better management of these two adjacent ecosystems beyond these possible international resources. In this regard, although there have been efforts to change the mindset of farmers, in collaboration with BASAL, and fishermen, progress in integrating environmental sustainability in general and adaptation to climate change and EbA in particular into the plans of these productive sectors has been limited. The results of the project have been included in the country's Strategic Plan for the Agricultural and Forestry Sector, but not in the plans or strategies of the agricultural and fisheries sectors at the sub-national level. Nor has a plan been developed for the integrated management of the coastal basins that drain into the mangroves of the provinces of intervention, which promotes good management of the ecological flow in the short, medium and long term, helping to ensure that restoration actions remain in place over time. Although this was not among the expected results of the project, it is important from the point of view of sustainability.

Perhaps the most significant environmental risk is that of an extreme event, particularly a hurricane, of very high magnitude. As discussed in section 3.2.2, this did not occur during the implementation of the project in the intervention area, but is very likely and could be devastating. Manglar Vivo has improved the response capacity, but the project areas remain highly exposed. The vulnerability of the inhabitants of the intervention area is analysed in more detail in section 3.6.1.

Another important environmental risk is fires, whose frequency and magnitude could increase with climate change. The work of Manglar Vivo in this aspect has been considerable in terms of physical actions, particularly the opening and maintenance of fire trails, technical capacity, equipment and

community surveillance, reducing the probability that fires will significantly affect the results of the project. Nevertheless, the risk is not negligeable. The May 2020 progress report notes that in the first five months of 2020 there was one less fire than in the same period in 2019, but the impact was greater, due not only to more favourable environmental conditions, but also to the fact that the preventive work with poachers and the use of fire has not been effective. Forest insurance would help to mitigate the impact of these external risks.

3.5.2 Communication

How effective are communications in ensuring stakeholder awareness of the project and of EbA?
Are there effective external communication mechanisms in place?

The project has undertaken numerous communications efforts, particularly as part of component 2 activities to raise awareness and train stakeholders on EbA and the importance of mangroves and other coastal wetlands in adapting to climate change. Over 123 materials were produced. Specifically, a total of 19 audio-visual materials were produced, 47 reports broadcast on local and national television, 39 reports and interviews broadcast on local and national radio, and 18 articles published in local and national media. This exceeds the targets defined in the logical framework during the project design.

In addition to being copious, the communication of the project has been effective. This was helped by the development in 2018 of a comprehensive communication strategy based on lessons learned in 2016 and 2017 in response to a recommendation from the MTR. This strategy identified the main lines of action and principles of the communication activities, as well as the communicative purposes and spaces and tools that could be used for each of the target public groups. Following the new strategy, which could have been more concrete, Manglar Vivo carried out communication adapted for different types of publics (communities, children, journalists, national and provincial governments...) with different objectives, using various media and diffusion channels (television, radio and press at local and national level, as well as social networks). These actions allowed the communication and dissemination of the project results at local, provincial, national and to a lesser extent at the international level, including the presence at some international events, such as NAP Expo.

The information available indicates that the work with the media has been one of the pillars of success and acceptance of the project at local and national level. The 2019 survey of a sample of 10% of the target population demonstrates the effectiveness of the communication actions. 91% of the respondents considered that the training and advocacy activities carried out by Manglar Vivo had increased their knowledge about climate change adaptation, the environment, and the importance of mangrove care and protection. In addition, it is reported that 76% know or use some of the materials developed by the project, including communication materials (audio-visuals, radio notes, brochures...). The MTR report already highlighted at the end of 2017 the very good quality of the communication tools produced and their contribution to the high level of public participation in the project and the good understanding by local stakeholders of the causes of the deterioration of the mangrove and its benefits in terms of EbA.

3.6 Impact

3.6.1 Are there signs that the project has contributed to, or enabled progress towards, the expected impacts (reduced vulnerability to climate change and pressure on ecosystems)?

To what extent has the project reduced pressure on the wetland ecosystems in the intervention area?

At the beginning of the project, the main factor of pressure on the wetland ecosystems in the intervention area was illegal activities by the population, mainly for the extraction of wood for charcoal production, sand mining, and poaching. The project has contributed significantly to reducing this pressure. Essentially, this has been done through three mechanisms: increased social awareness of the importance of protecting coastal ecosystems; more frequent and effective monitoring; and promotion of alternative livelihoods.

As mentioned, progress in raising awareness has been very significant. Populations have become defenders of coastal ecosystems. Monitoring and control has also made significant progress (see indicator 3.2), thanks to the strengthening of institutional coordination and the provision of equipment and transport. Increased awareness has also led to greater surveillance and social control. Progress in alternative livelihoods has been limited. The project has directly generated more jobs in the forestry sector (e.g. in Mayabeque the agroforestry company increased the number of workers from 20 to 55), with higher pay (quadrupling), and has generated alternative sources of income through beekeeping and the use of the invasive alien species removed to make charcoal and export pallets and beehive boxes. In the latter two areas, project support has not yet translated into full-time employment. In addition, the project has made some other efforts, such as exploring the use of a sludge with medicinal properties or the exploitation of ecotourism, with the development of a trail. These efforts have not yet borne concrete fruit. Manglar Vivo has also organised a course in the management of local development projects with the Articulated Platform for Integrated Territorial Development (PADIT by its initials in Spanish) in the province of Artemisa. Although only the bee initiative has been implemented, the conditions for other alternatives have been improved. Indirectly, through the improvement of ecosystem services, the project promotes greater productivity of key economic activities in the intervention area, namely agriculture and fisheries (see text below for more details). Although some positive impacts on agriculture and fisheries are already seen, these impacts will in principle be more evident in the medium and long term.

In addition to the economic exploitation activities, an element of pressure on the ecosystems was the malfunctioning of the canal system. Manglar Vivo helped to clean up trenches and canals and helped INRH to identify points that needed engineering adjustments to improve water flow. Drainage of water for agriculture is another pressure factor for coastal ecosystems. Manglar Vivo strengthened the awareness of farmers, mainly through BASAL and OP15, which focus on this, although there is probably room for improvement in this area.

In sum, in the short term, pressures on ecosystems have been reduced considerably, although they remain important. These pressures are likely to be reduced in the medium and long term, however, to the extent that the restoration of coastal ecosystems is strengthened and their benefits in marine (fishing) and terrestrial (agriculture) areas are more evident, and farmers and INRH implement good practices in the use of water resources and the maintenance and improvement of the canal system, respectively.

It is important to stress, however, that there are structural and circumstantial factors that do not help to reduce economic pressure on ecosystems. We refer in particular to the economic blockade of the country, which is compromises its prosperity, and the pandemic caused by COVID-19. In this sense, there is always a risk of unsustainable use of natural resources, given that communities live in the area.

To what extent has the project improved the health of the wetland ecosystems in the intervention area?

As mentioned (see sections on M&E and effectiveness), there is no complete information on this point. A baseline and robust end-situation analysis is lacking.

With regard to coastal ecosystems, as mentioned in section 3.3.1, the project carried out restoration interventions on 7,770 hectares. Of these, 4,368 hectares have been certified as restored in wetland forests and 3,402 hectares of mangroves. Regarding the results in terms of the health of coastal ecosystems, the available information suggests the following positive impacts[19]:

- Water: interviews indicate that there has been a reduction in water salinity, by improving the exchange between fresh and saltwater, as a result of cleaning ditches and canals and the purifying and barrier action of the strengthened mangrove. Available studies indicate a salinity level of 36 g/l [20], which can be considered an indicator of good health.

- Tree density/vegetation cover: Aerial pre and post images show positive results in terms of mangrove restoration. Existing information suggests an improvement in the growth rate of the forest cover of this ecosystem. According to the project data, the mangrove cover grew at a rate of 2.8% in the period 2006-2011 and a rate of 4.2% in the period 2011-2015. In contrast, mangrove coverage grew at a rate of 7.9% in the period 2015-2020, when the project was implemented. Interviews suggest that there are already red mangroves up to 10 metres long and with propagules or embryos, i.e. at full reproductive capacity. In the swamp forest, while the previous trend was towards degradation, the cover grew at a rate of 8.5% during the implementation of the project.

[19]The project has generated maps that show a clear improvement in the health of the mangroves between 2015 and 2020. These maps are included in Annex 7. The methodology is not entirely clear, so this final assessment summarizes the available information.
[20]This figure is an average of the measurements taken at 244 monitoring points: 210 in the mangrove ecosystem and 34 in the southern dyke speed bumps. These 244 monitoring points include the plots inherited from the Southern Archipelago project and the macro project from 2013 and the plots and stations set up by Manglar Vivo from 2015 to 2019. In the monitoring points of the southern dyke, the monitoring was carried out in cooperation with project 2 of the CPP OP15 programme, and from 2019 it was carried out with the INRH Artemisa..

- Normalized Vegetation Index: available information indicates that this index hardly changed during the project's duration[21]. In 2014 the average NDVI was 0.80, while in 2019 it was 0.81. In any case, the index suggests good health[22].

- Soil: The existing information also suggests a decrease in soil salinity. The data show a downward trend: from 39 ppm in the area around the canals and 47 ppm in the other areas in 2015 to an average of 34 ppm in 2019 (in the dry period) [23]. The effect and duration of this change is substantial. The project has 17 soil salinity monitoring points. In some points (7), analyses of functional groups of microorganisms were carried out. A slight increase in biodiversity was noted in areas where the change in salinity was permanent, mostly in areas favoured by microchannels or planting niches. The interviews mention a recovery of the soil/sedimentation and that metres of coast have been recovered.

- Floristic and Faunistic Composition / Biodiversity
    - Flora: available information points to a reduction in the presence of IAS (mainly casuarina (C. equisetifolia) and the Indian almond (Terminalia catappa)) and an increase in the presence of native species (especially the red mangrove, but also others) [24]. There are no concrete figures on the number or percentage of these before and after the project.
    - Fauna: Interviews suggest that species such as the manatee, bullfrog and crocodile have returned to the area. Migratory birds have also been seen, especially waders, coots and others, which had ceased to frequent the area[25]. The presence of molluscs (oysters) and crustaceans (shrimps) has also been detected.

In addition to improvements in the health of coastal ecosystems, available information indicates an improvement in the health of marine and terrestrial ecosystems. In marine ecosystems, an improvement in water quality in terms of micro-organism and hydrogen composition has been detected. There has also been an increase in the volume and diversity of marine flora and fauna (e.g. different types of molluscs, 4 species of fish, sponges), especially in the areas of Playa Majana and Punta Cayamas. The Gulf of Batabanó is strategic for fishing in the region, as it is the breeding ground for lobster and crayfish fry, which are caught as far as in Florida, USA. However, there is no solid scientific analysis of the project's impact on fishing. Interviews suggest that the project has helped to improve the aquifers in the provinces of Artemisa and Mayabeque on which

[21]This analysis was carried out at 235 points throughout the mangrove, where NDVI values were monitored from 2000 to 2019.
[22] Values between 0.6 and 1 are considered in the literature as indicators of healthy vegetation.
[23]It should be stressed that the data are not absolutely comparable: in 2015 there is no average and no indication of the season; in 2019 there is an average and an indication of the season.
[24]In particular, Haemathoxylon campechianum (Campeche wood, Brazil), Calophyllum antillanum (ocuje), Taliparitielatum (majagua), Sabal japa (toti tail, cana japa), Tabebuia angustata and T. shaferi (white oak), Bursera simaruba (almacigo), Swietenia mahagoni (mahogany, c. antillana), Cojoba arborea (red palm), Abarema glauca (Algerian palm) and Coccoloba praecox (uverillo, uvilla), Thrinax radiata (guano de costa), Cupania glabra (guara de costa), Erythroxylum confusum (arabo colorado) and Trichilia havanensis (siguaraya). These native species tend to offer multiple benefits. For example, the bagá species, in addition to providing protection against erosion of riverbanks, offers food services to wildlife.
[25] Birds: Buteogallus gundlachii (Batwing sparrowhawk), Patagioenas leucocephala (white-headed torcaza), Agelaius assimilis (marsh mayito), Melopyrrha nigra (negrito); Butterflies: Phoebis avellaneda; fish: Nandopsis tetracanthus (Biajaca criolla) and Limia vittata (Cuban limia). In the protected area, a greater presence of mammals such as Capromys pilorides (jutia conga) and Mysateles prehensiles (jutia carabalí) has been detected.

food production for the capital depends, as well as drinking water, although there are no specific data on this.

