Nicaraguan Electricity Company (ENEL)

Project "Integrated Watershed Management in Lake Apanás and Lake Asturias (NI-X1005)"

2018

# Consultant's Report on Final Evaluation
–
# Project "Integrated Watershed Management in Lake Apanás and Lake Asturias"

**VOLUME A**

**FINAL PROJECT EVALUATION REPORT**


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# CONTENTS

## List of Tables

## List of Figures



## List of Charts



## List of Maps

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AFS | Agroforestry systems |
| ANA | Autoridad Nacional del Agua [National Water Authority] |
| AOP | Annual Operating Plan |
| BCN | Banco Central de Nicaragua [Central Bank of Nicaragua] |
| CATIE | Centro Agronómico Tropical de Investigación y Enseñanza [Tropical Agricultural Research and Higher Education Center] |
| CIRA | Centro para la Investigación en Recursos Acuáticos de Nicaragua [Nicaraguan Aquatic Resources Research Center] |
| CMS | Carbon Monitoring System |
| EFC | Eco-forestry coffee |
| EMP | Environmental management plans |
| ENEL | Empresa Nicaragüense de Electricidad [Nicaraguan Electricity Company] |
| ERS | Environmental restoration systems |
| FER | Final evaluation report |
| FP | Fruit plantations |
| GoN | Government of Nicaragua |
| Ha | Hectare(s) |
| IDB | Inter-American Development Bank |
| IER | Interim evaluation report |
| INAFOR | Institutito Nacional Forestal [National Forestry Institute] |
| INETER | Instituto Nicaragüense de Estudios Territoriales [Nicaraguan Institute of Territorial Studies] |
| INIFOM | Instituto Nicaragüense de Fomento Municipal [Nicaraguan Institute of Municipal Development] |
| INTUR | Instituto Nicaragüense de Turismo [Nicaraguan Tourism Board] |
| IPE | Interim project evaluation or project's intermediate phase |
| IPF | Industrial plantation forests |
| MAG | Ministerio Agropecuario [Ministry of Agriculture (formerly Ministry of Agriculture and Forestry or 'MAGFOR'] |
| MARENA | Ministerio del Ambiente y los Recursos Naturales [Ministry of Environment and Natural Resources] |
| MEM | Ministerio de Energía y Minas [Ministry of Energy and Mines] |
| NRM | Natural regeneration management |
| NRM | Natural regeneration management |
| PAGRICC | Programa Ambiental de Gestión de Riesgos de Desastres y Cambio Climático [Environmental Program for Disaster Risk and Climate Change Management] |
| PCP | Procurement and Contracts Plan |
| PER | Project execution plan |
| PES | Payment for environmental services mechanism |
| PES | Payment for environmental services |
| PEU | Project Execution Unit |
| PGM | Project General Management |
| PNR | Private nature reserves |
| POSAF | Social-environmental and forest development plan |
| PTU | Project Technical Unit |
| SIAFOR | Sistema e Información Ambiental Forestal [Environmental-forestry system and information] |
| SINIA | Sistema Nacional de Información Ambiental [National Environmental Information System] |
| SISCAT | Sistema de Información Catastral [Cadaster Information System] |
| SPS | Silvopastoral systems |
| SWAT | Soil and Water Assessment Tool |
| TAU | Technical-administrative unit |
| TT | Tracking Tool |
| UNA | Universidad Nacional Agraria [National Agrarian University] |

**PROJECT OVERVIEW**

| | | | |
|---|---|---|---|
| Project name: | Integrated Watershed Management in Lake Apanás and Lake Asturias | | |
| GEF ID: | 3981 | IDB ID: | NI-X1005 |
| Country: | Republic of Nicaragua | | |
| GEF focal area: | Multifocal | Operational program: | BD-3, BD-5, CC-6 |
| Implementing agency (IA): | IA: The Nicaraguan Electricity Company (ENEL, in Spanish). Participating institutions: National Forestry Institute (INAFOR, in Spanish), Ministry of the Environment and Natural Resources (MARENA, in Spanish), and the National Water Authority (ANA, in Spanish). | | |
| Funding and disbursement structure: | Total from GEF | US$4,040,909 | |
| | Co-financing | US$4,869,657 | |
| | Total project cost (GEF + co-financing | US$8,910,566 | |
| | Total disbursement from GEF on February 3, 2018 | US$4,040,909 | |
| Project's relevant dates: | Approval by IDB | November 4, 2011 | |
| | Project start | February 3, 2012 | |
| | Eligibility date | August 3, 2012 | |
| | Expected project closeout date | February 3, 2017 | |
| | Actual project closeout date | February 3, 2018 | |
| Project evaluation dates: | Scheduled interim evaluation date | December 2014 | |
| | Final evaluation date | February 2018 | |

## CHAPTER 1. INTRODUCTION

1. The project "Integrated Watershed Management in Lake Apanás and Lake Asturias GRT/FM-12993-NI (NI-X1005)" seeks to encourage biodiversity conservation and climate change mitigation actions in the Lake Apanás and Lake Asturias watershed by:

(i) applying sustainable land-use restructuring and forestry management practices in order to increase carbon sequestration in forests, reduce greenhouse gas emissions, and protect fragile ecosystems; and

(ii) designing and piloting a payment for environmental services (PES) mechanism for farmers and owners of private nature reserves, which will be funded with the income from payments received for using water resources to generate hydroelectric power in this watershed.

2. In addition to being an ecosystem with high biodiversity importance and its related carbon content, Apanás is a watershed of significant strategic value because it provides the necessary water resources for hydroelectric power generation, crop irrigation, cattle ranching activities, and the production of vegetables and coffee—among other crops. Because of its importance, ENEL—in its role as executing institution—seeks to preserve the quality of the water resources, which will ultimately be used for electricity generation purposes. The National Water Authority (ANA, in Spanish), the National Forestry Institute (INAFOR, in Spanish), and the Ministry of Environment and Natural Resources (MARENA, in Spanish) serve as participating/co-executing institutions.

3. According to the project agreement, an independent interim (IE) and final (FE) project evaluation are to be carried out. Furthermore, the project must fulfill the requirements for the Global Environmental Fund's Tracking Tool (GEF TT). This tool was created to monitor the project by ensuring that the deadlines for biodiversity and climate change are met.

4. The interim project evaluation, covering the 2012–2014 period, was completed thereby assessing project achievements as of October 31, 2014. Among the achievements, it included physical and financial progress, as well as the level of achievement toward the project objectives, outputs, outcomes, and operating plan. Moreover, the project agreement required the creation of a Final Project Evaluation Report (FER) to be submitted to the Global Environment Fund (GEF). This report is intended to show outcome achievement by the project.

5. **Final Project Evaluation Report (FER)** The Final Project Evaluation Report (FER) includes a quantitative analysis of the level of adoption/rejection of land-use practices promoted by the project that yield the greatest environmental value. The following outcomes, which were established in the project outcome table, will be assessed:

(i) Increase in the number of hectares where sustainable soil- and forest-management practices are carried out.

(ii) Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities.

(iii) Annual decrease in sediments transported through priority micro-watersheds.

(iv) Increase in the number of hectares of forested land added to the National Network of Private Nature Reserves.

(v) Increase in the number of hectares incorporated into a payment for environmental services (PES) mechanism.

6. In addition, the FER is to answer the following questions:

7. On average, how much did the area that beneficiaries dedicated to high environmental-impact land use—water, carbon sequestration, and biodiversity habitat preservation—increase from program start to the present time? What are the main factors contributing to this increase in area?

8. What percentage of beneficiaries discontinued high environmental-impact land-use practices? What are the main reasons for discontinuation?

9. What is the percentage of non-beneficiary residents who have adopted land uses promoted by the project? Are there differences in the rates of adoption of the various land uses by the beneficiaries? What are the main factors that make non-beneficiaries adopt land uses?

10.**FER Specific Objectives.** The specific objectives of the Final Evaluation Report are:

- Evaluate project design and formulation, monitoring and evaluation system, and application of planned management (or the lack thereof) based on the interim evaluation.
- Thoroughly evaluate achievement of project goals and outcomes as established in the outcome table.
- Create an analysis of the various actors involved in project execution.
- Evaluate project sustainability and project components—from an institutional, financial, environmental, and social standpoint—, as well as the level of ownership by users and target groups by means of a retrospective analysis of actors' engagement in project activities.
- Facilitate a consultation and outcome dissemination process in order to promote transparency and accountability and share the outcomes through a dissemination workshop.
- Systematize lessons learned, findings, and recommendations that can improve selection, design, and execution of future initiatives funded by IDB and GEF.
- Provide feedback on recurring IDB/GEF projects' themes in alignment with the strategic objectives established for the financing of biodiversity and climate change projects, such as financial sustainability and other cross-cutting themes.
- Report on the significance of project results in light of IDB/GEF objectives, as well as national, local, and sectoral priorities.
- Evaluate the performance of all institutions involved in project execution and the support and oversight by IDB acting as GEF's implementing agency.
- Evaluate level of disbursements—both the grant and match funds for this project—and the use thereof.
- Provide the IDB team with the necessary input to prepare the project completion report (PCR) in adherence to guideline OP-1242-5 PCR, as well as the current principles and guidelines for PCRs.

11. **Evaluation Scope.** The scope of the consulting services is:

- Identify a methodological strategy that can help understand the scope and limitations of the evaluation. The following shall be carried out: (i) perform a diagnosis that will show the final scenario after project execution with regard to activities/outcome execution and attainment of outcomes; (ii) thoroughly evaluate attainment of project objectives and outcomes as per the outcome table and the grading categories suggested by GEF; and (iii) coordinate, oversee, and incorporate tracking tool results pertaining to climate change and biodiversity.
- Evaluate project significance, effectiveness, efficiency, and sustainability.
- Analyze engagement/participation level by project stakeholders.
- Analyze execution of project's monitoring and evaluation plan after project closeout and assess whether the project generated sufficient data to measure and evaluate the expected impact.
- Identify and document lessons learned related to project design and execution, the main challenges and barriers encountered during project execution, and weaknesses and strengths of the processes related to project execution.
- Evaluate project's replicability.
- Identify findings and make recommendations to take into account during the design and execution of projects with similar objectives which may be funded by IDB (each one to be presented separately).

12.**Deliverables.** The deliverables of the consulting services are:

- Output 1 – Work plan and timeline five days after contract signing. The proposal shall include a methodological proposal as well as a tentative table of contents in order to see the structure the report may have.
- Output 2 – Draft of Final Evaluation Report.
- Output 3 – Final Project Evaluation Report containing comments by the counterpart and the Bank.

13.**Structure of the report.** The report is made up of two volumes—A and B. Volume A – Project completion report, which is comprised of six chapters. Chapter 1 contains an introduction to the project. Chapter 2 covers the institutional framework, main actors and beneficiaries, investment amount, initial outcome table, schedule of disbursements, execution scheme, fiduciary aspects, contract conditions, analysis of contract conditions compliance, changes in the outcome table during execution, and identification of barriers to project execution. Chapter 3 covers the core criteria: project performance, which include the analysis of the significance of project outcomes; project effectiveness and sustainability; overall evaluation's justification; and evaluation of project's replicability with regard to other areas in the country with similar protection characteristics. Chapter 4 shows the non-core criteria, i.e., evaluation of project monitoring and evaluation, use of country systems, environmental and social safeguarding, evaluation of project strategy and execution mechanisms, capacity building, actors performance, and evaluation of the degree of engagement and ownership by key project actors—local, national, and regional institutions—throughout execution. Chapter 5 describes project's findings and recommendations and Chapter 6 describes lessons learned from project execution.

14."Volume B – Final Evaluation Report overview" is made up of seven annexes. Annex 1 shows the initial project outcome table. Annex 2 contains the results obtained from the SWOT workshop where the management of project execution was assessed in a participatory way. Annex 3 describes the Report on the Evaluation of the Level of Participation and Ownership by Stakeholders and Local/Municipal Institutions. Annex 4 sets out an analysis of procurement

and contracts carried out by the project. Annex 5 shows the results of the economic assessment. Annex 6 shows the consultant’s agenda of activities. Annex 7 shows the list of documents reviewed by the consultant.

## CHAPTER 2. GENERAL FRAMEWORK OF PROJECT

### 2.1 Project Background and Justification

15.The Apanás reservoir is located at the center of the Apanás Valley and feeds from the Lake Apanás and Lake Asturias watershed (hereinafter, the Apanás watershed). This watershed covers an area of 587.8 km$^2$ and receives the inflow of six rivers—Jigüina, Jinotega, San Gabriel, Sisle, Mancotal, and Arenal—as well as from a network of smaller tributaries and the bypassed waters of Lake Asturias, which was formed by the El Dorado dam. The Apanás watershed is located at the center of the second most diverse region in the world[1]—the Mesoamerican Biological Corridor—and it is a fragile ecosystem that has historically been an area for species circulation. The highlands of the watershed serve as habits for endangered fauna and flora. For example, the mountain avocado is the primary food for quetzals and bell birds (*chogüí*); these species may become extinct should their habit disappear. Other endangered species living in this watershed include mammals like the Nicaraguan pocket gopher (*orthogeomys matagalpae*) as well as migratory and native birds. Furthermore, Lake Apanás has been recognized as a Ramsar site[2] (wetland No. 1137, Art. 2.1, Ramsar Convention on Wetlands of International Importance).

16.At present, there are three hydroelectric power plants in operations and they are dependent on Lake Apanás' inflow. The Centroamérica, Larreynaga, and Carlos Fonseca (also known as Santa Bárbara) hydroelectric power plants generate 50 MW, 17.5 MW, and 50 MW, respectively. Together, they have a total installed capacity of 117.5 MW. The designs of another two hydroelectric power plants in the same watershed have been completed and waiting for financing. Their expected power generation capacity is 50 MW. Nicaragua's installed hydroelectric power generation capacity represents anywhere from 10.9% to 14% of the total electricity generation capacity of the country.

17.There has not been significant migration to the region. Instead, demographic movements are seasonal—e.g., coffee harvesting season. However, the most important economic activity in the region is coffee farming, followed by the production of basic grains (maize, beans), vegetables, fruits, aromatic plants, flowers, and scattered fishing and cattle ranching. The livelihood of the population living in the area depend on the Apanás watershed. They use it for crop irrigation, food, water for the cattle, household uses, fishing, and biomass extraction for electricity generation.

18.**The current status[3].** The Apanás watershed is affected by the intense and disorganized use of its natural resources as a consequence of the rise in population density. The watershed has 96,572 inhabitants, 50.6% of which live in urban areas and 49.4% of which in rural areas. The population density in the rural area is 90 inhab./km$^2$, which is higher than the national average of 72 inhab./km$^2$. Between 1984 and 2006, the population in the area rose by 32% and the annual subsistence crops rose by 65%. Seasonal demographic movements to the lake shoreline area gave rise to permanent settlements and changes in land use. The area used to be covered by mixed broadleaf, perennial trees and is now covered by sun-grown coffee crops

[1] Mittemeier *et al.*, 1998. *Evaluación y conservación de biodiversidad en paisajes fragmentados de Mesoamérica*. Harvey Celia A.; Sáenz, Joel C. INBio/CATIE/UNA, 2008, p. 328.
[2] The Ramsar Convention is an international treaty that establishes a non-regulatory structure for wetland conservation in each country. It also accounts for international cooperation in the area of conservation and best practices on wetland resource use.
[3] A full assessment titled: "*Estudio del Ordenamiento Ambiental del Territorio y Manejo de la Cuenca Hídrica: Lagos Apanás y Asturias*" (Study of the Environmental Land Reordering and Management of the Lake Apanás and Lake Asturias watershed) on the situation of the Apanás watershed can be consulted in the link provided.

(unprotected from forest cover) in combination with agriculture and cattle ranching activities, for which 35% of the forested coverage of the watershed was used.

19.The change in land use resulted in a high level of deforestation. At present time, the Apanás watershed has a forest cover of 7,057 ha, which is about only 13% of its original cover. The deforestation-reforestation ratio in the watershed is 30:1. Also, on average, only 50% of the 21 forest species in the watershed are in the process of recovering, which means that the other species are at risk of disappearing in the future. A historic land use analysis, covering the 1984-2006 period, shows that forest vegetation was reduced by 26%, which means that the annual deforestation rate is 1.24%—i.e., an annual loss of 190.22 ha of forest. Deforestation has resulted in a drop of carbon reserves, higher sedimentation into the reservoir, shrinkage of the natural ecosystem areas, and depletion of water resources, on top of the subsequent negative impact this has on hydroelectric power plants in their attempt to generate renewable energy. Higher forest fragmentation in the Apanás watershed has reduced connectivity of forested areas. In turn, this leads to loss of biodiversity and increases isolation of forested areas and key species. It is probable that the remaining forests will disappear by 2017 if no mitigation measures are adopted and the current excessive demand of forest resources and scarce reforestation activities remain unchanged[4].

20.The lack of significant institutional presence, coupled with insufficient coordination by the organizations present in the area, limit the chances of ensuring enforcement of current laws on protection of water and forest resources. Therefore, the opportunities to transfer useful technology for the sustainable use of natural resources are limited. For example, sustainable land-use reordering practices, as well as forested areas in other parts of the country where they have been successfully applied as part of the Socioenvironmental and Forestry Programs (POSAF—in Spanish—1 and 2) are not known. At best, they were only used partially, thus making their positive economic and environmental impact of introducing natural resource management systems scarcely known. Furthermore, there are scarce cadaster and land-use data in the watershed, which hinders proper execution and evaluation of any intervention in the area.

21.The Nicaraguan Electricity Company (ENEL, in Spanish) recognized the serious environmental degradation taking place in the Apanás watershed and, in 2018, funded an environmental and socioeconomic assessment on the watershed, as well as collaboration efforts to draw up the Land Use and Integrated Management Plan for the Lake Apanás Watershed. The purpose of the plan is to: (i) mitigate and address the vulnerability of water resources; (ii) protect the biodiversity of the Apanás Watershed; (iii) ensure the sustainable use of water for generating hydroelectric power; and (iv) engage in the orderly and sustainable exploitation of the natural resources, seeking to support

the right to socioeconomic development for the local population.

22.Three micro-watersheds, of the rivers San Gabriel, Cuyalí (Corinto Finca)[5], Sisle and the coastal areas of the reservoir within the Apanás Watershed have been carefully selected as priority project intervention areas through a rigorous process lead by ENEL and MARENA. Through the selection process, the most environmentally and socially sensitive areas (i.e., environmentally sensitive areas) were identified. They have the highest potential for meeting the biodiversity conservation and climate change mitigation objectives (ENEL 20107). These

[4] CABAL, S.A., 2008. *Estudio del Ordenamiento Ambiental del Territorio y Manejo de la Cuenca Hídrica: lagos Apanás y Asturias*, p. 9.
[5] ENEL and MARENA 2010, Deed No. 1 Selection of priority areas (*Plan de Manejo de la Cuenca Hídrica Lago de Apanás-Asturias*).

watersheds, primarily located in the municipality of Jinotega and, to a lesser extent, in the Municipality of San Rafael del Norte, cover a wide range of habitats.

23.On February 3, 2012, the Republic of Nicaragua and the Inter-American Development Bank (IDB) signed the grant agreement whereby the Bank acts as the manager of the Global Environment Fund (GEF) to support the execution of the project "Integrated Watershed Management in Lake Apanás and Lake Asturias" in the municipality of Jinotega (hereinafter, the Project).

### 2.2 Project description and components

24. Below are the objectives of the project, as well as the investment components, as established in the original GEF grant proposal and as stated in the agreement executed between the Bank and the Government of Nicaragua.

#### 2.2.1. Project Objective

25. This project aimed at promoting biodiversity conservation and climate change mitigation in the Apanás-Asturias watershed by: (i) applying sustainable restructuring activities for land use and forest areas in order to increase carbon sequestration in the forests, reduce greenhouse gas emissions, and protect fragile ecosystems, and (ii) designing and piloting a payment for environmental services (PES) mechanism[6] for farmers and owners of private nature reserves, which will be funded with the income from payments received for using water resources to generate hydroelectric power in this watershed.

#### 2.2.2. Project Components

26. **Component 1: Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management. GEF financing: US$1,117,759** Component 1 activities will be carried out by ENEL. This component seeks to improve managerial skills of local authorities, farmers, and land owners within the watershed by: (i) creating land-use planning instruments for local and national authorities and (ii) establishing a carbon-biodiversity monitoring system for land use, changes in land uses, and silviculture—including its implementation in priority areas.

27. The specific activities include: (i) support the formulation of three municipal decrees to help the creation of micro-watershed plans and micro-watershed committees, which will restore water management structures in the Apanás watershed; (ii) draft a joint decree for the three municipalities in order to support the creation of the Apanás sub-watershed committee, which shall obtain the certification by the National Water Authority (ANA); (iii) establish a carbon monitoring system to track land use and carbon contents in the ecosystems, covering 100% of the intervention area, which will be a reference to build the necessary capacities to measure, submit reports, and verify carbon contents in the watershed, and will be used by MARENA; and (iv) introduce a cadaster information system (SISCAT, in Spanish) and compile digital, topographic data of the properties in the shoreline micro-watersheds of the San Gabriel River, the Corinto Finca, and Apanás. It should be noted that ANA provided accompaniment for the legal registration of micro-watershed committees and the sub-watershed committee.

[6] The PES mechanism was referred to as the "Compensation for Environmental Services (CES) mechanism" during project execution.

28. **Component 2: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration. GEF financing: US$1,381,859** INAFOR will implement these activities—aimed at improving and restoring forest cover in the protected shoreline areas, the critical areas of the lowlands of the watershed, and alongside Lake Apanás—and will also apply sustainable land-use reordering practices in key forested areas and farming lands. In addition to the carbon- and biodiversity-related benefits as a result of these practices, the results from sustainable land-use and forested areas reordering in the watershed will improve surface water run-off and will help preserve water resources. These practices will also better local farmers' productive capacity, thus improving the living conditions of the population—a core aspect of the proposed sustainable land reordering strategy. In order to facilitate the execution of these sustainable land-management practices through the environmental restoration systems (ERS), they were organized by production system—agroforestry, silvopastoral, or forestry—according to the current and proposed land use (see operation manual for implementation of Component 2).

29. These three approaches defined the technologies promoted among selected land owners: (i) as for pasturelands, a system that incorporates trees and bushes with plot rotation and animal load control per unit while applying a feeding strategy specific for the dry season in order to reduce the pressure brought on by the drought; (ii) a good practices program targeting the areas where vegetables and coffee are produced in order to restore poorly managed soils due to the excessive use of pesticides and fertilizers; and (iii) the restoration of riparian forests located in the tributary micro-watersheds of the lakes. These practices have proven efficient in previous forest development programs.

30. **Component 3: Conservation of forest areas and biodiversity in private nature reserves[7] and the Ramsar site. GEF financing: US$602,876** Activities under Component 3 will be carried out by MARENA. This component has three strategic objectives: (i) turn fragmented or degraded forests into a landscape mosaic throughout target biological corridors through the National Network of Private Nature Reserves; (ii) create, together with small- and medium-sized farmers from the Apanás watershed, agri-tourist circuits in order for their productive activities to become environmentally sustainable and motivate them to continue to implement conservation practices; and (iii) strengthen, together with stakeholders, the management strategy for the Ramsar site, which will include the design and implementation of a biodiversity tracking and monitoring system. The consultants will select at least 25 eligible individuals who own sections or fragments of preserved forests with potential to become preserved biological corridors for quick ecological evaluations, business plans, and training for biodiversity follow-up and civil works. The selection will be ratified by MARENA. The specific tangible outcomes include: (i) inclusion of 1,000 ha of forest land into the National Network of Private Nature Reserves,
which will receive support in the form of a mix of investments and technical assistance; (ii) establishment of breeding centers for the most important local species; (iii) development of ecotourist routes and circuits, and training for tourist guides; and (iv) implementation of a biodiversity monitoring system for 12 key species in the predominant ecosystems in the micro-watersheds.

31. **Component 4: Design and implementation of the payment for environmental services mechanism in the Apanás Watershed. GEF financing:** US$701,035 ANA was in charge of implementing the activities under Component 4. As part of the project, a payment for environmental services mechanism was established in order to ensure long-term sustainability

[7] Private nature reserves refer to protected perennial/mixed broadleaf forested areas (cloud forests, pinewood forests, or oak forests), which are privately owned. In Nicaragua, they are commonly referred to as "private wild reserves."

of the use of water resources utilized by hydroelectric power plants and to carry out an integral management of the three micro-watersheds and the Apanás-Asturias watershed. The financed activities under this component are expected to yield the following outcomes: (i) at least 75 designed, negotiated, and operating PES agreements with farmers and NPR/tourist sites owners; a mechanism to prepare and apply a PES system will be established, which will include beneficiary eligibility criteria, cost of opportunity, contracting conditions, and compliance verification measures; (ii) at least 2,822 ha of forests will be added under the PES mechanism; and (iii) at least additional 314,008 tCO2 captured thanks to the promotion of sustainable management practices. The three outcomes from Component 4 helped laid the foundation for the establishment of viable and sustainable financing mechanisms to support biodiversity conservation and carbon removal actions in Nicaragua. Moreover, support to host ten dissemination workshops was provided to promote understanding of and show the benefits of the PES mechanism among local stakeholders and beneficiaries, as well as potential buyers and brokers.

### 2.3 Main actors and beneficiaries

32. These are the main project beneficiaries: (i) The population living in priority areas: They will have access to sustainable land and forested areas restructuring practices, and will increase their income as a result of productive activities diversification (e.g., ecotourism); (ii) The municipalities: They will have better institutional capacity to manage the Apanás watershed; (iii) MARENA, INAFOR, and ANA: They will do the necessary coordination efforts to enforce their decrees in the watershed; and (iv) ENEL: They will have a continuous waterflow for hydroelectric power generation thanks to water conservation and regeneration actions coupled with a drop in sedimentation as a result of the implementation of project activities.

### 2.4 Institutional Framework for Project Execution

33. The Nicaraguan Electricity Company (ENEL, in Spanish) is the execution entity of the project, and it will create a project execution unit (PEU). The PEU will be in charge of managing engagement and cooperation relationships with the project's participating or co-executing institutions.

34. The PEU would be physically located within the project area (i.e., Jinotega). It will be composed of a temporary organic structure for the project’s technical-administrative execution. The Management of the Project () will recruit a General Coordinator, a Technical Project Coordinator, an Administrative Assistant, a Financial Specialist, and a Procurement Specialist, and ENEL would appoint an Environmental Specialist for each one of the four components.

35. **Preparation for Execution.** INAFOR, MARENA, and ANA will make technical and operational support available for components 2, 3, and 4, respectively, for ENEL. It should be pointed out that activities under these components are in the realm of institutional responsibility and technical experience by these institutions. As an executing entity, ENEL will receive and manage project funds, purchase/hire all goods and services proposed for each component. In order to do so, ENEL will sign interinstitutional cooperation agreements with INAFOR, MARENA, and ANA for technical and operational support for project execution.

36. **Project's Coordinating Committee.** The creation of a Coordinating Committee was agreed. It will have representation from ENEL, ANA, INAFOR, MARENA, and the municipalities of San Rafael del Norte and Jinotega. This committee will serve as a forum for analysis of

annual progress made with regard to project outputs, outcomes, and follow up and evaluation plan, and for integrated watershed management.

37. **Participating Organizations.** Below is a brief description of the responsibilities by key actors and institutions that participated in project execution.

38. **Nicaraguan Electricity Company (ENEL)**. It is an entity affiliated to the Ministry of Energy and Mines (MEM, in Spanish). The Ministry dictates ENEL's policies, planes, and projections in adherence to the energy strategy of the [Nicaraguan] Government of Reconciliation and National Unity (GRUN, in Spanish). ENEL's main goal is to generate electric power using all available sources and prioritizing renewable sources in order to support and contributing to offering a low cost, accessible energy supply for all Nicaraguans. ENEL is the executing entity of the project through the PEU, which is responsible for the fiduciary management before the Bank. It is the direct executing entity for Component 1 with the technical support of INAFOR, MARENA, and ANA.

39. **The National Water Authority** (**ANA**, in Spanish) was created through Law No. 620, National General Water Law, approved on May 15, 2007 and published on La Gaceta, official daily, on September 4, 2007.

40. Due to the institution's role and organizational scheme, the Directorate of Watersheds was designated as its official counterpart for the project. The roles of the Directorate of Watersheds related to this project are: (i) authorize, coordinate, follow up, certify, and manage approval of watershed / sub-watershed / micro-watershed management plans; (ii) coordinate and promote enforcement and legalization of watershed / sub-watershed / micro-watershed committees, and manage their approval and registration in RPNDA; (iii) organize, install, and oversee watershed organization's operations; and (iv) coordinate—in collaboration with municipalities—water resource management within project area, including resolution of conflicts deriving from water use and exploitation or polluting discharges.

41. **The National Forestry Institute** (**INAFOR**, in Spanish). It is a decentralized entity of the Government holding its own legal status. It used to be affiliated to the Ministry of Agriculture (MAG, in Spanish). It has functional, technical, and administrative autonomy, its own budget and with sufficient capacities in its subject matter.

42. INAFOR is organized and works at the territorial level through ten Forestry District Delegations across the country. The project is located in District 8 corresponding to the municipalities of Jinotega and Matagalpa. The Forestry District—as an organizational, functional, technical, and operative entity—supports INAFOR's management efforts within project area. It takes over the responsibilities of and has the necessary capacities for project execution. In each territory, the entity will be responsible for enforcing technical regulations and forestry policies, as well as for interinstitutional coordination on this subject matter. The Forestry District 8 is also delegated with carrying out proper and timely control of forestry activities, decision making, and implementation of actions to set the priorities of the forestry sector.

43. According to INAFOR's organizational chart, the liaison unit for project execution is the Directorate of Forestry Development and Protection. More specifically, the Department of Forestry Development is the corresponding entity at the central level, and District Delegation 8 (i.e., Matagalpa and Jinotega) at the national level. Moreover, INAFOR received support from specialized technical units. The National Forestry Inventory Office was among these supporting

units; they estimated amounts of carbon dioxide capture in plots or plantation forests that are contributing to the forest cover.

44. Below are the main roles of the Directorate of Forestry Development and Protection in connection with the project: (i) implementation of nationwide programs in coordination with other forestry districts; (ii) promote the National Forestation Campaign[8]; (iii) promote community forestry; (iv) provide forestry incentives; (v) provide forestry protection; (vi) improve genetics; and (vii) follow up and monitor forests, including carbon sequestration monitoring. The actions carried out by this Directorate are in close alignment with the proposed project activities. The Directorate of Forestry Development and Protection has specialists in establishing and managing plantations, agroforestry systems, forest extension and promotion work, and forest protection. More specifically, the District Delegation of Jinotega has forestry inspectors at the municipal level.

45. **Ministry of Environment and Natural Resources** (**MARENA**, in Spanish). It is in charge of establishing conservation, protection, improvement, and environmental /natural resource restoration regulations in order to ensure rational and sustainable use of resources (according to Law 217 – General Law of the Environment and Natural Resources). MARENA uses buffer zones to manage the National System of Protected Areas. These zones are of utmost importance for water production, tourism development, and safeguarding wild flora and fauna species that may have disappeared from other regions of the country.

46. These are MARENA's objectives: (i) prevent, regulate, and control any cause or activity causing environmental deterioration and ecosystem contamination; (ii) establish means, ways, and opportunities for rational exploitation of natural resources as part of national planning actions founded on the basis of sustainable development, social equity and justice, and the cultural diversity of the country; (iii) make proper use of the physical space through territorial reordering taking into account environment and natural resource protection; (iv) strengthen the National System of Protected Areas to preserve biodiversity and other resources; (v) ensure rational use and management of watersheds and water resources thereby ensuring their sustainability; (vi) promote and encourage environmental education; (vii) enable a healthy environment that supports the promotion of health and disease prevention among the Nicaraguan population; and (viii) promote and encourage activities and programs to advance and comply with this law.

47. During execution of Component 3, MARENA will be in charge of identifying and making official the corridors with the highest potential in the micro-watersheds; identifying the properties that make up these corridors; identifying and selecting eligible farmers for receiving the investment components; planning investment at the farm level; executing contracts with each beneficiary; training and monitoring of each component by establishing permanent plots; and evaluating the results of each beneficiary.

48. MARENA is organized and works at the territorial level through 17 Territorial Delegations nationwide. The project was executed within the Territorial Delegation of Jinotega where the activities of Component 3 were coordinated and implemented. The National Biodiversity Director at the Natural Heritage Directorate General was the Ministry's representative to the project's coordination committee.

[8] This campaign focused on establishing tree nurseries, plantations, forestry extension and promotion, training in forestry topics, and forest fire prevention and control.