The health of coastal ecosystems, and associated marine and terrestrial ecosystems, is expected to improve over time as planted species grow, although as mentioned in section 3.5.1 these ecosystems are exposed to significant environmental risks. Mangrove planting began in late 2014 or the first half of 2015. In 5 years, the trees reach an average height of between 1.5 and 2 meters. In this sense, the intervention areas have been declared areas in the process of restoration and/or rehabilitation, and not restored or rehabilitated, because restoration is a process that takes time, especially given the degree of degradation at the beginning of the project.

Has the project reduced the vulnerability of the populations of the six municipalities in the project's direct intervention area (direct beneficiaries) and that of the populations of the provinces of Artemisa and Mayabeque beyond the six municipalities in the project's direct intervention area and other provinces of the country (particularly Havana) (indirect beneficiaries)?

Vulnerability is a complex concept, with many facets. It is not easy to measure. There are many debates in the international literature about the definition of vulnerability and/or resilience indicators.

As noted, the project has helped to restore coastal ecosystems. One of the services provided by these ecosystems is protection from sea-level rise and extreme weather events. In particular, mangroves dissipate wind and sea energy. In principle, in this sense, mangrove restoration reduces vulnerability to coastal flooding. The mangrove, especially the red mangrove, is a good barrier to sea penetration.

Scientific evidence on the impact of the project in this regard is scarce. However, there is anecdotal evidence. Before the project, coastal flooding reached 11 kilometres. During the project, coastal flooding reached a maximum of 8 kilometres. In recent events, waves invaded where there were no mangroves, while they did not invade where there were mangroves, because they provided protection.

The attribution is in any case complex, as it partly responds to the absence of very high intensity hurricanes during the implementation of the project. In fact, in order to measure the change in the level of vulnerability, one would have to see the effect of a hurricane of the same level. This information does not exist. However, it seems logical to think, and there are indications, that the recovery of coastal ecosystems has reduced vulnerability to coastal flooding. As mentioned, mangrove restoration takes time, so it is early to analyse the impact of restoration actions on the health of coastal ecosystems and, in turn, the impact of healthier coastal ecosystems on reducing the effect of sea level rise and extreme weather events. From the point of view of attribution, it should also be borne in mind that the rehabilitation of the southern dyke has also contributed to reducing vulnerability.

Beyond the restoration of ecosystems, other interventions have contributed to reducing vulnerability. The cleaning of ditches and canals has helped to improve the channelling and circulation of water, so that it flows more where it should, reducing the occurrence and extent of damage, and it flows faster, reducing the duration of damage.

In addition, the project has helped reduce vulnerability by strengthening planning, management and response capacities, providing more and better information, improving institutional and technical capacities, and providing equipment, including computers, vehicles and heavy (e.g. backhoe) and light (e.g. chainsaws) machinery.

Within this general framework, it is important to distinguish between several scales: municipalities on the first strip of coast, municipalities slightly further inland, municipalities slightly further inland in the provinces of Artemisa and Mayabeque, and Havana. Indeed, within the project the situation of the six municipalities is dissimilar: Batabanó and in particular Surgidero are very close to the coast; the other five municipalities are close but more distant from the coast.

In this sense, it is in Batabanó and especially in Surgidero that vulnerability has been reduced the most (5,000 inhabitants). In the other five municipalities (Artemisa, Alquízar, Güira de Melena, Melena del Sur and Güines) vulnerability to marine flooding has also been reduced. Interviews suggest that in some other municipalities in the two provinces, especially those most adjacent to the project area, vulnerability to marine flooding has also been reduced (sub-costal municipalities are no longer flooded). In these areas, as well as in Havana, the impact on surface and groundwater resources (saline intrusion) has been reduced, improving agriculture and the availability of drinking water. Interviews suggest that farmers are now able to grow crops that they could not grow before. In this sense, more than 2.5 million people have theoretically benefited from the project. These areas have also benefited from advances in the institutional, technical and material factors mentioned above. This zone of influence must include the population of the Isle of Youth, approximately 85,000 people, given its dependence on imports using the port of Surgidero de Batabanó, whose resilience to coastal flooding has been strengthened as a result of Manglar Vivo.

In its communications, the project uses a perception survey as an indicator of vulnerability reduction. Specifically, it highlights that in 2019, 80% of the more than 900 people interviewed in these six municipalities considered that their vulnerability had been reduced. In reality, this data indicates the ownership of the project by these people, but it is not a robust indicator of changes in the level of vulnerability.

AMA's Hazard, Vulnerability and Risk Studies Department plans to conduct one such study on the intervention area in 2021. This study will provide scientific data on the reduction of vulnerability to marine flooding of the direct and indirect beneficiaries of the project, taking into account future projections. In addition to its rigour, with extensive and detailed field work, this study will have the advantage of giving more time to settle the coastal ecosystems where Manglar Vivo has intervened.

To what extent have there been unexpected results (positive or negative) and what were they?

The evaluation team has not identified any negative unexpected results. The identified unexpected results are all positive. These include:

- the integration of EbA into the national education system;
- the direct promotion of some alternative livelihoods, such as ecotourism and medicinal muds;

- the creation of nurseries for the neighbouring forest[26];
- improving physical planning. Thanks to information generated by the project, the government will relocate the most vulnerable population;
- improving water planning by identifying the water passages that INRH need to improve to ensure water flow in coastal wetlands and aquifer recharge.
- There were also unexpected advances in scientific research. In particular, a fern species thought to be in danger of extinction was identified.

3.6.2 Cross-cutting elements

Did the project successfully integrate other UNDP priorities, such as the achievement of the Sustainable Development Goals (SDOs), poverty alleviation and generation of socio-economic benefits, prevention and recovery from natural disasters, respect for social and environmental safeguards and empowerment of women?

The contribution to SDGs was not integrated into the project design, as they were defined after the project was designed (SDGs were formulated in 2015, while the project was designed in 2011). However, the purpose and activities of the project contribute to the fulfilment of several SDGs, namely those on climate change (no. 13), preservation of marine and terrestrial diversity (no. 14 and 15), clean water (no. 6), decent work (no. 8) and gender equity (no. 5, see below).

On the other hand, although the project's primary vocation was environmental, it generated economic and/or social benefits. As mentioned in section 3.6.1, in the short term there were positive impacts in terms of job creation and improvement of working conditions in the forestry sector and the development of new potential income generating activities, such as beekeeping. In the medium term, the project provides benefits in terms of increased productivity in agriculture and fisheries, the key livelihoods in the area. These socio-economic benefits contribute to poverty reduction in the beneficiary communities, although the lack of data makes it impossible to quantify this contribution[27].

As discussed in more detail in section 3.6.1, it is reasonable to think that the project contributed to reducing the vulnerability of the populations in the south of the provinces of Artemisa and Mayabeque to coastal flooding, although there is no scientific data to confirm this.

Furthermore, although environmental and social safeguards were not defined during project design, given that these requirements were integrated into UNDP procedures in 2015, negative social or environmental impacts have not been reported. The project team considered these aspects during the implementation of the activities, in light of the knowledge gained from training funded by the GFC, ensuring that the activities of Manglar Vivo did not have any negative environmental and social impacts.

[26]The project did not establish mangrove nurseries. It was assessed that they are not economically, ecologically or genetically feasible..
[27]It should be borne in mind that the poverty line is not used in Cuba, as it is considered an inadequate indicator of the socio-economic conditions of the population in a country where health and education are free.

The project has also evolved in terms of gender mainstreaming. Although the Federation of Cuban Women and the MINAG gender group were consulted during the design of the project, the project document does not pay sufficient attention to gender equity. The context analysis is general and not very precise. It points out that women are particularly vulnerable to climate risks and extreme events in the area, since they are the first ones who have to migrate to ensure safe living conditions for their children. However, the project document does not provide an in-depth analysis of this differentiated vulnerability, nor more generally of the living conditions and role of women in the two target provinces. The project document does not include a gender action plan either. Nor does it appear that this was elaborated in the initiation phase, as promised in the project document. Furthermore, the results framework does not systematically integrate the gender perspective. It includes very few gender-disaggregated indicators. Only the indicator on the total number of people benefiting from the project (indicator II) and the indicator on the number of people participating in local volunteer groups established under component 2 (indicator 2.3) detail gender targets (45 per cent women).

During implementation, monitoring and reporting on gender equality has not been systematic. In the last PPR and the June 2020 update on project progress, indicator II is not broken down by gender, although it is detailed for indicator 2.3. The impact summary document does not provide details on gender. Indeed, no information is available on the level of women's participation in many activities, such as the proportion of women in awareness raising and training workshops, the formulation of provincial and municipal development plans, or jobs created in the forestry sector.

However, available information suggests that during its implementation the project did contribute to and did not undermine gender equity, albeit with nuances. The target of having at least 45% of the beneficiaries be women has been exceeded by the end of the project: women represent 48% of the direct beneficiaries and 50% of the indirect beneficiaries. In indicator 2.3, the target is met at the aggregate level, but not for two of the five groups created[28].

Beyond that, the interviews indicate that women have been active participants in the various project activities. In this sense, the interviews indicate that the project has contributed to improving women's representation and participation in the forestry sector. While the workers / labourers remain men, women have had access to technical positions, both in the forestry company brigades and in the nurseries created. For example, women from the communities of Surgidero de Batabanó and Cajio came to hold technical positions within the protected area of the Gulf of Batabanó. It is worth mentioning that the project is part of a socio-cultural context in which women are equal participants in all of the nation's activities[29]. In fact, in Cuba the gender quota in all sectors is 50% and work is paid equally[30].

During its implementation, the project has also made efforts to integrate young people. As mentioned, work was done with primary and secondary schools and universities, from the point of

[28] In Guanímar (10 women out of 18 members), in Surgidero de Batabanó (9 women out of 16 members), in Cajio (12 women out of 20 members), in Playa Mayabeque (13 women out of 35 members), and in Playa Majana (no women out of 5 members).
[29] This does not justify the absence of a detailed gender analysis, gender action plan or systematic monitoring of the project's contribution to gender equality. These aspects are indispensable and mandatory in any international project, regardless of a country's progress in gender equality. Their content changes according to the context, but their need does not.
[30] https://oig.cepal.org/es/paises/11/profile.

view of awareness raising and, in the second case, also of labour enrolment. In addition, young people were trained and involved in forestry work. They worked as forestry technicians or field workers who are responsible for monitoring the flora, planting native species, nurseries and other activities. At the end of the project, 17% of the direct project beneficiaries and 14% of the indirect beneficiaries are young people.

3.6.3 Production of public goods

Were new knowledge, approaches and technologies promoted?

The project pioneered the introduction of the EbA concept in Cuba and Latin America. As explained, EbA is a cost-effective approach compared to structural measures that were used to protect coastal communities from the risk of flooding and submersion (e.g. construction of a retaining wall).

In addition, Manglar Vivo helped to improve knowledge about the restoration of coastal ecosystems. In general, it introduced an ecosystem approach, moving from forest management (planting without hydrological rehabilitation) to the management of wetlands as ecosystems (with hydrological rehabilitation) and promoting a broader territorial approach, considering watersheds and marine ecosystems. It also introduced new techniques. Indeed, although there is long experience of planting mangroves in Cuba, some of the techniques promoted by Manglar Vivo were new. For example, while before it was planted from the sea to the land, now it is planted from the land to the sea. Other new practices include the island method, the niche technique or the staking or palisade, which creates an artificial barrier that helps deposit sediment and reduces the impact of tidal flow and thus coastal erosion. These practices have demonstrated effectiveness and results not previously seen. Likewise, Manglar Vivo generated knowledge in terms of forest species.

Work on the economic or monetary valuation of coastal wetland ecosystem goods and services, the cost-benefit analysis of coastal ecosystem restoration, and the comparison between EbA and adaptation measures based on hard or soft infrastructure works was also very innovative from a knowledge standpoint, although work on the latter aspect was limited. As a result of the project, six theses were produced on this aspect[31].

3.6.4 Demonstration

Have measures been taken successfully to disseminate public goods, for example through training, development of demonstration sites or dissemination of information, among others?

The project has conducted numerous training activities with different types of stakeholders on the concept of EbA. According to the latest version of the project's progress matrix, 173 trainings were

[31]This includes 2 full studies and 4 university graduation papers. One of the full papers focuses on the mangrove ecosystem and the other on the swamp forest. These two studies are ready to be presented as scientific articles in the Ibero-American Journal of Ecological Economics. Three of the graduation papers focused on the mangrove ecosystem and one on the swamp forest.

conducted for governments, local media, and teachers and children, as well as 2916 training actions for communities.

In addition to training, Manglar Vivo has promoted practical learning, with demonstration plots where training has been given to society in general, from the inhabitants to agroforestry workers and agricultural producers, as well as students at different levels. In particular, two classrooms were created, one in Surgidero de Batabanó, within the Golfo de Batabanó protected area, and another in Cajio, within the CGB facilities, established in conjunction with the BASAL project. These reference plots serve as a natural classroom for educational and scientific purposes, in addition to being able to document in situ collections of the area's native species, methods of enriching the mangrove and swamp forest and control of IAS. Forest workers and volunteer groups, both made up of community members, have also learned by doing. The five volunteer groups supported the implementation, control and monitoring of the mangrove restoration activities and participated in raising awareness and disseminating the results of the project in their respective communities.

Additionally, Manglar Vivo developed 10 methodological guides, highlighting those focused on the economic valuation of ecosystem services and the restoration of the mangrove. The systematization products developed allow the consolidation and capitalization of the knowledge generated by the project. Manglar Vivo promoted 60 additional publications.

In addition, the project has taken steps towards the creation of knowledge management systems. In particular, and it is important to be specific about this, Manglar Vivo has strengthened the links between the generators of information and knowledge about EbA (particularly research institutes and universities, more specifically the municipal university centres and the universities of Havana, Artemisa and Agraria in Havana) and the users and propagators of this information to the communities (in particular the national, provincial and municipal governments, the media and the training rooms). In addition, the project has created a digital folder system containing all the project information, including documentary and geographic information, available to local governments and the training classrooms themselves.

In the longer term, the project promoted the integration of the EbA directly into the development strategies and plans of the municipalities and provinces of Artemisa and Mayabeque. The project has succeeded in including EbA in 26 local development plans, significantly exceeding the target set out in the logical framework, with significant financial commitments. In addition, the project promoted the introduction of the EbA concept in the school and university system. In particular, this approach was integrated into the pedagogical guidelines and textbooks of some basic subjects in primary and secondary education (grades 5, 7 and 10) and in optional subjects in different university courses. This will contribute to the dissemination of public goods generated by the project.

The 2019 survey shows that these efforts yielded good results. Ninety-one percent of the respondents that year considered that the training and promotion activities carried out by Manglar Vivo have increased their knowledge about climate change adaptation, the environment and the importance of caring for and protecting the mangrove. Beyond the area of intervention and the short term, these demonstration strategies offer good prospects for replication and scaling up.

3.6.5 Replication / Scaling up

Are activities, demonstrations and/or techniques being repeated within or outside the project, at national or international level? Are some of the approaches developed through the project being adopted at regional/national level, which are being widely accepted, and perhaps legally required?

As mentioned, the results of the project strengthened the development in 2017 of Tarea Vida, which incorporated experiences from the project. The results of the project have also been included in the country's Strategic Plan for the Agriculture and Forestry Sector, with a horizon up to 2030. In addition, the results of the project have been incorporated into the educational system, both in textbooks for grades 5, 7 and 10 and in the contents of subjects for various university courses. As indicated in the section on sustainability, the project results also strengthened the development of development and economic plans at provincial and municipal level, as well as environmental strategies at provincial level.

During the project, the project's approach was applied in other areas of the country. The lessons of Manglar Vivo have been used in the implementation of a project in the Bay of Havana, specifically in the Ensenada de Tisconia. In this area the Bay Group is carrying out actions for the recovery and rehabilitation of a very degraded mangrove area, and with similar characteristics to those of the mangroves where Manglar Vivo is concentrated. Manglar Vivo cooperated actively in the rehabilitation, applying EbA tools and training key actors, from the directors to the farmers of the area, and carrying out communication activities in the Bay and in the interest circles of the adjacent primary schools, transferring the positive experiences obtained in the province of Mayabeque. Thanks to the restoration actions implemented, the health of the mangrove has improved considerably in this area. Interviews suggest that flamingos and other species have returned to the area after many years.

Furthermore, the Manglar Vivo approach was implemented in another ecosystem, in order not only to broaden the application of given knowledge, but above all to enrich and refine it. In particular, Manglar Vivo, focused, as emphasized, on the southern coast of the central part of the large island of Cuba, also developed activities on the south-eastern coast of this island, specifically in Caymanera, in the province of Guantanamo, more than 500 km from the main intervention area. The environmental conditions in this area are different from those in the south of the provinces of Artemisa and Mayabeque. Support included the exchange of knowledge and the use of trained human resources and material acquired by Manglar Vivo in this other area. This activity allowed the enrichment of knowledge on restoration methodologies and will facilitate the expansion to other regions of the country.

Less specifically, there are prospects for expansion in the intervention municipalities. The interviews suggest that in the municipality of Artemisa the lessons of Manglar Vivo have been used in other areas of the municipality. The prospects for scaling-up are more promising in the project's intervention provinces. The governments and agroforestry companies in the provinces of Artemisa and Mayabeque are interested in extending the practices of Manglar Vivo to other municipalities on both the southern and northern coasts. The province of Artemisa will replicate the initiative on the north coast. It has already identified the areas and how to do it. There is also a willingness to apply these methodologies in other municipalities on the south coast of the province. There the mangroves are relatively well conserved, but the province wants to ensure that they are maintained

and/or improved. In the province of Mayabeque two municipalities, Nueva Paz and San Nicolás, have secured FONADEF resources for 2021 to restore wetland areas in their territories in harmony with the Manglar Vivo approach and techniques. Nueva Paz is explicitly mentioned as a priority in Tarea Vida. There is also interest in applying the Manglar Vivo methodology in the other municipalities of the province. The State Forestry Service of the province of Mayabeque, which approves the municipal forestry plans, is providing technical assistance so that the plans of these municipalities include restoration actions in the coastal strip following the Manglar Vivo methodology. This expansion has been promoted by the inter-municipal exchange of experiences at the provincial level. The representatives of the municipalities of Artemisa, Batabanó and Melena Sur indicate that they have exchanged their experience in Manglar Vivo with the other municipalities in their provinces.

At the national level, within the framework of Tarea Vida, there have been efforts to share the results and lessons of Manglar Vivo with other provinces in the country. To this end, as mentioned, books and guides have been prepared and published, and members of the PMU have participated in dissemination events. For example, as a result of the project, more attention is being paid to community involvement and the use of climate change projections as a tool for decision makers is becoming more widespread. The Ministry of Agriculture is also seeking to replicate the Manglar Vivo methodologies with agroforestry companies throughout the country. For its part, the ENPPFF has introduced the EbA approach in its work, not only in Batabanó and Cajio, but also in La Coloma and all the areas it serves, such as Guayabal in Manzanillo, Granma province, in the south east of the country. Theoretical and practical EbA training was also provided in the central region of the island, particularly in the Ciénaga de Zapata in Matanzas province.

In general, the country is very interested in EbA, given its vulnerability and the social and environmental benefits it generates, but also its high effectiveness and relatively low cost compared to alternatives such as resettlement or infrastructure measures in an economic context negatively affected by the economic and commercial blockade.

In addition, the lessons learned during the implementation of this project are being used in the design of other projects to be funded with international resources, of different scales. The most ambitious is the project "Adaptation to climate change in the coastal zone of Cuba with an ecosystem-based approach", better known as Mi Costa. This is a concept note to be financed by the GVF, with UNDP again as the implementing agency. The project considerably extends the geographical coverage of Manglar Vivo. With a budget of 24 m USD for eight years, the project covers seven provinces, 24 municipalities and 1,300 km, directly or indirectly benefiting almost 10% of the Cuban population. As mentioned, Mi Costa includes the intervention areas of Manglar Vivo (84 km of the 1,300 km of Mi Costa correspond to the intervention area of Manglar Vivo). Building on its lessons, Mi Costa fills gaps in Manglar Vivo, particularly by taking a truly holistic approach, integrating actions in terrestrial, coastal and marine ecosystems, with a watershed approach. In addition, Mi Costa promotes a more active participation of communities, particularly with regard to environmental indicators and climate services at the local level and will create a national digital platform for knowledge management. Mi Costa is evidence of the progress made with Manglar Vivo. If Manglar Vivo worked on 84 km in six years, Mi Costa is looking to work on 1,300 km in eight years. Not only is there a difference in scale, but also in capacity and effectiveness thanks to the lessons learned from the implementation of Manglar Vivo. A first proposal has already been sent to the regional GCF.

In addition, the lessons of Manglar Vivo are being taken into account in the formulation of the project "Building coastal resilience in Cuba through natural solutions for climate change adaptation", which involves four municipalities on the northern coast and will be funded by the European Union, and a project promoted by FAO in the same area. Although the interventions will be in different areas than where Manglar Vivo has worked, these projects will benefit the areas of intervention of Manglar Vivo because of their continuity in terms of water resources.

At the international level, there has been no concrete progress in replicating the lessons learned during the implementation of the project. Somehow, however, the lessons learned in terms of EbA have been capitalized on by UNDP's regional office for the region in the development of new projects.

It is important to emphasize that in these expansions, care is being taken to attend to the specificities of each area, and to avoid copy-pasting.

4. CONCLUSIONS, LESSONS AND RECOMMENDATIONS

4.1 Conclusions

Relevance

Manglar Vivo is consistent with the United Nations conventions on climate change, wetlands, and biodiversity. The project follows international guidelines on EbA, with room for improvement in terms of socio-economic benefits and demonstration of reduction of climate vulnerability of the coastal population. The project is in line with the overall objective of the Adaptation Fund and contributes to several of the outcomes and outputs included in its strategic framework. The project is also in line with UNDP priorities at global, regional and national levels. In addition, the project is in line with Cuba's United Nations Development Assistance Framework 2014-2018.

The project is also consistent with national strategies and priorities in the areas of economic and social development (National Programme for Economic and Social Development 2030), climate change (Tarea Vida) and environment (National Environmental Strategy, National Biodiversity Programme). In addition, the objectives and activities of the project respond to the problems and needs of the provinces and municipalities where it focuses. All stakeholders actively participated in the design and implementation of the project. Some key institutions were incorporated during implementation once they were identified as relevant. The collaborative and interactive nature of the project processes, in which different actors worked together and in which the ideas of all of them were valued, is noteworthy.

Project Design

The objective, outcomes, outputs and activities of the project are quite clear and well-integrated. However, some aspects, such as the structure of outcomes and outputs and the location of the integration of the EbA in the provincial and municipal planning, generate confusion. On the other hand, there are important gaps in relation to climate information; the connectivity of coastal ecosystems with terrestrial ecosystems, particularly the corresponding watershed, and the marine ecosystem; the built environment; and the promotion of alternative livelihoods and the adjustment of practices of productive sectors other than forestry, such as farmers and fishermen, in order to reduce pressures on ecosystems. These limitations are relatively understandable, given the relatively limited financial resources available, the time frame and the pilot nature of this project.