## 2.5 Project Cost and Financing

49. Total project cost was estimated in US$8,910,566 to be financed as follows: US$4,040,909 will be funded through a GEF grant, which will be managed by IDB, acting as GEF's executing agency, and US$4,869,657 will be provided by ENEL, MARENA, INAFOR, and ANA as local match funds. The match funds are broken down as follows: (i) ENEL will provide US$2,129,496 in goods and US$285,760 in cash, and (ii) MARENA, INAFOR, and ANA will provide US$2,454,401 in goods. **Table 1** shows original total project costs broken down by component.

**Table 1. Project Investment Costs (US$)**

| Components | IDB/GEF | Match | Total |
|---|---|---|---|
| Component 1: **Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management.** | 1,117,759.00 | 2,073,038.00 | 3,190,797.00 |
| Component 2: **Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration.** | 1,381,859.00 | 1,131,893.00 | 2,513,752.00 |
| Component 3: **Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.** | 602,876.00 | 703,394.00 | 1,306,270.00. |
| Component 4: **Design and implementation of the payment for environmental services mechanism in the Apanás Watershed.** | 701,035.00 | 558,332.00 | 1,259,367.00 |
| Project management and oversight | 237,380.00 | 403,000.00 | 640,380.00 |
| Total US$ | **4,040,909.00** | **4,869,657.00** | **8,910,566.00** |
| Percentage of approved total | **45%** | **55%** | **100%** |

*Source: Project's financing proposal.*

## 2.6 Disbursement Schedule

50. The project is under a non-reimbursable GEF investment grant scheme in combination with local contributions as match funds. **Table 2** shows the planned annual disbursement schedule.

**Table 2. Planned Disbursement Schedule (in US$)**

| | 2011 | 2012 | 2013 | 2014 | 2015 | Total |
|---|---|---|---|---|---|---|
| GEF | 400,000 | 800,000 | 1,640,000 | 800,000 | 400,909 | 4,040,909 |

## 2.7 Original Project Outcome Table

51. The project outcome table includes output and outcome indicators, as well as intermediate and final outcomes that will support project follow up and evaluation actions. The indicators were agreed upon with ENEL, INAFOR, MARENA, and ANA. The original project outcome table is shown in Annex 1 and below are listed the most significant outcome indicators (see Table 3).

**Table 3. Project Outcome Indicators**

| Outcome indicators | Unit of measurement | 2010 baseline | Original expected goal |
|---|---|---|---|
| **Outcome 1 indicator:** Rise in the number of hectares where sustainable soil and forest management practices are carried out. | Hectares (ha) | 3,325.08 | 5,220.8 |
| **Outcome 2 indicator:** Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities. | Tons | 0 | 491,151.0 |
| **Outcome 3 indicator:** Annual decrease in sediments dragged through priority micro-watershed. | Percentage (%) | To be determined in Year 1. | 20 |
| **Outcome 4 indicator:** Increase the number of hectares of forest land within the network of private nature reserves (PNR). | Hectares (ha) | 170 ha | 1,170.0 |
| **Outcome 5 indicator:** Rise in the number of hectares of protected forests incorporated into a payment for environmental services mechanism. | Hectares (ha) | 0 | 2,822.0 |

### 2.8 Fiduciary Aspects

52. The project will be managed by ENEL, as this institution has ample experience in leading IDB operations. SIGFAPRO is the financial management system ENEL will implement. According to the Bank's policies and guidelines and the provisions contained in the grant agreement, the submission of audited financial statements is required.

53. Procurement processes for this project are to follow the provisions of set forth in policy GN-2349-9, "Policies for the Procurement of Goods and Works financed by the Inter-American Development Bank," and policy GN-2350-9, "Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank." These processes are executed by ENEL.

### 2.9 Environmental and Social Aspects

54. This project has positive impacts on the environment, as it seeks to promote sustainable land and forested areas reordering, the conservation of a Ramsar site, and biodiversity conservation of private nature reserves in the Apanás watershed. This is very important for generating hydroelectric power and reduce carbon dioxide emissions. The project also underpins the design and application of a payment for environmental services mechanism to support local conservation and watershed management efforts.

55. In compliance with the environmental policies and safeguards (IDB OP-703), and taking the objectives, impacts, and risks of this technical operation into account, the project was classified as Category C.

### 2.10 Project Contractual Clauses

56. **Conditions and Contractual Clauses.** GEF's non reimbursable financing agreement No. GRT/FM-12993-NI was signed between the Republic of Nicaragua and the Inter-American Development Bank (IDB) on February 3, 2012. It contains a set of clauses related to project

costs, as well as to special conditions prior to disbursement and the execution of such agreement.

57. **Special conditions prior to the first disbursement.** Clause 2.02 of the agreement establishes that the first disbursement is contingent upon: (i) the signing of a subsidiary agreement for project execution between the GoN and ENEL; (ii) the creation of a PEU by ENEL, which will be made up of at least one General Coordinator, one Procurement Specialist, and one Financial Specialist; (iii) the selection of a Project Technical Coordinator; (iv) the signing and incorporation of participation agreements for project execution between ENEL and the other participating institutions; (v) the establishment of a Project Coordinating Committee; and (vi) the approval of the Project's Operating Manual. In addition, other conditions regarding agreement execution were established, as follows:

58. **Non-reimbursable financing and additional resources.** Clause 1.01 established the cost of the project at US$8,910,566. The non-reimbursable amount to be funded by IDB/GEF is US$4,040,909 (Clause 1.02) and additional funding from participating institutions is US$4,869.657 (Clause 1.03).

59. **Disbursement timeline.** Five years from contract signing is the maximum term for disbursing grant funds (Clause 2.04).

60. **Procurement of goods and services.** The policy for commissioning of works and procurement of goods and services will be guided by the provisions set forth in policy GN-2349-9, "Policies for the Procurement of Goods and Works financed by the Inter-American Development Bank," as stated in Clause 3.01, and policy GN-2350-9, "Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank," as established in Clause 3.04. Both clauses establish the procedures and conditions for bidding processes.

61. **Oversight.** Chapter IV of the agreement sets out the following required oversight processes for project execution:

(i) *Records, inspections, and reports*: Clause 4.01 establishes that the executing entity undertakes to keep records, allow inspections, provide reports, keep a financial information system and an IDB-acceptable internal control structure, and allow the auditing of financial information according to the provisions set forth in the agreement.

(ii) *Project execution oversight:* Clause 4.02 stipulates planning and follow-up instruments, including, among others, the project execution plan, progress reports, and other tools created to monitor project activities and outputs. Also, it establishes the commitment to collaborate in the two project evaluations: (i) interim evaluation – to be completed within 24 months from the date of disbursement eligibility is declared or when 35% of funds has been disbursed; and (ii) final evaluation – six months before the date of the last scheduled disbursement.

(iii) *Financial statements and other reports*: Within 120 days of closing each economic exercise and during the disbursement term, the audited financial statements of the project shall be submitted and endorsed by the signature of an external auditor in accordance with Clause 4.03.

### 2.11 Analysis of Compliance with Contractual Conditions

62. ENEL, in its role as executing entity, met all conditions and contractual eligibility clauses—throughout project execution—set forth in the agreement by creating the Project Execution Unit (PEU).

63. **Special conditions prior to first disbursement.** All special conditions established in the agreement were fulfilled: (i) the GoN, through the Ministry of Finance and Public Credit and ENEL, signed an agreement where the conditions for resource transfer and execution obligations were established according to the terms agreed upon with IDB; (ii) the PEU was created and it included a General Coordinator, a Procurement Specialist, and a Financial Specialist, (iii) the Project Technical Coordinator was selected, (iv) Participation Agreements were signed between ENEL and the other institutions (INAFOR, MARENA, ANA); (v) a Project Coordinating Committee was created; and (vi) the Project's Operating Manual was approved.

64. **Conditions related to the execution of the agreement.** All conditions were met when applicable: (i) project's actual total cost was higher than originally established in Clause 1.01 (US$8,910,566); (ii) the disbursement timeline was extended by 12 months, to February 3, 2018, and the corresponding changes were applied according to the agreement; (iii) procurement processes for this project were carried out according to the provisions set forth in clauses 3.01 and 3.04; and (iv) oversight instruments were created and used by ENEL's PEU. Also, records were kept through the SIGFAPRO system and Microsoft Excel as established in Clause 4.01, and oversight reports were prepared and submitted within 60 days, as established in the agreement and in accordance with the agreed upon standards. Furthermore, the interim evaluation was carried out (in 2015) as well as the final evaluation in adherence to Clause 4.02—subject matter of this report. As for the project's financial statements, these were submitted within 120 days from completion of each economic exercise. They were audited by the firm Valladares García & Compañía following international auditing regulations, as well as IDB-specific requirements.

65. **Non-reimbursable financing and additional resources.** At project closeout, over 100% of the project funds were used up, as established in Clause 1.01 (US$8,910,566), US$4,040,909 of which were provided by IDB/GEF. The remaining funds were executed as a local match by the co-executing entities as shown in the audited financial statements. The actual total amount was higher than planned, as shown more in detail later in this report.

66. **Disbursement timeline.** The disbursement timeline was extended by 12 months, to February 3, 2018, according to a communication issued by IDB on June 10, 2016.

67. **Procurement of goods and services.** Procurement processes for this project were carried out in accordance with the provisions set forth in clauses 3.01 and 3.04, as well as IDB's policies and procedures.

### 2.12 Reviews and changes of output/outcome indicators during project execution or other aspects related to grant execution

68. The outcome table was modified while project execution was underway due to three main events. The first event is the reprogramming of and modifications to the project carried out in 2015. The second one is the incorporation of outputs and goals derived from the Environmental Program for Disaster Risk Management and Climate Change (PAGRICC, in Spanish), which accounts for the GoN's match. The third one is the additional year for grant agreement execution, which delayed the project's closing date by February 2018.

69. *Reprogramming and modifications to the project.* In April 2015, the project was reformulated due to the following events: (i) ENEL's PEU's technical review of each component, and (ii) the interim evaluation report completed in March 2015.

70. This reformulation was agreed upon between ENEL's PEU and the co-executing institutions (INAFOR, MARENA, ANA, ENEL), and was not objected by IDB[9]. The most recurring changes in this 2015 reformulation have to do with an increase in the goals for Component 2 output indicators, especially those related to the establishment and improvement of the environmental restoration systems (ERS).

71. Other proposed and, subsequently, approved changes include renaming indicators, modifying deadlines, and merging output indicators related to training. Below are the changes for each project component in detail.

a) Component 1. Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management.

   (i) *Deadline for Output 3 was changed from 2014 to 2015.* Output 3, "Personnel trained in surveillance techniques, reporting, and carbon content verification," was originally expected to be completed by 2014. However, given the fact that this output was contingent on the completion and installation of the Carbon Monitoring System (CMS), it had to be pushed back to 2016.

   (ii) *The name for Output 5's indicator was changed.* Initially, Output 5 was "Reference Study of the Evaluation of Water Reservoirs, Water Discharges, Sediment Concentrations and Waterflow into Streams." After the evaluation by ENEL's PEU, it was concluded that the name did not reflect what the output was about. As a result, it was changed to "Water Reference Study (bathymetry, water balance, waterflows, and sedimentation) for Lake Apanás and Lake Asturias created."

   (iii) *The name for Output 6's indicator was changed.* The original name of Output 5 was "Soil Utilization and Integrated Management Plan for the Lake Apanás Watershed," which was expected to be completed by the second year of the project. However, this output had already been completed even before project started because ENEL hired in July 2018 a consulting team that drew up the "Study on Environmental Territorial Reordering and Management of the Lake Apanás and Lake Asturias watershed," which could have been used to meet this indicator. Despite the fact that this study was created, it was never officialized, so it was not adopted as a working tool by the co-executing institutions. Because of this, the indicator was renamed "Integrated Watershed Management Plan for Lake Apanás adopted." It is important to highlight that, prior to its adoption, the plan required to: (i) update ENEL's study, and (ii) add the new micro-watersheds.

   (iv) *The name and goal for Output 8's indicator were changed.* According to the original outcome table, the Output 8 indicator was "Watershed committee members trained in watershed management tools." ENEL's PEU changed the name to "Watershed committee members undergoing continued training in watershed management," and the goal is to train 50 members.

[9] The reformulation and modification proposal was submitted to the IDB on April 10, 2015 and the Bank issued a 'no objection' communication (CID/CDNI/1175/2015) on April 15, 2015.

b) Component 2: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration.

72. The main changes for Component 2 are: (i) modifying physical goals for outputs 1, 2, 3, 4, 5, 8, 9, and 12; (ii) renaming Output 6, and (iii) merging indicators 7 and 11.

(i) *Modifying physical goals for output indicators.* Project reformulation focused primarily on modifying the project's tangible goals. The main reason for this modification had to do with the little or inexistent interest by some of the actors in the environmental restoration systems (ERS)—gallery forests and live fences around vegetables and other crops.

Due to the lack of interest by project actors, the following actions were implemented: (i) the gallery forests system was replaced with the natural regeneration management system, and the goal was set at 490 ha; (ii) the live fences system around crops was replaced with fruit plantations, and the goal was set at 50 ha; (iii) the indicator of vegetables under conservation practices was removed; and (iv) the goals for agroforestry systems (AFS), eco-forestry coffee (EFC), and silvopastoral systems (SPS) rose due to said system changes as shown in **Table 4.**

**Table 4**
**Original and reformulated project goals (in ha)**

| Output indicator | Original goal | Reformulated goal | Change |
|---|---|---|---|
| 2.1 Agroforestry systems (AFS) | 363.0 | 685.0 | Goal was increased |
| 2.2 Shade-grown eco-forestry coffee (EFC) | 50.0 | 217.0 | Goal was increased |
| 2.3 Gallery forests (previous)<br>Natural regeneration system (new) | 511.0 | 490.0 | Change of indicator |
| 2.4 Silvopastoral systems (SPS) | 821.0 | 1,065.0 | Goal was increased |
| 2.5 Industrial plantation forests (IPF) | 150.0 | 150.0 | - |
| 2.8 Live fences | 300.0 | 41.0 | Goal was decreased |
| 2.9 Live fences around crops (previous); fruit plantations (new) | 200.0 | 50.0 | Goal was decreased |
| 2.10 Vegetable plantations where soil and water resource conservation practices are implemented | 40.0 | | Indicator was removed |
| Total | 2,435.0 | 2,698.0 | |

*Source: Project's reformulation and modification proposal - 2015.*

(ii) *The name for Output 6's indicator was changed.* Originally, Output 6 was "Sustainable reordering plans," which was changed to "Farm plan" because the scope for Component 2 included the creation of farm plans and not forest reordering plans.

(iii) *Outputs 7 and 11 were merged.* The indicator for Output 7, "Communities trained in business plan formulation, sustainable forest reordering, and wood value chains," was merged with the one for Output 11, "Local farmers trained in sustainable forest exploitation," for the following reasons: (a) the effort was focused on individuals, not in communities; (b) training topics are not directly focused on project activities; for example, when dealing with value chains, a relationship must be established with

plantation forests whose owners are individuals; and (c) there is no communal ownership of the land because properties are privately owned.

c) Component 3. Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.

73. Two types of changes were made to this component: (i) change of goals, and (ii) change of indicator name:

(i) *The goal for Output 1's indicator was changed.* Initially, the goal for Output 1, "Management plans for private nature reserves," was to develop 25 plans. However, MARENA requested ENEL's PEU to add the 13 farms that had just been declared PNRs by the project, which rose to 38 the number of plans to develop.

(ii) *The name for Output 6's indicator was changed.* It was suggested that the name "Ecotourist accommodation facilities installed and operating" should be changed to "ecotourist sighting points established." The indicator goal was set to 25 sighting points, as the allocated amounts or budgets to develop tourist accommodations were not sufficient.

74. **Execution of PAGRICC in project areas.** PAGRICC was executed by MARENA in coordination with nine municipalities of two micro-watersheds that make up the San Juan River (Lake Apanás and Viejo River micro-watersheds). It was financed by the GoN through a US$10-million loan from IDB in combination with the local match contribution of US$0.4 million, the financing by the Swiss Agency for Development and Cooperation for US$ 3.1 million, and the contribution by the Nordic Development Fund for US$3 million. PAGRICC sought to reduce the vulnerability to climate change-related phenomena of rural populations in Nicaragua by implementing these three components: (i) support for the adoption of environmental restoration systems, (ii) infrastructure to reduce losses caused by disasters, and (iii) capacity building.

75. PAGRICC promoted, similar to the project, the establishment of environmental restoration systems—agroforestry systems, silvopastoral systems, eco-forestry coffee, power plants, forest management, natural regeneration management, and industrial plants—and each system included a list of five-to-six sustainable conservation practices. The project seeks to foster biodiversity conservation and climate change mitigation in the Apanás watershed. Because of this, it adopted some PAGRICC goals during the project's reformulation and modification phase. This adoption is deeded part of MARENA's contribution to the project in order to ultimately benefit the watershed, as shown in the following table.

**Table 5.**
**Incorporation of PAGRICC as a contribution to the Apanás watershed**

| Output indicators | 2010 baseline | Reformulated goals GEF 2015 | PAGRICC 2015 | Expected goal 2015 |
|---|---|---|---|---|
| 2.1 Agroforestry systems (AFS) | 0.0 | 685.0 | 2,835.0 | 3,520.0 |
| 2.2 Shade-grown eco-forestry coffee (EFC) | 0.0 | 217.0 | 559.0 | 776.0 |
| Natural regeneration system (NRS) | 1,152.8 | 490.0 | 0.0 | 1,642.8 |
| 2.4 Silvopastoral systems (SPS) | 2,104.4 | 1,065.0 | 3,062.0 | 6,231.4 |
| 2.5 Industrial plantation forests (IPF) | 68.6 | 150.0 | 522.0 | 740.6 |
| 2.8 Live fences | 0.0 | 41.0 | 0.0 | 41.0 |
| 2.9 Fruit plantations | 0.0 | 50.0 | 0.0 | 50.0 |
| Total | 3,325.8 | 2,698.0 | 6978.0 | 13,001.8 |

*Source: Project's reformulation and modification proposal - 2015.*

76. It should be noted that PAGRICC did not have any interventions in the project when the grant agreement was approved.

77. **Extension of the grant agreement term.** Initially, project completion was scheduled for February 2017. However, on June 10, 2016, the IDB extended project execution by 12 months in order to achieve the desired implementation and operating of the PES fund. Finally, all these changes were added to the project outcome table and to IDB’s PMR. A summary of changes made following the Bank's methodology are shown below in **Table 6**.

## Table 6. Table of Changes to the Project

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| **Component 1:** Strengthening of institutional structures and planning capacities for project management.<br><br>**Output 3:** Eleven technicians trained in surveillance, reporting, and carbon content verification techniques through technical assistance provided by hired specialist and technicians. | Rescheduling of indicator's deadline | Deadline for Output 3 was changed from 2014 to 2015. | 0 | 11 | 11 | The deadline was pushed back because this output was contingent on the completion and installation of the Carbon Monitoring System (CMS), which was completed in the first quarter of 2015. | 4/10/2015 | 4/15/2015 |
| **Component 1:** Strengthening of institutional structures and planning capacities for project management.<br><br>**Output 5:** Reference study of water surface elevation, water discharges, sediment concentration, and streamflow. | Indicator's name changed | Output 5 was renamed "Water Reference Study (bathymetry, water balance, waterflows, and sedimentation) for Lake Apanás and Lake Asturias created." | 0 | 1 | 1 | The previous name did not reflect what this output intended to develop. As a result, renaming the output was proposed and approved. | 4/10/2015 | 4/15/2015 |
| **Component 1:** Strengthening of institutional structures and local land use planning capacities, soil | Indicator's name changed | Output 6 was renamed "Adopted reordering and integrated | - | 1 | 1 | This output was completed before the project started because, in July 2018, ENEL hired a consulting team to | 4/10/2015 | 4/15/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| conservation practices, and integrated watershed management.<br><br>**Output 6:**<br>Land-use and integrated management plan for the Lake Apanás watershed. | | management plan for the Lake Apanás Watershed." | | | | draft the "Study on Environmental Territorial Reordering and Management of the Lake Apanás and Lake Asturias watershed."<br><br>However, this study was never officialized, so it was not adopted as a working tool by the co-executing institutions. This is why the indicator was renamed.<br><br>It is important to highlight that, prior to its adoption, the plan required to: (i) update ENEL's study, and (ii) add the new micro-watersheds. | | |
| **Component 1:**<br>Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management.<br><br>**Output 8:**<br>Watershed committee members trained in watershed management tools. | Indicator's name changed<br><br>Goal adjustment for this indicator. | The output was renamed "Watershed committee members undergoing continued training in watershed management."<br><br>Also, the goal was set to 50 members trained. | 0 | 30 | 50 | It was suggested to change the goal for this indicator to 50 members trained. It was suggested to change the output's name to "Watershed committee members undergoing continued training in watershed management." However, during PMR reformulation, 12 people were added to the revised goal. | 4/10/2015 | 4/15/2015 |
| **Component 2:** | Goal adjustment | The goal for this | 0 | 363 | 685 | This output's goals were | 4/10/2015 | 4/15/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| Application of sustainable land- and forested-area reordering practices.<br><br>**Output 1:**<br>Three hundred sixty-three hectares of agroforestry systems established. | for this indicator. | indicator went from 363 to 685 ha of crops where agroforestry systems are established. | | | | increased due to resource reallocation and physical goals, and the little or inexistent interest by the actors in other systems, such as gallery forests and live fences around vegetables and other crops. | | |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 2:**<br>Fifty hectares of eco-forestry coffee established with restored shade. | Goal adjustment for this indicator. | Output goal for this indicator went from 50 to 217. | 0 | 50 | 217 | This output's goals were increased due to resource reallocation and physical goals, and the little or inexistent interest by the actors in other systems, such as gallery forests and live fences around vegetables and other crops. | 4/10/2015 | 4/15/2015 |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 3:**<br>Five hundred and eleven hectares of gallery forests established. | Change of indicator | The output was redefined to natural regeneration management and the goal was set at 490 ha.<br><br>According to the baseline, the goal went from 1,663.8 to 1,642.8 ha. | 1152.8 | 1,663.8 | 1,642.8 | The original goal was to increase forested areas under environmental regeneration system to 511 ha. But, (vegetable) farmers in the river areas did not show any interest. As a result, the project opted for establishing a "Natural regeneration system area (out of the private reserves)." | 4/10/2015 | 4/15/2015 |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering | Goal adjustment for this indicator. | The goal for this indicator was changed from 821 | 2,104.4 | 2,925.4 | 3,169.4 | This output's goals were increased due to resource reallocation and physical goals, | 4/10/2015 | 4/15/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| practices.<br><br>**Output 4:**<br>821 ha of silvopastoral systems established. | | to 1,065 ha established under SPS.<br><br>According to the baseline, the project goal went from 2,925.4 to 3,169.4. | | | | and the little or inexistent interest by the actors in other systems, such as gallery forests and live fences around vegetables and other crops. | | |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 6:**<br>Sustainable forest reordering plans | Indicator's name changed | The output was renamed "Farm plans" | 0 | 60 | 60 | Output name modification was reviewed and approved because the scope for Component 2 included the creation of farm plans, not forest reordering plans. | 4/10/2015 | 4/15/2015 |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 7:**<br>Five communities trained in business plan formulation, sustainable forest reordering, and wood value chains.<br><br>**Output 11:** Five communities trained in business plan formulation, sustainable forest reordering, and wood value | The outputs were merged and Output 7 was removed. | Outputs 7 and 11 were merged. | 0 | 5 | - | This output was merged with Output 11 for the following reasons:<br><br>- The effort was focused on individuals, not communities.<br><br>- Training topics are not targeting project activities directly. For example, when dealing with value chains, a relationship must be established with plantation forests whose owners are individuals. | 4/10/2015 | 4/15/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| chains. | | | | | | - There is no communal ownership of the land because properties are privately owned. | | |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 8:**<br>Three hundred hectares of live fences established. | Goal adjustment for this indicator. | The goal was decreased from 300 to 41 ha of established live fences. | 0 | 300 | 41 | The goal was lowered because beneficiary farmers have productive units reduced in size. They expressed they would compromise farming land if they were to establish such a system.<br><br>The remaining funds, originally allocated to this output, were redirected to expand forest conservation areas using the various environmental restoration systems (ERS) implemented by the project in the area. | 4/10/2015 | 4/15/2015 |
| **Component 2:**<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 9:**<br>Hectares of live fences around crops. | Change of indicator | The system was changed to fruit plantations | 0 | 200 | 50 | INAFOR recommended to add subsistence smallholders with one hectare in order to establish fruit plantations in their plots as part of the promotion of expanded forest cover in the farms. | 4/10/2015 | 4/15/2015 |
| **Component 2:** | Output indicator | Output indicator | - | 40 | - | There was little interest from | 4/10/2015 | 4/15/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| Application of sustainable land- and forested-area reordering practices.<br><br>**Output 10:**<br>Areas of vegetable plots where soil and water resource conservation practices are implemented. | was removed. | was removed.<br><br>Resources originally allocated to Output 10 were transferred to other ERSs. | | | | vegetable farmers and the technological package was too expensive.<br><br>As a result, the resources originally allocated to this output were redirected to fund these environmental restoration systems (ERS): eco-forestry coffee, silvopastoral systems, and plantation forests. | | |
| Component 2:<br>Application of sustainable land- and forested-area reordering practices.<br><br>**Output 11:** Five communities trained in business plan formulation, sustainable forest reordering, and wood value chains. | Output merging | Outputs 7 and 11 were merged.<br><br>The goal of five communities trained was changed to 150 persons trained. | 0 | 5 | 150 | Output 11 was merged with Output 7 (see reasons for this change in **Output 7**). | 4/10/2015 | 4/15/2015 |
| **Component 3:**<br>Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.<br><br>**Output 1:**<br>Management plans for private nature reserves | Goal adjustment for this indicator. | The goal for this indicator was changed from 25 to 38 plans. | 6 | 25 | 38 | MARENA requested ENEL's PEU to add the 13 farms to the original goal for Output 13. These farms had just been declared PNR within GEF's Watershed Project framework. | 11/16/2015 | 11/17/2015 |

| Portions of the outcome table where changes took place | Name of the change | Type of change | Baseline | Original goal | Formally revised goal | Reason for change | Date when change was made | Date agreed upon with implementing agency |
|---|---|---|---|---|---|---|---|---|
| **Component 3:**<br>Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.<br><br>**Output 5:**<br>Ecotourist accommodation facilities built. | Indicator's name changed | The output's name was changed to "ecotourist sighting points." | 0 | 25 | 35 | It was suggested that the name "Ecotourist accommodation facilities installed and operating" should be changed to "ecotourist sighting points established." The indicator goal was set to 25 sighting points. | 4/10/2015 | 4/15/2015 |

## 2.13 Barriers to project design and execution

78. This section covers the major barriers to project design and execution. It is important to note that these barriers were identified through: (i) technical meetings with the organizations involved in project execution; (ii) results derived from the SWOT Workshop held on August 20, 2018, which intended to asses—in a participatory way—institutional performance and management effectiveness in the execution of the project "Integrated Watershed Management in Lake Apanás and Lake Asturias (GRT/FM-12993-NI)" whose report is presented in Annex 2; (iii) the Report on the Evaluation of the Level of Participation and Ownership by Stakeholders And Local/Municipal Institutions, which was created based on the field visits made on 3-7 September, 2018 and is shown in Annex 3[10]; and (iv) the analysis carried out by the consultant on the basis of the documentation of the project.

a. Barriers to project design and preparation

79. *Overestimating level of interest by the largest landowners.* CABAL, S.A. conducted a study to be used for project preparation and created a design proposal for the payment for environmental services (PES) mechanism. They estimated that PES beneficiaries should be represented by landowners with forested areas larger than 20 ha. Therefore, projections set the best scenario at 700 ha of plantation forests and 2,000 ha of natural forest. The first year would start off with the private nature reserves (PNR)—four already existing within the watershed and declared as such by the project, together with other properties already identified with potential to become PNRs. This scenario was included in the scope of the project. The goal was to sign 75 contracts, thereby incorporating 2,822 ha into the systems under the assumption that PSA beneficiaries or actors own significant extensions of land in three micro-watersheds—San Gabriel, Cuyalí (Corinto Finca), and the Sisle River. In retrospect, CABAL, S.A.'s study established that landowners were willing to adopt the mechanism. But ENEL's PEU pointed out that, during project execution, the same landowners did not show any interest in it. As a result, a decision was made to expand it to actors owning properties of 1-3 manzanas on average, across 11 micro-watersheds. This resulted in only 722.6 hectares being incorporated into the PES mechanism at project closeout—a number lower than expected—despite the fact that the goal 'number of contracts' was exceeded.

80. *Lack of a sequential analysis of activities on the Project Execution Plan.* The design of the Project Execution Plan (PEP) did not provide for a comprehensive analysis of the activities in order to identify procurement and commissioning processes to be executed in a sequential fashion. This resulted in some activities being delayed in 2013, such as (i) the procurement of Musaceae stumps for the establishment of agroforestry systems because the farm management plans had to be drafted beforehand; and the trainings for business plan formulation and sustainable forest reordering that same year because, before holding these trainings, a search for beneficiaries and a requirement revision had to be carried out for each system to be established. At least six additional months were required to correct identified issues and start developing and executing the expected outputs.

81. *Procurement Plan's non holistic approach.* The Project Procurement Plan (PP), upon grant award, should have been designed with a holistic approach, especially for bidding processes that would be carried out over the five years of project execution. This would have allowed optimal resource and time planning as required by each bidding process. The PP provided for

[10] This workshop was held with the participation of key participating institutions, especially the members of the PEU and officials from INAFOR and MARENA, in order to collect feedback and learn about the risks and lessons learned. This event proved successful, as it made it possible to assess outcomes and potential risks for future projects.

an 18-month timeline (medium term) and it did not include a thorough preliminary analysis on the procurement methods taking into account the operational context of the project. As a consequence, this resulted in modifications and annual updates. The plan underwent 33 updates in less than six years, thereby incorporating 124 new processes and cancelling 85. Among these processes there were the hiring of individual consultants and firms, execution of national bidding processes to purchase goods and commission works in 2013. This significant number of updates to the PP also owed to the executing learning curve of the implementing agency, as it had to purchase plant materials, with which the agency was not familiar. Updates to the PP resulted in additional time to carry out processes and the corresponding execution plans, as well as planning, evaluation, and approval by IDB. **Annex 4** shows an analysis of procurement and commissioning processes carried out.

82. *Adding a Communications and Awareness Campaigning Plan.* This plan is aimed at ensuring effective project planning and management, which is to be organized with a cross-cutting perspective and should allow integral execution of this plan. This includes the components and its respective awareness campaigns for the potential beneficiaries. This will facilitate understanding among involved actors, optimize the management of human and financial resources related to project activities, and enhance participation and support at the local level.

83. *Actors' little or no interest in some environmental restoration systems.* Potential beneficiaries and farmers should be identified, together with their interests and capacities, prior to project execution. This will improve watershed management and make the project successful. Initially, CABAL, S.A.'s study suggested to prioritize those properties with natural forest areas larger than 20 ha. In 2014, no farmer applied to the gallery forests program because the level of acceptance was not favorable for this type of system by the actors, mainly due to profitability issues. This resulted in the goal about 'implementing some environmental restoration systems (ERS)' being reformulated and other being added. This required subsequent studies which delayed the execution of processes related to ERS implementation.

b. External barriers to the project

84. *Regional weather phenomena.* The irregular rainy season—due to the intensification of El Niño—delayed the establishment of the ERS. These had to be scheduled for 2015 because of the prolonged absence of rainfall and as a mitigation strategy. Activities related to establishing ERS were put on hold and resumed in the first semester of 2016. Meanwhile progress was made in the processes prior to execution, such as the procurement of plant materials and technical assistance for actors on risk management and best environmental practices. As a result, project execution was delayed by six to nine months.

85. *Lack of specialists in strategic areas.* The project required the co-executing institutions to have specialists in strategic areas during its execution. As a result of the lack of experts, in 2013, the construction of four dykes was put on hold for six months because INAFOR they did not have the necessary experience in gabion structure design. Likewise, in 2014, there were difficulties in coordinating infrastructure engineering for biodiversity exploitation and conservation by MARENA due to its complexity. As a result, delivery of Component 2 outputs was rescheduled for the subsequent year.

c. Barriers faced by the management

86. *Delays in project execution during the first two years.* In March 2015, the IEI was carried out in order to evaluate and review achievements for the first three years of project execution,

analyze the potential impact and sustainability of outcomes, and propose the necessary modifications and changes to improve project performance for that year to ultimately achieve the desired outcomes. The evaluation identified the existence of good interinstitutional coordination and territorial management among co-executing institutions, as well as the intention to incorporate other geographic areas into the project. Also, the IEI identified some institutional weaknesses. Among these are ANA's staff turnover and low participation during the first years, financial issues in processing payments to vendors, and the lack of information about local match disbursements. The IEI pointed out there was limited progress made toward the components, and the fact that the outputs were in critical condition. It should be noted that the report showed the needed solutions to improve project performance. In other words, the IEI recommendations were drawn upon by the ENEL’s PEU team and, as a result, the delays were delays for that year were overcome and the proposed objectives were reached.