All targets are feasible and realistic within the budget. In contrast, the targets are not feasible and realistic within the 5-year timeframe, due to structural difficulties in implementation. The no-cost extension of one year confirms this. Specifically, as defined, the three targets related to the restoration of coastal ecosystems are neither feasible nor realistic in a time perspective.

The results framework included in the project document does not allow measurement of the achievement of the objective (reduction of vulnerability) or the key intermediate outcome (improvement in the health of coastal ecosystems). Indicator systems are more appropriate in components 2 and 3, although there are significant shortcomings. Overall, 80% of the indicators in the results framework are not specific and/or consistent.

The project document does not present assumptions but does identify and analyse risks to project implementation. All the risks identified were relevant, although not all of them were given due weight. The likelihood and risk of three of the seven risks should have been higher than considered in the project document. The project document did not consider five major risks. Five of the seven risks considered were either not present or did not have a significant impact. Two were more likely to occur and have a greater impact than expected (having to go to the international market and facing long, difficult and uncertain procurement processes). Of the risks not considered in the project document, three occurred, with moderate impacts.

The project document does not clearly integrate lessons learned from other projects. The interviews suggest that external lessons learned, especially at the national level, were taken into account during project implementation.

The project document does a good job at identifying and analysing complementary international projects and identifying synergies. The project is very complementary to past and ongoing projects, particularly two, BASAL and OP15, in terms of ecosystem and approach. The project had a high level of coordination with other international cooperation interventions during its implementation, thanks in part to Cuban institutional structures. Manglar Vivo carried out joint activities with BASAL and OP15. Project activities were also coordinated with work and research initiatives carried out by Cuban institutions in the agricultural, water and forestry fields.

Effectiveness

At the end of the project, all the final targets in the result framework have been met, and 8 or 50% have been exceeded. The fulfilment of the targets has been satisfactory at the objective level and very satisfactory at the outcome level. Performance is also satisfactory using the AF Result Tracker. All targets have been met, and 5 or 25% have been exceeded. This analysis is based on

important assumptions. Section 3.6.1 examines impacts in terms of vulnerability and health of ecosystems based on available information.

To meet the targets set out in the project document, Manglar Vivo had to overcome some significant challenges. The most substantial challenge was the need to import key inputs, and the difficulties of doing so given the trade blockade the country is under. In addition to this general difficulty, there were also specific challenges due to the change of importer and the limited preparation of the second. Other important obstacles were the low environmental awareness of the communities; the short-term vision of the agroforestry companies; the existence of limited knowledge, given the innovative nature of the project; the state of degradation of the ecosystems; the insufficient availability of labour; and COVID-19.

The risk mitigation strategies identified in the project document were adequate, although the sequencing of activities was not taken into account in some respects. During project implementation, actions to mitigate risks were appropriate. The project showed a high capacity for adaptive management. The project responded adequately to the recommendations of the mid-term evaluation. The multidisciplinary composition of the steering committee and work teams helped to identify risks and define and implement strategies to mitigate them.

Efficiency

As of May 2020, the project had spent 96% of the total budget foreseen in the project document. Available information suggests that the rest is committed. Financial implementation was low in 2014, 2015 and 2016, mainly due to the issue of imports. Financial implementation improved from 2017, with a fall in 2018. There are important differences in financial execution by component: component 1 has been spent 10% less and will spend 5% less than planned, while components 2 and 3 have been spent and will spend 20% more than planned. The main reason is that input prices have been different from the forecast: lower in component 1, higher in the other two. Project management costs are and are expected to be slightly lower than planned.

Manglar Vivo managed to mobilize 382 percent of the co-financing committed in the project document. The main source is the National Forestry Development Fund (FONADEF by its initials in Spanish), with resources from the Ministry of Agriculture. The co-financing, all in kind, helped to mitigate the impact of the delay in importing some goods and to exceed some of the targets.

The project produced financial reports and audits with the required regularity. Financial management has followed the donor's budget lines and complied with their rules. Nevertheless, the quality of financial reporting can be improved, both for international and national funding.

An analysis of the determinants of the cost-effectiveness of EbA projects suggests that the cost-effectiveness of Manglar Vivo was probably intermediate. In Cuba, projects that take the lessons learned from Manglar Vivo are likely to be more efficient. In terms of management costs, Manglar Vivo is not particularly efficient: its management costs represent 6.5% of its total costs. These are below the AF ceiling (9.5%), but above the GEF and GCF ceiling for projects of this size (5%). The cost-benefit analysis carried out as part of the project indicates that ecosystem restoration was cost-effective: for every CUP invested in coastal ecosystem restoration, there was a gain of more than 6.8 CUP. This analysis does not measure the cost-effectiveness of EbA. The project

document demonstrates the profitability of EbA as opposed to adaptation through the construction of grey infrastructure.

The project document includes an appropriate M&E plan. As indicated, the results framework has major shortcomings. During implementation, especially from the mid-term evaluation, the project strengthened the M&E system. The report has been appropriate in terms of quantity, exceeding requirements. However, although the AF guidelines are met, the quality of monitoring reports is average: it improves on the requirements of the project document, but additional information is not always relevant or clear, while relevant information that should exist is not always provided. Often the report does not respond completely, directly or clearly to the system of indicators.

The project established effective partnerships with relevant actors. The Steering Committee had a broad and diverse representation and worked well in terms of dialogue and exchange and strategic leadership. The PMU is technically robust and provided regular monitoring of the project, with room for improvement in reporting. AMA has performed well in its role as executor, from a technical, administrative and consultation point of view. However, as explained, its recently created import agency was not prepared to assume that role for this project. For its part, UNDP fulfilled its role as implementer, providing the required technical and administrative assistance, and showing a demanding but practical, constructive and collaborative attitude. The dialogue between the PMU, AMA and UNDP was fluid. Despite all this, the project was extended by one year, at no cost.

Sustainability

Components 2 and 3 can be considered as the exit or sustainability strategy of Manglar Vivo. The sustainability strategy is sound, although more attention should have been paid to other connected ecosystems, with interventions that ensure ecological flow; the integration of sustainability into productive sectors other than forestry (particularly agriculture and fisheries); and the promotion of alternative livelihoods.

From the point of view of the political, regulatory and institutional framework, the necessary conditions have been established to give sustainability to the project results in the short, medium and long term. Indeed, Cuba's international commitments and national policies will help give continuity to these results. At provincial and municipal level, the inclusion of the AbE in up to 26 plans will also favour sustainability. The strengthening of institutional structures will also help.

From a financial point of view, the provinces of Artemisa and Mayabeque and the project municipalities have already secured substantial resources to give continuity to the results of Manglar Vivo, especially those related to ecosystem restoration. The agro-forestry companies and forestry services in these two provinces and ENPPFF are also in a position to mobilize financial resources. In addition, the forests are insured. Additionally, there is progress in mobilizing international resources (see below). The project has provided equipment that will facilitate the continuity of the project results both in the forest and in the canals. Although there may be problems with the supply of spare parts, the technical and financial capacity exists to maintain them. The prospects are not so bright for livelihoods (see below).

From a socio-cultural perspective, the project has strengthened the awareness and training of almost all relevant actors. There are no indications that this can be reversed, given its integration into the education system and the dynamism of interest circles and training rooms. There is also a

strong political will to give continuity to the project's results. There also seems to be sufficient technical capacity and knowledge transfer mechanisms to do so. The project's extensive and effective communication activities have contributed decisively to this.

From an environmental perspective, the project results are subject to significant risks, including the occurrence of a major extreme weather event, especially a hurricane, and to a lesser extent fires; the expansion of IAS; and the degradation of connected ecosystems, such as water resources and the marine ecosystem, in part due to the absence of an integrated management plan for the coastal basins that drain the intervened mangroves.

Impact

In the short term, pressures on ecosystems have been significantly reduced through increased awareness, more frequent and effective monitoring, promotion of alternative livelihoods, and improved maintenance and use of water infrastructure and resources. Despite all this, in the short term, pressures on ecosystems are not negligible. These pressures are likely to be reduced in the medium and long term, however, as the restoration of coastal ecosystems is strengthened and its benefits in marine (fisheries) and terrestrial (agriculture) areas become more apparent, and farmers and the INRH implement good practices in the use of water resources and the maintenance and improvement of the canal system, respectively. The economic blockade of the country and the COVID-19 do not help to reduce these pressures.

There is no comprehensive information on the health of coastal ecosystems. Available information suggests an improvement, in terms of lower water and soil salinity, faster growth of forest cover, and recovery of flora and fauna (birds, mammals, reptiles, molluscs and crustaceans). The normalized vegetation index hardly changed. In addition, available information indicates an improvement in the health of marine and terrestrial ecosystems. The health of these ecosystems is expected to improve over time.

Scientific evidence on the impact of the project in reducing vulnerability to coastal flooding is scarce. It is reasonable to think that the restoration of coastal ecosystems, the cleaning of ditches and channels, and the strengthening of planning, management and response capacities have reduced the vulnerability of target populations to these aspects. There is anecdotal evidence in this regard. Those who have benefited most are the populations immediately on the coast. An AMA study will assess vulnerability reduction more rigorously in 2021.

Manglar Vivo contributed to SDGs, had socio-economic benefits, respected environmental and social safeguards, and promoted gender equity and the inclusion of youth. The evaluation team has identified only positive unexpected impacts.

The project provided public goods in the form of new knowledge, approaches and technologies. In particular, Manglar Vivo generated knowledge in terms of EbA, restoration of coastal ecosystems and the economic valuation of the goods and services they offer and the cost-effectiveness of their restoration. The project took measures to disseminate these public goods, including training, demonstration sites, publications of methodological guides, and knowledge management systems that link generators of information and knowledge about EbA and users and propagators of that information. In addition, the integration of EbA into provincial and municipal plans and into the school and university system was promoted, facilitating the circulation of these public goods.

There are excellent prospects in terms of replication and/or scaling up. The results of the project have informed the development of policies and strategies, such as Tarea Vida, agricultural and educational plans, and provincial and municipal plans. During the project, the project's approach was applied in other areas of the country, such as Havana and Guantanamo provinces, with different environmental conditions from those of the project in the second case. There are prospects for replication in the municipalities and, to a greater extent, the provinces of the project. At the national level, within the framework of Tarea Vida, there have been efforts to share the results and lessons of Manglar Vivo with other provinces in the country. Progress is being made in the provinces of Granma and Matanzas. In addition, the lessons learned during the implementation of this project are being used in the design of other projects to be financed with international resources, of different scales. The most ambitious, known as Mi Costa, covers, with a budget of 24 m USD, 1,300 km of coastline. At the international level, there has been no concrete progress in replicating the lessons learned during the implementation of the project.

4.2 Lessons

From the above[32], the following lessons can be drawn, which can be organised by distinguishing between effective project actions and areas of opportunity.

Effective actions of Manglar Vivo:

- From the point of view of relevance, sustainability and impact, it is essential that the project is aligned with international, national, provincial and municipal priorities. In this sense, it is key to articulate the project with strategic, long-term national policies and plans, with resources and visibility, such as the economic and social development programme and the national adaptation plan (Tarea Vida).
- From the perspective of relevance, effectiveness, sustainability and impact, it is important to try to identify all relevant actors in the design, but it is fundamental to have an inclusive, open and collaborative approach during implementation, integrating those strategic actors that were not identified in the design.
- From the angle of effectiveness, sustainability and impact, it is essential to promote the connectivity of coastal ecosystems, working simultaneously on mangrove, swamp and bordering forests, and combining the elimination of IAS and the planting of native species with hydrological restoration.
- For relevance, effectiveness and efficiency, it is key to coordinate closely with provincial and municipal governments, as well as with all complementary projects present in the intervention area and the surrounding ecosystems, identifying and exploiting synergies, including joint activities.
- For effectiveness, efficiency, sustainability and impact, it is essential to promote multi- and interdisciplinary teams, with the active presence of research institutes and academia, and favour a collaborative attitude and permanent exchange of knowledge. In this respect, it is

[32]These lessons also take account the lessons set out in the PPR and the MTR.

important to implement an approach that integrates theory with practice, with a high degree of ownership by local governments and communities.