87. *High staff turnover in PEU and co-executing institutions.* Stability within the project's working team (ENEL's PEU) is essential for correct process development and operations, and for adequate performance of organizational roles during project execution. In the 2012-2014 period, high specialized staff’s turnover was made evident at PEU and the other co-executing institutions, particularly, at the intermediate organizational level. Moreover, in 2014, the PEU was restructured, thus adding new members to the unit. This resulted in the loss of continuity and a delay in the deadlines for process execution mainly because the new officials had to be trained in their respective areas and updated on the progress on project execution made to date.

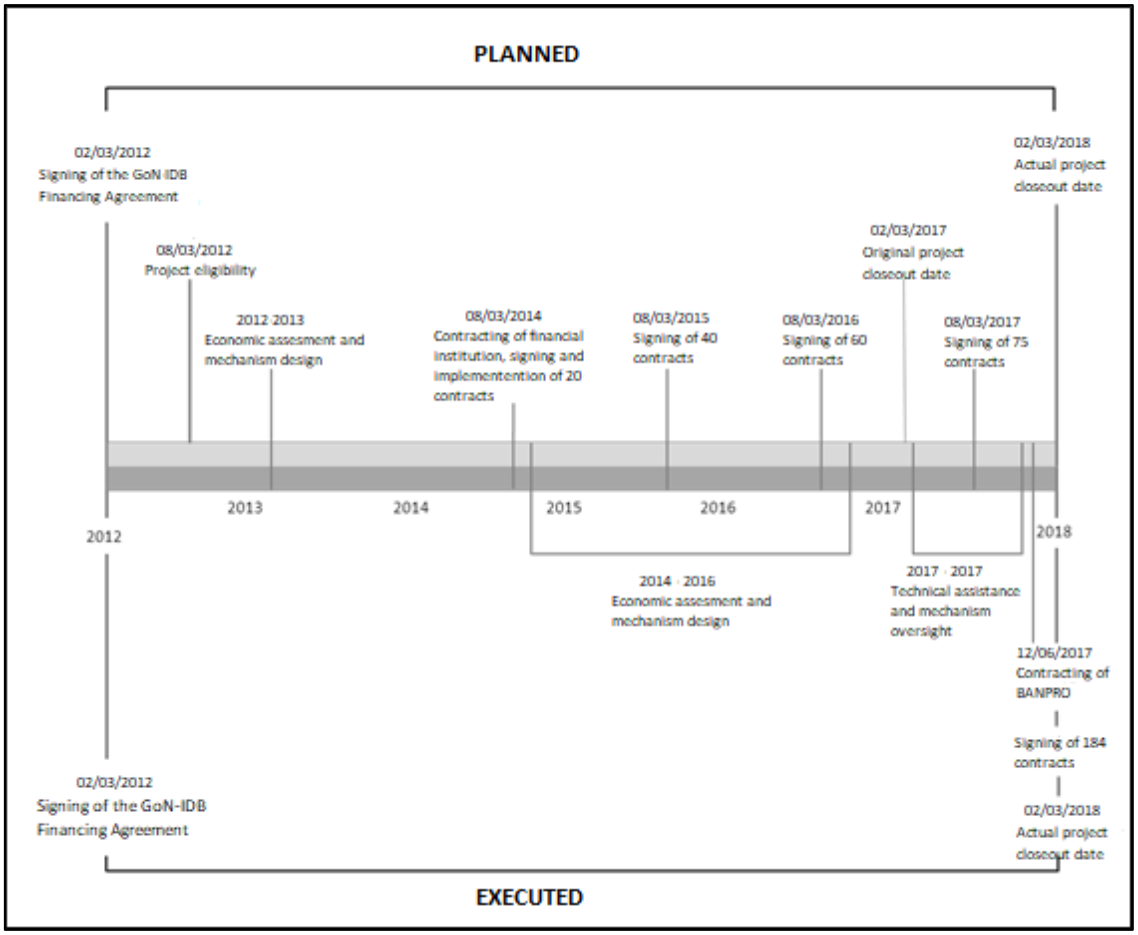
88. *Delays in output approval by co-executing institutions due to staff turnover.* Some project activities were delayed because the co-executing institutions had not approved the terms of reference, outputs or the completed studies. In 2014, the approval of the “Assessment, Design, and Development of the Cadaster Information System” and the “Design and Development of the Carbon Monitoring System” was overdue. As a consequence, three activities were delayed: (i) the creation of the Carbon Monitoring System, (ii) knowledge transfer to co-executing institutions’ technicians, and lastly, (iii) technical audit to the system. Additionally, during the first semester of 2015 there were delays related to the review of the terms of reference for contracting new consulting services and for setting the technical specifications by MARENA. This delayed bidding processes for work procurement, which had to be pushed back to the second semester of 2015.

89. *Delays due to the termination of the CIAT contract.* The termination of the contract signed with CIAT resulted in additional delays, as they bidding processes had to be started again. In 2016, the sediment related activity contained in the “Water Reference Study” was not carried out because CIAT was to create this study but the contracting process was not completed due to differences in the contract negotiation. Therefore, the terms of reference as well as the objectives of the consulting service had to be redefined, and, six months later, the process had to be restarted. As a result of this new proc, the National Agrarian University (UNA, in Spanish) was selected on October 24, 2017, which delayed the delivery of this activity and of Output 5, “Water Reference Study.”

90. *Delays in the implementation of the payment for environmental services (PES) mechanism.* The PES mechanism was implemented and is operating, but its design process took longer than expected. As seen in **Figure 1**, the original design process and the economic feasibility had to be completed in approximately one year—as per the agreement—so that the PES mechanism would start operations in Year 2, i.e., 2014 (see planned actions). But, since there was a number of processes in place to ensure its implementation, the mechanism started off

successfully by signing the first 184 contracts with actors. This represented an area of 722.6 ha under this mechanism for conservation of forested areas.

**Figure 1. PES mechanism implementation scheme**




*Source: Project Outcome Table*

91. *The creation and execution of the PES mechanism took four years and six months.* The delay was mainly brought on by: (i) delays in contracting specialists to join the project team in the first years; (ii) the duration of the bidding process and the TECNIC consulting service in 2013 to assess the economic feasibility of the mechanism and other instruments; the process took 136 to be completed (original timeline was 87 days) and the consulting service took two years to be completed; (iii) contracting an additional consulting services to improve and complement TECNIC products, provide technical assistance to create and strengthen the Project Technical Unit (PTU), oversee the implementation of the PES mechanism; the bidding process was completed in six months (original timeline was 21 days) and the consulting services by the Tropical Agricultural Research and Higher Education Center (CATIE, in Spanish) required another seven months to complete; (iv) the contract for consulting services was extended by another month in order to create a proposal for selecting offerors for the ERS and PNRs, which were delayed due to the review of delivered outputs. These factors did not make the design and initial execution plan to be completed and significantly delayed project activities. The mechanism, which had to be designed in one year and implemented in four, was designed in three years and only one year was left for instrument development (December 2017) and three months for execution.

92. *ENEL's PEU leadership throughout project execution.* A positive aspect or a strength of the project was the leadership role ENEL’s PEU undertook to manage the project. Their capacity to delegate tasks, coordinate efforts with other co-executing institutions, and the creation of strategic partnerships, together with their ability to understand and solve problems during project execution made it possible for them to overcome initial weaknesses that posed a threat to achieving expected outputs and outcomes.

## CHAPTER 3. CORE CRITERIA. Project Objective

### 3.1. Significance of the Outcomes

a. Significance of Project Objectives, Design, and Implementation

93. The project, including its objectives, components, institutional framework, instruments, and mechanisms—i.e., the payment for environmental services mechanism—were relevant for the GoN, ENEL, IDB, and GEF because it was aligned with their technical assistance strategies and priorities/policies. Environmental degradation is a factor that hinders economic growth and social welfare. Deforestation and loss of biodiversity are phenomena that have a significant impact on the environmental sustainability of Nicaragua. In fact, since the grant award date, the significance of this project continues to grow exponentially. The need for mitigating the frequency and severity of weather events became an important issue in the policies of the Government of Nicaragua, especially because of the farmers being affected by climate change effects in the Lake Apanás and Lake Asturias watershed.

94. The following sections show how project objectives and components meet the needs of the country and fit into the strategies of IDB in Nicaragua. This includes the analysis of the vertical logic, and an explanation of the links between project outputs, outcomes, and impacts, and their cohesiveness.

b. Alignment with the country's needs for development.

95. Nicaragua is one of the countries that is most vulnerable to climate change effects, which cause damage and losses mainly to the most vulnerable populations, the poor, and the indigenous communities. The project seeks to promote biodiversity conservation and climate change mitigation in the Lake Apanás and Lake Asturias watershed, which is strategically aligned with IDB's institutional strategy GN-2299. The project supports vulnerability to natural disasters mitigation efforts and strengthening institutional capacity for disaster prevention management and search of alternative sources of energy.

96. The project supported the actors—small-scale farmers—by providing adequate environmental restoration systems and technical training for sustainable land reordering in the 11 most vulnerable micro-watersheds in the municipalities of Jinotega and San Rafael del Norte, thus improving the productivity in their farms.

97. The project is also strategically aligned with climate change and environmental sustainability, which is made evident by the rise in the number of PNRs in the intervention areas due to mitigation and adaptation efforts. It is also reflected by the adoption of ERS, as per Outcome 1 indicator, as a result of adaptation to climate change efforts. Another piece of evidence is the rise in the number of people protected by mitigation works as per indicators of outcomes 2, 3, and 4, thus preventing (sequestrating) the direct emission of tons of carbon dioxide equivalent, reducing annual sediments going into the micro-watersheds, and promoting the implementation of sustainable land and forest management practices in many hectares of forest.

98. Furthermore, the project designed, implemented, and piloted the PES mechanism in order to protect and preserve a number of forest hectares under a compensation mechanism. By increasing forest cover, sedimentation and erosion can be reduced as a result of various conservation activities the project promoted to ensure waterflow for power generation. The

PES mechanism will continue operating after project closeout, until 2021, and it is expected that ENEL, the GoN, and other donors will continue to support it, thus ensuring conservation and protection of the water resources in the watershed in the mid- and long-term.

c. Vertical logic

99. Below is an analysis of the project's vertical logic assessing how valid the relationship between its outputs and outcomes is, as well as how consistent and relevant project development goals are. Project's vertical logic is shown in **Figure 2**.

100. It should be noted that original outcome table from the grant agreement, as presented in Annex 1, captured the general logic of the project and was based on existing evidence that the interventions promoted by the project are among the most efficient approaches for this kind of project.

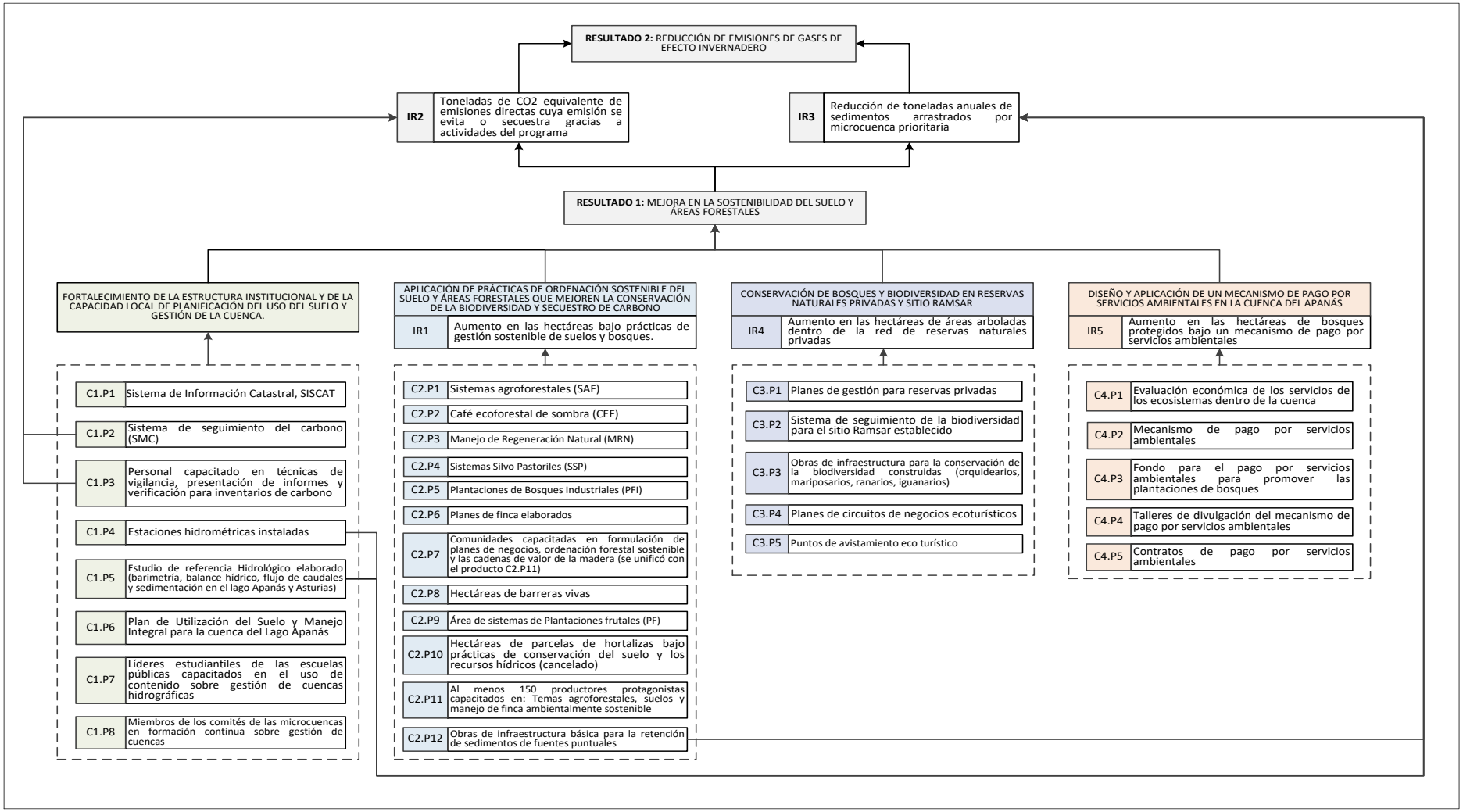
101. Various environmental operations performed by IDB in Nicaragua have proven successful, especially soil and forested area conservation measures, and capacity building for local resource managers. The assessment of such operations shows that measures such as technology transfer and capacity building activities for farmers and farmer administrators are efficient in attaining conservation objectives.

102. However, little adjustments were necessary to better show the project's causal chain. In order to do so, two outcomes, which were implicit in the project objective, were included because they were critical for understanding the project's logic and sequence. The first outcome is “Improving sustainability of land and forested areas” and the second one is “Reducing greenhouse gas emissions.” Project was meant to be executed through four components that are technically and operationally interrelated. If implemented correctly, they would contribute to improving land and forested areas’ sustainability, thus ensuring GHG carbon dioxide equivalent sequestration and decrease in sediments dragged into the watershed through runoff.

103. Component 1 financed activities aimed at increasing management skills of the local authorities, farmers, and farm owners at the watershed level by: (i) implementing a Cadaster Information System (SISCAT); (ii) designing a Carbon Monitoring System (CMS); (iii) training staff in carbon surveillance techniques; (iv) installing hydrometer units; (v) creating hydrologic studies in the Apanás sub-watershed; (vi) implementing a land use plan; (vii) training student leaders, and (viii) creating and training micro-watershed committees.

104. As expected during the design phase, the cause-effect ratio made it possible for all these instruments to strengthen the institutional structure and the local capacity for land-use planning and management by the municipalities by means of the cadaster systems. This improved the tools for local land-use management and promoted sustainable practices of land and forested areas management, which in turn allowed, together with other project components, to reduce greenhouse gas emissions.

## Figure 2. Project's vertical logic



105. However, it is important to point out that, while micro-watershed committees were organized and established within a legal framework with clear roles to carry out the activities, their interaction with other local actors to coordinate and develop management activities in the watershed was a challenge.

106. The vertical logic of Component 2, like the previous component, was achieved. The establishment and improvement of environmental restoration systems managed to increase the number of hectares under sustainable land-use and forest management to 6,148.8, which is Outcome 1 indicator, thus helping to: (i) improve land and forested areas sustainability; (ii) prevent the release of or capture direct carbon dioxide equivalent emissions; and (iii) reduce sedimentation in the basin.

107. At first, the attainment of the vertical logic for Component 2 was affected by the little interest of actors in some ERS that were previously defined. This barrier was overcome rather quickly by replacing the previous ERS and incorporating 11 new micro-watersheds.

108. The cause-effect relationships that were implicit in Component 3's vertical logic made the attainment of this component possible. The established outputs made it possible to attain tangible outcomes, such as the addition of 1,393.42 ha of forested areas to the National Network of Private Nature Reserves (PNR), Outcome 4 indicator (O4 I). This helped improve land sustainability and reduce greenhouse gas emissions.

109. Moreover, breeding centers for the most important species were created, trainings were held for tourist guides in the project area, and a biodiversity monitoring system was implemented for the Ramsar site specials, all of which helped strengthen MARENA's overall management.

110. The activities for Component 4, "Design and implementation of the payment for environmental services (PES) mechanism in the Apanás Watershed," sought to establish this mechanism in order to ensure long-term the sustainability of components 2 and 3.

111. The PES mechanism began operations in February 2017. Its original design established that a total of 2,822 ha would be gradually integrated under this mechanism. But with the signing of 75 contracts over the course of the four years of implementation. And the contribution of each component's outputs, the goals set in during the design were exceeded as shown below:

(i) O1 I: Raise the number of hectares where sustainable soil and forest management practices are carried out by 6,148.8.

(ii) O4 I: Add 1,393.42 hectares of forested land to the National Network of Private Nature Reserves.

(iii) O5 I: Raise the number of hectares of protected forests under the payment for environmental services mechanism by 722.6 (1,011.66 mz).

(iv) O2 I: capture 893,256 $tCO_2e$ from greenhouse gas emissions.

(v) O3 I: reduce 23,573,137.00 tons of sediments being transported into the watershed.

## 3.2. Effectiveness

a. Evaluation of the project's general objectives

112. The general objective of this project is to promote biodiversity conservation and climate change mitigation in the Apanás-Asturias watershed by: (i) applying sustainable restructuring activities for land use and forest areas in order to increase carbon sequestration in the forests, reduce greenhouse gas emissions, and protect fragile ecosystems, and (ii) designing and piloting a payment for environmental services (PES) mechanism for farmers and owners of private nature reserves, which will be funded with the income from payments received for using water resources to generate hydroelectric power in this watershed.

**Objective 1: Apply sustainable land-use restructuring and forestry management practices in order to increase carbon sequestration in forests, reduce greenhouse gas emissions, and protect fragile ecosystems.**

Rating: Very satisfactory

113. This objective was attained **very satisfactorily** through these outcomes: (i) sustainable land use and forested areas reordering, which raised to 6,148.8 the number of hectares under sustainable management practices, and (ii) forest conservation in the National Network of Private Nature Reserves (PNR) by incorporating 1,393.42 ha of forest into this network.

114. As a result, those outcomes made it possible to (i) improve the sustainability of lands and forested areas, (ii) capture a total of 893,256 tons of direct carbon dioxide equivalent emissions, and (iii) prevent 23,573,137 tons of sediments from being transported into Lake Apanás.

115. These results are shown in the project outcome table (see **Table 7**). Outcome indicators attained by the project are listed below along with the designated rating.

## Table 7. Table of reached outcomes as of February 2018

## REACHED OUTCOMES

| Indicator | Unit of measurement | Baseline value | Baseline year | Means of verification | Expected and actual goal | | |
|---|---|---|---|---|---|---|---|
| **Outcome: Improved sustainability of land use and forested areas** | | | | | | | |
| **Outcome 1 indicator:** Rise in the number of hectares where sustainable soil and forest management practices are carried out. | Hectares (ha) | 3,325.8 | 2010 | Attainment of indicators for outputs 2.1, 2.2, 2.3, 2.4, and 2.5, all of which are part of Component 2. | | IDB/GEF | PAGRICC |
| | | | | | Initial goal for 2018 | 5,220.8 | - |
| | | | | | Revised goal (2015) | 6,053.8 | 6,978.0 |
| | | | | | Reached goal as of February 2018 | 6,148.8 | 4,303.0 |
| **Reached:** 102%<br>**Comments:** The IDB-GEF project successfully applied sustainable land and forest management practices on 2,823 ha through environmental restoration services (ERS). This, in combination with the 2010 baseline number of 3,325.8 ha, translates in a total reach of 6,148.8 ha with ERS. Regarding the PAGRICC goals that accounted for local match, MARENA reported that agroforestry systems (AFS), eco-forestry coffee (EFC), natural regeneration management (NRM), silvopastoral systems (SPS), and industrial plantation forests (IPF) were established on 4,304.0 ha. | | | | | | | |
| **Outcome 4 indicator:** Increase the number of hectares of forest land within the network of private nature reserves (PNR). | Hectares (ha) | 170 | 2010 | Compliance with environmental management plans for the private nature reserves from Component 3. | Initial goal for 2018 | 1,170.0 | |
| | | | | | Revised goal (in 2015) | - | |
| | | | | | Reached goal as of February 2018 | 1,563.4 | |
| **Reached:** 134%<br>**Comments:** The project successfully added 1,563.42 ha of forested areas into the National Network of Protected Nature Reserves (NNPNR) by establishing 42 private nature reserves, exceeding the initial goal of 1,000 ha. In 2014, 25 areas were successfully declared PNRs (covering 991.26 ha) and, in 2014, 17 areas were declared PNRs (covering 402.16 ha). It should be pointed out that each PNR has a ministerial decree, a Quick Ecological Study, and an environmental management plan. | | | | | | | |
| **Outcome 5 indicator:** Rise in the number of hectares of protected forests incorporated into a payment for environmental services mechanism. | Hectares (ha) | 0 | 2010 | Report from the ANA's land-use monitoring system | Initial goal for 2018 | 2,822 | |
| | | | | | Revised goal (in 2015) | - | |
| | | | | | Reached goal as of February 2018 | 722.6 | |

| Indicator | Unit of measurement | Baseline value | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| **Reached:** 26%<br>**Comments:** According to the original design of the project, it was expected that 75 contracts would be signed, thus covering 2,822 ha of land. At closeout date, 184 contracts were signed, thus exceeding Output 4.5 (see Component 4), i.e., 75 contracts. On the other hand, the total area under the PES mechanism was just 722.6 ha (1,011.66 manzanas), which is 26% of the goal. | | | | | | |
| **Outcome: Decrease in greenhouse gas emissions and sediments** | | | | | | |
| **Outcome 2 indicator:** Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities. | Tons (ton) | 0 | 2010 | Tons of carbon dioxide tracked by the Carbon Monitoring System. | Initial goal for 2018 | 491,151 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 893,256 |
| **Reached:** 182%<br>**Comments:** The goal was exceeded. The amount of sequestered carbon dioxide in the areas with ERS in combination with the preserved forests was 893,256 $tCO_2$. Agroforestry systems, eco-forestry coffee, silvopastoral systems, plantation forests, and protected broadleaf forests in the PNR farms were established in 2,787 ha. This does not include natural regeneration management (NRM) areas, fruit plantations, or live fences. The amount of carbon that has been captured in the PAGRICC areas is not included. | | | | | | |
| **Outcome 3 indicator:** Annual decrease in sediments dragged through the priority micro-watershed. | % | 0 | 2013 | Agreement between ENEL and CIRA/UNAN<br>Agreement between ENEL and UNA<br>SWAT system reports | Initial goal for 2018 | 20.00 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 32.38 |
| **Reached:** 161.9%<br>**Comments:** In 2013, the baseline for the amount of sediments falling into Lake Apanás was calculated in 72,799,244. This calculation was made possible thanks to the agreements ENEL signed with UNA and CIRA UNAN, and to the implementation of the Soil and Water Assessment Tool (SWAT). According to calculations by CIRA/UNAN and UNA, the amount of sediments being transported into the lake were reduced down to 49,226,107 t/y in 2016, which means that the total amount of sediment was reduced by 23,573,137 t, equivalent to 32.38% of the 2013 amount. | | | | | | |

## OUTPUTS

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| Component 1. Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management. | | | | | | |
| 1.1 Cadaster Information System (SISCAT) | System | 0 | 2010 | SISCAT's technical report<br>Confirmation of SISCAT implementation | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** The goal was achieved. Cadaster units at the municipal offices of Jinotega and San Rafael del Norte apply the SISCAT during their annual planning when performing cadaster roles and territorial reordering in their respective municipalities. Moreover, an environmental reordering plan of the area, which was created by the project, was published and adopted by the municipal offices of Jinotega and San Rafael del Norte. | | | | | | |
| 1.2 Carbon Monitoring System (CMS) | System | 0 | 2010 | CMS reports | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** The design and development of the CMS was completed in the first semester of 2015. From the second semester of 2015, the system started operations and has been linked to (i) the socioeconomic data of the various land uses on 900 farms, and (ii) the data contained in the 365 records of the potential beneficiaries that were previously identified. The CMS already has the records of the various land uses of 11 micro-watersheds in the Apanás sub-watershed. This includes farms where ERSs and PNRs were established. | | | | | | |
| 1.3 Staff trained in surveillance techniques, reporting, and carbon content verification. | Individuals | 0 | 2010 | Training reports and participants reports | Initial goal for 2018 | 11 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 43 |
| **Reached:** 391%<br>**Comments:** The project trained 43 persons, thus exceeding the original goal of 11 persons considerably. Nineteen people were trained in 2016 and 24 were trained in 2017. The ongoing training workshops were about monitoring tools and estimation of carbon content for the various types of land uses. | | | | | | |
| 1.4 Installed hydrometric/hydrometeorological stations | Stations | 0 | 2010 | Technical agreement between ENEL and INETER<br>Oversight visits to ENEL | Initial goal for 2018 | 2 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 3 |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| | | | | facilities | | |
| **Reached:** 150%<br>**Comments:** The three stations that were built are being operated by the network of the Nicaraguan Institute of Territorial Studies (INETER, in Spanish). This is the institution in charge of the weather and climate monitoring nationwide. The stations are: 1) the Mancotal hydrometeorological station in the Apanás-Asturias watershed, and its UTM coordinates are: X=618994, Y= 1464306; 2) the pluviometric-weather station in the community of La Porra in the San Gabriel micro-watershed, whose UTM coordinates are: X=609779, Y=1465373; and 3) the telemetric-weather station in the Las Brumas PNR, which is located in the community of San Gregorio, the Sisle micro-watershed, and its coordinates are: X= 605401, and Y= 1462163. | | | | | | |
| 1.5 Water Reference Study (bathymetry, water balance, waterflows, and sedimentation) for Lake Apanás and Lake Asturias created. | Study | 0 | 2010 | Approved reference study | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** This output was completed thanks to the agreement between ENEL and CIRA/UNAN, thus making it possible to carry out the following studies: (i) hydrological studies of Lake Apanás, (ii) water balance, (iii) streamflow, and (iv) sedimentation at Lake Apanás. This is how the baseline indicator for these was achieved on these themes. Moreover, CIRA/UNAN have been overseeing, evaluating, and reporting on the data collected from these studies. In 2016, a reference study on sediment estimation was carried out through an agreement between ENEL and UNA. | | | | | | |
| 1.6 Land use and integrated management plan for the Lake Apanás watershed. | Plan | 0 | 2010 | Approved plan and specialized studies | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** In 2015, the update, reformulation, and modifications to the Environmental Land Reordering and Watershed Management Plan for Lake Apanás were completed. Also, five specialized studies on the watershed were added. These five studies make up the reference study: (i) analysis of the ecologic forest fragmentation and interplay in the Lake Apanás and Lake Asturias sub-watershed; (ii) integrated management plans for the micro-watersheds located in the project area; (iii) study of carbon estimation and market; (iv) vulnerability assessment and study of adaptation to climate change in hydroelectric power generation; (v) study to update soil fertility and farmer typology in the Sisle, San Antonio, Mancotal, Los Pedernales, La Esperanza, La Vueltosa, Santa Rita, and Santa Gertrudis micro-watersheds, and the Mancotal dam. | | | | | | |
| 1.7 Public school student leaders trained in the use of information about watershed management. | Individuals | 0 | 2010 | Training reports and participant reports | Initial goal for 2018 | 150 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 165 |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| **Reached:** 110%<br>**Comments:** A total of 165 student leaders were trained, as follows: (i) Sixteen students were trained in 2014, and (ii) 149 in 2015. The students came from 28 schools in the municipalities of San Rafael del Norte and Jinotega. The goal was exceeded by 15 students. Also, 28 signs were installed in the 28 schools of the area. It should be noted that the project successfully trained and held events to foster nature protection values for 2,905 actors (1,629 of which were men—or 56%—and 1,276 were women—or 44%). | | | | | | |
| 1.8 Watershed committee members undergoing continued training in watershed management. | Individuals | 0 | 2010 | Training reports and participant reports | Initial goal for 2018 | 30 |
| | | | | | Revised goal (in 2015) | 50 |
| | | | | | Reached goal as of February 2018 | 98 |
| **Reached:** 196%<br>**Comments:** The project successfully trained 98 people, thus exceeding the 2015 revised goal of 50 people. The group of beneficiaries included the members of the micro-watershed committees, community leaders, farmers, and members of the Potable Water Committees in the project area. | | | | | | |
| Component 2: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration. | | | | | | |
| 2.1 Agroforestry systems (AFS) | Hectares (ha) | 0 | 2010 | Actor cards, vouchers for delivery of incentives. | | IDB/GEF / PAGRICC |
| | | | | | Initial goal for 2018 | 363.0 / - |
| | | | | | Revised goal (in 2015) | 685.0 / 2,835.0 |
| | | | | | Reached goal as of February 2018 | 776.5 / 1,739.0 |
| **Reached:** 113% IDB/GEF<br>**Comments:** The project exceeded the original and revised goal (2015), as it successfully applied sustainable reordering practices in 776.5 ha—agroforestry systems (AFS). As a result, it surpassed the original goal by 214% and the revised goal by 113%. PAGRICC reported that, during its programming for 2014 and 2015, 1,739 ha of agroforestry systems were established, which, in combination with the 776.5 achieved by the project, adding up to a total of 2,515.5 ha of land where agroforestry systems are being implemented in the Apanás sub-watershed. | | | | | | |
| 2.2 Shade-grown eco-forestry coffee (EFC) | Hectares (ha) | 0 | 2010 | Actor cards, incentive-delivery vouchers | | IDB/GEF / PAGRICC |
| | | | | | Initial goal for 2018 | 50 / - |
| | | | | | Revised goal (in 2015) | 217 / 559 |
| | | | | | Reached goal as of February 2018 | 228 / 413 |