- From the point of view of effectiveness, sustainability and impact, it is important to develop an identity manual and to undertake communication in a professional manner, with the help of experts, for example, the Design Institute and the Faculty of Communication of the University of Havana, respectively.
- From the perspective of effectiveness, it is necessary to adjust the data sheets of the agroforestry companies to ensure efficient forestry work and adequate remuneration, and thus a sufficient and motivated workforce.
- From the perspective of efficiency, a solid technical basis and a fluid dialogue between the PMU, the executing agency (AMA) and the implementing agency (UNDP) are essential for the efficient implementation of an international project.
- From the point of view of relevance, effectiveness and efficiency, it is essential to ensure the commitment of national institutions in order to be able to face difficulties as they arise (such as the provision of equipment or more manpower when the inputs provided with international funding have not arrived).
- From the point of view of sustainability and impact, cost-benefit analyses are an interesting analytical exercise and a useful tool for generating ownership and promoting sustainability, replication and scaling up.
- From the point of view of efficiency, sustainability and impact, the restoration of ecosystems is cost-effective: for every CUP invested in the restoration of coastal ecosystems, a gain of more than 6.8 CUP was obtained. EbA is also more cost-effective than adaptation through the construction of grey infrastructure. That said, EbA and adaptation with grey infrastructure are complementary and sometimes the latter is irreplaceable.
- From the point of view of sustainability, insurance can be important in providing continuity to the results of a project if a disaster occurs.
- From the point of view of effectiveness, sustainability and impact, it is essential to define and adopt measures to disseminate public goods (particularly the knowledge created), including training, demonstration sites, publications of methodological guides, and knowledge management systems that link the generators of information and knowledge and the users and propagators of that information
- For a greater impact, it is strategic to apply during the project its approach in other areas of the country, with similar and different ecosystems to the project, and with information and data on observed and projected climate variability and change, in order to finetune the approach.
- For greater impact, it is important to use the lessons learned during the implementation of one project in the design of other projects, of different scale.

Areas of opportunity:

- It is important to avoid confusion in the project document and to follow international guidelines and good practice (e.g. by defining fewer outcomes than outputs).
- From the point of view of relevance, effectiveness and impact, it is important to have a strong climate information component.
- From the angle of effectiveness, sustainability and impact, it is key to strengthen ecological connectivity, working simultaneously on coastal, terrestrial (inland watershed) and marine

ecosystems, considering the management effects of upstream and downstream areas of the intervention area.

- From the angle of effectiveness, sustainability and impact, it is essential to consider the built environment and human settlements, and to make strategic interventions in hard infrastructure, even when it comes to EbA projects, since they are complementary and not exclusive measures. Significantly reducing the vulnerability to climate change of some populations may require in some cases hard interventions (in some cases EbA may be insufficient to reduce vulnerability to acceptable levels).
- From the perspective of relevance, sustainability and impact, projects that involve protection and/or restoration of ecosystems must directly promote, at a certain scale and strategically (with a value chain vision), alternative livelihoods to those that result in the degradation of these ecosystems. The improvement in the provision of ecosystem goods and services as a result of protection and/or restoration actions is mainly manifested in the medium and long term.
- From the perspective of relevance, sustainability, and impact, it is essential to involve the productive actors that degrade ecosystems in a less direct way. In the case of coastal ecosystems, it is not enough to involve those who deforest, but also those who negatively affect the health of these ecosystems due to excessive water extraction (farmers) or fishing methods that degrade marine ecosystems.
- From the point of view of efficiency, when defining the duration of international projects, both technical and administrative issues must be taken into account, in particular the volume and speed of the contracting and procurement processes. In Cuba, attention must be paid to the need to import a large volume of goods and the long time this requires, due to the US economic, financial and commercial blockade. In this sense, projects in Cuba may require more time than in other countries.
- From an efficiency point of view, it is necessary to strengthen the capacity of importing companies on the specificities of the equipment to be imported and to strengthen the transition processes from the beginning.
- From the management perspective, all targets must be feasible and realistic within the time frame of a project
- From a management point of view, it is essential that the results framework allows the achievement of the objective and the outcomes to be measured. In this regard, it is essential to define SMART indicators of vulnerability. Defining robust indicators of ecosystem health is also essential in EbA projects.
- From a management perspective, risk identification and analysis must be realistic, recognizing the probability and potential impact of each risk.
- From the perspective of effectiveness, it is important to ensure sufficient labour from the outset, promoting adequate wages.
- From the perspective of effectiveness, efficiency, sustainability and impact, in EbA projects it is very important to have a robust M&E system from the beginning to monitor and evaluate the impacts of restoration actions on the ecosystems and the vulnerability of the population in a concrete and holistic way, considering the different ecosystems. The report has to be clear and concise and respond directly to all the elements of the indicator. The M&E system must be an instrument that supports planning and decision making during the course of the project.
- From an impact perspective, at the international level, it is important to establish systems to identify, systematise and disseminate lessons learned during project implementation, for example through South-South forums in the Caribbean.

4.3 Recommendations

Recommendation 1: Based on the results of the project, the PMU and AMA should prepare a document describing the aspects to be taken into account in the development of an integrated management plan for the coastal basins that drain into the mangroves of southern Artemisa and Mayabeque, in order to promote good management of the ecological flow in the short, medium and long term and thus contribute to the permanence of restoration actions. AMA should present this document to the National Watershed Council (CNCH), which in the country is responsible for watershed management and the elaboration of its management plans.

Recommendation 2: The PMU, AMA and UNDP should organize a workshop as soon as the situation of COVID-19 allows to identify and characterize lessons learned during project implementation. This exercise should take into account the lessons learned collected in the PPRs and this final evaluation but should be flexible enough to integrate the lessons identified by all relevant actors. After the workshop, the PMU, AMA and UNDP should consolidate the lessons, integrate them into one document and disseminate them, including their integration into the adopted knowledge management system.

Recommendation 3: AMA, UNDP and AF should use these lessons in the development and implementation of new projects. In this regard, AMA should continue its efforts for national and international initiatives, while UNDP and AF should strengthen them, for example, by organizing webinars that bring together various projects in the Caribbean.

Recommendation 4: AMA should promote that the HVR study planned for the intervention area in 2021 is actually carried out, taking into account future climate projections. AMA should ensure that the study takes into account Manglar Vivo. In this regard, the study should answer questions on ecosystem health and the vulnerability of direct and indirect beneficiaries of Manglar Vivo that this final evaluation has not been able to fully answer due to its scope in terms of equipment and days and the impossibility of conducting field work due to the COVID-19. The results of the HVR should be considered as an evaluation of the results of Manglar Vivo, with more time elapsing since its completion. AMA should ensure that this is explicit, for example with a dedicated annex. This annex should include lessons learned. AMA should ensure that these lessons are taken into account in the design of new projects. AMA should also share the results of the HVR, the conclusions in terms of the results of Manglar Vivo and the lessons learned with UNDP Cuba and Panama, so that they can incorporate the lessons learned into the design and implementation of new projects.

5 ANNEXES

5.1 Evaluation matrix

Table 7. Evaluation matrix

Evaluation criteria	Questions	Indicators	Sources	Methods
1. Relevance: To what extent was the project consistent with international environmental and climate change conventions, the strategic objectives of the Adaptation Fund and UNDP and local, regional and national priorities in terms of development, environmental protection and adaptation to climate change?				
.1.1. Is the project consistent with the objectives of international environmental and climate change conventions and international guidelines on EbA?	• To what extent is the project aligned with the objectives of the international environmental (United Nations Convention on Biological Diversity (CBD)) and climate change (United Nations Framework Convention on Climate Change (UNFCCC)) conventions? • Is the Project in tune with international guidelines on EbA?	• Priorities and areas of work of the international environmental (CBD) and climate change (UNFCCC) conventions incorporated into the design and implementation of the project • Consideration of international EbA guidelines in the design and implementation of the project	• Project document • PPRs • CDB and UNFCCC websites • Interviews with UNDP Cuba and Panama, PMU and AMA	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
.1.2. Is the project consistent with AF strategic priorities?	• How does the project contribute to the AF's strategic priorities?	• Existence of a clear link between the project objectives and the strategic priorities of the AF	• Project documents • AF strategic documents • Interviews with UNDP Cuba and Panama, PMU and AMA	• Document review • Interviews
.1.3. Is the project align with UNDP priorities?	• How does the project contribute to UNDP priorities at the national and regional level?	• Existence of a clear link between the project objectives and UNDP priorities at the national and regional level	• Project documents • UNDP Cuba country document • Interviews with UNDP Cuba and Panama	• Document review • Interviews
.1.4. To what extent is the project consistent with national environmental, climate change and sustainable development strategies and priorities?	• How does the project contribute to the country's strategies and priorities for the environment, climate change and sustainable development? • Has the project been appropriated by the country? • What was the level of stakeholder participation in the design and implementation of the project?	• Level of alignment between project objectives and national environmental, climate change and sustainable development priorities, policies and strategies • Perception of the level of country ownership of the project • Perception of the level of stakeholder participation in project design and implementation	• Project documents • National policies and strategies (National Development Plan, Tarea Vida…) • Interviews with AMA, MINAG and other national partners	• Document review • Interviews
.1.5. Is the project consistent with the provincial and municipal needs and priorities?	• To what extent does the project respond to provincial and municipal needs? • Have all relevant local actors been involved in project implementation?	• Level of alignment between the project objectives and the needs of the relevant actors at the provincial and municipal levels, in terms of alignment	• Project document • PPRs • Provincial and municipal development plans • Interviews with representatives of	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
		with the provincial and municipal development plans • Perception of the level of involvement of local actors in project implementation	Artemisa and Mayabeque provinces and the six target municipalities	
2. Project design: Was the project internally coherent and robust in its design?				
2.1. Analysis of the logical / results framework	• How clear and well-integrated were the project's objectives, outcomes, outputs and activities? • How feasible and realistic were the project objectives, outcomes and outputs within the available budget and time frame? • How effective was the monitoring and evaluation system (indicators, baselines, targets, methods and sources of verification) in measuring the progress/outcomes of the project? Were they SMART[33] and consistent with the project objectives, outcomes and outputs?	• Consistency between the objective, outcomes, outputs and activities of the project • Feasibility of objectives, outcomes and outputs within the project's budget and time frame • Quality of the monitoring and evaluation system in the project document • Understanding by the project management unit of the objectives, outcomes and outputs and the timetable • Understanding of objectives, outcomes, outputs and timelines by national, provincial and municipal implementation partners	• Project document • Interviews with UNDP Cuba y Panama, PMU and executing partners (AMA, provincial y municipal governments)	• Document review • Interviews

[33] For specific, measurable, achievable, relevant, time-based.