<table>
<tr><th>Output/indicator</th><th>Unit of measurement</th><th>Baseline number</th><th>Baseline year</th><th>Means of verification</th><th colspan="3">Expected and actual goal</th></tr>
<tr><td colspan="8">Reached: 105%<br>Comments: The project successfully applied sustainable reordering practices—eco-forestry coffee (EFC) system—on 228 ha, thus surpassing the original goal by 456% and the revised goal by 105%. PAGRICC reported that, for 2014 and 2015, 413 ha were established, which, in combination with the 228 ha generated by the project, add up to a total of 641 ha in the Apanás sub-watershed.</td></tr>
<tr><td rowspan="4">2.3 Natural regeneration management (NRM)</td><td rowspan="4">Hectares (ha)</td><td rowspan="4">1,152.8</td><td rowspan="4">2010</td><td rowspan="4">Actor cards, incentive-delivery vouchers</td><td></td><td>IDB/GEF</td><td>PAGRICC</td></tr>
<tr><td>Initial goal for 2018</td><td>1,663.8</td><td>-</td></tr>
<tr><td>Revised goal (in 2015)</td><td>1,642.8</td><td>-</td></tr>
<tr><td>Reached goal as of February 2018</td><td>1,625.8</td><td>197</td></tr>
<tr><td colspan="8">Reached: 99%<br>Comments: The original goal was to raise the area for gallery forest protection up to 511 ha, which would make up a total of 1,663.8 ha. In other words, it was intended to establish additional 511 ha from the baseline. However, in 2015, the goal was revised and the output was redefined as "natural regeneration management (NRM) in farms." as a result, 490 additional hectares were programmed, which make up a total of 1,642.8 ha, including the baseline. The project established a total of 473 ha. In addition, as a result of the ENEL-IDB agreement, 197 ha from PAGRICC were incorporated in the Apanás sub-watershed. The two projects together achieved a total of 670 ha where natural regeneration management was incorporated. When adding this figure to the baseline value of 1,152.8 ha, this gives a total of 1,828.8 ha where NRM systems have been established in the Apanás sub-watershed.</td></tr>
<tr><td rowspan="4">2.4 Silvopastoral systems (SPS)</td><td rowspan="4">Hectares (ha)</td><td rowspan="4">2,104.4</td><td rowspan="4">2010</td><td rowspan="4">Actor cards, incentive-delivery vouchers</td><td></td><td>IDB/GEF</td><td>PAGRICC</td></tr>
<tr><td>Initial goal for 2018</td><td>2,925.4</td><td>-</td></tr>
<tr><td>Revised goal (in 2015)</td><td>3,169.4</td><td>3,062</td></tr>
<tr><td>Reached goal as of February 2018</td><td>3,235.9</td><td>1,755</td></tr>
<tr><td colspan="8">Reached: 102%<br>Comments: The goal was exceeded by 102%. The project successfully implemented silvopastoral systems in 1,131.5 ha. A total of 249 actors were engaged in establishing silvopastoral systems in their farms. According to what PAGRICC and the project reported in their programming, 2,886.5 ha were established, of which 1,755 are from PAGRICC and 1,131.5 are from the project. In combination with the baseline figure (2,104.4), this makes up a total of 4,990.9 ha where silvopastoral systems are being implemented in the Apanás sub-watershed.</td></tr>
<tr><td rowspan="4">2.5 Industrial plantation forests (IPF)</td><td rowspan="4">Hectares (ha)</td><td rowspan="4">68.6</td><td rowspan="4">2010</td><td rowspan="4">Actor cards, incentive-delivery vouchers</td><td></td><td>IDB/GEF</td><td>PAGRICC</td></tr>
<tr><td>Initial goal for 2018</td><td>218.6</td><td>-</td></tr>
<tr><td>Revised goal (in 2015)</td><td>218.6</td><td>522</td></tr>
<tr><td>Reached goal as of February 2018</td><td>179.6</td><td>200</td></tr>
</table>

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| **Reached:** 82%<br>**Comments:** The original goal was to establish industrial-type plantation forests in 150 ha—68.6 ha in addition to the baseline value—which makes up a total of 218.6 ha. The goal was not reached because the systems were only established in 111 ha, adding up to a total of 179.6 (including the baseline). This owed to the fact that owners were somewhat reluctant to adopt the system because the average property size in the area ranged anywhere from 1 to 3 manzanas (1.4 ha).<br>According to what PAGRICC and the project reported in their programming—200 ha and 111 ha, respectively—industrial plantation forests (IPF) were established in 311 ha. In addition to the existing ones—68.6 ha from the baseline—, this gives a total of 379.6 ha where IPFs were established in the Apanás sub-watershed. | | | | | | |
| 2.6 Created farm plans | Plans | 0 | 2010 | Created farm profiles and plans | Initial goal for 2018 | 60 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 61 |
| **Reached:** 102%<br>**Comments:** The project developed 61 farm plans along with their respective inspection profiles for the plantations. In addition, as part of the project, 385 profiles were drawn up. INAFOR reviewed and approved all 446 profiles. Each landowner received a certificate of registration issued by the National Forest Registry. In order to achieve the goal for this output, the technical team of Component 2 received the additional support from three specialists to draft the plans for the actors using environmental restoration systems (ERS). | | | | | | |
| 2.7 Communities trained in business plan formulation, sustainable forest reordering, and wood value chains. | Farmers/actors | 0 | 2010 | Reports by ENEL and INAFOR | Initial goal for 2018 | 5 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | N/A |
| **Comments:** This indicator was merged with Indicator 2.11. As part of Component 2, at least 150 farmers were trained in topics such as agroforestry, soils, and environmentally sustainable farm management. This output was removed, in agreement with the Bank, when the Annual Operating Plan was under review in March 2015. The reason for this change was that Output 2.6 (plans and profiles) required INAFOR technicians to train the interested actors. | | | | | | |
| 2.8 Live fences | Hectares (ha) | 0 | 2010 | Actor cards, incentive-delivery vouchers | Initial goal for 2018 | 300 |
| | | | | | Revised goal (in 2015) | 41 |
| | | | | | Reached goal as of February 2018 | 41 |
| **Reached:** 100%<br>**Comments:** The goal for this indicator was revised and set at 41 ha of live fences in 2015, and it was fully reached (100%). In 2015, when the Annual Operating Plan was under review, the resources for this output were reallocated to goals of other outputs related to environmental restoration systems (ERS). A total of 41 actors were engaged. | | | | | | |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| 2.9 Areas with fruit plantations (PF) systems. | Hectares (ha) | 0 | 2010 | Actor cards, incentive-delivery vouchers | Initial goal for 2018 | 200 |
| | | | | | Revised goal (in 2015) | 50 |
| | | | | | Reached goal as of February 2018 | 62 |
| **Reached:** 124%<br>**Comments:** In 2015, the goal for this indicator was revised and was set at 50 ha of fruit plantations. However, upon project completion, fruit plantations were established in 62 ha, thus exceeding the revised goal. | | | | | | |
| 2.10 Hectares of vegetable plantations where soil and water resource conservation practices are implemented | Hectares (ha) | 0 | 2010 | Reports by ENEL and INAFOR | Initial goal for 2018 | 40 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | N/A |
| **Reached:** Resources were reallocated to outputs 2.1, 2.2, 2.4, and 2.5, as approved by IDB on April 15, 2015.<br>**Comments:** When the 2015 AOP was being planned, the resources from this output were reallocated to finance environmental restoration systems—agroforestry systems, eco-forestry coffee, silvopastoral systems, and plantation forests. This decision was made because of the limited interest shown by the farmers with vegetable farming systems, whose technological package was too expensive. Therefore, these resources were reallocated to the previously mentioned outputs. | | | | | | |
| 2.11 At least 150 farmers were trained in topics such as agroforestry, soils, and environmentally sustainable farm management. | Number of trained farmers | 0 | 2010 | Training reports and/or participant records | Initial goal for 2018 | 5 |
| | | | | | Revised goal (in 2015) | 150 |
| | | | | | Reached goal as of February 2018 | 526 |
| **Reached:** 342%<br>**Comments:** The 'trained communities' indicator was replaced with 'training local farmers in topics such as agroforestry, soils, and environmentally sustainable farm management. In 2015, the goal was reset, with IDB's approval (CID/CNI/1175/2015), at 154 farmers. It was widely exceeded, as a total of 526 were successfully trained. Thirty-two workshops were held thereby training: (i) 4 farmers in 2013, (ii) 88 in 2015, (iii) 153 in 2016, (iv) 153 in 2016, and (iv) 281 in 2017. | | | | | | |
| 2.12 Basic infrastructure projects (seven across the six tributaries) for sediment retention at specific sources. | Infrastructure projects | 0 | 2010 | Technical record and site visits by ENEL | Initial goal for 2018 | 42 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 42 |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| **Reached:** 100%<br>**Comments:** The project achieved this goal satisfactorily by building 42 gabions: (i) 6 in 2015, (ii) 23 in 2016, and (iii) 13 in 2017. To set up the construction of gabions, site visits were made to selected micro-watersheds located in the mid-high and mid-sections of each micro-watershed. | | | | | | |
| Component 3: **Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.** | | | | | | |
| 3.1 Management plans for private nature reserves | Plans | 6 | 2010 | Quick ecological studies, environmental management plans, and ministerial decrees for the 42 farms. | Initial goal for 2018 | 25 |
| | | | | | Revised goal (in 2015) | 38 |
| | | | | | Reached goal as of February 2018 | 48 |
| **Reached:** 126%<br>**Comments:** Through the project, 42 plans and six baselines were drawn up, making up a total of 48 plans. This indicator exceeded the revised goal from 2015. These 42 plans benefit 42 farms that were declared PNRs by ministerial decrees in the 2014-2017 period. In terms of conservation area, the 42 PNRs make up a total area of 1,563.42 ha, which are already incorporated into the National Network of Private Nature Reserves. All PNRs have the following technical documents: Quick ecological studies (QES), environmental management plans (EMP), and all required legal documentation (ministerial decree, property deed, and national identity card, among others). | | | | | | |
| 3.2 Biodiversity monitoring system established for the Ramsar site. | System | 0 | 2010 | Approved technical report | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** The system was set up in March 2017, and it included technical training for PNR owners and key local actors in the Apanás-Asturias sub-watershed. The system is incorporated and embedded into the National Environmental Information System (SINIA, in Spanish), which is managed and operated by MARENA. Moreover, eight manuals for wildlife management and three manuals for terrestrial/aquatic fauna and flora biodiversity management were created and published. | | | | | | |
| 3.3 Constructed infrastructure for biodiversity conservation (orchid gardens, butterfly farms, frog farms, and iguana farms). | Infrastructure work | 0 | 2010 | Design and receipt of infrastructure projects | Initial goal for 2018 | 35 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 35 |
| **Reached:** 100%<br>**Comments:** Reportedly, 100% of this outcome was achieved. In 2016, 23 infrastructure projects were completed, including 12 orchid gardens, five frog farms, three iguana farms, and three butterfly farms. In 2017, 12 projects were completed, including nine orchid gardens, one frog farm, and two iguana farms. In total, 35 construction projects were completed and are currently operating. It should be pointed out that, according to the agreement signed between ENEL, MARENA, and FAZOONIC, technical assistance for managing those 35 infrastructure projects was ensured (animal breeding centers and orchid gardens). Moreover, four manuals for animal breeding were successfully published. | | | | | | |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| 3.4 Business plans for eco-tourist circuits | Plans | 4 | 2010 | Business plans for eco-tourist circuits | Initial goal for 2018 | 25 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 25 |
| **Reached:** 100%<br>**Comments:** This goal was successfully met, as 25 business plans were created. These plans include a five-year income platform for PNR owners, which were approved by MARENA and INTUR in Jinotega by the end of 2014. As a result of the agreement between UNA, ENEL, and MARENA, a tourist guide training course (*Guía de Naturaleza*) was held for 22 representatives of the PNRs accredited by INTUR. | | | | | | |
| 3.5 Ecotourist sighting points | Built ranches | 0 | 2010 | Design and letter of receipt of infrastructure work | Initial goal for 2018 | 25 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 35 |
| **Reached:** 100%<br>**Comments:** This output was renamed "Ecotourist sighting ranches," as the allocated funds did not cover the cost for building accommodation facilities. As a result, the original goal of 25 ranches was exceeded, as 35 sighting ranches were built. Moreover, 27 signs containing general information about the PNRs were built and installed to make them more visible. | | | | | | |
| Component 4: Design and implementation of the payment for environmental services mechanism in the Apanás-Asturias watershed. | | | | | | |
| 4.1 Economic assessment of the ecosystem services within the watershed | Study | 0 | 2010 | Approved consulting report | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** Output 4.1 was merged with Output 4.2. This output was achieved in 2016 when the consulting services were contracted for the "Economic assessment of payment for environmental, watershed, and biodiversity services, and design of the payment for environmental services (PES) mechanism." The results derived from these consulting services provided evidence suggesting that the main issue in the watershed is the expansion of the agricultural frontier and the loss of forest cover, as originally conceptualized in the project where a water PES scheme was going to be designed. This is why the water PES scheme was reformulated and turned into a payment for environmental services mechanism for conservation, reforestation, and protection of the forest cover as a contributing factor for greenhouse gases sequestration (climate change mitigation). In turn, this ensures a habitat for biodiversity, reduces sediments (erosion), increases streamflow, and, ultimately, ensures the sustainability of hydroelectric power generation activities, which are managed by ENEL. | | | | | | |
| 4.2 Payment for environmental | Study | 0 | 2010 | Same as Output 4.1 | Initial goal for 2018 | 1 |

| Output/indicator | Unit of measurement | Baseline number | Baseline year | Means of verification | Expected and actual goal | |
|---|---|---|---|---|---|---|
| services mechanism | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** Output 4.2 was merged with Output 4.1 (see comments for Output 4.1). In 2016, the consulting services titled "Economic assessment of payment for environmental, watershed, and biodiversity services, and design of the payment for environmental services (PES) mechanism" were contracted. A document containing the technical/legal instruments of the PES mechanism was created and published. | | | | | | |
| 4.3 Payment for environmental services fund to promote plantation forests | Fund | 0 | 2010 | Same as Output 4.1 | Initial goal for 2018 | 1 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 1 |
| **Reached:** 100%<br>**Comments:** This output was successfully achieved, as on February 3, 2017, the interinstitutional agreement between ENEL, MARENA, INAFOR, and ANA was signed to implement the PES mechanism. In addition, the financial institution Banco de la Producción (BANPRO) was contracted through a bidding process to safeguard the seed capital. This institution has been managing the PES mechanism funds through annual contracts until their completion in 2021. | | | | | | |
| 4.4 Dissemination workshops for the payment for environmental services mechanism | Workshops | 0 | 2010 | Workshop reports and/or records | Initial goal for 2018 | 10 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 12 |
| **Reached:** 120%<br>**Comments:** Twelve workshops were held, thus surpassing the original goal of ten workshops. A total of 382 officials and technicians from the PEU, INAFOR, MARENA, and ANA, as well as local project actors were trained. | | | | | | |
| 4.5 Payment for environmental services contracts | Contracts | 0 | 2010 | Signed and active contracts | Initial goal for 2018 | 75 |
| | | | | | Revised goal (in 2015) | - |
| | | | | | Reached goal as of February 2018 | 184 |
| **Reached:** 245%<br>**Comments:** This output was completed successfully. The PES mechanism started operating in February 2018 with the signing of 184 contracts between ENEL and the actors (PNR owners and farmers using ERS). This was equivalent to 722.6 ha (1,011.66 mz) covered and US$44,773.59 to be paid out that same year. | | | | | | |

**O1 I. Rise in the number of hectares where sustainable soil and forest management practices are carried out.**

Rating: Very satisfactory

116. Output 1 indicator was rated 'very satisfactory' because it reached 102% of the goal that was reformulated in 2015. At project closeout, sustainable land and forest management practices were being implemented on 6,148.3 ha (see **Table 8**).

**Table 8. O1 I rating**

| Outcome indicators | Unit of measurement | Baseline (2010) | Original goal (2018) | Reformulated goal (2015) | Reached goal February 2018 | Rating[11] |
|---|---|---|---|---|---|---|
| O1 I: Rise in the number of hectares where sustainable soil and forest management practices are carried out. | Hectares (ha) | 3,325.8 | 5,220.8 | 6,053.8 | 6,148.8 (102%) | Very satisfactory |

*Source: Outcome table.*

117. In order to reach the goals established for this indicator, the following was started in 2013: (i) informative assemblies with community members of the Apanás-Asturias sub-watershed were held to inform the public regarding the objective of the project, and (ii) the actors for the various environmental restoration systems (ERS) were identified and selected. In 2014, the following was carried out: (i) ERS implementation strategy, (ii) drafting of specifications for the plant materials and tools, (iii) verification of selected farmers' farms in order to determine the areas where the ERS would be established, (iv) contracting vendors to supply agricultural tools and plant materials, and (v) delivery of incentives to selected actors.

118. Lastly, as seen in Table 9, from the second semester of 2014 to October 2017, the project established the following: (i) agroforestry systems on 776.5 ha, (ii) eco-forestry coffee on 228 ha, (iii) natural regeneration management on 473 ha, (iv) silvopastoral systems on 1,131.5 ha, (v) industrial plantation forests on 11 ha, (vi) live fences on 41 ha, and (vii) fruit plantations on 62 ha; this adds up to a total of 2,823 ha of land and engagement of 1,208 farmers in the Apanás sub-watershed.

119. From the second semester of 2014 to October 2017, environmental restoration systems were established on 2,823 ha (Cycle 1, Cycle 2, Cycle 3, and Cycle 4) together with GEF. This, in addition to the 3,325.80 ha from the baseline calculated in 2010, results in a vegetation cover of 6,148.80 ha where sustainable land use reordering practices are implemented.

120. Furthermore, MARENA reportedly contributed through the PAGRICC a total of 4,304 ha where agroforestry systems, eco-forestry coffee, natural regeneration management, silvopastoral systems, and industrial plantation forests were established in the Apanás sub-watershed, which were accounted for as local match.

[11]Indicator ratings were proposed and validated during the SWOT workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias," held on August 20 (see Annex 2).

**Table 9. Hectares where sustainable land-use and forest reordering practices are implemented in the Apanás sub-watershed**

| Environmental restoration systems | IDB/GEF project | | | PAGRICC project | Total Apanás sub-watershed |
|---|---|---|---|---|---|
| | Baseline | Reached goals | Outcome table | | |
| 2.1 Agroforestry systems (AFS) | 0.0 | 776.5 | 776.5 | 1,739.0 | 2,515.5 |
| 2.2 Shade-grown eco-forestry coffee (EFC) | 0.0 | 228.0 | 228.0 | 413.0 | 641.0 |
| 2.3 Natural regeneration management (NRM) | 1,152.8 | 473.0 | 1,625.8 | 197.0 | 1,822.8 |
| 2.4 Silvopastoral systems (SPS) | 2,104.4 | 1,131.5 | 3,235.9 | 1,755.0 | 4,990.9 |
| 2.5 Industrial plantation forests (IPF) | 68.6 | 111.0 | 179.6 | 200.0 | 379.6 |
| 2.8 Live fences (LF) | 0.0 | 41.0 | 41.0 | 0.0 | 41.0 |
| 2.9 Fruit plantations areas (FP) | 0.0 | 62.0 | 62.0 | 0.0 | 62.0 |
| O1 I: Rise in the number of hectares where sustainable soil and forest management practices are carried out | 3,325.8 | 2,823.0 | 6,148.8 | 4,304.0 | 10,452.8 |

*Source: Outcome table.*

**O2 I. Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities.**

Rating: Very satisfactory

121. Output 2 indicator was rated 'very satisfactory' because it reached 182% of the goal, thus reducing the number of carbon dioxide equivalent emissions by 893,256 tons per year by establishing broadleaf forests, agroforestry systems, shade-grown eco-forestry coffee, silvopastoral systems, and industrial plantation forests on 2,787.0 ha, as shown in **Table 10**.

**Table 10. O2 I rating**

| Outcome indicators | Unit of measurement | Baseline | Original goal | February 2018[12] | Rating[13] |
|---|---|---|---|---|---|
| O2 I: Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities. | Tons | 0 | 491,151.0 | 893,256.0 (182%) | Very satisfactory |

*Source: Outcome table.*

122. In order to calculate how many tons of carbon was captured, an analysis of the areas with established ERS with the highest environmental impact, which could be protected by the PES mechanism was conducted. Additionally, the Carbon Monitoring System was used to estimate captured carbon, taking into account the following variables: above-ground biomass, underground biomass, and carbon contents in the soil and leaf litter. As a result, it was

[12]Does not include the areas established through the natural regeneration management, fruit plantations, and live fences systems.
[13]Indicator ratings were proposed and validated during the SWOT workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias," held on August 20 as one of the activities carried out by the consultant.

estimated that the 2,787.0 established hectares captured 893,256 tons of carbon dioxide per year.

123. As seen in **Table 11**, each hectare of broadleaf forests captured 495 tons of carbon dioxide per year, followed by AFS and EFC, which capture 294 tons each, SPS capture 290 tons, and IPF capture 22 tons per year.

**Table 11. Tons of $CO_2$ captured by the project**

| PNR/ERS | Established hectares | Above-ground biomass ($tCO_2$/ha) | Underground biomass ($tCO_2$/ha) | Soil carbon ($tCO_2$/ha) | Leaf litter ($tCO_2$/ha) | Total $CO_2$ | Constant | $tCO_2$/ha/y established ha | Total $tCO_2$/y |
|---|---|---|---|---|---|---|---|---|---|
| Broadleaf forests (PNR) | 540.0 | 48.41 | 17.91 | 65.00 | 3.65 | 135.00 | 3.67 | 495 | 267,543 |
| Agroforestry systems (AFS) | 776.5 | 7.80 | 3.12 | 65.00 | 3.65 | 80.00 | 3.67 | 294 | 228,127 |
| Shade-grown eco-forestry coffee (EFC) | 228.0 | 7.80 | 3.12 | 65.00 | 3.65 | 80.00 | 3.67 | 294 | 66,941 |
| Silvopastoral systems (SPS) | 1,131.5 | 7.80 | 2.89 | 65.00 | 3.65 | 79.00 | 3.67 | 290 | 328,201 |
| Industrial plantation forests (IPF) | 111.0 | 2.42 | 0.00 | 0.00 | 3.65 | 6.00 | 3.67 | 22 | 2,444 |
| Total | 2,787.0 | 74.23 | 27.04 | 260.00 | 18.25 | 380.00 | 18.35 | 1,395 | 893,256 |

*Source: Outcome table.*

**O3 I. Annual decrease in sediments transported through priority micro-watersheds.**

Rating: Very satisfactory

124. This indicator was rated 'very satisfactory' mainly because of the gabions build to retain sediments going into the watershed. Together with the implementation of ERS, sediments going into the watershed were reduced by 32.38% in comparison to 2013. It should be noted that the estimation of sediments for the 2013-2016 period was done through the various water assessments. These assessments were made possible thanks to the cooperation agreement between ENEL and CIRA/UNAN Managua and the agreement between ENEL and UNA. These agreements made it possible to use the SWAT tool.

125. Aided by this tool, the Apanás sub-watershed was broken down into 139 water response units. It was determined that the total amount of sediments being transported into Lake Apanás in 2013 was 72,799,244 t/y and, in 2016, it was 49,226,107 t/y. This means that in the 2013-2016 period, there was a drop—of about 23,573,137 t—in the total amount of sediments going into Lake Apanás, which is equivalent to a 32.38% decrease.

126. It should be noted that the establishment of the environmental restoration systems was completed in 2017. As these systems continue to develop and remain operating overtime, they will generate an even greater impact on reducing soil erosion, and, as a result, on reducing the amount of sediments going into the Apanás-Asturias sub-watershed (see **Table 12**).

**Table 12. O3 I rating**

| Outcome indicators | Unit of measurement | Baseline | Original goal | February 2018 | Rating[14] |
|---|---|---|---|---|---|
| **O3 I.** Annual decrease in sediments dragged through the priority micro-watershed. | Percentage (%) | 0 | 20.00 | 32.38 (12.38%) | Very satisfactory |

*Source: Outcome table.*

**O4 I. Increase in the number of hectares of forested land added to the National Network of Private Nature Reserves.**

Rating: Very satisfactory

127. Similar to the previous outcome indicators, the O4 I exceeded the goal by 134%. The project successfully accredited, through MARENA's ministerial decree, 1,393.42 ha of land as conservation areas by creating 42 environmental management plans. In combination with the baseline value established in 2010, this represents a total of 1,563.42 ha of land accredited as conservation area (see **Table 13**).

[14] Indicator ratings were proposed and validated during the SWOT workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias," held on August 20 as one of the activities carried out by the consultant.

**Table 13. O4 I rating**

| Outcome indicators | Unit of measurement | Baseline | Original goal | February 2018 | Rating[15] |
|---|---|---|---|---|---|
| **O4 I:** Rise in the number of hectares of forest land within the National Network of Private Nature Reserves (PNR). | Hectares (ha) | 170 | 1,170.0 | 1,563.42 (134%) | Very satisfactory |

*Source: Outcome table.*

128. These PNRs have been added to the National System of Protected Areas (SINAP). The 42 PNRs have their respective ministerial decrees issued by MARENA, as well as their quick ecological studies, and environmental management plans.

**O5 I. Rise in the number of hectares of protected forests incorporated into a payment for environmental services mechanism by 2,822 ha.**

Rating: Moderately satisfactory

129. This outcome was rated as 'moderately satisfactory.' Initially, this activity had to be executed at the beginning of Year 1, but this was pushed back to February 2018 on project closeout date. A total of 722.6 ha (1011.7 mz) were protected through the signing of 184 PES contracts, 162 for ERS, and 22 for PNR. It should be noted that the project outcome table established that 2,822 ha should be covered through the signing of 75 contracts, i.e., it was estimated that, on average, 37 ha for each farmer were going to be protected upon signing the PES contract. In reality, this proved complex because most farmers own an average of 1-3 planted manzanas for self-consumption and for sale (see **Table 14**).[16]

**Table 14. O5 I rating**

| Outcome indicators | Unit of measurement | Baseline | Original goal | February 2018 | Rating[17] |
|---|---|---|---|---|---|
| O5 I: Rise in the number of hectares of protected forests incorporated into a payment for environmental services mechanism. | Hectares (ha) | 0 | 2,822.0 | 722.6 (26%) | Moderately satisfactory |

*Source: Outcome table.*

130. **Overall assessment of Objective 1**: In general terms, Objective 1 can be rated as 'very satisfactory' (see **Table 15.** Summary of Outcome Indicator Evaluation) because the proposed goals for outcomes 1-4 were achieved, as seen in the matrix. This resulted from the implementation of the activities provided for in Component 2 (ERS) and Component 3 (PNR). At project closeout, the goal for Outcome 5 indicator had not been reached. Only 722.6 hectares were covered through the signing of 184 contracts—162 for ERS and 22 for PNR. This

[15]Indicator ratings were proposed and validated during the workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias," held on August 20, 2018.
[16] The 1,011.7 manzanas are broken down as follows: 344.67 manzanas are protected for being declared PNRs through MARENA's resolution, and the various ERS were established over 666.99 manzanas as part of the Component 2 of the project.
[17] Indicator ratings were proposed and validated during the workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias."

is why Outcome 5 indicator was rated 'moderately satisfactory' and Objective 1 had an overall rating of 'very satisfactory' due to the importance the indicators for outcomes 1-4 have for Outcome 5 indicator. Also, Outcome 5 indicator is being evaluated in Objective 2, which will be analyzed in the following section.

**Table 15. Summary of Outcome Indicator Evaluation**

| Outcome indicators | Unit of measurement | Original goal | Reached goal as of February 2018 | Weighing | Rating |
|---|---|---|---|---|---|
| Outcome 1 indicator: Rise in the number of hectares where sustainable soil and forest management practices are carried out. | Hectares (ha) | 6,053.8 (reformulated) | 6,148.8 (102%) | 25% | Very satisfactory |
| Outcome 2 indicator: Tons of carbon dioxide equivalent to direct emissions that have been removed or sequestered due to the execution of project activities. | Tons | 491,151.0 | 893,256.0 (182%) | 10% | Very satisfactory |
| Outcome 3 indicator: Annual decrease in sediments dragged through priority micro-watershed. | Percentage (%) | 20.00 | 32.38 (12.38%) | 15% | Very satisfactory |
| Outcome 4 indicator: Increase the number of hectares of forest land within the National Network of Private Nature Reserves (PNR). | Hectares (ha) | 1,170.0 | 1,563.42 (134%) | 25% | Very satisfactory |
| Outcome 5 indicator: Rise in the number of hectares of protected forests incorporated into a payment for environmental services mechanism. | Hectares (ha) | 2,822.0 | 722.618 (25.6%) | 25% | Moderately satisfactory |
| General evaluation | | | | 100% | Very satisfactory |

*Source: Workshop for the project "Integrated Watershed Management in Lake Apanás and Lake Asturias."*

**Objective 2: Designing and piloting a payment for environmental services (PES) mechanism for farmers and owners of private nature reserves, which will be funded with the income from payments received for using water resources to generate hydroelectric power in this watershed.**

Rating: Moderately satisfactory

131. The payment for environmental services (PES) mechanism, which was implemented in a moderately satisfactory way by the project, will improve water infiltration in the watershed. The PES mechanism is an innovative experience which was favored with the ownership of local protagonists and actors, public institutions and organizations. This will facilitate the

[18] When this report was being drafted, there were 404 contracts signed (equivalent to 1,554 ha), 184 (723 ha) of which were signed during the first round and 220 (831) of which during the second one.

articulation of efforts and commitments to face global warming and ensure water resource sustainability in the Apanás watershed for hydroelectric power generation for the country.

132. While the PES mechanism was implemented, is operating, and exceeded the goal of signed contracts, this objective received the previously mentioned rating because it failed to reach the goal of adding 2,822 ha under this mechanism at project closeout.

133. The design of the PES mechanism took nearly 4 years and 6 months to be completed, which resulted in the following: (i) its creation was pushed back to February 2017, and (ii) it started operating in December 2017 when the BANPRO bank was hired as the financial arm of the mechanism, this forced the mechanism to operate for less than a year until the donation ended.

134. Notwithstanding the foregoing, it is expected that after four years of operations, as defined in its design, the mechanism will surpass the goal. In order for this to be possible, for the next four years, ENEL must to continue to operate the mechanism and BANPRO should continue to be the financial administrator. Furthermore, additional resources are needed for its administration, contract awarding/supervision, technical oversight. These resources would make it possible to monitor commitments undertaken by the protagonists and keep the evaluation and follow up cycle to grant the respective payments to farmers who signed a PES contract.

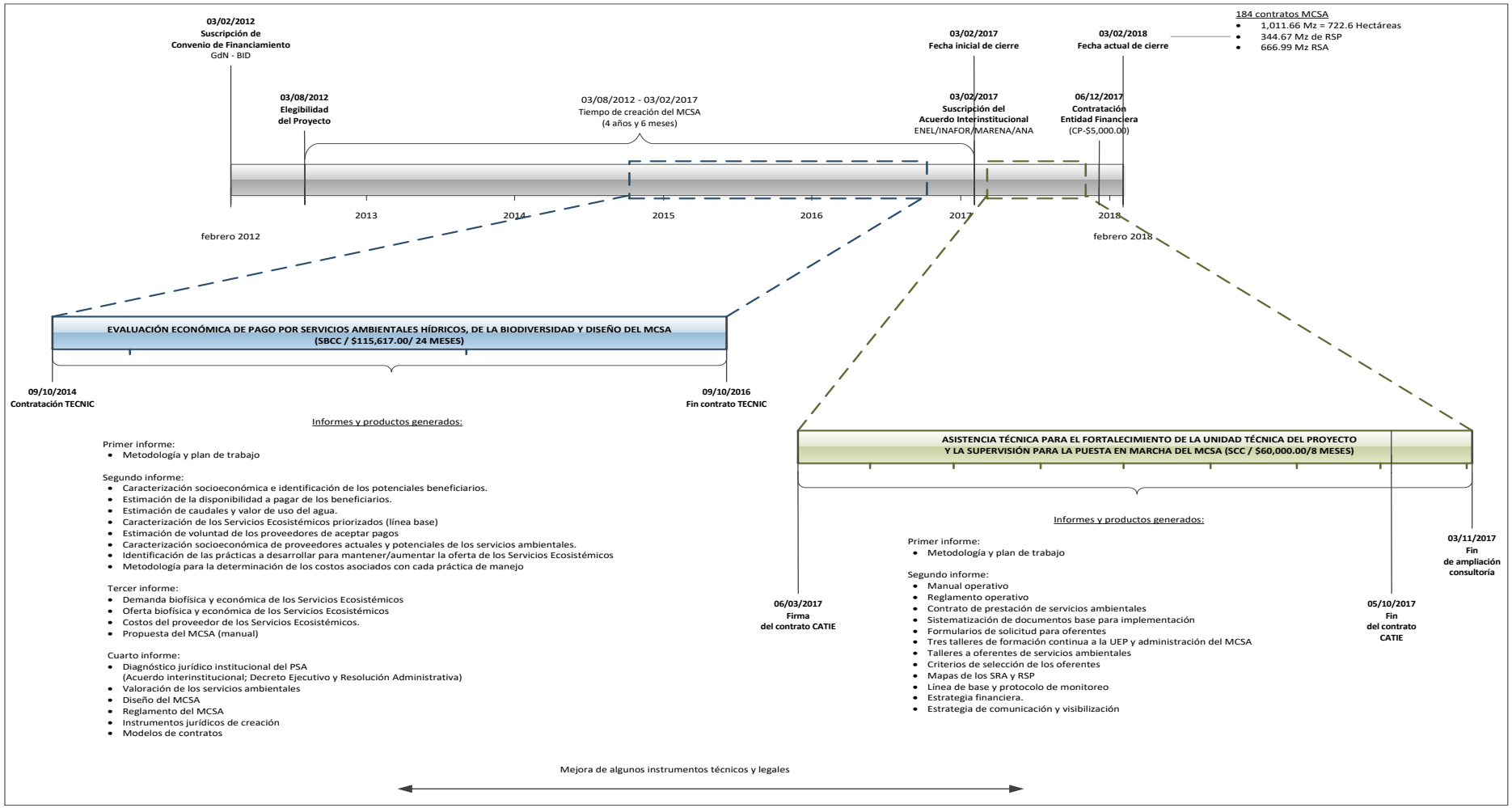
135. It should be noted that the previously mentioned activities were not provided for nor will they be financed with the seed capital. This puts its sustainability at stake and will be analyzed in Section 3.4 of this report.

136. Below is a description of the processes followed for the design, development, and operation of the PES mechanism (see Figure 3. PES mechanism implementation scheme).

137. ***Design Phase***. As seen in Figure 3. PES mechanism implementation scheme, the bidding process to select the firm that would do the economic assessment for and design of the PES mechanism stared on April 21, 2014 and concluded in October 2014. The consulting firm TECNIC was selected at the end of this process, by which time, the mechanism had to be already operating.

138. It took the consulting firm two years to carry out the "Economic assessment of payments for environmental, watershed, and biodiversity services, and design of the PES mechanism" (from October 2014 to October 2016), and it cost US$115,617.00. During that time, the firm TECNIC delivered four reports, which were subsequently improved and updated. These reports contained the following:

## Figure 3. PES mechanism implementation scheme



(i). *Report 1*: Methodology and work plan.

(ii). *Report 2*: Assessment for the implementation of the mechanism, which included a socioeconomic analysis of the sector, identification of potential beneficiaries, estimation of payments for beneficiaries, availability of funds and willingness to pay by those requiring environmental services, estimation of waterflows and value of water, characterization of environmental services, identification of practices to develop, and methodologies to estimate costs associated to each practice.

(iii). *Report 3*: Study of environmental services, which includes biophysical and economic offer/demand, supplier costs, and PES handbook proposal.

(iv). *Report 4:* The creation of legal instruments for the application of the mechanism, legal assessment of the mechanism, assessment of environmental services, PES mechanism design, regulation and instruments for the creation of the PES mechanism and contract models.

139. As a result of the consulting services by TECNIC, an institutional agreement was signed by the co-executing institutions at project closeout on February 3, 2017. The agreement established (i) the procedures guiding the creation of the PES mechanism, (ii) the operations of the PES mechanism, (iii) responsibilities and sanctions by their dependencies, and (iv) ENEL's role in leading the mechanism.

140. ***Development phase*.** Under ENEL's leadership, in order to create the technical foundation that ensures the functionality of the PES, ENEL's PEU and the IDB agreed to contract the services of a consulting firm to carry out the "technical assistance for strengthening the project's execution unit (administrator of the PES mechanism) and oversee the operations of the mechanism." This aims at improving and complementing the documents created by TECNIC.

141. The SBCC process started on September 27, 2016, after which the Tropical Agricultural Research and Higher Education Center (CATIE) was contracted on March 6, 2017 for US$60,000.00. The consulting services included ten outputs and a final report; it lasted eight months and two reports were submitted:

(i). *Report 1*: Methodology and work plan.

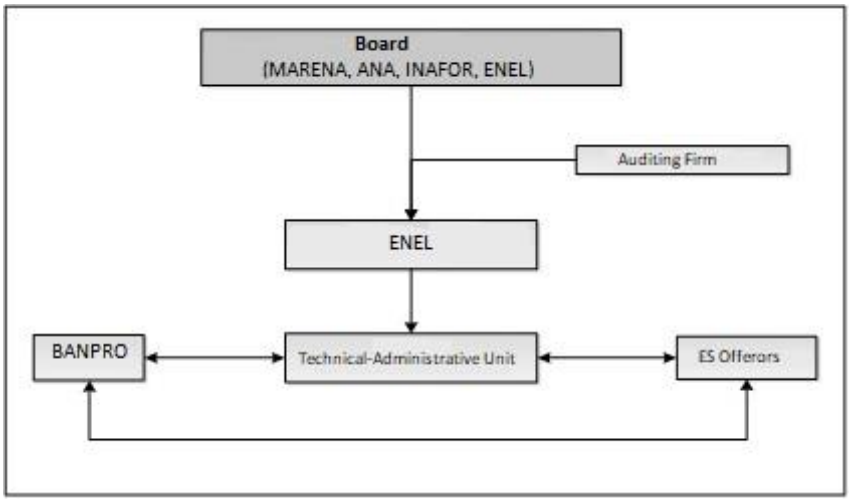
(ii). *Report 2:* Included deliverables, such as the operating manual, operations regulations, and the environmental services agreement. Also, the base documents for PES implementation were systematized—PES offerors' application form, selection proposal for the first 150 offerors of ERS and PNR, and a sample of 50 farms where on-site verification will be carried out.

142. On May 18, 2017, the selection process began by comparing prices to contract the services of a financial institution to manage the fund of payment for environmental services in the Apanás watershed in the Department of Jinotega. At the end of this process the bank BANPRO was hired for US$5000 on October 27, 2017.

143. By the end of 2017, the PES mechanism was established with a seed capital fund of US$557,693.54. This amount will cover PES contract obligations for three years, i.e., from 2018 to 2021. The PES mechanism does not cover ordinary expenses for managing, operating, and overseeing the fund.

144. **Fund execution mechanism.** ENEL manages the PES mechanism through the Technical-Administrative Unit (TAU). This unit is in charge of coordinating, carrying out technical validation, creating files, monitoring, following up, and evaluating the mechanism, as well as overseeing the community and environmental work. Also, it reports to the Board of Directors, which is the maximum authority composed of ENEL, INAFOR, MARENA, and ANA, as shown in the figure below.

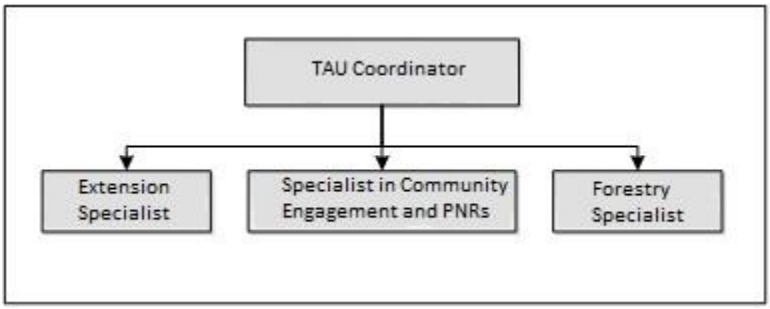
**Figure 4. Institutional Structure of the PES mechanism**




*Source: PES Mechanism's Operating Manual*

145. In order to carry out its roles, the mechanism's organizational structure is made up of (i) one Extension Specialist, (ii) one Forestry Specialist, (iii) one Specialist in Community Engagement and PNRs, and one Technical Coordinator for implementation on site, as shown in the figure below. In addition, ENEL incorporated an Environmental Economy Specialist, a Project Responsible, a Financial Specialist, an Administrator, a Procurement Specialist, and a Control and Follow up Specialist.

**Figure 5. Technical-Administrative Unit**




*Source: PES Mechanism's Operating Manual.*

146. **Fund operations phase.** In order to develop the PES mechanism, US$1,094,455.23 were allocated, US$791,931 of which were provided by the GEF and US$302,254.23 of which were in the form of local match, as shown on **Table 16**.

147. As seen in Table 16, US$688,367.39 were allocated to the PES mechanism (Output 3), US$559,492.80 of which are the seed capital. The design of the mechanism (outputs 1 and 2

totaling US$275,085.02), followed by the dissemination workshops, were other significant costs.

**Table 16. Cost allocations for the creation and implementation of the PES mechanism**

| Outputs | Total execution cost (US$) | | |
|---|---|---|---|
| | GEF | Match | Total |
| **O1.** Created economic assessment study for the environmental services in the watershed. **O2**. Created design study for the PES mechanism. | 115,617.00 | 159,468.02 | 275,085.02 |
| Consulting services by TECNIC | 115,617.00 | - | 115,617.00 |
| In-kind contribution | - | 159,468.02 | 159,468.02 |
| **O3.** Implemented fund for the PES mechanism to promote plantation forests. | 654,126.00 | 34,241.39 | 688,367.39 |
| Consulting services by CATIE | 60,000.00 | - | 60,000.00 |
| Contract with BANPRO | 5,000.00 | - | 5,000.00 |
| Seed capital | 557,693.54 | | 557,693.54 |
| Other contributions | 31,432.46 | - | 31,432.46 |
| In-kind contribution | | 34,241.39 | 34,241.39 |
| **O4.** Implemented dissemination workshops for the PES mechanism. | 22,188.00 | 108,814.82 | 131,002.82 |
| **O5.** Contracts drafted for the Payment for Environmental Services mechanism. | | | |
| Total | 791,931.00 | 302,524.23 | 1,094,455.23 |

*Source: Procurement and Costs Plan provided by ENEL's PEU.*

148. **PES mechanism's progress at project closeout.** Contract signing was planned out in rounds. During the first round, 184 contracts were signed, during the second one, 220, and during the third one, 100 additional contracts are expected to be signed. The projection for 2019 is to have at least 504 contracts signed, thus covering 2,214.6 ha (see **Table 17**).

**Table 17. PES contracts**

| Round | Signed contracts | Hectares | Manzanas | Annual payment | Total payment | US$ per mz |
|---|---|---|---|---|---|---|
| First round (February 2018) | 184 | 722.6 | 1011.6 | 33,586.5 | 100,759.6 | 33.2 |
| Second round (July 2018) | 220 | 831.0 | 1163.0 | 38,378.3 | 115,135.0 | 33.0 |
| Third round (2019) | 100 | 661.0 | 925.8 | 30,550.4 | 91,651.2 | 33.0 |
| Total | 504 | 2214.6 | 3100.4 | 102,515.3 | 307,545.8 | |

*Source: Outcome matrix*

149. For the first 184 signed contracts, a total of US$33,586.50 will be paid out, US$10,138.70 of which has already been disbursed. The remaining US$23,447.23 would be disbursed in November 2018. The payments for environmental services will be disbursed for three years as follows: 30% at the beginning and 70% upon meeting the conditions established by the mechanism (see **Table 18. Projection of the use of the PES** resources).

## Table 18. Projection of the use of the PES resources

| Round | Year 1: 2018 | | | Year 2: 2019 | | | Year 3: 2020 | | | Year 4: 2021 | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Feb. | Nov. | Total | Feb. | Nov. | Total | Feb. | Nov. | Total | Feb. | Nov. | Total | |
| First round | 10,138.70 | 23,447.83 | 33,586.53 | - | - | - | - | - | - | - | - | - | 33,586.53 |
| Renewal | - | 10,138.70 | 10,138.70 | 23,447.83 | 10,138.70 | 33,586.53 | 23,447.83 | - | 23,447.83 | - | - | - | 67,173.06 |
| Second round | - | 11,513.50 | 11,513.50 | 26,864.83 | 11,513.50 | 38,378.33 | 26,864.83 | 11,513.50 | 38,378.33 | 26,864.83 | - | 26,864.83 | 115,134.99 |
| Third round | - | - | - | 9,165.12 | 21,385.28 | 30,550.40 | 9,165.12 | 21,385.28 | 30,550.40 | 21,385.28 | 9,165.12 | 30,550.40 | 91,651.20 |
| Total | 10,138.70 | 45,100.03 | 55,238.73 | 59,477.78 | 43,037.48 | 102,515.26 | 59,477.78 | 32,898.78 | 92,376.56 | 48,250.11 | 9,165.12 | 57,415.23 | 307,545.78 |

*Source: Outcome matrix*

Legend: Year 1 payment | Year 2 payment | Year 3 payment

150. It is important to highlight that the Carbon Monitoring System analyzed 713.82 ha of land registered in the system, which are protected under the PES mechanism. As a result, it was reported that 155,512.10 tons of carbon were captured by the implementation of environmental restoration systems (ERS) and 120,184.32 tons of carbon were captured by the private nature reserves (PNRs), as seen below.

**Table 19. Carbon captured in the areas under the PES mechanism**

| ERS/PNR | Analyzed hectares | Captured carbon (t $CO_2$) |
|---|---|---|
| SPS | 127.7 | 37,183.41 |
| IPF | 8.59 | 76.29 |
| AFS | 150.48 | 50,692.09 |
| EFC | 184.42 | 67,560.31 |
| Forest | 242.63 | 120,184.32 |
| Total | 713.82 | 275,696.42 |

*Source: 2018 Carbon Report*

151. **Overall assessment of Objective 2.** This objective was rated as 'moderately satisfactory,' as according to the project's MOP, the following elements of the scope should have been reached: (i) start operations during Year 1 of execution, and (ii) protect 2,822 ha of forests under a PES mechanism. Delays in the design and implementation of the mechanism prevented these elements from being reached at project closeout. As a result, the expected impact was also delayed, hence the benefit of more improved areas that increase waterflow. This, together with the high risk associated with its sustainability over the course of the implementation of the fund, justifies the assigned rating.

152. **Project effectiveness rating.** In light of the above, the rating for project effectiveness is 'satisfactory,' as the rating for Objective 1 is 'very satisfactory' and for Objective 2 is 'moderately satisfactory.'

b. Evaluation of reached project's outputs by component

153. Output attainment was monitored through the outcome matrix, the Annual Monitoring Plan, and the evaluations promoted by the IDB. But, since each sub-program had differentiated characteristics and an execution scheme with different levels of functional dependency, specific tools created by the project were used to track output attainment, as follows: (i) a carbon monitoring system, (ii) land-use monitoring system, (iii) hydrological studies to monitor project's impact on waterflows and sedimentation, and (iv) a biodiversity monitoring system for the species living in the Ramsar site. In addition, there was a monitoring, tracking, evaluation, and reporting system which used functional, dynamic, and comprehensive computerized tools for the various feeders.

154. In general, the outputs, as well as the previously analyzed objectives and outcomes, were attained. It should be pointed out that the actions by ENEL's PEU and the co-executing institutions ensured the effectiveness of the activities defined to achieve those outputs.

155. Below is a detail of each product by component. The following section was created based on the following documents: (i) Final Project Report drafted by ENEL's PEU, which was assisted

by a consultant who designed the outcome table; (ii) interviews by the consultant made during site visits; and (iii) field work carried out as part of the activities.

**Component 1: Strengthening of institutional structures and planning capacities for watershed management**

156. The activities under this component were geared to increasing the managerial skills of local authorities, farmers, and landowners in the watershed. Therefore, various interventions were enabled, which resulted in the following outputs.

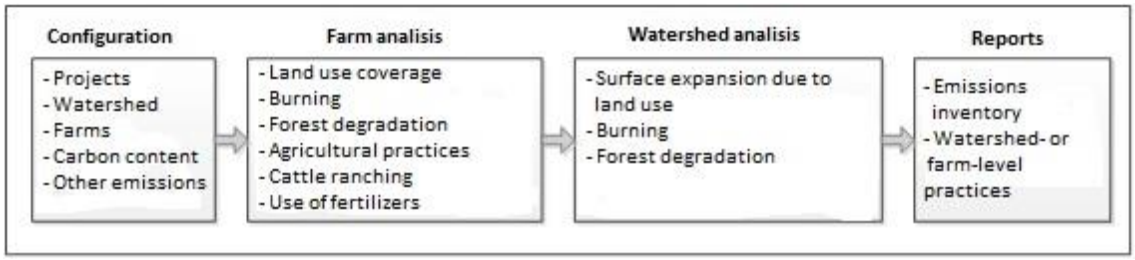
157. **Output 1: Cadaster Information System (SISCAT), implemented.** The SISCAT was successfully implemented. It was completed in 2014 and it provided equipment and technical training for the staff of the land registry offices of the municipal offices of Jinotega and San Rafael del Norte. These two municipalities are currently using this tool in the performance of their land-registry and land-reordering roles. Also, during the first semester of 2015, the process of updating the alphanumeric data of the Apanás-Asturias, San Gabriel, and Corinto Finca watersheds was completed. During the second semester of 2015 and throughout 2016, a specialist from ENEL's PEU monitored the alphanumeric data update process to ensure successful implementation of the SISCAT in both municipal offices.

158. Thanks to the implementation of SISCAT, the institutional capacity of the municipal offices of Jinotega and San Rafael del Norte was strengthened. Representatives from both offices confirmed that, at present time, they have an updated version of the system where owners and land data (including the area and perimeter) have been added. The system improved the processes for (i) collecting property taxes, and (ii) carrying out urban and territorial planning, and it also supported the formulation and construction of water and sanitation projects.[19]

159. **Output 2: Carbon Monitoring System, implemented.** The Carbon Monitoring System (CMS) was successfully implemented. This is now a computerized tool with an environmental approach that has the capacity to monitor carbon contents periodically in the micro-watersheds. It can also evaluate forecasts and the results of activities that entail a decrease in emissions or increase in captured carbon, such as prevented deforestation, forestation, forest degradation, and land use changes. Moreover, the CMS makes it possible to carry out analysis at the watershed or farm levels, which turns it into a monitoring and evaluation tool for good agricultural and environmental-conservation practices. Lastly, the CMS is an 'offline' desktop application that operates without the need of user identification (see Figure 6).

[19] For more information, see the 'field work results' report that delves into the level of perception and ownership by the owners of PNRs and ERSs.

**Figure 6. CMS's operations scheme**




*Source: 2018 Monitoring Report*

160. As part of the implementation and validation, officials of INAFOR, MARENA, and the PEU were trained in collecting and verifying variables deemed useful data for creating reports. These variables include: vegetation cover data and forest inventory information, actual land use map, and some data on forest carbon plots in each micro-watershed under study.

161. **Output 3: Technical staff trained in carbon inventory.** According to the outcome matrix, the project set a goal of training 11 technicians in tools to estimate carbon contents. However, in the 2016-2017 period, a total of 43 technicians and officials of ENEL, INAFOR, MARENA, and ANA were trained. This means that a 391% of the goal was attained. Additionally, a training was held on September 26, 2017 to teach how to monitor ERS areas and PES-protected areas in the Apanás-Asturias watershed. It was led by a CATIE specialist and was geared to strengthening carbon estimation skills. During this training, a demonstration of the Open Data Kit tool was presented. This tool is used to monitor and evaluate the ERSs and forests under the PES mechanism.

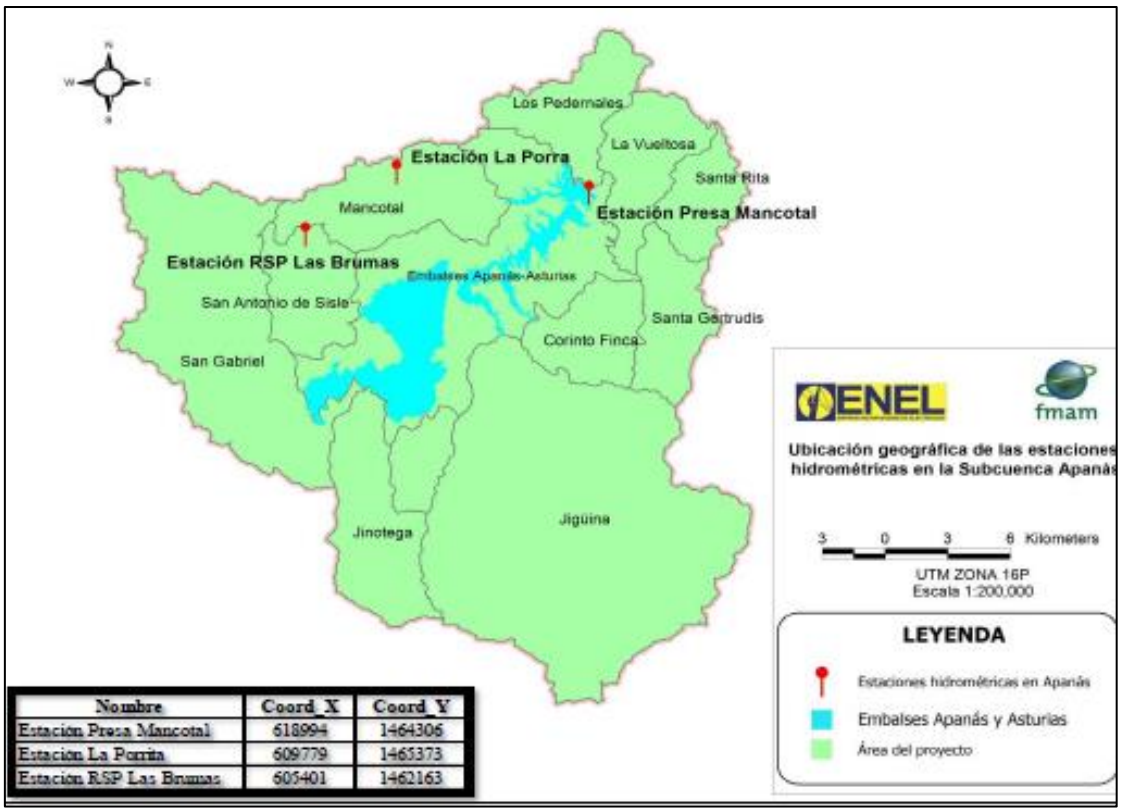
162. **Output 4: Hydrometeorological stations, installed.** The project reached 100% of this output. During the 2014-2017 period, two technical collaboration agreements were signed between ENEL and INETER to install and implement three hydrometer stations. The objective was to strengthen the network of stations and monitor the hydrological and climate variables in the Apanás-Asturias watershed. These stations are hooked into INETER's national network.

163. They are located in the sites and coordinates shown below:

- The Mancotal hydrometeorological station in the Apanás-Asturias watershed, and its UTM coordinates are X=618994 and Y= 1464306.
- The pluviometric-weather station in the community of La Porra in the San Gabriel micro-watershed, whose UTM coordinates are X=609779 and Y=1465373.
- The telemetric-weather station in the Las Brumas PNR, which is located in the community of San Gregorio, the Sisle micro-watershed; its coordinates are X= 605401, and Y= 1462163.

164. The following map shows the location of the previously mentioned stations.

**Map 1. Location of Hydrometeorological Stations**




*Source: Final Project Report*

165. **Output 5: Created Water Reference Study (bathymetry, water balance, waterflows, and sedimentation) for Lake Apanás and Lake Asturias.** In order to conduct these studies, an agreement between ENEL and CIRA was signed on July 4, 2013. In April and May 2015, the report on the hydrological studies on Lake Apanás' bathymetry, water balance, streamflow, and sedimentation was presented, discussed, and agreed upon between the co-executing institutions and CIRA.

166. Subsequently, on October 24, 2016, a technical collaboration agreement was signed between ENEL and UNA to measure the indicator for Outcome 3. This would be achieved by estimating the number of tons of erosion per year and determining the number of suspended solids in Lake Apanás, which would serve as a baseline for sediments. The measuring was completed on October 24, 2017, as per the agreement between both institutions, resulting in the achievement of 100% of the scope established in said agreement.

167. **Output 6: Integral Watershed Management Plan for Lake Apanás, adopted.** As an integral part of the strategy, the Environmental Land Reordering and Watershed Management Plan for Lake Apanás and Lake Asturias—which was commissioned by ENEL in 2018—has been strengthened by means of various studies.

168. The following specialized studies make up the Reordering Plan:

- *Analysis of the ecologic forest fragmentation and interplay in the Lake Apanás and Lake Asturias sub-watershed.*
- Creation of integrated management plans for the micro-watersheds located in the project area.
- Carbon estimation and carbon market.
- *Vulnerability assessment and study of adaptation to climate change in hydroelectric power generation.*
- Study to update soil fertility and farmer typology in the Sisle, San Antonio, Mancotal, Los Pedernales, La Esperanza, La Vueltosa, Santa Rita, and Santa Gertrudis micro-watersheds, and the Mancotal dam.
- *Update to the Apanás Ramsar site's Wetland Management Plan (1137)* in the context of the project by hiring a consultant who is a subject matter expert.

169. The reason why the Environmental Land Reordering and Watershed Management Plan for Lake Apanás and Lake Asturias was updated is so we could have an up-to-date document that can be copied and disseminated among the actors and institutions in the area.

170. **Output 7: Public school student leaders trained in watershed management.** Reportedly, 110% of this goal was achieved. This means that 165 student leaders from 28 schools were trained—16 were trained in 2014 and 149 in 2015.

171. As part of the project's institutional strengthening efforts, an Environmental Education Plan (EEP) was created and implemented. It was approved by the Environmental Management Units of the municipal offices of Jinotega and San Rafael del Norte, MINED, MARENA, INAFOR, MAG (Jinotega), and ENEL's PEU. It was implemented, coordinated, and monitored by teachers in charge of the MINED's core centers in Jinotega and San Rafael del Norte at the schools located within the project area.

172. Moreover, educational material was provided for all 28 schools in the Corinto Finca (Rio Cuyalí) micro-watershed.

173. **Output 8: Watershed committee members undergoing continued training in watershed management.** The project reached 100% of this output as originally formulated. In November 2013, an Apanás-Asturias Sub-watershed Committee was created and, in October 2013, three micro-watershed committees were established—San Gabriel, Corinto Finca, and Apanás. The committees were created following the formal and legal incorporation processes established by ANA and the water laws. The creation of these committees followed a consultation and consensus process with the ERS actors in each micro-watershed. The legal instruments that govern sub-watershed and micro-watershed committees establish that their validity is good for one year. Afterwards, the validity is automatically renewed, contingent upon the deforestation issues in the area. However, it is a good idea to renew the approval of such committees to keep the process active before ANA. The committees that were created in each micro-watershed are put into action when they are summoned to analyze ERS-related issues as a way to solve them in a collective way and to support applicable actions in the area. The project design did not provide for an action plan to define the operations and sustainability of these committees. The tasks to be performed by these committees were limited to participating in trainings and receiving technical assistance and to supporting the development

of promotion, awareness raising, and empowerment strategies for the actors who adopted the systems.

174. The elections for the Apanás-Asturias Sub-watershed Committee were held on November 6, 2013 through a consultation workshop with the participation of 100 actors from the San Gabriel, Corinto Finca, and Apanás micro-watersheds. Fourteen persons were elected to be part of the Board of Directors. Directors are elected to one-year terms as established by ANA (see Table 20Table 21).

**Table 20 Sub-watershed Committee Board**

| No. | Name | Position held on the committee | Represented institution |
|---|---|---|---|
| 1 | Julio César Palacios Arauz | Chair | UGA Jinotega |
| 2 | Joseph José Altamirano González | Vice-Chair | Movimiento Guardabarranco |
| 3 | Tatiana Pérez Pineda | Deputy Vice-Chair | Movimiento Guardabarranco |
| 4 | Rafael Osmin Altamirano | Secretary | Member of the City Council of Jinotega |
| 5 | Silvia Elena Sequeira Blandón | Treasurer | Chair for San Gabriel |
| 6 | Ana Dameysi Ortéz | Enforcer | Member of the City Council of San Rafael del Norte |
| 7 | Jasson Josué Centeno Pineda | Member | Vice-Chair for San Gabriel |
| 8 | Mario de Jesús Mairena Zelaya | Member | UGA San Rafael |
| 9 | Katalina Johana Vargas García | Member | Deputy Vice-Chair for Asturias |
| 10 | Aracely del Socorro López Perez | Member | UMA Jinotega |
| 11 | María Deysi González García | Member | Vice-Chair for Corinto Finca |
| 13 | José Antonio García | Member | Chair for Corinto Finca |
| 14 | Carlos José Rizo Valdivia | Member | Chair for Asturias |
| 15 | Maritza del Carmen Sánchez Alvarado | Member | Municipal Environmental Committee |

175. Elections for the micro-watershed committees adhered to gender equity, geographic distribution, and members' representativeness criteria. This is how the following boards were elected(see **Table 21, Table 22 and Table 23**).

**Table 21 San Gabriel Micro-watershed Board of Directors – elected on October 23, 2013**

| No. | Name | Position |
|---|---|---|
| 1 | Silvia Elena Sequeira Blandón | Chair |
| 2 | Jasson Josué Centeno Pineda | Vice-Chair |
| 3 | Sobeyda del Carmen López Pineda | Secretary |
| 4 | Teresa de Jesús Flores | Treasurer |
| 5 | Vladimir Antonio López Mayorga | Enforcer |
| 6 | Ernesto José González Castro | Member |
| 7 | Fátima del Rosario Mendoza Méndez | Member |
| 8 | Rodolfo Miranda Osegueda | Member |

**Table 22 Apanás-Asturias Micro-watershed Board of Directors – elected on October 24, 2013**

| No. | Name | Position |
|---|---|---|
| 1 | Carlos José Rizo | Chair |
| 2 | Katalina Johana Vargas García | Vice-Chair |
| 3 | Marlen Anyoleth Herrera Zamora | Secretary |
| 4 | Jesús Ruby Vargas | Treasurer |
| 5 | Gustavo Joaquín Picado | Enforcer |
| 6 | Vilma Hernández Montenegro | Member |
| 7 | Simeón Dionisio Ruiz | Member |
| 8 | Dolores de Jesús González | Member |
| 9 | Margarita Hernández Cruz | Member |
| 10 | José Ernesto Palacios Wells | Member |

**Table 23 Corinto Finca Micro-watershed Board of Directors – elected on October 25, 2013**

| No. | Name | Position |
|---|---|---|
| 1 | José Antonio García | Chair |
| 2 | María Deysi González García | Vice-Chair |
| 3 | Francisca del Carmen Castro | Secretary |
| 4 | Xiomara del Carmen García | Treasurer |
| 5 | Juan Santiago García B. | Enforcer |
| 6 | Guadalupe de Jesús González | Member |
| 7 | Cristian Justina Meza | Member |
| 8 | Liseth del Rosario Castro | Member |
| 9 | Pablo Iván Cruz Fajardo | Member |
| 10 | Xiomara Hernández Zamora | Member |

**Component 2: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration.**

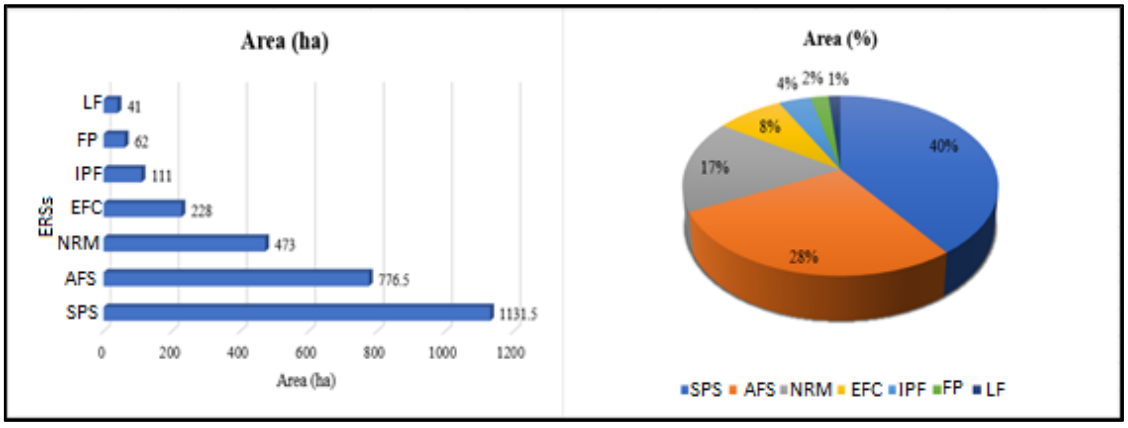
176. Project's Component 2 contains 12 outputs, eight of which are linked to the establishment of environmental restoration systems. One of them has to do with the creation of farm plans, two outputs were merged and are linked to training efforts, and, lastly, one output has to do with infrastructure development.

177. The following are the reached outputs and goals which are linked to the establishment of environmental restoration systems (ERS):

- Output 1 – Establishment of AFS.
- Output 2 – Establishment of EFC.
- Output 3 – Establishment of NRM.
- Output 4 – Establishment of SPS.
- Output 5 – Establishment of IPF.
- Output 8 – Establishment of areas with live fences.
- Output 9 – Establishment of areas with fruit plantations.
- Output 10 – Establishment of vegetable plots where soil and water resource conservation practices are implemented (deleted).

178. As for the outputs linked to the establishment of ERSs, all except for live fences, successfully reached or exceeded the goals reformulated in 2015. As seen in **Chart 1** showing all ERSs, 1131.5 ha are SPS (40%); 776.5 ha, AFS (28%); 473, ha, NRM (17%); 228 ha, EFC (8%); 111 ha, IPF (4%); 62 ha, FP (2%); and 41 ha, live fences (1%). The IDB/GEF project established a total of 2,823 ha.