Evaluation criteria	Questions	Indicators	Sources	Methods
2.2. Assumptions and risks	• Were the project assumptions and risks well identified in the project document? • Did the identified assumptions and risks help to determine the planned activities and outputs? • Have the externalities (such as the effects of climate change, etc.) that are relevant to the results been adequately taken into account?	• Completeness of risk identification and assumptions during project planning and design • Degree and nature of the influence of external factors on the planned activities • Extent to which planning documents anticipated or reflected the risks/externalities already faced by the project during implementation	• Project document and other planning documents • PPRs • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
2.3. Lessons from other relevant projects (in the same field) incorporated in the project design	• Were relevant lessons learned from other projects properly incorporated into the project design?	• Examples of consideration of relevant lessons learned/project recommendations in project design	• Project document	• Document review
2.4. Linkage and complementarity of the project with other interventions within the sector	• ¿ Were other interventions within the sector clearly identified in the project document? • To what extent does the project support (and not duplicate) activities and objectives not addressed by others?	• Other interventions in the sector duly described and their possible synergies with the project analysed • Level of coherence and complementarity of the project with projects and programmes of other donors	• Project document • PPRs • Interviews with UNDP Cuba and Panama, PMU and AMA	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
	• Has the intervention been coordinated with others to seek complementarity and synergies?			
3. Effectiveness: To what extent have the expected results and objectives of the project been achieved?				
3.1. Has the project been effective in achieving the planned objectives, outcomes and outputs?	• To what extent did the project achieve its objectives? • To what extent did the project achieve the expected outcomes? • What was the quality of the outcomes achieved? • To what extent did the project achieve the planned outputs? • What has been the quality of the outputs provided?	• Level of achievement of targets with respect to objectives • Level of achievement of targets with respect to outcomes • Level of achievement of output targets • Quality of outcomes • Quality of outputs •	• Project document • PPR • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews • Field visits (to the extent possible)
3.2. How were risks managed and mitigated?	• How well were the risks and assumptions managed? • What was the quality of the risk mitigation strategies developed? Were they sufficient?	• Quality of existing information systems to identify new risks and other issues • Quality of risk mitigation strategies developed and followed	• Project document • PPR • Minutes of Steering Committee meetings • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
3.3. ¿ What lessons can be drawn in terms of	• What lessons have been learned from the project in terms of achieving objectives and outcomes?	• Reporting of the lessons learned from the analysis	• Project documents • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA,	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
effectiveness for other similar projects in the future?	• What changes could have been made (if relevant) in the project design to improve the achievement of the project objectives and expected outcomes?		MINAG…), provincial and municipal governments.	
4. Efficiency: Was the project implemented efficiently, in accordance with international and national norms and standards?				
4.1. Adaptive management	• Did the project undergo significant changes as a result of recommendations from workshops, the steering committee or other review procedures? • What follow-up actions (if any) and/or adaptive management measures have been taken in response to the progress reports (PPRs)? • To what extent were the recommendations of the mid-term evaluation taken into account? • How were the lessons from the adaptive management process documented, shared with and internalised by key partners?	• Responsiveness of implementing and executing agencies to recommendations made through the review processes (PPR and mid-term evaluation) • Examples of changes in project strategy/approach as a direct result of recommendations • Proportion of adaptive management processes documented and shared with partners	• PPRs • Minutes of workshops and meetings of the Steering Committee • MTR • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA).	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
4.2. Financing and co-financing	• Is there a difference between planned and actual expenditure and why? • Did the leverage of funds (co-financing) occur as planned? • Were the accounting and financial systems established for the management of the project and the production of accurate and timely financial information adequate? • Were the financial resources used efficiently? Could the financial resources have been used more efficiently?	• Level of discrepancy between planned and executed budget • Level of discrepancy between planned and leveraged co-financing • Availability and quality of financial reports • Level of project management costs and discrepancy with forecasts • Costs related to the results achieved compared to the costs of similar projects in other organizations • Cost-benefit ratio of applying the EBA approach, and comparison with alternative approaches (particularly infrastructure) to enhance adaptation	• Project document • PPR • Financial reports • Audits • MTR • Cost-benefit analyses of similar projects • Interviews with UNDP Cuba and PMU	• Document review • Interviews
4.3. M&E system	• Did the project have a strong M&E system to measure the achievement of results? • Did it have sufficient financial resources? • Was the logical framework used during implementation as a management and monitoring tool?	• Robustness of the M&E system • Financing the M&E system • Level of use of the M&E system • Timeliness and quality of monitoring and progress reports	• Project document • PPRs • MTR • Interviews with UNDP Cuba and PMU	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
	• Did the project meet the requirements/timeframe for progress reporting? • Were progress reports fully and adequately completed (in compliance with the guidelines and providing the necessary strategic information)?			
4.4. Institutional arrangements and stakeholder involvement	• To what extent were the capacities of the implementing entities analysed during the design phase? • To what extent were roles and responsibilities discussed and are these clear in the design? • To what extent were effective partnerships for project implementation established with relevant stakeholders at different levels? • To what extent were relevant stakeholders involved in the design, implementation and monitoring of the project? (through information sharing and consultation)	• Number and types of partnerships established between the project and local bodies/organisation • Extent and quality of interaction/interchange between project implementers and local partners • Number, type and quality of mechanisms implemented to promote stakeholder participation at each stage of project design, implementation and monitoring • Number and level of participation in workshops • Perception of the use of local skills, experience and knowledge	• Project documents • Minutes of meetings and workshops • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments. To the extent possible, interviews and focus groups with the direct and indirect beneficiaries •	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
	• Did national stakeholders have an active role in the project decision-making that guided the implementation? • To what extent did the project use local skills, experience and knowledge in the design, implementation and evaluation of project activities?			
4.5. Management systems	• Have the implementing and executing agencies put sufficient resources in place to achieve the project results? • What is the quality of project execution and implementation by the executing and implementing agencies, respectively? • How effective was the collaboration between the institutions responsible for project implementation? • Have the tasks programmed in the project's Annual Work Plans (AWP) been fulfilled?	• Evidence that clear roles and responsibilities have been established • Level of discrepancy between the actual and planned amount of budget and staff time spent on the project • Difference between the actual and the planned schedule for the implementation of the project • Quality of supervision of implementing and executing agencies, respectively • Number of activities programmed / completed in accordance with the AWPs •	• PPRs • AWPs and budgets • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments.	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
	• Has the project experienced any delays in implementation? If so, why?			
4.6. What lessons can be drawn in terms of efficiency for other similar projects in the future?	• What lessons can be learned from the project in terms of efficiency? • What changes (if any) could have been made to the project to improve its efficiency?	• Reporting of the lessons learned from the analysis.	• PPRs • MTR • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
5. Sustainability: To what extent are there financial, institutional, socio-economic and/or environmental risks to sustain the project results in the long term?				
5.1. To what extent are there financial, institutional, socio-economic and/or environmental risks to sustain the project results in the medium and long term?	• What are the main challenges that could affect the sustainability of the project results? Have they been addressed during the project management? • What factors may enable or hinder the achievement of sustainable results? • Did the project devise a sound sustainability strategy and did it include a specific exit strategy and implement it?	• Extent of obstacles and/or risks to the sustainability of project results • Existence and strength of a sustainability and exit strategy • Number of management plans developed and implemented as a result of the project	• Project documents • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments.	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
5.2. Country ownership/ strengthening of institutional and community capacities	• To what extent is the level of capacity and stakeholder ownership of the AbE approach sufficient to enable the continuation of project benefits?	• Level of integration of project and EBA objectives into the planning frameworks/documents of institutional and private actors	• Planning documents, strategies of relevant partners • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
5.3. Communication	• How effective are communications in ensuring stakeholder awareness of the project and of EBA? • Are there effective external communication mechanisms in place?	• Existence of an internal communication plan, communication protocols and feedback mechanisms • Level of awareness perceived by stakeholders about project results and activities • Number and type of external communication mechanisms or activities implemented • Estimation of the cost-benefit ratio of applying the EbA approach available to planners	• Project documents • Progress reports • Communication materials • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments.	• Document review • Interviews
6. Impact: To what extent has the project contributed to or enabled progress towards reducing pressure on the environment, improving ecological status, adapting to climate change and generally improving the quality of life of direct and indirect beneficiaries?				
6.1. Are there signs that the project has contributed to, or enabled progress towards, the expected impacts (reduced vulnerability to	• To what extent has the project reduced pressure on the wetland ecosystems in the intervention area?	• Number and intensity of pressure factors on ecosystems • Mangrove and wetland areas with increased health indexes	• Monitoring and progress reports • MTR • Interviews with UNDP Cuba and Panama, PMU,	• Document review • Interviews • Field visits (to the extent possible).

Evaluation criteria	Questions	Indicators	Sources	Methods
climate change and pressure on ecosystems)?	• To what extent has the project improved the health of the wetland ecosystems in the intervention area? • Has the project reduced the vulnerability of the populations of the six municipalities in the project's direct intervention zone (direct beneficiaries)? • Has the project reduced the vulnerability of the populations of the provinces of Artemisa and Mayabeque beyond the six municipalities in the project's direct intervention zone (indirect beneficiaries)? • Has the project reduced the vulnerability of the populations in other provinces of the country (particularly Havana) (indirect beneficiaries)? • To what extent have there been unforeseen results (positive or negative) and what were they?	• Number of people (men and women) with reduced vulnerability due to proximity to healthy mangrove and wetland ecosystems (in all six municipalities, in the two provinces, in other provinces) • Examples of unforeseen, positive and negative results	executing partners (AMA, MINAG…), provincial and municipal governments. To the extent possible, interviews and focus groups with the direct and indirect beneficiaries	

Evaluation criteria	Questions	Indicators	Sources	Methods
6.2. Cross-cutting elements	• Did the project successfully integrate other UNDP priorities, such as the achievement of the Sustainable Development Goals (SDGs), poverty alleviation and generation of socio-economic benefits, prevention and recovery from natural disasters, respect for social and environmental safeguards and empowerment of women?	• Contribution to SDGs • Percentage of direct beneficiaries (in the six municipalities) who are poor • Promotion of sustainable livelihoods (e.g. jobs created, income generated) • Evidence that the project results contribute to strengthening the capacity of communities to cope with natural disasters • Evidence that the project complied with social and environmental safeguards • Integration of gender equality in the project design (gender analysis and gender action plan) • Proportion of implementing partners and participants in workshops, training courses or knowledge sharing who are women during implementation • Evidence of activities that incorporate gender into planning or activities at community or national level as a result of the project	• Monitoring and progress reports • MTR • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments. To the extent possible, interviews and focus groups with the direct and indirect beneficiaries	• Document review • Interviews • Field visits (to the extent possible)

Evaluation criteria	Questions	Indicators	Sources	Methods
6.3. Production of public goods	• Did the project promote new technologies and approaches?	• Examples of new technologies and approaches promoted and used during project implementation	• Progress reports • MTR • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
6.4. Demonstration	• Have steps been taken successfully to disseminate public goods, for example through the development of demonstration sites, information dissemination and training?	• Number and type of dissemination activities carried out • Number of demonstration sites • Number of trainings organized and number/type of participants in those trainings • Quality of activities for the dissemination of public goods	• Progress reports • Communication materials of the project • Progress reports • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
6.5. Replication	• Are activities, demonstrations and/or techniques being replicated within or outside the project, nationally or internationally?	• Examples of activities/techniques used in the project and reproduced in other projects/initiatives (other geographical areas and/or funded by other financial partners)	• Progress reports • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA, MINAG…), provincial and municipal governments	• Document review • Interviews
6.6. Scaling up	• Are some of the approaches developed through the project, which are being widely accepted, and perhaps	• Examples of laws and regulations inspired by the project results	• Progress reports • Interviews with UNDP Cuba and Panama, PMU, executing partners (AMA,	• Document review • Interviews

Evaluation criteria	Questions	Indicators	Sources	Methods
	legally required, being adopted at regional/national level?	• Examples of large-scale initiatives based on project results or methods	MINAG…), provincial and municipal governments	

5.2 List of reviewed documents

The documentation listed in Annex B of the terms of reference, as well as other documents, have been reviewed in detail. In particular, the evaluation team has been reviewed:

- Project document
- Inception report
- PPR for 2015, 2016, 2017, 2018 y 2019
- Progress reports and annual work plans
- Monitoring reports prepared by the project
- Audits
- Mid-term Review
- Annual operation plan for 2015, 2016, 2017, 2018 y 2019
- Minutes of the Steering Committee for 2015, 2016, 2017, 2018 y 2019
- Budget revisions
- Consultancy reports
- Maps
- National Adaptation Plan (Tarea Vida) (CITMA, 2017)
- Cuba UNDP Framework Document 2014-2018
- Guidelines regarding management costs of AF, GEF and GCF
    - https://www.adaptation-fund.org/generic/costs-and-fees/#:~:text=The%20project%20execution%20cost%20(B,to%20day%20activities%20of%20projects
    - GEF Guidelines on the project and program cycle policy. GEF/C.52/Inf.06/Rev.01 (2017)
    - GCF Policies on fees for accredited entities and delivery partners. GCF/B.19/29 (2018).