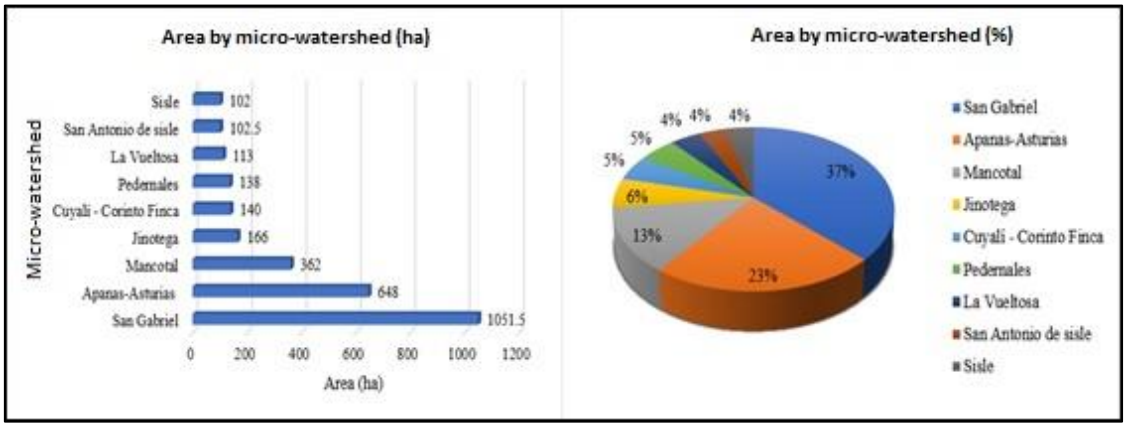
**Chart 1. Total area broken down by implemented ERS**




*Source: ENEL, 2018.*

179. If the ERS areas are broken down by micro-watersheds, this shows that 37% are located in the San Gabriel micro-watershed (1051.5 ha), 23% in Apanás-Asturias (648 ha), 13% in Mancotal (362 ha), 6% in Jinotega (166 ha), 5% in Cuyalí-Corinto Finca, 4.9% in Pedernales (138 ha), 4% in La Vueltosa (113 ha), 3.6% in San Antonio Sisle (102.5 ha), and 3.6% in Sisle (102 ha) (see **Chart 2**).

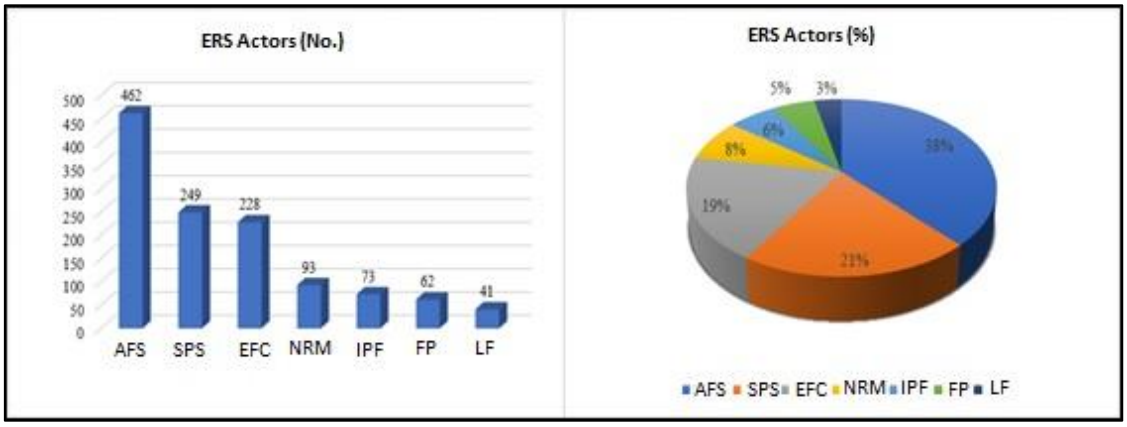
**Chart 2. Total area broken down by micro-watershed (in ha)**




*Source: ENEL, 2018.*

180. Also, 1,208 actors were needed to establish the ERSs in those 2,823 ha. AFSs are the ERSs with more participants, that is, 462 actors, which represents 38% of the total number of actors. They are followed by SPS with 462 actors (21%), EFC with 228 (19%), NRM with 93 (8%), IPF with 73 (6%), FP with 62 (5%), and live fences with 41 (3%) (see **Chart 3**).

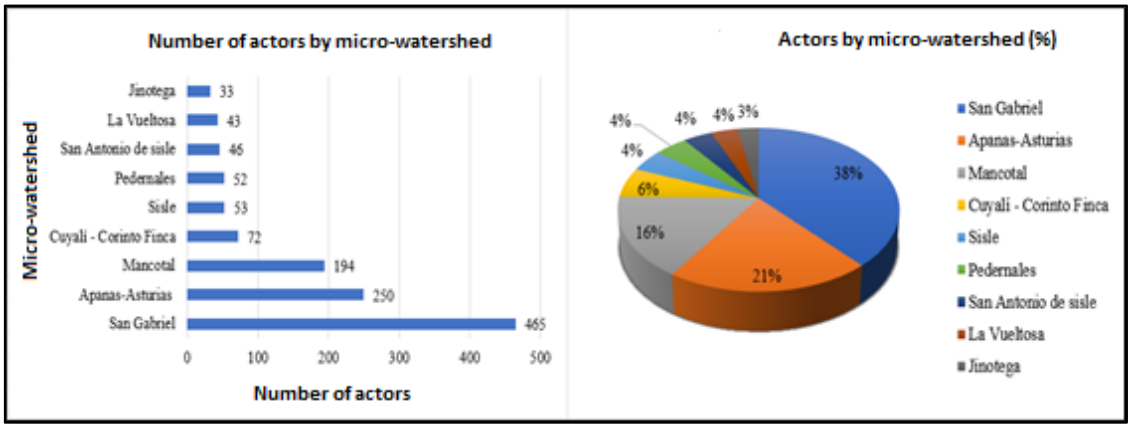
**Chart 3. Number of actors broken down by ERS**




*Source: ENEL, 2018.*

181. Moreover, San Gabriel is the micro-watershed that concentrates 38% of actors with 465 participants. This is followed by Apanás-Asturias with 21% (250 actors), Mancotal with 16% (194), Cuyalí-Corinto Finca with 6% (72), Sisle with 4.4% (53), Pedernales with 4.3% (52), San Antonio Sisle with 3.8% (46), La Vueltosa with 3.6% (43), and Jinotega with 3% (33) (see **Chart 4**).

**Chart 4. Number of actors broken down by micro-watershed**




*Source: ENEL, 2018.*

182. It should be noted that, according to the project's progress reports, the establishment of the various ERSs was delayed mainly due to the impacts of El Niño on the region.

183. Below is a detail of each product by component.

184. **Output 6: Created farm plans.** In the context of the project, 61 farm plans were created—one plan over the established goal. Each farm plan included information about the plantation forests profile and other types of forest cover present in the farms. Moreover, the Project created 385 profiles for plantation registration, thereby making it possible for each owner to receive a certificate of registration issued by the National Forest Registry. It should be noted that both the profile and the farm plan are requirements for the PES mechanism.

185. **Output 7: Five communities trained in business plan formulation, sustainable forest reordering, and wood value chains.** This output was merged with Output 11 when the project was under review in 2015.

186. **Output 10: Areas of vegetable plots where soil and water resource conservation practices are implemented.** When the project was being reformulated in 2015, this output was deleted and its resources were reallocated to other outputs related with environmental restoration systems.

187. **Output 11: At least 150 farmers were trained in topics such as agroforestry, soils, and environmentally sustainable farm management.** The revised goal (in 2015) was 154 trained farmers, which was widely exceeded, as a total of 526 ERS-farmers were trained.

188. The trainings for the farmers were led by the extension specialists from Component 2. The objective was to promote practical tools to improve reordering and management of production systems in a sustainable and environmentally-friendly way.

189. The topics covered in the trainings were: (i) establishment of agroforestry systems, (ii) establishment of eco-forestry coffee, (iii) establishment of silvopastoral systems, (iv) soil and water conservation, (v) water harvesting, (vi) methodology to create a farm reordering plan, and (vi) coffee pest/disease control and management.

190. **Output 12: Basic infrastructure projects built for sediment retention.** This goal was reached satisfactorily, as 42 gabions were built alongside riverbanks for sediment retention, as follows: (i) 6 in 2015, (ii) 23 in 2016, and (iii) 13 in 2017.

191. The design and construction of gabions was properly inspected by civil engineering specialists—ENEL's hydraulic specialists. They carried out this inspection following the required specifications in order to protect against water abrasion on riverbanks and to redirect streamflow in the areas from where run-off drags more sediment.

192. **Table 24** Shows the specific locations of built gabions in the Apanás-Asturias sub-watershed.

**Table 24. Location of gabions built by the Project**

| Site | Community | X coordinates | Y coordinates | Width (in m) | Height (in m) |
|---|---|---|---|---|---|
| 1 | Chagüite Grande 1 | 603580 | 1453323 | 14 | 3 |
| 2 | Sisle 2 | 603687 | 1453423 | 10 | 4 |
| 3 | Sisle 2 | 606332 | 1458793 | 14 | 3 |
| 4 | San Antonio de Sisle | 605520 | 1460215 | 10 | 3 |
| 5 | San Antonio de Sisle | 605512 | 1460218 | 14 | 3 |
| 6 | San Gabriel | 601648 | 1456267 | 7 | 1 |
| 7 | San Gabriel | 601648 | 1456267 | 7 | 1 |
| 8 | Mancotal (River) | 609804 | 1464211 | 13 | 3 |
| 9 | Mancotal (bridge) | 610716 | 1464283 | 15 | 3 |
| 10 | Mancotal Arriba (River) | 611433 | 1464962 | 10 | 2 |
| 11 | Mancotal Arriba (River) | 611453 | 1464967 | 5 | 2 |
| 12 | Mancotal Abajo (River) | 611470 | 1465000 | 5 | 2 |
| 13 | Mancotal Abajo (River) | 611475 | 1464986 | 5 | 2 |
| 14 | Mancotal Abajo | 611621 | 1465097 | 6 | 2 |
| 15 | Mancotal Abajo | 611605 | 1465072 | 6 | 2 |
| 16 | Mancotal Abajo | 612486 | 1464549 | 6 | 2 |

| Site | Community | X coordinates | Y coordinates | Width (in m) | Height (in m) |
|---|---|---|---|---|---|
| 17 | Paso Real (bridge) | 613674 | 1463076 | 15 | 2 |
| 18 | La Porrita gore | 610108 | 1460175 | 13 | 2 |
| 19 | La Porrita gore | 610126 | 1460170 | 8 | 2 |
| 20 | Road to Los Robles | 614582 | 1455054 | 6 | 3 |
| 21 | Road to Los Robles | 614582 | 1455054 | 5 | 2 |
| 22 | Los Robles | 614692 | 1455042 | 8 | 2 |
| 23 | Los Robles | 614692 | 1455042 | 8 | 2 |
| 24 | San Pedro de Buculmay | 614108 | 1455851 | 10 | 3 |
| 25 | San Pedro de Buculmay | 614108 | 1455851 | 5 | 2 |
| 26 | San Pedro de Buculmay | 619725 | 1455956 | 15 | 2 |
| 27 | Cuyalí River | 621313 | 1456856 | 20 | 2 |
| 28 | Arenales | 618360 | 1465718 | 13 | 2 |
| 29 | Arenales | 618946 | 1466010 | 12 | 3 |
| 30 | El Pencal | 597970 | 1462383 | 15 | 2 |
| 31 | El Pencal (River) | 597974 | 1462325 | 15 | 2 |
| 32 | El Aguacatal | 599398 | 1462392 | 8 | 2 |
| 33 | El Aguacatal | 599398 | 1462392 | 8 | 2 |
| 34 | El Aguacatal (River) | 599895 | 1462563 | 10 | 2 |
| 35 | El Aguacatal | 599992 | 1462604 | 8 | 2 |
| 36 | El Aguacatal | 599992 | 1462604 | 14 | 2 |
| 37 | El Aguacatal | 600105 | 1462544 | 12 | 3 |
| 38 | La Altura | 597544 | 1463385 | 15 | 2 |
| 39 | La Altura | 597644 | 1463718 | 10 | 2 |
| 40 | La Altura | 597544 | 1463385 | 7 | 3 |
| 41 | Los Potrerillos | 601342 | 1460741 | 8 | 1 |
| 42 | El Pencal (bridge) | 600068 | 1462573 | 7 | 1 |

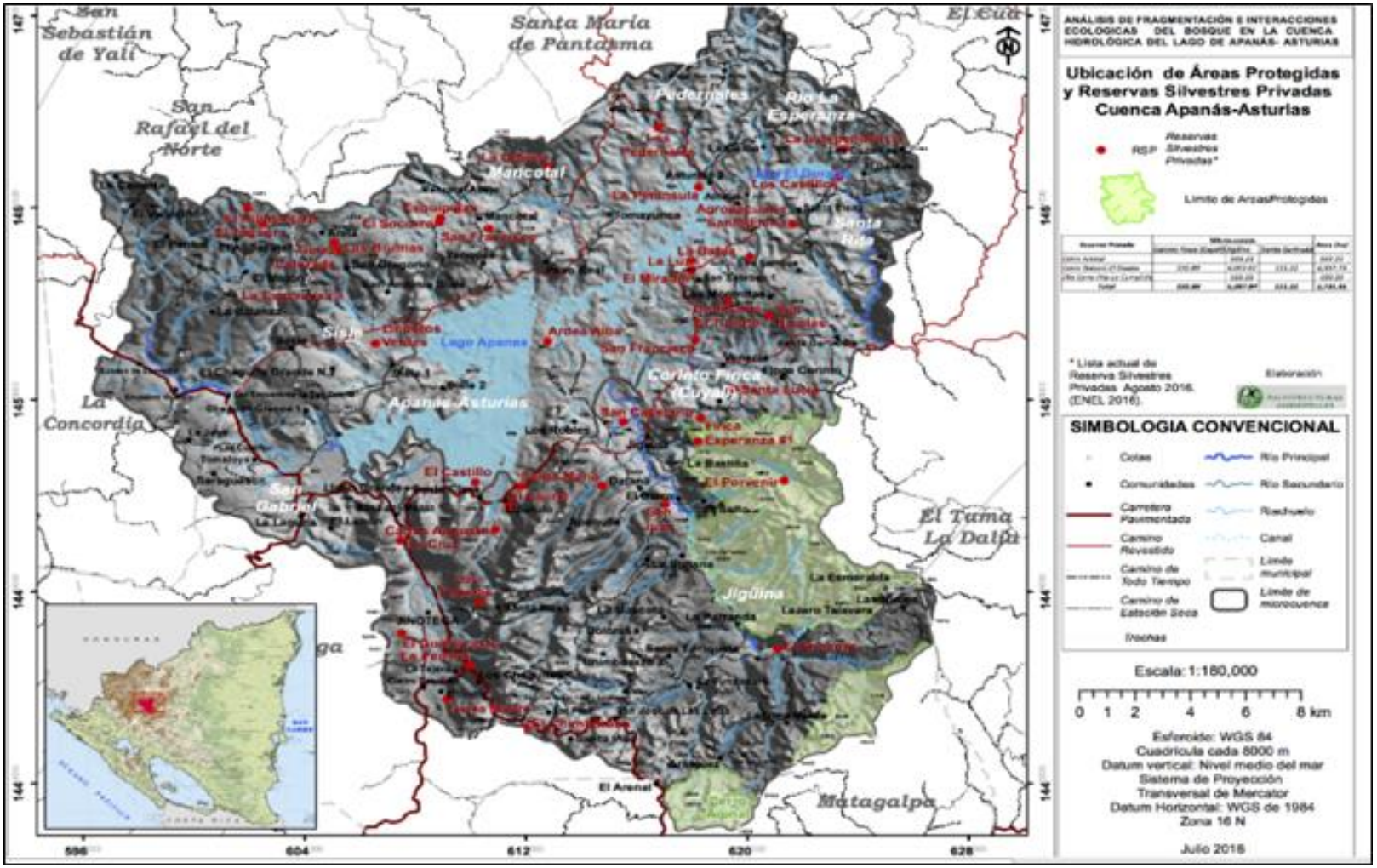
*Source: Final Project Report.*

**Component 3: Conservation of forest areas and biodiversity in Private Nature Reserves and the Ramsar site.**

193. **Output 1: Created management plans for private nature reserves.** Execution for this output reached 111% of the goal (38 plans for PNRs), as a total of 42 farms were declared PNRs through MARENA's ministerial decree in the 2014-2017 period (see **Map 2**).

194. These 42 farms represent an area of 1,545.45 ha of protected land that was incorporated into the National Network of Private Nature Reserves. All PNRs that were accredited by MARENA have the following technical documents: quick ecological studies (QES), environmental management plans (EMP), and all required legal documentation (ministerial decree, property deed, and national identity card, among others).

**Map 2. Location of the 42 PNRs established by the Project**




*Source: Final Project Evaluation*

195. The 42 farms that were declared PNRs in the Apanás-Asturias sub-watershed are listed on **Table 25**.

**Table 25. Farms declared PNRs by the Project[20]**

| No. | Reserve | Ministerial decree | No. | Reserve | Ministerial decree |
|---|---|---|---|---|---|
| 1 | El Jaguar | 15.04.2014 | 22 | La Guadalupana | 56.12.2014 |
| 2 | Kilimanjaro | 12.04.2014 | 23 | El Castillo | 12.03.2016 |
| 3 | El Chimborazo | 13.04.2014 | 24 | Las Brumas | 14.03.2016 |
| 4 | El Encanto | 14.04.2014 | 25 | Tierra Colorada | 15.03.2016 |
| 5 | La Luz | 18.04.2014 | 26 | Linderos Verdes | 16.03.2016 |
| 6 | "El Triunfo" agricultural farm | 22.05.2014 | 27 | San Francisco | 13.03.2016 |
| 7 | "Los Potrerillos" agricultural farm | 23.05.2014 | 28 | La Odisea | 80.11.2016 |
| 8 | Los Castillos | 24.05.2014 | 29 | La Independencia | 45.09.2016 |
| 9 | "Santa Elena" agricultural farm | 60.12.2014 | 30 | Tierra Madre | 62.10.2016 |
| 10 | El Mirador | 16.04.2014 | 31 | La Esperanza 1 | 63.10.2016 |
| 11 | La Bahía | 17.04.2014 | 32 | La Esperanza 2 | 64.10.2016 |
| 12 | Carlos Augusto | 14-2001 | 33 | La Perrera | 46.09.2016 |
| 13 | El Laurel | 21.05.2014 | 34 | La Cruz | 48.09.2016 |
| 14 | La Esperanza | 60.12.2014 | 35 | El Socorro | 44.09.2016 |
| 15 | Los Papales | 57.12.2014 | 36 | San Francisco | 49.09.2016 |
| 16 | Los Pedernales | 58.12.2014 | 37 | El Guanacaste | 47.09.2016 |
| 17 | San Cayetano | 53.12.2014 | 38 | San Juan | 78.11.2016 |
| 18 | San Nicolás | 54.12.2014 | 39 | San Jorge | 77.11.2016 |
| 19 | Santa Lucía | 09.02.2015 | 40 | El Timato | 79.11.2016 |
| 20 | Santa María | 59.12.2014 | 41 | El Porvenir | 108.07.2017 |
| 21 | La Península | 55.12.2014 | 42 | Ardea Alba | 109.07.2017 |

*Source: Final Project Report*

196. **Output 2. Bioindicator monitoring system established for the Ramsar site.** This tool is connected to the National Environmental Information System (SINIA, in Spanish), which is managed and operated by MARENA. It is currently validating project data collected on site. The data collection process follows these steps: the taxonomists collect information, which is then delivered to the Delegation; the Delegation submits this information to the central office of MARENA to feed the system. The system was created in January 2018 along with the publication of bioindicator monitoring manuals for terrestrial/aquatic fauna and terrestrial flora. A training was held for the community members in charge of collecting data on site. It is recommended that this system, which is connected to SINIA, be updated and monitored on an annual basis.

197. As part of the system, 15 species in the Apanás watershed were identified as environmental bioindicators. Fourteen local actors were trained to serve as community parataxonomists within the Community Bioindicator Monitoring System[21].

[20] Two existing PNRs, Carlos Augusto and El Jaguar. The former' area was verified, and the latter's conservation area was expanded, which required the QES/EMP processes to start over to get a new ministerial decree.

198. Furthermore, the following documents were drawn up and published: (i) three bioindicator monitoring manuals for terrestrial/aquatic fauna and terrestrial flora; (ii) eight wildlife management manuals for various taxa (fish, orchids, fungi, ferns, heliconia, butterflies, red-eyed green frog, lowland paca, and the Central American agouti), and (iii) an administration and user's manual for the users of the community monitoring system. A list of trained taxonomists is shown on **Table 26**.

**Table 26. Trained parataxonomists**

| Component | Name | PNR/Community |
|---|---|---|
| Flora | 1. Andrea Herrera | El Laurel PNR |
| | 2. Andrés Altamirano | Kilimanjaro PNR |
| | 3. Douglas Méndez | Linderos Verdes PNR |
| | 4. Roger Elías Zeas | El Mirador/La Bahía PNR |
| | 5. Milton Martínez C. | El Encanto PNR |
| | 6. Juana Salguera | Santa Lucía |
| Terrestrial fauna | 7. Rodrigo López | El Gobiado |
| | 8. Jimmy Zeledón | Jinotega/MARENA |
| | 9. Moisés Siles | El Jaguar PNR |
| | 10. Wilmer Talavera | El Jaguar PNR |
| | 11. Augnner Pérez | Jinotega/MARENA |
| Aquatic fauna | 12. Lenner Isidro Hernández A. | Sisle 1 |
| | 13. Walter Tomas Cruz R.* | Asturias |
| | 14. Heriberto Guatemala Rivera | Asturias |

*Source: Presentation "Achievements of Component 3 in Apanás – MARENA, 8/8/2018."*

199. **Output 3. Constructed and operating infrastructure for biodiversity conservation.** The project achieved 100% of this goal. As seen in Table 27, 35 infrastructure projects were completed (21 orchid gardens, six frog farms, five iguana farms, three butterfly farms) for conservation efforts in the Apanás-Asturias, Mancotal, Corinto Finca, Jigüina, Jinotega, Sisle, San Antonio de Sisle, and La Vueltosa micro-watersheds (see **Map 3**).

**Table 27. Animal breeding centers installed by the Project**

| N° | Private Nature Reserve (PNR) | Ministerial decree | Animal breeding center | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | Butterfly farm | Orchid garden | Frog farm | Iguana farm | |
| 1 | El Jaguar | 15.04.2014 | | | 1 | | 1 |
| 2 | Kilimanjaro | 12.04.2014 | | 1 | | | 1 |
| 4 | El Encanto | 14.04.2014 | | 1 | | | 1 |
| 6 | El Triunfo | 22.05.2014 | | 1 | | | 1 |
| 7 | Los Potrerillos | 23.05.2014 | 1 | | | | 1 |
| 8 | Los Castillos | 24.05.2014 | | 1 | | | 1 |
| 10 | El Mirador | 16.04.2014 | | 1 | | | 1 |
| 11 | La Bahía | 17.04.2014 | | | 1 | | 1 |
| 12 | Carlos Augusto | 14-2001 | | | 1 | | 1 |

[21] Ten 'Wildlife Management' workshops were held in Jinotega from February 21 to February 23, 2017. Also, the CMS workshop was held on January 20, 2017 at SINIA.

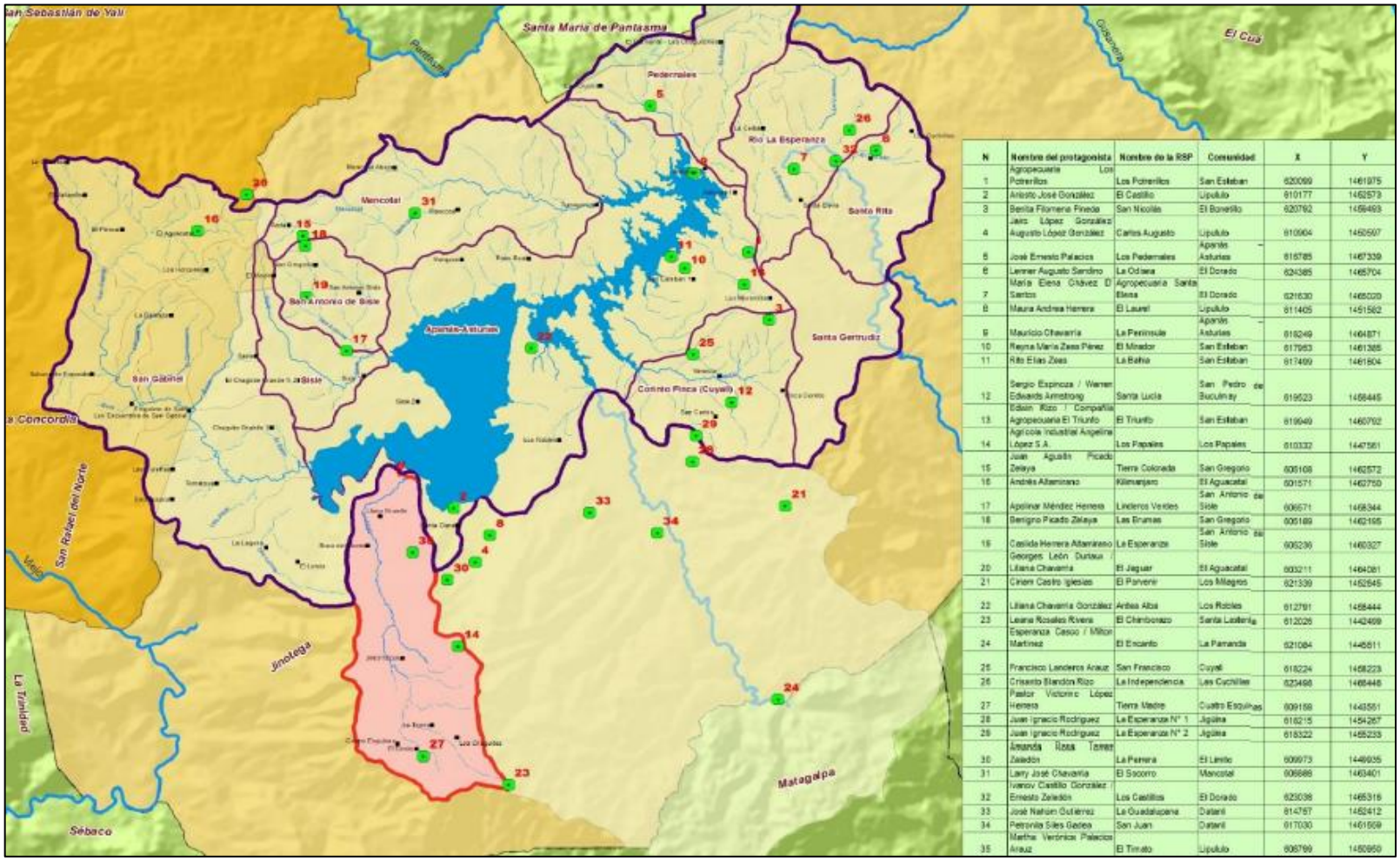
| N° | Private Nature Reserve (PNR) | Ministerial decree | Animal breeding center | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | Butterfly farm | Orchid garden | Frog farm | Iguana farm | |
| 13 | El Laurel | 21.05.2014 | | 1 | | | 1 |
| 14 | La Esperanza | 60.12.2014 | | | | 1 | 1 |
| 15 | Los Papales | 57.12.2014 | | 1 | | | 1 |
| 16 | Los Pedernales | 58.12.2014 | | | | 1 | 1 |
| 18 | San Nicolás | 54.12.2014 | | | 1 | | 1 |
| 19 | Santa Lucía | 09.02.2015 | | 1 | | | 1 |
| 21 | La Península | 55.12.2014 | | | | 1 | 1 |
| 22 | La Guadalupana | 56.12.2014 | | 1 | | | 1 |
| 23 | El Castillo | 12.03.2016 | 1 | | | | 1 |
| 24 | Las Brumas | 14.03.2016 | | 1 | | | 1 |
| 26 | Linderos Verdes | 16.03.2016 | | 1 | | | 1 |
| 27 | San Francisco | 13.03.2016 | 1 | | | | 1 |
| 28 | La Odisea | 80.11.2016 | | 1 | | | 1 |
| 29 | La Independencia | 45.09.2016 | | 1 | | | 1 |
| 30 | Tierra Madre | 62.10.2016 | | | | 1 | 1 |
| 31 | La Esperanza 1 | 63.10.2016 | | 1 | | | 1 |
| 32 | La Esperanza 2 | 64.10.2016 | | 1 | | | 1 |
| 33 | La Perrera | 46.09.2016 | | | 1 | | 1 |
| 34 | La Cruz | 48.09.2016 | | | | 1 | 1 |
| 35 | El Socorro | 44.09.2016 | | 1 | | | 1 |
| 36 | Ardea Alba | 49.09.2016 | | | 1 | | 1 |
| 37 | El Guanacaste | 47.09.2016 | | 1 | | | 1 |
| 38 | San Juan | 78.11.2016 | | 1 | | | 1 |
| 39 | San Jorge | 77.11.2016 | | 1 | | | 1 |
| 40 | El Timato | 79.11.2016 | | 1 | | | 1 |
| 41 | El Porvenir | 108.07.2017 | | 1 | | | 1 |
| Total | | | 3 | 21 | 6 | 5 | 35 |

*Source: Final Project Report.*

200. In connection with the built infrastructure, MARENA coordinated the delivery of 448 breeding stocks for the green iguana (200) and red-eyed green frog (248) breeding centers.

201. It should be pointed out that, thanks to the agreement signed between ENEL, MARENA, and FAZOONIC, technical assistance for PNR owners was ensured to manage the built infrastructure projects. Moreover, four manuals for animal breeding were successfully published.

**Map 3. Location of conservation infrastructure projects**




| N | Nombre del protagonista | Nombre de la RSP | Comunidad | X | Y |
|---|---|---|---|---|---|
| 1 | Agropecuaria Los Potrerillos | Los Potrerillos | San Esteban | 620099 | 1461975 |
| 2 | Aniesto José González | El Castillo | Lipululo | 610177 | 1462573 |
| 3 | Benita Filomena Pineda | San Nicolás | El Bonetillo | 620792 | 1459493 |
| 4 | Jairo López González Augusto López González | Carlos Augusto | Lipululo | 610904 | 1462507 |
| 5 | José Ernesto Palacios | Los Pedernales | Apanás Asturias | 616785 | 1467339 |
| 6 | Lenner Augusto Sandino | La Odisea | El Dorado | 624385 | 1465704 |
| 7 | María Elena Chávez D Santos | Agropecuaria Santa Elena | El Dorado | 621630 | 1465020 |
| 8 | Maura Andrea Herrera | El Laurel | Lipululo | 611405 | 1451562 |
| 9 | Mauricio Chavarría | La Península | Apanás Asturias | 616249 | 1464871 |
| 10 | Reyna María Zeas Pérez | El Mirador | San Esteban | 617953 | 1461385 |
| 11 | Rito Elías Zeas | La Bahía | San Esteban | 617499 | 1461804 |
| 12 | Sergio Espinoza / Warren Edwards Armstrong | Santa Lucía | San Pedro de Buculmay | 619523 | 1458445 |
| 13 | Edwin Rizo / Compañía Agropecuaria El Triunfo | El Triunfo | San Esteban | 619949 | 1460702 |
| 14 | Agrícola Industrial Angelina López S.A. | Los Papales | Los Papales | 610332 | 1447561 |
| 15 | Juan Agustín Picado Zelaya | Tierra Colorada | San Gregorio | 605108 | 1462572 |
| 16 | Andrés Altamirano | Kilimanjaro | El Aguacatal | 601571 | 1462750 |
| 17 | Apolinar Méndez Herrera | Linderos Verdes | San Antonio de Sisle | 606571 | 1468344 |
| 18 | Benigno Picado Zelaya | Las Brumas | San Gregorio | 605189 | 1462195 |
| 19 | Casilda Herrera Altamirano | La Esperanza | San Antonio de Sisle | 606236 | 1460327 |
| 20 | Georges León Dutreux / Liliana Chavarría | El Jaguar | El Aguacatal | 603211 | 1464081 |
| 21 | Cirieni Castro Iglesias | El Porvenir | Los Milagros | 621339 | 1462545 |
| 22 | Liliana Chavarría González | Antea Alba | Los Robles | 612791 | 1468444 |
| 23 | Leana Rosales Rivera | El Chimborazo | Santa Lastenia | 612026 | 1462469 |
| 24 | Esperanza Casco / Milton Martínez | El Encanto | La Pamanda | 621084 | 1445811 |
| 25 | Francisco Landeros Araúz | San Francisco | Cuyalí | 618224 | 1468223 |
| 26 | Crisanto Blandón Rizo | La Independencia | Las Cuchillas | 623466 | 1468446 |
| 27 | Pastor Victorino López Herrera | Tierra Madre | Cuatro Esquinas | 609158 | 1449551 |
| 28 | Juan Ignacio Rodríguez | La Esperanza N° 1 | Jigüina | 618215 | 1454267 |
| 29 | Juan Ignacio Rodríguez | La Esperanza N° 2 | Jigüina | 618322 | 1455233 |
| 30 | Amanda Rosa Torres Zeledón | La Pemera | El Limón | 609973 | 1449935 |
| 31 | Larry José Chavarría | El Socorro | Mancotal | 606686 | 1463401 |
| 32 | Ivanov Castillo González / Ernesto Zeledón | Los Castillos | El Dorado | 623038 | 1465316 |
| 33 | José Nahum Gutiérrez | La Guadalupana | Datanlí | 614757 | 1452412 |
| 34 | Petronila Siles Gadea | San Juan | Datanlí | 617030 | 1461569 |
| 35 | Martha Verónica Palacios Araúz | El Tirrato | Lipululo | 606799 | 1460950 |

*Source: Final Project Report.*

202. **Output 4: Created business plans for eco-tourist circuits.** The project reached 100% of this output in general terms, thus making it possible for 25 families in the Apanás watershed to have their business plan to promote ecotourist initiatives in the area. These plans were approved by MARENA and INTUR Jinotega by the end of 2014.

**Figure 7. Types of business plans**


*Source: Presentation "Achievements of Component 3 in Apanás – MARENA, 8/8/2018."*

203. In order to strengthen this output, MARENA finalized an interinstitutional collaboration agreement with ENEL and UNA, which resulted in the development of a training and the accreditation of 25 local tourist guides. The training was made up of four modules: a) guiding techniques, b) cultural heritage, c) natural heritage, and d) first aid techniques.

204. **Output 5. Established ecotourism sighting points.** A total of 35 sighting ranches were built. They serve as observation points for biodiversity indicators for research purposes and enablers of ecotourism in the PNR farms.

**Figure 8. Sighting ranches**

*Source: Presentation "Achievements of Component 3 in Apanás – MARENA, 8/8/2018."*

205. Also, 27 signs containing general information about the PNRs were built and installed to make the reserves more visible.

206. **Table 28** contains information about the reserves where the 35 sighting ranches were built:

**Table 28. Sighting ranches**

| N° | Private Nature Reserve | Actor's name | Community | Coordinates | |
|---|---|---|---|---|---|
| | | | | X | Y |
| 1 | El Jaguar | Georges León Duriaux<br>Liliana Chavarría | El Aguacatal | 603211 | 1464081 |
| 2 | Kilimanjaro | Andrés Altamirano | El Aguacatal | 601571 | 1462750 |
| 3 | Los Pedernales | José Ernesto Palacios | Apanás-Asturias | 616785 | 1467339 |
| 4 | La Península | Mauricio Chavarría | Apanás-Asturias | 618249 | 1464871 |
| 5 | Tierra Madre | Pastor Victorino López Herrera | Cuatro Esquinas | 609158 | 1443551 |
| 6 | San Francisco | Francisco Landeros Arauz | Cuyalí | 618224 | 1458223 |
| 7 | La Guadalupana | José Nahúm Gutiérrez | Datanlí | 614757 | 1452412 |
| 8 | San Juan | Petronila Siles Gadea | Datanlí | 617030 | 1451659 |
| 9 | San Nicolás | Benita Filomena Pineda | El Bonetilllo | 620792 | 1459493 |
| 10 | "Santa Elena" agricultural farm | María Elena Chávez D' Santos | El Dorado | 621630 | 1465020 |
| 11 | Los Castillos | Ivanov Castillo González<br>Ernesto Zeledón | El Dorado | 623038 | 1465316 |
| 12 | La Odisea | Lenner Augusto Sandino | El Dorado | 624385 | 1465704 |
| 13 | La Perrera | Amanda Rosa Torrez Zeledón | El Limito | 609973 | 1449935 |
| 14 | La Esperanza 1 | Juan Ignacio Rodríguez | Jigüina | 618215 | 1454267 |
| 15 | La Esperanza 2 | Juan Ignacio Rodríguez | Jigüina | 618322 | 1455233 |
| 16 | El Encanto | Esperanza Casco<br>Milton Martínez C. | La Parranda | 621084 | 1445611 |
| 17 | La Independencia | Crisanto Blandón Rizo | Las Cuchillas | 623498 | 1466446 |
| 18 | Los Castillos | Ariosto José González | Lipululo | 610177 | 1452573 |
| 19 | Carlos Augusto | Jairo López González<br>Augusto López González | Lipululo | 610904 | 1450597 |
| 20 | El Laurel | Maura Andrea Herrera | Lipululo | 611405 | 1451582 |
| 21 | El Timato | Martha Verónica Palacios Arauz | Lipululo | 608799 | 1450950 |
| 22 | El Porvenir | Miriam Castro Iglesias | Los Milagros | 621339 | 1452645 |
| 23 | Los Papales | Agrícola Industrial Angelina López S.A. | Los Papales | 610332 | 1447561 |
| 24 | Ardea Alba | Liliana Chavarría González | Los Robles | 612791 | 1458444 |
| 25 | El Socorro | Larry José Chavarría | Mancotal | 608888 | 1463401 |
| 26 | La Esperanza | Casilda Herrera Altamirano | San Antonio de Sisle | 605236 | 1460327 |
| 27 | Linderos Verdes | Apolinar Méndez Herrera | San Antonio de Sisle | 606571 | 1458344 |
| 28 | El Triunfo | Edwin Rizo, El Triunfo" agricultural company | San Esteban | 619949 | 1460792 |
| 29 | Los Potrerillos | "Los Potrerillos" agricultural farm | San Esteban | 620099 | 1461975 |
| 30 | El Mirador | Reyna María Zeas Pérez | San Esteban | 617953 | 1461385 |
| 31 | La Bahía | Rito Elías Zeas | San Esteban | 617499 | 1461804 |
| 32 | Las Brumas | Benigno Picado Zelaya | San Gregorio | 605189 | 1462195 |
| 33 | Tierra Colorada | Juan Agustín Picado Zelaya | San Gregorio | 605108 | 1462572 |
| 34 | Santa Lucía | Sergio Espinoza<br>Warren Edwards Armstrong | San Pedro de Bucul May | 619523 | 1456445 |
| 35 | El Chimborazo | Leana Rosales Rivera | Santa Lastenia | 612026 | 1442499 |

*Source: Final Project Report.*

**Component 4: Design and implementation of the Payments for Environmental Services mechanism in the Apanás-Asturias watershed.**

207. ***Output 1: Created economic assessment study for the environmental services in the watershed, and Output 2: Created design study for the PES mechanism.*** Output 4.1 was merged with Output 4.2, and it was achieved in 2016 when the consulting services "Economic assessment of payments for environmental services, biodiversity, and design of the compensation for environmental services mechanism" were contracted.

208. Based on the results of these consulting services, it was evidenced that the main problems in the watershed are the expansion of the agricultural frontier and the loss of forest cover. This is why the water PES scheme was reformulated and turned into a Payment for Environmental Services mechanism for conservation, reforestation, and protection of the forest cover as a contributing factor for greenhouse gases sequestration (climate change mitigation). This ensures a habitat for biodiversity, reduces sediments (erosion), increases streamflow, and ensures the sustainability of hydroelectric power generation activities, which are managed by ENEL.

209. In order to strengthen the consulting services' results, an analysis of the following was carried out: cost-opportunity for the various ERSs, PES implementation scenarios, and economic assessment of the environmental services. Moreover, an agreement was signed as a result of these consulting services in order to create a payment for environmental services mechanism in the Lake Apanás and Lake Asturias watershed. The agreement was signed on February 3, 2017 between ANA, MARENA, ENEL, and INAFOR.

210. ***Output 3: Implemented fund for the PES mechanism to promote plantation forests.*** One hundred percent of this output, as programed in the project, was reached. A seed capital in the amount of US$557,693.54 was established to implement the PES mechanism. In order to produce this output, consulting services for 'technical assistance to strengthen the Project's Technical Unit and oversee the implementation of the PES mechanism' were hired. These consulting services were provided by the Agricultural Research and Higher Education Center (CATIE).

211. It should be noted that the fund shall only be used to pay for PES contracts' obligations (with the actors) for a four-year term (2018-2021). It does not cover administration and operations costs incurred by PEU while performing monitoring and tracking activities, as ENEL took over this part as part of the commitments undertaken with the IDB.

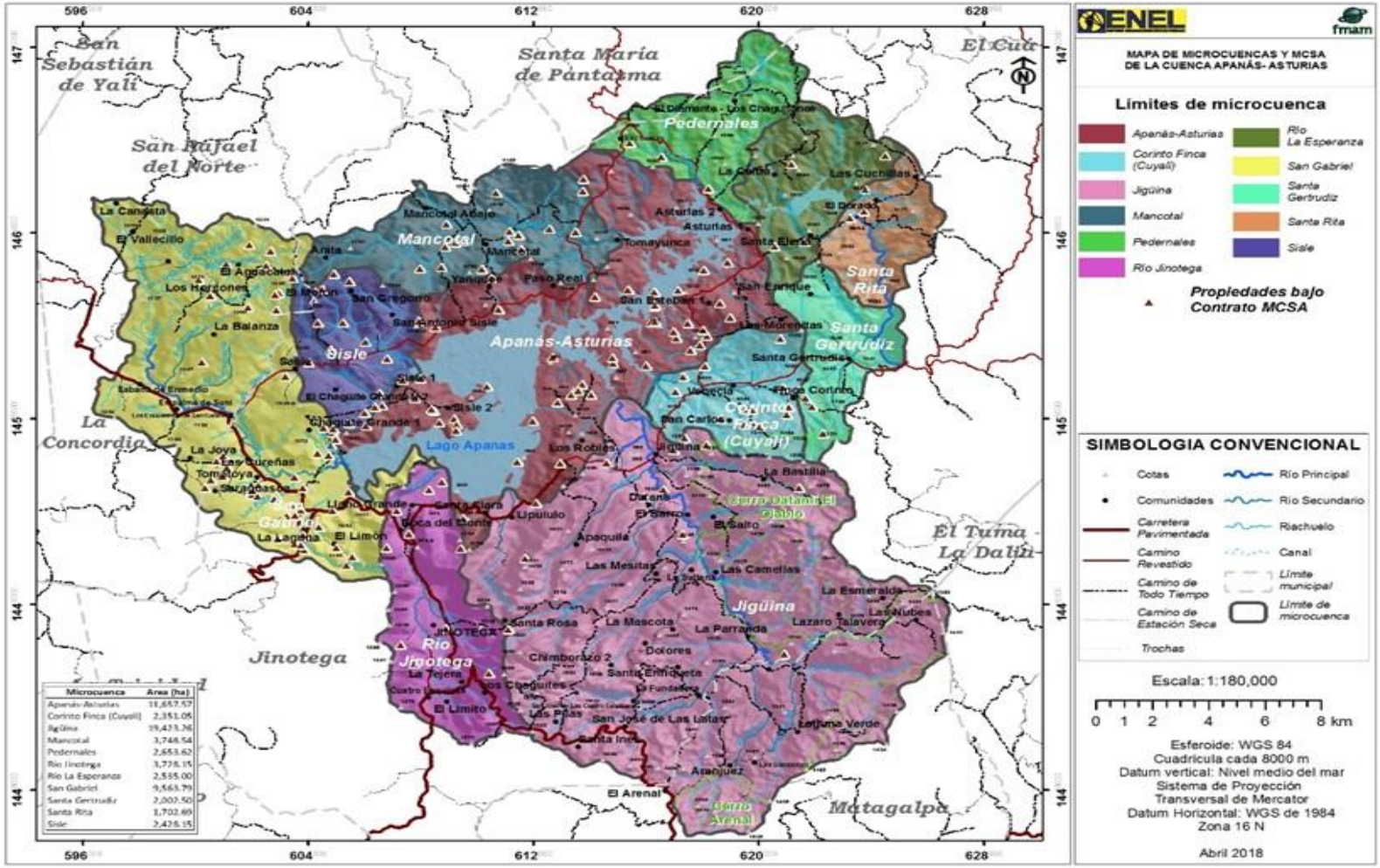
212. ***Output 4: Implemented dissemination workshops for the PES mechanism.*** Twelve workshops were held with the objective of raising awareness and disseminating information about the PES mechanism. In turn, this would help ensure the mechanism's sustainability. The workshops were led by: (i) UNA—through a collaboration agreement with ENEL—; (ii) PEU's specialist in environmental economy; and (iii) CATIE.

213. According to the two semiannual reports created by ENEL's PEU, it was reported that 30 officials and technicians from the four co-executing institutions were engaged in this output, as well as 221 accredited actors with ERS and PNR.

214. Moreover, the workshops made it possible for the participants to (i) identify the environmental wealth they have in their communities, (ii) learn about the environmental services that require conservation, and (iii) learn about the basics and characteristics of the PES mechanism.

215. ***Output 5: Contracts for the Payment for Environmental Services mechanism, drafted and in force.*** The programmed goal was 75 signed contracts. At project closeout date, 184 contracts had been signed, i.e., 245% of the goal was attained. The location of the 184 farms under the PES mechanism are shown on Map 4.

**Map 4. Location of the 184 farms under the PES mechanism**



c. Unforeseen results

216. **PAGRICC's contribution to the IDB/GEF project.** As mentioned in Section 2.11, the implementation of the PAGRICC program by MARENA was not accounted for during the design phase. The PAGRICC program contributed to improving the sustainability of the soil and forested areas in the Apanás watershed by applying ERSs on 4,304.0 ha.

217. As a result, there is a total of 10,452.8 ha of protected land in the watershed, 3,325.8 ha of which (32%) were there before project start, 2,823.0 of which (27%) were established through the IDB project, and 4,304.0 of which (41%) were established through the PAGRICC program (see **Table 30.** Evolution of Outcome 1 Indicator, **Chart 5** and **Chart 6**).

**Table 29. Hectares under sustainable management practices**

| Type of system | Dedicated area (in ha) | | Rise | System participation / total hectares (%) |
|---|---|---|---|---|
| | Before (2010) | After (Feb. 2018) | Ha | |
| Silvopastoral systems (SPS) | 2,104.4 | 3,235.9 | 1,131.5 | 40% |
| Agroforestry systems (AFS) | 0 | 776.5 | 776.5 | 28% |
| Natural regeneration system (NRS) | 1,152.8 | 1,625.8 | 473.0 | 17% |
| Shade-grown eco-forestry coffee (EFC) | 0 | 228.0 | 228.0 | 8% |
| Industrial plantation forests (IPF) | 68.6 | 179.6 | 111.0 | 4% |
| Fruit plantations | 0 | 62 | 62 | 2% |
| Live fences | 0 | 41 | 41 | 1% |
| Total | 3,325.8 | 6,148.8 | 2,823.0 | 100% |

*Source: Project Report and Outcome Matrix proposed by ENEL's PEU.*

218. It should be noted, however, that there is no estimate of the amount of carbon or sediments that the PAGRICC program prevented in Lake Apanás and Lake Asturias. While the calculation for sediments may be impossible to obtain, it is recommended that the carbon dioxide be estimated in order to determine more accurately the amount of captured GHG emissions.

d. Answers to GEF's questions

219. According to GEF, the final evaluation should address the following questions:

220. **QUESTION 1: On average, how much did the area that beneficiaries dedicated to high environmental-impact land use—water, carbon sequestration, and biodiversity habitat preservation—increase from program start to the present time?**

221. In terms of the number of hectares, the project has expanded by a total of 2,823 ha, which are now implementing sustainable land and forest management practices. Considering that, in 2010, the project baseline was 3,325.8 ha according to the grant project report (IDB and GoN) and its outcome table, the project has shown excellent results in comparison to the baseline. The largest increment was seen in silvopastoral systems where a rise of 1,131.5 ha was recorded due to the adoption of best agricultural practices by the cattle ranchers (see **Error! Reference source not found.**).

## Table 30. Evolution of Outcome 1 Indicator

| Environmental restoration systems | Initial goal as of 2012 | | | | Revised goal (2015) | | | | Reached goal as of February 2018 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IDB Project | | PAGRICC Program | Sub-Watershed Total | IDB Project | | PAGRICC program | Sub-watershed Total | IDB project | | | PAGRICC Program | Sub-watershed Total |
| | Baseline | Original goals | | | Baseline | Reformulated goals | | | Baseline | Reached goals | Outcome matrix | | |
| 2.1 Agroforestry systems (AFS) | 0.0 | 363.0 | 0.0 | 363.0 | 0.0 | 685.0 | 2,835.0 | 3,520.0 | 0.0 | 776.5 | 776.5 | 1,739.0 | 2,515.5 |
| 2.2 Shade-grown eco-forestry coffee (EFC) | 0.0 | 50.0 | 0.0 | 50.0 | 0.0 | 217.0 | 559.0 | 776.0 | 0.0 | 228.0 | 228.0 | 413.0 | 641.0 |
| 2.3 Natural regeneration management (NRM) | 1,152.8 | 511.0 | 0.0 | 1,663.8 | 1,152.8 | 490.0 | 0.0 | 1,642.8 | 1,152.8 | 473.0 | 1,625.8 | 197.0 | 1,822.8 |
| 2.4 Silvopastoral systems (SPS) | 2,104.4 | 821.0 | 0.0 | 2,925.4 | 2,104.4 | 1,065.0 | 3,062.0 | 6,231.4 | 2,104.4 | 1,131.5 | 3,235.9 | 1,755.0 | 4,990.9 |
| 2.5 Industrial plantation forests (IPF) | 68.6 | 150.0 | 0.0 | 218.6 | 68.6 | 150.0 | 522.6 | 740.6 | 68.6 | 111.0 | 179.6 | 200.0 | 379.6 |
| 2.8 Live fences | - | - | - | - | 0.0 | 41.0 | 0.0 | 41.0 | 0.0 | 41.0 | 41.0 | 0.0 | 41.0 |
| 2.9 Fruit plantations areas | - | - | - | - | 0.0 | 50.0 | 0.0 | 50.0 | 0.0 | 62.0 | 62.0 | 0.0 | 62.0 |
| O1 I: Number of hectares where sustainable soil and forest management practices are carried out. | 3,325.8 | 1,895.0 | 0.0 | 5,220.8 | 3,325.8 | 2,698.0 | 6,978.0 | 13,001.8 | 3,325.8 | 2,823.0 | 6,148.8 | 4,304.0 | 10,452.8 |

**Chart 5. Original goals**

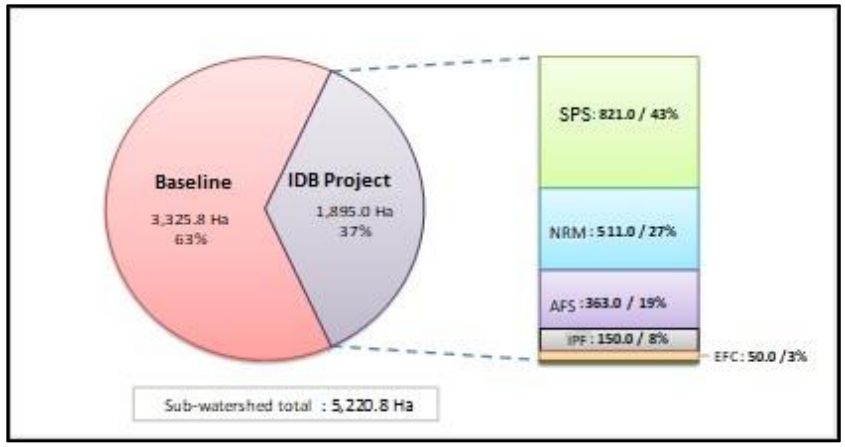
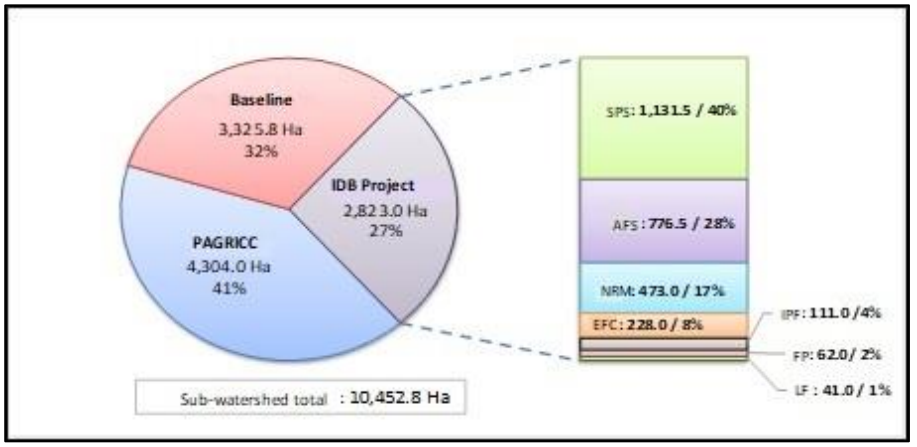



**Chart 6. Reached goal as of February 2018**



222. From an environmental perspective, each land use has an environmental value aligned with the project's objective, such as: (i) improving water infiltration in the recharge zones in the watershed, (ii) increasing carbon fixation/sequestration, and (iii) expanding the habitat for biodiversity.

223. Similarly, the systems that contributed the greatest environmental values are the following (in order of priority):

- Natural regeneration management (NRS)
- Industrial plantation forests (IPF)
- Shade-grown eco-forestry coffee (EFC)
- Agroforestry systems (AFS)
- Fruit plantations (FP)
- Silvopastoral systems (SPS)
- Live fences (LF)

224. As seen in **Table 31**, the systems with the greatest environmental value are the ones that increased the least.

**Table 31 Environmental values of the implemented ERSs**

| Type of system | Dedicated area (in ha) | | Rise in hectares | System representativeness per total hectares (%) | Qualitative analysis | |
|---|---|---|---|---|---|---|
| | Before (2010) | After (Feb. 2018) | | | Purpose | Environmental value |
| Silvopastoral systems (SPS) | 2,104.4 | 3,235.9 | 1,131.5 | 40.1% | Sustainable management technique for cattle ranching activities. | Carbon sequestration |
| Agroforestry systems (AFS) | 0 | 776.5 | 776.5 | 27.5% | A sustainable management technique that increases vegetation cover | (i). Carbon sequestration<br>(ii). Serves as a habit for biodiversity<br>(iii). Improves water infiltration<br>(iv). Decreases erosion processes and sediments into the watershed |
| Natural regeneration system (NRS) | 1,152.8 | 1,625.8 | 473.0 | 16.8% | | |
| Shade-grown eco-forestry coffee (EFC) | 0 | 228.0 | 228.0 | 8.1% | | |
| Industrial plantation forests (IPF) | 68.6 | 179.6 | 111.0 | 3.9% | | |
| Fruit plantations | 0 | 62 | 62 | 2.2% | | |
| Live fences (LF) | 0 | 41 | 41 | 1.5% | Sustainable management technique that preserves soil and water | Carbon sequestration |
| Total | 3,325.8 | 6,148.8 | 2,823.0 | 100.0% | | |

*Source: Project Report and Outcome Matrix proposed by ENEL's PEU.*

225. As seen in **Table 31**, carbon sequestration has increased by 41.6% due to the sustainable management techniques, more specifically, through SPSs and LFs. Furthermore, the vegetation cover has expanded, as well the sustainable management technique by 58.4%. This resulted in

improvements in carbon sequestration, habitats for biodiversity, infiltration, and reduction of sediments.

226. It is important to note that in order to cover those 2,823 ha, the project scope was expanded. This made it possible to expand the intervention area from three micro-watersheds—as originally established in CABAL, S.A.'s study—to 11. This change was made because the big farmers in the San Gabriel micro-watershed were not interested in improving their systems[22].

227. Using CABAL, S.A.'s baseline studies from 2010[23] as a reference, a number of predominant land uses were identified in the original three priority watersheds, as shown in the following table:

**Table 32. Micro-watershed area according to CABAL, S.A.**

| Type of cover | Micro-watershed area (in ha) | | | Total |
|---|---|---|---|---|
| | Apanás drainage | Cuyalí River | San Gabriel River | |
| Agriculture | 770.1 | 193.6 | 571.4 | 1,535.1 |
| Bushes | 357.3 | 361.9 | 212.9 | 932.1 |
| Mixed forest | 32.5 | 0.0 | 0.0 | 32.5 |
| Intervened semi-deciduous forests | 1915.0 | 63.2 | 63.2 | 2,041.4 |
| Seasonal evergreen forests | 181.4 | 145.5 | 145.5 | 472.4 |
| Gallery forests | 378.8 | 201.9 | 201.9 | 782.6 |
| Shade-grown coffee plantations | 819.7 | 402.7 | 402.7 | 1,625.1 |
| Populated areas | 338.4 | 98.0 | 98.0 | 534.4 |
| Vegetables | 559.5 | 1.2 | 1.2 | 561.9 |
| Wetlands | 823.5 | 33.1 | 33.1 | 889.7 |
| Improved pasture | 548.0 | 24.7 | 24.7 | 597.4 |
| Wooded pastures | 1573.3 | 618.5 | 618.5 | 2,810.3 |
| Natural pastures | 913.4 | 0.0 | 0.0 | 913.4 |
| Total | 9210.8 | 2144.3 | 7969.7 | 19,324.8 |

*Source: CABAL, S.A., 2010.*

228. **What are the main factors contributing to this increase in area?**

229. The determining factors for land use change are based on the Project's strategy of:

- Establishing an intervention strategy from the farmers' perspective due to the fact that some proposed production systems were rejected by the local farmers.
- Providing technical assistance in keeping with the local demand and farm sizes in order to improve production systems through soil and water conservation measures. This made it possible to optimize productivity levels in the area and to decrease the deterioration of the watershed.
- Improving the system in order to get the greatest environmental value to meet the needs of the beneficiaries and to facilitate its adoption.

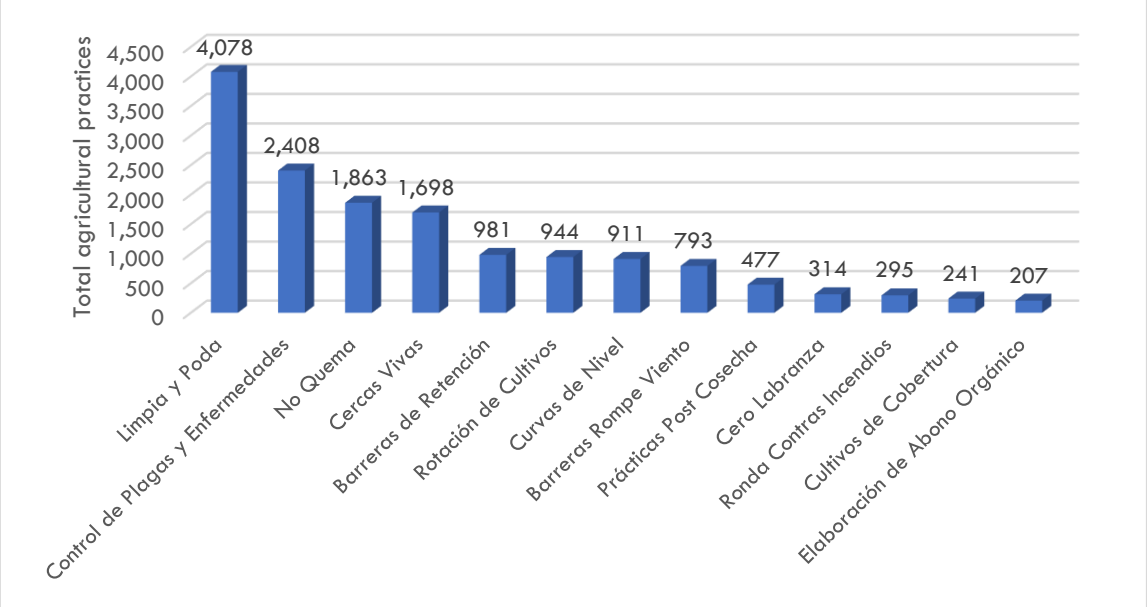
[22] According to CABAL, S.A.'s study from 2010, the Project's strategy should focus on improving existing land uses in the micro-watersheds. This would improve farming practices and would serve as a mechanism to expand the vegetation cover.
[23] Preparation of project "GEF–NI– X 1005: Management of the Apanás-Asturias watershed." Component 1. Carbon and Monitoring System Baseline. Component 1's Final Report. September 9, 2010.

- Allowing farmers to choose between the various systems depending on their economic needs.

230. It should be noted that, according to the 2011 National Agricultural Census (CENAGRO, in Spanish), a total of 15,210[24] agricultural practices were implemented in the sub-watershed. The most common practices in the project area are: (i) clearing and pruning, (ii) pest and disease control, and (iii) no-burning.

231. According to this census, the implementation of environmental restoration systems with the most difficult agricultural practices to implement should help improve yields and reduce lost areas, especially for crops that are most sensitive to weather phenomena, such as beans and coffee. Agricultural practices, such as fire breaks and windbreakers are hard to implement or are implement less frequently than the most popular ones.

**Chart 7. Agricultural practices implemented in the Apanás-Asturias Sub-watershed**




*Source: Author, based on the 2011 CENAGRO Report (4th report).*

Based on index estimation, which was done using econometric models, it is found that the implementation of agricultural practices in the Apanás sub-watershed shows various levels of implementation. The following are the ones with the lowest level of implementation: (i) cover crops, (ii) organic fertilizer, (ii) fire breaks, and (iii) zero farming work. The farther the crop coefficients are from zero, the harder they are to implement (see Table 33).

[24] Based on the 2011 CENAGRO Report (4th report).

**Table 33. Implementation rates for the agricultural practices in the Apanás sub-watershed**

| Agricultural practice | Coefficient | Standard. Error. | Z | P>[Z] |
|---|---|---|---|---|
| Contour farming | 1.78 | 0.036 | 49.59 | 0.00 |
| Pest and disease control | 0.48 | 0.026 | 18.46 | 0.00 |
| Retention barriers | 1.69 | 0.035 | 48.62 | 0.00 |
| Cover crops | 3.22 | 0.066 | 49.08 | 0.00 |
| Live fences | 1.00 | 0.028 | 35.07 | 0.00 |
| Zero farming work | 2.95 | 0.058 | 50.9 | 0.00 |
| Windbreakers | 1.94 | 0.038 | 51 | 0.00 |
| Post harvesting practices | 2.50 | 0.048 | 52.52 | 0.00 |
| No burning | 0.87 | 0.028 | 31.39 | 0.00 |
| Production of organic fertilizer | 3.38 | 0.071 | 47.84 | 0.00 |
| Crop rotation | 1.73 | 0.035 | 49.15 | 0.00 |
| Fire breaks | -3.01 | 0.060 | 50.52 | 0.00 |
| Clearing and pruning | -0.61 | 0.026 | -23.1 | 0.00 |

*Source: Author estimates based on the 2011 CENAGRO Report (4th report).*

232. Another significant change during project execution was the PES mechanism. It was a mechanism thought to ensure availability of water, and it evolved into a payment for environmental services (PES) mechanism with a forestry approach. The reason for this change was the fact that the deforestation rate in the Apanás-Asturias sub-watershed was higher than 1,000 ha as a consequence of the implementation of a number of farming practices. In other words, the trees (forests) became the umbrella environmental asset, as they are directly linked to the water asset and they offer a variety of environmental services—more infiltration, carbon sequestration, habitats for biodiversity, scenic beauty, erosion mitigation, and less sediment, among others.

233. The forest resources available for water infiltration are 22,117.75 ha based on land use data from 2015. In light of the current forest cover, water infiltration is, on average, 5,456.31 $m^3$/ha/y in the Apanás-Asturias sub-watershed. The micro-watersheds that contribute the most are: Jigüina, Río Jinotega, Apanás, and Asturias. The total amount of water generated from the Apanás sub-watershed is 126,913,784.43 $m^3$. The micro-watersheds with the greatest streamflow are: Jigüina, Río Jinotega, Apanás, and Asturias.

234. The following table shows water infiltration in the Apanás sub-watershed broken down by micro-watershed. When analyzing the 1986-2016 period, it shows that infiltration has decreased by 207,708,411.56 $m^3$ in the past 30 years. The Jigüina, San Gabriel, and Apanás-Asturias micro-watersheds represent 69% of the drop in the entire Apanás sub-watershed.

**Table 34. Water infiltration based on vegetation cover (in $m^3$)**

| Micro-watershed | Infiltration in 1986 (in $m^3$) | Infiltration in 2016 (in $m^3$) |
|---|---|---|
| Apanás-Asturias | 44,707,752.45 | 10,652,296.35 |
| Corinto Finca (Cuyalí) | 13,447,979.64 | 4,383,969.26 |
| Jigüina | 117,582,327.97 | 60,503,340.16 |
| Mancotal | 17,802,083.99 | 7,899,932.50 |
| Pedernales | 12,057,959.31 | 6,321,635.42 |
| Jinotega River | 25,283,748.14 | 11,906,876.17 |
| La Esperanza River | 10,873,234.41 | 5,476,722.75 |
| San Gabriel | 60,993,984.10 | 8,940,128.69 |

| Micro-watershed | Infiltration in 1986 (in $m^3$) | Infiltration in 2016 (in $m^3$) |
|---|---|---|
| Santa Gertrudiz | 9,080,802.66 | 3,327,570.54 |
| Santa Rita | 6,944,865.61 | 3,692,566.02 |
| Sisle | 15,847,457.72 | 3,808,746.58 |
| **Total** | **334,622,196.00** | **126,913,784.43** |

*Source: Author, based on INETER data from 2016.*

235. **QUESTION 2: What percentage of beneficiaries discontinued high environmental-impact land-use practices? What are the main reasons for discontinuation?**

236. At present time, there is no record of actors discontinuing land uses that yield the greatest environmental value. All of them continue to implement the activities they committed to doing as part of the project's scope.