5.3 List of interviewed persons and institutions

6 July 2020

9:00 am - 10:30 am – UNDP Cuba

- Grisel Acosta. *UNDP Cuba.*
- María Rosa Moreno. *UNDP Cuba.*
- Tomas Escobar. *UNDP Cuba.*

9 July 2020

11:00 am – 12:00 am - Claudia Ortiz. *UNDP Regional Service Centre for Latin America and the Caribbean*

13 July 2020

9:00 am – 11:00 am- CITMA

- Odalys Goicochea Cardoso. Director, Environment Directorate*, CITMA.*
- Maritza García García. President, *AMA, CITMA.*
- Maritza González Cordero. *Director of Programmes and Projects, AMA, CITMA.*
- Pedro Ruiz. International Affairs Directorate, *CITMA (RAMSAR Focal Point)*

11:05 am – 12:00 am - MINAG

- Oscar Labrador Llanes. Directorate for Forest Flora and Fauna. *MINAG*
- Edelmira Castro. *Agroforestry Group. MINAG*

01:00 am –2:00 pm – Research institutes

- Daimar Cánovas González. *Director IES.*
- Roberto Nuñez Moreira. *Director ICIMAR*

2:05 pm – 3:00 pm – Raúl González Rodríguez. *CGB*

3:05 pm – 5:00 pm - PMU

- Luis David Almeida Famada. Project *Director, AMA*
- José M. Guzmán Menéndez. Technical *Coordinator, AMA*
- Reynier Samón Mesa. Project *Administrator, INAF*

14 July 2020

9:00 am – 10:00 am – PMU - Component 1

- Wilmer Toirac Arguelle. *Coordinator Comp 1 - INAF. MINAG*
- Julio César Álvarez Montes de Oca. Coordinator activities *Comp1 - IES. CITMA*
- Teresa Suárez Sarría. *Coordinator activities Comp1 - INAF. MINAG*

10:05 am – 11:00 am – Agroforestry enterprise Artemisa

- Juan Carlos Pérez Mendoza**.** *Coordinator*
- Rodrigo Fernando Moren.

11:05 am – 12:00 pm –State Forestry Service Artemisa.

- Amalia Ramos Mojena. Chief of section
- Leiser Ricardo Mendoza. Specialist
-

1:00 pm – 2:00 pm –State Forestry Service Mayabeque

- Idania Padilla. *Chief of section*
- Osnay. Specialist

2:05 pm – 3:15 pm –Agroforestry Enterprise Mayabeque.

- Adrián Varela Mederos. Director
- Felipe Cárdenas Crespo Coordinator
- Gualberto Gonzales.

15 July 2020

8:00 am – 9:00 am – PMU Component 2

- Juliette Díaz Abreu. *Coordinator Comp 2 AMA*
- Omelio Borroto Leiseca. *Mundo Latino.*

9:05 am – 10:00 am – Provincial governments

- Orlando Días Darías. *Director CITMA. Artemisa Provincial Government*
- Terina García Davis. *Director CITMA. Mayabeque Provincial Government*

10:05 am – 11:00 am – Provincial governments. Specialists

- Alexis Argudín Pereira. *Provincial project coordinator - Artemisa.*
- Iván Efraín Martínez Bordón. *Provincial project coordinator - Mayabeque*

11:05 pm – 12:00 pm – Municipal governments

- Elenne Quiñones Echeverría. Chief of section *CITMA. Batabanó.*
- Graicel Falcón Gil. *Chief of Section CITMA. Melena del Sur.*
- Pablo Bachiller. *Section CITMA. Artemisa.*
- Drialys Borroto. *Section CITMA. Arquizar.*

3:05 pm – 4:30 pm – Community leaders and voluntary groups

- Ricardo Álvarez Doval. *Guanímar Voluntary group.*
- Leandro Lázaro Marín Torres. *Community leader*
- Hiosvany Marín. Community leader *Cajío.*
- Vicente Hdez. Núñez, Community leader *Cajío*
- Yamila Alfonso. *Batabanó Voluntary group*
- Yamir Bello. *Community leader Melena del Sur*

16 July 2020

9:00 am – 10:00 am – PMU Component 3

- Eduardo Cuesta. *Coordinator activities Comp 3*
- Edel Elías Hernández. *Coordinator activities Comp 3*
- Miguel Ángel Vales. *Consultant*

10:05 am – 12:00 am – Capacity building classrooms and firefighters

- Sandro Álvarez Doval. CGB, Güira Melena. *Cajío Capacity Building Classroom*
- Odalmis Mujica Armenteros. *CGB Majana, Artemisa*.
- Yarmila Baltazar González. *Artemisa Capacity Building Classroom*.
- Elvys Leyva Alou. *Batabano Capacity Building Classroom*
- María Teresa Aguiar Añuez. *Director Protected Area Golfo Batabanó*
- Paulino Columbié. CGB *Melena-Batabanó.*

12:30 pm – 2:00 pm - Education

- Elio L. Amador Lorenzo. Coordinator UNAH.
- Josbel Gómez Torres, J Universidad Artemisa.
- Ismael Santos Abreu, MES and MINED.
- Primary school teacher, Cajio.
- Director – pre-graduate level.
- Maikel Cáceres Suárez,

1 and 17 July 2020 -International projects

- Eduardo Planos Gutiérrez, Director Project Third National Communication.
- Juan Mario Martínez, Director BASAL.
- Alfredo Martínez, Director OP15.

17 July 2020 – Site visits

- Silvia Vilma García Fernández, Director Bahía Habana Working group.
- Nereyda Junco Garzón, Director Center for Environmental Studies Camagüey.
- Ismael Santos Abreu, National Education System.

21 and 22 July 2020- Local stakeholders in Batabanó and Cajio (field visits)

- María Elena y Carlos of the Cajio capacity building classroom
- Andy Montero Díaz, ENPPFF.
- Marcia Elena Rodríguez Quintana, ENPPFF.
- Lianne de la Caridad Echevarría Leiva, student.
- Bárbara Leiva Acosta, Golfo de Batabanó Protected Area, ENPPFF
- Marcos Consi, Golfo de Batabanó Protected Area, ENPPFF
- Idania Padilla Cantillo, State Forestry Service Mayabeque.

5.4 Statement of agreement of the evaluation consultants

Evaluators:

1. Must present information that is complete and fair in its assessment of strengths and weaknesses so that decisions or actions taken are well founded.
2. Must disclose the full set of evaluation findings along with information on their limitations and have this accessible to all affected by the evaluation with expressed legal rights to receive results.
3. Should protect the anonymity and confidentiality of individual informants. They should provide maximum notice, minimize demands on time, and respect people's right not to engage. Evaluators must respect people's right to provide information in confidence and must ensure that sensitive information cannot be traced to its source. Evaluators are not expected to evaluate individuals and must balance an evaluation of management functions with this general principle.
4. Sometimes uncover evidence of wrongdoing while conducting evaluations. Such cases must be reported discreetly to the appropriate investigative body. Evaluators should consult with other relevant oversight entities when there is any doubt about if and how issues should be reported.
5. Should be sensitive to beliefs, manners and customs and act with integrity and honesty in their relations with all stakeholders. In line with the UN Universal Declaration of Human Rights, evaluators must be sensitive to and address issues of discrimination and gender equality. They should avoid offending the dignity and self-respect of those persons with whom they come in contact in the course of the evaluation. Knowing that evaluation might negatively affect the interests of some stakeholders, evaluators should conduct the evaluation and communicate its purpose and results in a way that clearly respects the stakeholders' dignity and self-worth.
6. Are responsible for their performance and their product(s). They are responsible for the clear, accurate and fair written and/or oral presentation of study imitations, findings and recommendations.
7. Should reflect sound accounting procedures and be prudent in using the resources of the evaluation.

Jon García

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: Jon García Bañales

Name of Consultancy Organization (where relevant)**:**

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Bilbao, Spain* on *12/08/2020*

Signature:

Joanna Acosta Velázquez

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: Joanna Acosta Velázquez

Name of Consultancy Organization (where relevant)**:**

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at *Ciudad de México, México* on *12/08/2020*

Signature:

Daysi Vilamajo

Evaluation Consultant Agreement Form

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: Daysi Vilamajó Alberdi

Name of Consultancy Organization (where relevant)**:**

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at La Habana, Cuba on *12/08/2020*

Signature:

5.5. Detailed comments to the project's results framework

Table 8. Comments to the system of indicators included in the Project document[34]

Type of Indicator	Indicator	Baseline	Target for Project End	Comments
Objective: To increase the resilience of populations living in the coastal zone of the provinces to Mayabeque Artemisa and the effects of climate change.	I. Areas with high rates of health and the conditions of the mangroves (soil and salinity of the water, the density of the canopy, the existence of local regimes of protection).	Coastal ecosystems that cover 7 318 ha are degraded, have excessive levels of salinity due to seawater intrusion and the obstruction of channels and have a limited protection regime.	7 318 Ha (total area where reforestation of mangrove, restoration of the mangrove ecosystems, and the enrichment of the forested areas inland was carried out) Note: the rates of coastal mangroves and wetlands must be nominated in the methodological documents to be developed at the start of the project.	The indicator is not entirely accurate: it refers to health and conditions, but the latter would be health-related, and the third aspect mentioned refers to management (protection) but not health. In general, the indicator could be considered to refer to ha with high health indices, measured in terms of salinity and sediment in the water and density of forest cover. But here too the indicator is not specific: it does not say what high health indices mean (e.g. what degree of salinity is considered adequate (10%, 30%?). The baseline is not specific: it would need to indicate what specifically was the state in terms of salinity and sediment and density of forest cover, with numbers. It is not enough to say that they are degraded or that they have high levels of salinity (nothing is said about the sediments). The target is not consistent. It refers to the number of hectares where restoration activities have been carried out, but not to their impact (hectares with high health indices), as the indicator.
	II. Numbers of people (men and women) with reduced vulnerability due to proximity of functioning	17,524 People in 47 communities are	21 502 People (of which at least 45% are women) directly	The indicator is not specific: it does not indicate how vulnerability is measured and what that vulnerability is. It is assumed that the improvement

[34] This matrix comments on the detailed results framework included in the project document (pp. 61-63) that is used in the progress reports and not the logical framework summarised in the project document (pp. 20-21). It should be noted that the MTR does not provide a detailed analysis by indicator. It notes in general that indicators are not SMART and that there are no impact indicators and recommends fixing this. It also provides a proposal for an experimental design for the mangrove work (Annex 8), but this covers only some of the indicators in the logical framework and is not specific to the indicators.

Type of Indicator	Indicator	Baseline	Target for Project End	Comments
	mangrove forest and wetland ecosystems.	directly affected by coastal flooding.	affected by the reduction of coastal flooding.	of mangroves reduces vulnerability. This is a reasonable assumption, but the indicator should not assume this, but rather measure vulnerability. The baseline is more precise (vulnerability to coastal flooding), but it does not indicate how to measure it. The target has the same shortcoming. On the other hand, the baseline does not establish the proportion of women to men in the population.
		270,705 People are indirectly affected by the impacts of the phenomena associated with the CC on economic activities.	270,705 People (at least 45% are women) benefit indirectly by the reduction of the impact of the phenomena associated with the CC on economic activities.	The indicator has two baselines and targets, which is not robust and clearly indicates its lack of specificity. This sub-indicator is remarkably imprecise: it is not known which economic activities are referred to, how they are affected and how the impacts on them will be reduced. It seems that the reference here is not to economic activities (in particular agriculture), but to life in general (all social, economic and cultural activities), including infrastructure. The indicator is based on the above assumption. This is reasonable for direct beneficiaries, but less so for indirect ones, so measuring the actual reduction in vulnerability is even more important.
Outcome indicator	1.1 Area (ha) of red mangrove is established along shore between Batabanó and Punta Mora.	533 ha	1290,6 ha of which 85% survived* (1097 ha) *Survival can only be measured 3 years after planting	The indicator is quite precise, although it is not clear whether it refers to action or outcome, when action does not necessarily lead to outcome (many of the planted seedlings may die). The target clarifies this partially but not completely. It is also not clear if the target refers to the consolidated target or only to the new ones, nor if the target includes only those that can be counted in 2020, with reference to those planted in 2017, thus ceasing to count those planted in 2018, 2019 and 2020.

Type of Indicator	Indicator	Baseline	Target for Project End	Comments
Outcome indicator	1.2 Cumulative area of mangrove ecosystem restored between Majana and Surgidero de Batabanó.	144 ha	1711,9 ha of which 85% survived* (1455,1 ha) *Survival can only be measured 3 years after planting	Same as above.
Outcome indicator	1.3 Cumulative area of landward edge woodlands restored and enriched.	939 ha	4315,5 ha of which 85% survived* (3668,2 ha) *Survival can only be measured 3 years after planting	Same as above.
Outcome indicator	1.4 Numbers of IAS management plans developed.	0	1, covering 7,318 ha	The indicator, baseline and target are relatively accurate, relevant and consistent (the target refers to no. de ha, but the indicator does not).
Outcome Indicator	2.1 Numbers of provincial and municipal development plans that make specific provision for EBA.	2 provincial and 6 municipal governments are preparing development plans that do not include EBA.	2 provincial plans and 6 municipal plans	The indicator, baseline and target are fine.

Type of Indicator	Indicator	Baseline	Target for Project End	Comments
Outcome Indicator	2.2 Numbers of provincial and municipal governments with EBA-related knowledge management systems in place.	0	2 provincial and 6 municipal governments	The indicator is not entirely accurate, as it is not known what it refers to with knowledge management systems in place: how to measure whether they have such a system (what it consists of) and how to measure whether it is in place. The baseline and target do not make this clear.
Outcome Indicator	2.3 Numbers of community members (men and women) belonging to local voluntary groups addressing environmental and adaptation issues.	0	1 group with at least 15 members (of which at least 45% are women) in four municipalities	The indicator and the target are not consistent: the indicator refers to no. of people, the second to number of groups with no. of people. The target is not clear: it is not known whether the target is 15 persons or 60 persons (4 groups of 15 persons)
Outcome Indicator	2.4 Numbers of local schools with study programmes incorporating adaptation issues.	0	16 primary schools 15 secondary schools 3 municipal universities 1 teacher training institute	The indicator, baseline and target are fine.
Outcome Indicator	2.5 Numbers of dissemination and awareness raising materials on adaptation issues, produced by local media	0	17 audiovisual 3 local television 5 local radio 2 articles	The indicator, baseline and target are fine.
Outcome Indicator	3.1 Frequency of training and technical support visits carried out by provincial and municipal governments to coastal communities in support of EBA	0	3 training and technical assistant activities undertaken per year by technical authorities to coastal areas.	The target, baseline and target are not entirely consistent, as there is no consistency in the stakeholders: the indicator says provincial and municipal governments, and the target technical authorities, but it is not known whether they are the same.

Type of Indicator	Indicator	Baseline	Target for Project End	Comments
Outcome Indicator	3.2 Frequency of inspection visits to coastal areas by provincial and municipal governments in support of EBA	0	3 inspection activities undertaken per year by provincial municipal government and other regulatory authorities	There is a duplication between indicators 3.1 and 3.2. At the same time there are implicitly two sub-indicators for 3.2 that require one explicit indicator each.
Outcome Indicator	3.3 Number of studies and methodologies carried out to estimate the cost - benefit from the implementation of the approach ABE, available for planners and policy makers.	0	3	The indicator and target could be more precise, distinguishing between studies and methodologies

5.6 Performance according to the Adaptation Fund's results framework

Tabla 9. Desempeño de Manglar Vivo según el marco de resultados del Fondo de Adaptación[35]

		Baseline information				Target performance at completion				Performance at completion				Cumplimiento		
Impact: Increased resiliency at the community, national, and regional levels to climate variability and change	Core Indicator: No. of beneficiaries		Total (direct + indirect beneficiaries)	Direct beneficiaries supported by the project	Indirect beneficiaries supported by the project		Total (direct + indirect beneficiaries)	Direct beneficiaries supported by the project	Indirect beneficiaries supported by the project		Total (direct + indirect beneficiaries)	Direct beneficiaries supported by the project	Indirect beneficiaries supported by the project			
		Total	0	0	0	*Total*	288,224	17,519	270,705	*Total*	288,224	21,502	270,705	100%	123%	100%
		% of female beneficiaries	0%	0%	0%	*% of female beneficiaries*	49%	48%	50%	*% of female beneficiaries*	49%	46%	50%	OK	OK	OK
		% of Youth beneficiaries	0%	0%	0%	*% of Youth beneficiaries*	15%	15%	14%	*% of Youth beneficiaries*	15%	17%	14%	OK	Superado	OK

		Baseline information				Target performance at completion				Performance at completion				Cumplimiento
Outcome 1: Reduced exposure to climate-related hazards and threats	Indicator 1: Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	Number of targeted stakeholders		Hazards information generated and disseminated	Overall effectiveness	Number of targeted stakeholders		Hazards information generated and disseminated	Overall effectiveness	Number of targeted stakeholders		Hazards information generated and disseminated	Overall effectiveness	
		Total		Coastal flooding	2: Partially effective	*Total*		Coastal flooding	4: Effective	*Total*		Coastal flooding	4: Effective	OK, aunque está muy claro cómo lo miden y si la calificación está justificada
		% of female targeted				*% of female targeted*				*% of female targeted*				
Output 1.1 Risk and vulnerability assessments conducted and updated	Indicator 1.1: No. of projects/programmes that conduct and update risk and vulnerability assessments	No. of projects/programmes that conduct and update risk and vulnerability assessments	Sector	Scale	Status	No. of projects/programmes that conduct and update risk and vulnerability assessments	Sector	Scale	Status	No. of projects/programmes that conduct and update risk and vulnerability assessments	Sector	Scale	Status	
		1	Multi-sector	National	2: Undertaking or updating of assessments in progress	1	Multi-sector	Local	3: Risk and vulnerability assessments completed or updated	1.00	Multi-sector	Local	3: Risk and vulnerability assessments completed or updated	OK, aunque está muy claro cómo lo miden y si la calificación está justificada
		No. of projects/progra	Sector	Scale	Status	No. of projects/pro	Sector	Scale	Status	No. of projects/progr	Sector	Scale	Status	
Output 1.2 Targeted population groups covered by adequate risk reduction systems	Core Indicator 1.2: No. of Early Warning Systems	No. of adopted Early Warning Systems	Category targeted	Hazard	Coastal flooding	No. of adopted Early Warning Systems	Category targeted	Hazard	Coastal flooding	No. of adopted Early Warning Systems	Category targeted	Hazard		
		1	3: Dissemination and communication	Geographical coverage	Regional	1	4: Response capability	Geographical coverage	Local	1.00	4: Response capability	Geographical coverage	Local	OK
				Number of municipalities	6			Number of municipalities	6			Number of municipalities	6.00	OK

[35] Only the targets against which Manglar Vivo reports have been included. The AF results framework is much broader.

		Baseline information				Target performance at completion				Performance at completion				Cumplimiento
Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	Indicator 2: Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	Number of staff targeted		Sector	Capacity level	Number of staff targeted		Sector	Capacity level	Number of staff targeted		Sector	Capacity level	
		Total	0	Coastal management	2: Low capacity	*Total*	88	Coastal management	4: High capacity	*Total*	154	Coastal management	4: High capacity	175%
		% of female targeted	0			*% of female targeted*	25.0%			*% of female targeted*	45.0%			Mucho más alto

		Baseline information				Target performance at completion				Target performance at completion				Cumplimiento
Outcome 5: Increased ecosystem resilience in response to climate change and variability-induced stress	Indicator 5: Ecosystem services and natural resource assets maintained or improved under climate change and variability-induced stress	Natural resource improvement level		Sector	Type	Natural resource improvement level		Sector	Type	Natural resource improvement level		Sector	Type	
		1: Ineffective		Coastal management	land	4: Effective		Coastal management	land	4: Effective		Coastal management	land	OK
Output 5: Vulnerable ecosystem services and natural resource assets strengthned in response to climate change impacts, including variability	Core Indicator 5.1: Natural Assets protected or rehabilitated	Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/rehabilitated	Unit	Effectiveness of protection/rehabilitation	Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/rehabilitated	Unit	Effectiveness of protection/rehabilitation	Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/rehabilitated	Unit	Effectiveness of protection/rehabilitation	
		Mangroves	677.0	ha rehabilitated	1: Ineffective	Mangroves	3,002.0	ha rehabilitated	4: Effective	Mangroves	3402.00	ha rehabilitated		113%
		Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/rehabilitated	Unit	Effectiveness of protection/rehabilitation	Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/re	Unit	Effectiveness of protection/rehabilitation	Natural asset or Ecosystem (type)	Total number of natural assets or ecosystems protected/rehabilitated	Unit	Effectiveness of protection/rehabilitation	
		Forests	939.0	ha rehabilitated	1: Ineffective	Forests	4,315.0	ha rehabilitated	4: Effective	Forests	4368.00	ha rehabilitated		101%

		Baseline information				Targeted performance at completion				Performance at completion				Cumplimiento
Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted	Indicator 6.1: Increase in households and communities having more secure access to livelihood assets	No. of targeted households	% of female headed households	Improvement level		No. of targeted households	% of female headed households	Improvement level		No. of targeted households	% of female headed households	Improvement level		
Output 6 Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	Indicator 6.1.1: No. and type of adaptation assets created or strengthened in support of individual or community livelihood strategies	Number of Assets	Type of Assets	Sector	Adaptation strategy	Number of Assets	Type of Assets	Sector	Adaptation strategy	Number of Assets	Type of Assets	Sector	Adaptation strategy	
		0				84	Natural capital	Coastal management	Mangrove reforestation	84	Natural capital	Coastal management	Mangrove reforestation	100%

		Baseline information			Target performance at completion			Performance at completion			Cumplimiento
Outcome 7: Improved policies and regulations that promote and enforce resilience measures	Indicator 7: Climate change priorities are integrated into national development strategy	Integration level			Integration level			Integration level			
		3: Some			5: All (Fully integrated)			5: All (Fully integrated)			
	Indicator 7.2: No. of targeted development strategies with incorporated climate change priorities enforced	No. of Development strategies	Regulation	Effectiveness	No. of Development strategies	Regulation	Effectiveness	No. of Development strategies	Regulation	Effectiveness	
		0			8	4: Enforced (Most elements implemented)	4: Effective	8.00	4: Enforced (Most elements implemented)	4: Effective	OK

5.7 Maps showing the health of the mangroves in 2015 and 2020

EVALUATION REPORT CLEARANCE FORM

Evaluation Report Reviewed and Cleared by

UNDP County Office

Name: Gricel Acc

Signature: _____ Date: 14/09/2020

UNDP GEF RTA

Name: Claudia Ortiz

Signature:_____ Date:_____