237. As part of the project cycle, by adopting and continuing the practices promoted by the project, it is expected that the following will be achieved: (i) all 1,208 actors will continue to undertake sustainable ERS practices, and (ii) 504 PES contracts will be signed by 2021.

238. **QUESTION 3: What is the percentage of non-beneficiary residents who have adopted land uses promoted by the project? Are there differences in the rates of adoption of the various land uses by the beneficiaries? What are the main factors that make non-beneficiaries adopt land uses?**

239. It should be pointed out that project design did not conceptualize nor considered such measurement or baseline value. This is why the percentage of residents or number of farmers outside the project area or their adoption rates were not accounted for.

240. In order to be able to answer this question, the project design should have provided for, since its inception, a baseline that includes information of the universe of farmers in the Apanás sub-watershed, as well as of their land uses. In other words, the baseline should have collected information of land uses for the 6,250 farmers and not just a sample thereof. Without a comprehensive baseline, it is not possible to monitor beneficiaries (controlled group) and non-beneficiaries (contractual) throughout project execution in order to establish a 'difference in differences' analysis.

### 3.3. Efficiency

Rating: Satisfactory

a. Economic assessment

241. Project efficiency is satisfactory. From its inception to closing date, the project was executed with the participation of the central government and the local actors (implementing ERSs and PNRs). As a result, the following outcomes were achieved:

- Environmental restoration systems (eco-forestry coffee, silvopasture, agroforestry, plantation forests, fruit plantations) promoted by INAFOR were implemented in 2,823 ha.
- Forty-two sediment retention infrastructure projects were built in various tributary micro-watersheds.

- Forty-two PNRs were accredited (out of the goal of 25 PNRs) through MARENA's ministerial decrees, which is equals 1,500 ha where remnants of primary forest are preserved (**see Annex 5**).
- Thirty-five animal breeding centers were built in 35 PNRs with the objective of preserving biodiversity in the area.
- Thirty-five sighting ranches were built in 35 PNRs in order to strengthen the circuit of ecotourist businesses in the area, which supports the efforts of biodiversity conservation in the PNRs.
- The interinstitutional agreement to implement the Payment for Environmental Services (PES) mechanism was signed on February 3, 2017.
- In 2017, 184 PES agreements were signed to keep and conserve the forest cover in the area—implementation of the PES mechanism.

242. The economic flow provides for the total number of areas where ERSs or PNRs were established by the project. Since Component 1 was about institutional strengthening, it was not included in the evaluation. Component 4, which finances the design and operation of the PES mechanism, has not generated income yet; therefore, it was not included in the economic assessment. **Annex 5** lays out the assumptions and outcomes of the economic assessment.

243. For the after-the-fact economic assessment, the 2,823 ha were taken into account. A total of 1,208 actors implemented ERSs. The flow was computed based on the productivity changes reported by the beneficiaries of the ERSs and forest conservation through PNRs. The flow includes econometric estimates of the cubic meters of streamflow generated as a result of forest conservation and of the energy generated by the cubic meters of water going through the turbines.

244. The flow was computed for five years, especially throughout the implementation of the PES mechanism, for which a discount rate of 12% was used. Results show a positive NPV of US$2,676,506.08 and an IRR of 17%. Moreover, the cost-benefit analysis was higher than one (1.24).

245. There is direct correlation between ERSs and erosion/sedimentation in the Apanás-Asturias sub-watershed. This correlation was simulated using spatial econometric models and the Universal Soil Loss Equation (USLE) method—and other related studies. The results show that when ERS-AFSs increase by 10% in a specific area, erosion drops by 2.5%. But when ERS-SPSs increase by 10%, erosion drops by 1.4%. The simulation of the impact on reducing erosion through the environmental restoration system AFS and SPS is 3.9%. The eco-forestry coffee ERSs have the lowest impact on reducing erosion because when they increase by 10%, erosion drops only by 1%. When these three environmental restoration systems rise by 10%, erosion drops by 4.9%. This is reasonable, as these ERS (SPS and AFS) represent the majority of the established systems.

b. <u>Evaluation of the project's planning and financial execution</u>

246. Below is an analysis of the project's planning and financial execution. The objective of this analysis is to assess how well the project's financial management was carried out.

247. **Total project costs.** According to the grant agreement, the original cost was US$8,910,566,00, US$4,040,909.00 of which were provided by GEF and a local match fund in the amount of US$4,869,657.00 provided by the following institutions: ENEL, INAFOR, MARENA, and ANA.

248. **Table 35.** Project's Original Cost vs. Executed Cost as of February 2018 shows that project execution cost US$9,966,664.26 or 112% of the agreed amount. This increase was generated due to: (i) an increase of project goals, as a result of the review carried out in 2015, (ii) the incorporation of US$1,400,000.00 from the Environmental Program for Disaster Risk and Climate Change Management (PAGRICC), as INAFOR's match, and (iii) the increase in costs, as a consequence of minimum technical requirements for the infrastructure projects contained in components 1 and 2, including breeding centers and signs. The Bank's contribution was transferred in full as per the agreement and 100% of the grant was executed.

249. Project annual cost. Annual project execution costs are listed in **Table 36.** Actual Project Costs Per Year, which is shown later in this document. It should be pointed out that, due to the delays at the beginning of the project in 2012, project execution cost was at the lowest level with US$81,767.26, 78% of which was from match funds and 22% from the Bank. In the three subsequent years, the total execution cost rose gradually and, by the end of 2015, halfway through project execution, 50% of the original cost had already been used up. Also, 2017–2018 was the period with the highest project execution cost in the amount of US$2,654,715.09, 53.8% of which came from the grant and 46.2% from the local match.

c. Project Financial Analysis

250. Project financial execution shows that (i) 111% of the original project cost was executed, (ii) 100% of IDB-GEF funds were used, (iii) 120% of original match funds were executed, and (iv) the original cost allocation scheme was kept without modifications, as costs focused on project financial execution. Because of this, project financial execution is deemed satisfactory.

## Table 35. Project's Original Cost vs. Executed Cost as of February 2018

| Component | Original total cost (US$) | | | Total executed cost (US$) | | | Original cost percentage |
|---|---|---|---|---|---|---|---|
| | IDB/GEF | Match | Total | IDB/GEF | Match | Total | |
| C1. Strengthening of institutional structures and planning capacities for project management (ENEL). | 1,117,759.00 | 2,073,038.00 | 3,190,797.00 | 1,067,527.35 | 2,343,159.83 | 3,410,687.18 | 107% |
| C2. Application of sustainable land- and forested-area reordering practices (INAFOR). | 1,381,859.00 | 1,131,893.00 | 2,513,752.00 | 1,209,024.42 | 1,795,481.55 | 3,004,505.97 | 120% |
| C3. Conservation of forested areas and biodiversity in private nature reserves and the Ramsar site (MARENA). | 602,876.00 | 703,394.00 | 1,306,270.00 | 664,693.69 | 1,083,171.59 | 1,747,865.28 | 134% |
| C4. Design and implementation of the payment for environmental services mechanism in the Apanás-Asturias Watershed (ANA). | 701,035.00 | 558,332.00 | 1,259,367.00 | 884,461.18 | 308,289.41 | 1,192,750.59 | 95% |
| Project Management | 237,380.00 | 403,000.00 | 640,380.00 | 215,187.99 | 395,667.25 | 610,855.24 | 95% |
| **TOTALS** | **4,040,909.00** | **4,869,657.00** | **8,910,566.00** | **4,040,894.63** | **5,925,769.63** | **9,966,664.26** | **112%** |

*Source: Final Project Report. The local match by PAGRICC for Us$1.4m is not accounted for in this table. Only the goals agreed upon during the 2015 reformulation are included. However, the 2013 Audit Report (p.19) establishes that the amount of US$1.4 m provided by PAGRICC will be spent.*

## Table 36. Actual Project Costs Per Year

| Source | Total executed cost (US$/y) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | Total |
| IDB/GEF | 18,284.00 | 262,489.35 | 729,525.42 | 611,139.63 | 989,267.86 | 1,430,188.37 | 4,040,894.63 | |
| Local match | 63,483.26 | 869,712.09 | 1,087,076.65 | 1,251,112.06 | 1,429,858.85 | 1,224,526.72 | 5,925,769.63 | |
| **TOTALS** | **81,767.26** | **1,132,201.44** | **1,816,602.07** | **1,862,251.69** | **2,419,126.71** | **2,654,715.09** | **9,966,664.26** | |

*Source: Final Project Report.*

### 3.4. Sustainability

Rating: **Low**

251. Project sustainability rating is considered low. This is because the PES mechanism has high financial, as well as institutional, technical, and environmental risks because it would not have been created and implemented if no funds had been secured (grant) to run the pilot until 2021. **Table 37.** Project Sustainability Analysis shows the latent risks, as well as the actions and challenges for ensuring the continuity of reached outcomes as of Final Evaluation date. These results were analyzed in collaboration with the involved actors during the above-mentioned SWOT workshop.

### 3.5. Justification for Global Project Rating

Rating: **Satisfactory**

252. **Significance**. The significance of project objectives and design continues to be high, even five years later. It is necessary to continue and expand conservation and reforestation actions in Lake Apanás and Lake Asturias by creating new projects or follow up activities to, ultimately, reach GEF objectives and ensure the PES mechanism's operations until its completion. In general, the commitment by the GoN and ENEL has been high. They are both willing to attract other donors to finance similar projects that focus on environmental protection and biodiversity conservation in the Apanás-Asturias watershed. Moreover, project objectives are aligned with country priorities and IDB's assistance to the GoN.

253. **Efficacy.** The overall efficacy is deemed satisfactory in light of the progress made toward the attainment of the project's core indicators and objectives. Achievement level is very satisfactory for four out of five outcomes of Objective 1. As for Objective 2, despite the challenges during implementation and long design and implementation phases of the PES mechanism, it was successfully implemented in a moderately satisfactory way. It is expected its operations will close in 2021, by which time, it is expected to receive resources so ENEL can continue to manage the fund.

254. **Efficiency**. Project's efficiency level is rated as satisfactory. This rating owes to the fact that the economic assessment of total investments generated an internal rate of return of 17%—five percentage points over the applied discount rate for such analysis—thus meeting investment profitability expectations. The majority of this project's outputs and activities were accomplished, with the exception of the PES mechanism that is in its first year of operations.

### 3.6. Evaluation of Project's Replicability

255. This project came into being as a result of an initiative by the GoN through ENEL in coordination with another three institutions—INAFOR, MARENA, and ANA. The objective of such initiative was to promote organized watershed management on the basis of four components: (i) strengthening of institutional structures and local land-use planning capacity, (ii) application of sustainable land- and forested-areas reordering practices, (iii) forest and biodiversity conservation, and (iv) design and planning of a PES mechanism in the Lake Apanás and Lake Asturias watershed.

## Table 37. Project Sustainability Analysis

| Risk Factors or Elements | Risk | Probability factor | Probability of occurrence | Impact on achievements | Challenges and actions to take to ensure project outcomes sustainability |
|---|---|---|---|---|---|
| **Finance** | 1 Limited financial resources to address the issues in the entire watershed. | The GoN and ENEL may not create the necessary investment projects to expand environmental services in the watershed. | High | High | Developing projects and seeking internal/external financing is required in order to expand ERSs or agricultural exploitations (AE) for the 6,100 beneficiaries, 1,208 of which have only been reached. The PEU team must focus on developing projects and raising funds to address the issues and bridge the existing gaps. The Ministry of Finance and Public Credit's (MHCP, in Spanish) Public Investment System approved two project profiles, thus granting approval to look for new funding sources for conservation actions in the watershed. In its strategies, the GoN must prioritize similar projects in order to foster water resources conservation. |
| | 2 Short- and mid-term economic sustainability of the PES mechanism. | ENEL may not come up with the budget required by the PEU after December 2019.<br>The other competent environmental institutions, together with ENEL, may not adopt the PES mechanism. | High | High | The PES mechanism's execution period is approximately three years and will conclude in 2021. ENEL's PEU team has sufficient funds to manage and oversee the mechanism until December 2019. ENEL should fund this team's operations until the PES mechanism comes to an end, that is, annual budgets should be secured until PES closeout.<br>Also, institutions should allocate annual funds to the PES mechanism throughout its execution in order to expand it. In order to do so, funding sources must be sought after in the form of grants, loans, and transfers, among others, to ultimately capitalize the mechanism's fund. |
| **Institutional Framework** | 1 Limited institutional presence in the area to operate the PES mechanism. | High staff turnover at the institutions participating in the project and lack of resources to train and retain staff in the project area. | High | High | Ensure participating institutions designate technical staff in the project area to carry out the necessary interinstitutional coordination for the mechanism. Also, PEU should keep its presence in the project area to monitor and provide technical assistance for the PES contract signees. |
| | 2 Little ownership shown by competent institutions for executing the Integrated Watershed Management Plan for Lake Apanás to ensure | Weak interinstitutional coordination between ANA, MARENA, INAFOR, and ENEL, as well as between the established sub-watershed and micro-watershed | High | High | Hold monthly meetings to monitor PES mechanism's actions, while ensuring interinstitutional coordination.<br>Ensure coordination efforts and constant communication between involved actors (ENEL, MARENA, INAFOR, and ANA) and the sub-watershed and micro-watershed committees in order to protect and ensure sustainability in the watershed, thus accomplishing their mission, roles, and responsibilities. Moreover, ENEL, through its PEU, should |

| Risk Factors or Elements | Risk | Probability factor | Probability of occurrence | Impact on achievements | Challenges and actions to take to ensure project outcomes sustainability |
|---|---|---|---|---|---|
| | sustainability in the watershed. | committees in the municipalities of Jinotega and San Rafael del Norte. | | | continue to oversee the mechanism's technical, operational, and financial performance. |
| **Technical Risks** | 1 Limited capacity to track and monitor the PES mechanism. | PEU's staff may not have the necessary training to monitor and follow up on PES contracts. | High | High | Keep the PEU's staff trained so they are able to manage new contracts and provide adequate follow up and monitoring. This will ensure that the accumulated experience by the hired staff will be leveraged throughout the life of the PES mechanism. |
| | 2 Actors' non-compliance with commitments undertaken with the PES mechanism. | Payment for managing the PES mechanism being suspended by ENEL and reduced budget for technical accompaniment at PES closeout. | High | High | Design and implement a contract tracking and verification system. Also, design and establish accountability, auditing, and evaluation mechanisms that support resource use transparency and compliance with contractual obligations by the offerors, and design and implement training plans for ERS offerors.<br><br>Ensure permanent technical accompaniment when performing contract surveillance with the actors, as well as monitoring for the areas under the mechanism.<br><br>Provide the PEU with the necessary instruments and assets to control, track, monitor, and evaluate the contracts. |
| **Environmental Risks** | 1 Watershed management sustainability. | Failure to provide prompt approvals for resources to ensure watershed sustainability. | High | High | The integrated management plans should be implemented and they should include reordering activities. Interinstitutional coordination between the government entities (ENEL, MARENA, INAFOR, ANA) must be ensured according to their specific competences. Plans should provide for planning and development of participatory strategies for local actors with an emphasis on sustainable rural development. This will be achieved by means of implementing soil and water conservation techniques, recovering forest fragments, and designing and implementing projects geared toward ecotourism and related services. |
| | 2 Sustainability of the necessary streamflow for hydroelectric power generation. | Discontinuation of the general objectives established by the project and GEF.<br>Failure to achieve GoN strategies to change the energy matrix by using | High | High | The design of future projects should aim for the construction of basic infrastructure for sediment retention. In order to achieve this, the following must be done: (i) strengthen ongoing implementation of environmental restoration systems, (ii) ensure the PES mechanism is compliant with requirements and criteria for access to incentives, and (iii) secure funding sources to add funds to the PES mechanism. Also, more involvement from institutions should be ensured to guarantee and |

| Risk Factors or Elements | Risk | Probability factor | Probability of occurrence | Impact on achievements | Challenges and actions to take to ensure project outcomes sustainability |
|---|---|---|---|---|---|
| | | natural resources in a sustainable way. | | | enhance the water resources in the area, as well as their environmental characteristics to benefit energy exploitation. These institutions should play a governing and governmental role, and must be very knowledgeable of the local laws and the territorial context. |
| | 3 Prioritize systems that yield the greatest environmental benefit. | The cost of opportunity for large farmers is too high for them to switch to production systems with lower profitability but higher environmental impact. | High | High | Projects with systems that yield the highest environmental benefit should be prioritized.<br><br>A credit line should be established within the PES fund itself to allow compensation for other environmental services. This would reward farmers who change traditional practices for environmentally-friendly practices.<br><br>Alternative land uses should be implemented at a large scale, which, in turn, would result in more investment toward reconversion of cultural techniques in agricultural activities.<br><br>Ecotourism should be boosted or PES mechanism’s income sources should be diversified. |

256. In its scope, the pilot project promoted biodiversity conservation and climate change mitigation in the Apanás-Asturias watershed. This would be achieved through direct intervention to reduce sedimentation, increase sequestered carbon's capital, and establish sustainable agri-silvopastoral management practices. According to GEF, in order to validate a proposal for payment for environmental services as a mechanism to promote biodiversity conservation and reduction of greenhouse gas emissions, the replicable aspects should be taken into account.

257. It is important to highlight the key leadership role ENEL plays as a model of institutional framework to carry out interinstitutional coordination among the various co-executing institutions to execute the project. Since this is a pilot project, it responds to the specific characteristics of the environmental restoration systems and protection of private nature reserves, as part of the good practices for watershed management promoted through a fund such as the PES mechanism. All these mechanisms help maintain the environmental services provided by the Apanás-Asturias watershed—a national heritage site of shared responsibility. In other words, the leading institution in project execution is to make impacts in collaboration with other partner institutions (INAFOR, MARENA, and ANA), aligned with their social responsibility and mandate.

258. This project is fully replicable because it is pertinent, relevant, efficient, effective, and has an adequate institutional framework. But it would be even more replicable if it manages to ensure the sustainability of the PES mechanism by securing more funding. In turn, this would ensure the necessary seed capital to make the desired long-term impact, which consists of decreasing and mitigating erosion processes and ensuring the necessary streamflow for power generation.

259. Some aspects are described below—broken down by component—which should be taken into account to ensure project's replicability in other countries or cities:

260. **Component 1**: **Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management.**

- Training for the staff of municipal offices and officials of MARENA to teach them about the tax benefits for actors who promote conservation practices according to the current laws so they can benefit from such practices.

- Incorporating a communication, awareness raising, and dissemination strategy in the design to promote the impacts of the project. This should be based on knowledge management of both executors and social actors. More budget should be assigned for this. Therefore, a systematic approach is needed which makes it possible to identify and collect data about the initiatives in the watershed, including stakeholders. Information would be shared to, firstly, reach project overall goals and, secondly, to reach organizational efficiency. To ensure project's replicability, it is necessary to develop a continuous promotion and dissemination plan every year. It should be done at the institutional and governmental levels. It must guarantee and promote project's ownership among protagonists and actors in the area of influence in the mid- and long-term.

- Establishing interinstitutional communication spaces where achievements, progress, and challenges can be assessed in the area of territorial reordering in strategic partnership with the target population.

- Strengthening local institutional presence to enable effective coordination work in a shorter amount of time with additional resources.

261. **Component 2**: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration.

- More resources should be destined for trainings and technical assistance by establishing 'witness' or reference farms to display the changes the implemented techniques can bring about.

- More research on the quality of plant material in keeping with the local conditions and harvesting seasons.

- Promoting crops that produce greater cover, and improving soil and water conservation infrastructures on the slopes.

- Promoting productive-cultural diversification practices, using the right technologies. The greatest challenges for the project are the expansion of the agricultural frontier, extensive cattle-ranching, large pasturelands, and vegetable farming without soil and water conservation measures.

262. **Component 3:** Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site.

- Facilitating management mechanisms that, in return, can bring statutory legal benefits, thus improving participation spaces offered by the local authorities.

- Implementing patrolling (surveillance) and monitoring mechanisms through interinstitutional and stakeholder coordination with the objective of ensuring natural resources conservation.

- Carrying out more research and development actions on breeding of captivated species in order for them to fit into the existing weather conditions of the region.

- Promoting eco-businesses with other complementary services in the area.

263. **Component 4**: Design and implementation of the payment for environmental services mechanism in the Apanás-Asturias watershed.

- Incorporating investment sustainability into project objectives and promoting PES since the beginning in order to leverage resources when an operation is chosen, thus reducing PES design, development, and implementation time.

- Establishing fee mechanisms which are differentiated by type of system where the best rewarded systems shall be the ones with greater cover. This will promote positive changes in production techniques.

- Revisiting aspects related to the value of environmental services (water for consumption, for energy purposes, etc.) to improve investments in eco-businesses.

# CHAPTER 4. NON-CORE CRITERIA

## 4.1. Evaluation of Project Monitoring and Evaluation

Rating: Satisfactory

a. M&E Design

264. During project design, it was established that the outcome table would serve as the foundation for monitoring and evaluating project outcomes, including the output table by component. Also, it was agreed that ENEL, through its PEU, would submit semiannual progress reports based on the proposed qualitative and quantitative indicators.

265. It was also agreed that ENEL would submit, during project execution, semiannual project progress reports (SPPR). But in order to do so, a monitoring system was need which could integrate the technical progress and the financial information. The SPPRs were to: (i) focus on goal and indicator achievement as proposed in the outcome table, and (ii) analyzing and presenting identified problems and risks, and proposing the necessary corrective measures. SPPRs would feed from the update to the management tools—project execution plan (PEP), Annual Operating Plan (AOP), and the Procurement Plan (PP). Also, audited reports and financial statements would be submitted.

266. According to the grant agreement, ENEL was to submit an IEI within 90 days after 36 months had elapsed since project start or when 50% of grant funds had been disbursed. A FER is to be submitted within 90 days of the date when 90% of grant funds had been disbursed. These two reports were created by ENEL's PEU and approved by IDB.

267. In general, the outcome/output monitoring and evaluation system was in line with the project's investment components and had three levels: (i) grant contractual conditions, (ii) semiannual reporting system, and (iii) Interim Project Evaluation and Final Project Evaluation. The outcome table design was satisfactory, especially, in terms of expected outcome indicators and their respective goals. However, with regard to output indicators and the action/output ratio, which would serve as a reference for progress monitoring, there were several changes. These were explained in Section 2.12 about reformulation and modifications to the project carried out in 2015, and, with regard to: (i) the indicators related to the environmental restoration systems (ERS), (ii) indicator renaming, and changes to deadlines, and (iii) merge of indicators related to training. These changes were made in consensus between IDB and ENEL's PEU, and they do not have an adverse effect on expected outcome indicators.

268. The PEU team was in charge of collecting the required information for monitoring, and of developing and implementing the PES system, now referred to as PES mechanism, which will continue operations until 2021.

269. One project objective had to do with learning and capacity building. The design of the PES mechanism incorporated these activities. Semiannual reporting was one of the activities and it included follow up to strategic planning, a risk analysis and mitigation actions, lessons learned, and fiduciary management.

b. M&E Implementation

270. Since the agreement came into force, the project was charged in IDB's system called Outcome Monitoring Plan (OMP). This was to monitor the development of such plan at all

levels of the outcome table, i.e., Procurement Plan, output table, and outcome and indicators table, which were updated periodically. The changes or adjustments to the table in 2015 were also recorded. This year, some goals from PAGRICC—a project financed by IDB—were incorporated as a match contribution from the government. This contribution included 2,835 ha of agroforestry systems, 559 ha of shade-grown eco-forestry coffee, 3,062 ha of silvopastoral systems, and 522 ha of industrial plantation forests. The project's M&E System recorded the rise in output indicator numbers as a result of the incorporation of PAGRICC.

271. The IDB has conducted project oversight through inspection visits, management missions, and technical assistance to achieve the desired outcomes. It should be highlighted the fact that individual consultants were hired periodically to, among other activities, hold workshops that served as an assessment and problem-solving tool. These events had the active participation of co-executing institutions and other environmental specialists to develop and update GEF's biodiversity and climate change tracking tool.

272. The following tools were used during the implementation of the M&E System: (i) technical presence on the field for all components through the decentralized offices of each participating institution, as well as the technical unit of ENEL's PEU in Jinotega to verify outcomes and outputs on site, (ii) infrastructure projects oversight (sighting points, gabions, breeding centers) by the PEU team and its delegation in Jinotega, and (iii) regular visits by IDB officials and consultants.

273. In general terms, it is safe to say that monitoring and oversight actions by IDB detected the delays in the first years of the project. This made it possible to implement corrective measures, especially in the area of procurement and consulting services. As a result, the plan was updated 33 times, thus supporting the conceptualization, design, development, and implementation of the PES mechanism, which took several years to be materialized and start operations.

274. Also, annual progress reports, covering the activities from June 1 to June 31, have been presented every October the Secretariat of the GEF. During the Project Execution Review[25], ENEL's PEU met all GEF requirements, using all GEF tracking tools in collaboration with a task manager designated by the IDB.

c. M&E Utilization

275. During project execution, ENEL's PEU absorbed and implemented the oversight and evaluation methodology instruments proposed by the Bank—outcome table and the system of risks and mitigation proposals for the short- and mid-term. The objective was to get better results in project management and administration. Additionally, instruments such as the AOP, PP, and PER were formulated, implemented, and utilized as institutional and financial planning tools. These instruments were utilized not only by ENEL's PEU, but also by the co-executing institutions—MARENA, INAFOR, and la ANA. The M&E System made it possible to carry out, in a satisfactory fashion, the interim and final project evaluation.

276. The Interim Project Evaluation was completed in the first quarter of 2015. It focused on qualitative and quantitative evaluation of outcomes and outputs reached to date. It also included the investment sustainability analysis while drawing on lessons learned. This was done in order to have sufficient information about reached outcomes and actual activities, which would be compared to the expected outcomes/activities originally established in the

[25] A condition established in the project's Operating Manual, Chapter 7 – Planning, Monitoring, Evaluation, and Reporting.

outcome table. The recommendations derived from the report improved project performance until its completion.

277. As of February 2018, when the last disbursement was made, the Final Project Evaluation Report was submitted. It was drafted by ENEL's PEU and, with the support of an independent consultant, was updated in September 2018.

d. Environmental and Social Management Plan

278. In adherence to the dispositions of the Operating Manual[26], the project required consulting services[27] to create specific tools and monitor and evaluate the regular activities of the project components, which are contained in the ENEL's PEU portal. The deliverables of the consulting services are: (i) a carbon monitoring system, (ii) land-use monitoring system, (iii) hydrological studies to monitor project's impact on waterflows and sedimentation, and (iv) a biodiversity monitoring system.

279. As part of the environmental and social management strategies, the following activities were carried out[28]:

- Component 1: Fifty-four consulting services and 15 workshops on water management and carbon monitoring throughout project lifecycle.
- Component 2: Training for communities, community leaders, and farmers in topics such as hygiene, environmental education, and environmental regulatory framework. It should be noted that both subsistence smallholders and PNR owners who have some productive infrastructure participated in this component.
- Component 3: Workshops for stakeholders to coordinate the establishment of biological corridors, collect feedback on sustainable land- and forested-area reordering practices, and monitor project outcomes.
- Component 4: Twelve workshops for 382 officials and local actors and protagonists to promote the payment for environmental services mechanism among landowners and local authorities.

## 4.2. Use of Country Systems

280. **Procurement Aspects.** Procurement processes for this project followed the provisions of set forth in IDB policy GN-2350-9, "Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank," and policy GN-2349-9, "Policies for the Procurement of Goods and Works financed by the Inter-American Development Bank," and adhering to the dispositions set forth in the non-reimbursable grant proposal (NI-X1005). ENEL's PEU followed the policies established by the IDB in the GEF Grant Agreement. Oversight for all procurement and contracting processes was carried out *ex ante* by IDB. As mentioned above, the application of policies and processes affected and delayed project execution for the first two years. This was part of the learning curve by the ENEL's PEU team while applying the policies.

281. Project procurement management should have been conceived, from its design, with a holistic view of bidding processes to carry out during project execution, taking into account the term and total scope thereof. Since only an 18-month (mid-term) was accounted for, this gave

[26] As defined in Number 7.1., Chapter 7: Planning, Monitoring, Evaluation, and Report of the Project's Operating Manual.
[27] Consulting services titled "Monitoring, tracking, evaluation, and report of the project in the Apanás-Asturias watershed, Jinotega," carried out by the firm Quetzalli Nicaragua, S.A. (Final report was submitted in August 2014).
[28] Chapter 8: Environmental and Social Management Plan.

rise to excessive modifications to the initial plan. In less than six years, 33 changes were made. Concurrently, while planning the bidding methods, local market capacity (vendors, prices) should have been analyzed. This would have resulted in a type of management that is more suited to the reality of the project, thus making it more efficient. Annex 4 shows a complementary analysis of the above procurement-related aspects.

282. The trend in procurement should be geared toward broadening the approach of the Procurement Plan. This can be achieved by adding a deep and detailed analysis of the processes to follow, while considering elements, such as the evaluation of the operational context of the country, vendor and market capacity, mitigation of procurement-related risks, and a list of vendors and their scope (costs, terms, contract), all of which is the foundation of a more efficient procurement strategy.

283. **Financial Aspects.** This project resorted to the national financial and administrative system called Integrated System for Project Management (SIGFAPRO, in Spanish) through ENEL's PEU. This system was capable of handling bookkeeping, budget and financial records, exporting of financial statements, and other reports required for internal control. Moreover, the PEP, AOP, and the Procurement Execution Plan System (SEPA, in Spanish) were complements to the system and facilitated project design and execution. They provided information on procurement processes, expenses, disbursements, and semiannual progress reports in a timely manner.

284. The financial management of the project was carried out in adherence to the procedures established in the agreement and to the accepted accounting principles of the institution. Through IDB's 'no objection,' the accounting firm Valladares García & Compañía was authorized to make audits in accordance with the International Financial Reporting Standards (IFRS). The audited financial statements were submitted on an annual basis and there were no reports of irregular resource management situations.

### 4.3. Environmental and Social Safeguards

285. Project evaluation was carried out on the basis of the Environmental and Safeguards Compliance Policy (OP-703), more specifically, of the Policy Directive A. 2, "Support environmental and natural resources management operations," which provides for the application of IDB's non-reimbursable financial resources to finance environmental management operations. Among other options, GEF's objective is to support investments that can yield environmental benefits worldwide.

286. The project was classified as Category C based on IDB policies and taking into account the objectives, effects, and risks to the operations. This category provides for operations that have no environment, and social, impacts or has minimum impact.

287. The estimated environmental risks for project execution were the following: (i) the Apanás watershed is exposed to natural hazards (weather events) and climate change effects, which would be mitigated through the activities provided for in components 2 and 3, and (ii) institutional risks, which were managed thanks to ENEL's leadership to carry out effective interinstitutional coordination work.

288. The main mitigation measures for these effects are: (i) a land-use plan; (ii) sustainable land- and forested-areas reordering practices, which are included in Component 2 indicators; (iii) conservation of private nature reserves and a Ramsar site, which are included as part of

Outcome 3 indicators; and (iv) planning, environmental education, and coordination mechanism incorporated as part of Component 1.

289. Since mitigation measures were part of outcome indicators, it is deemed that the implementation of such mitigation measures and compliance with the Environmental and Social Safeguards were highly satisfactory.

### 4.4. Overall Capacity Building by the Project

290. **Institutional Strengthening and Technical Capacities.** The project supported local capacity building and institution strengthening efforts on sustainable watershed management. As part of a cross-cutting education strategy in all four project components, the following activities focus on knowledge management were carried out in collaboration with the involved actors:

291. *Diploma Course in Natural Resources Management and Handling with a Focus on Watersheds.* It was held by ENEL in 2015 and trained 155 actors in technical and managerial aspects related to handling and management of natural resources with a focus on watersheds and gender. Officials from co-executing institutions and the municipalities of Jinotega and San Rafael del Norte, as well as PNR owners with a higher academic or technical level attended this training.

292. *Training course for Local Tourist Guides.* It was coordinated by MARENA and was held by UNA. It trained and accredited 25 community youths and provided them with the necessary knowledge and tools to provide and disseminate accurate and true information about the historic, cultural, and environmental potential of the Apanás-Asturias watershed.

293. *Technical training workshops.* Various technical training workshops were held throughout project execution. Their objective was to train actors in specific topics depending on their role. The following results were achieved:

- 155 officials and PNR owners were trained in land-use planning and soil conservation practices, use of the Carbon Monitoring System (CMS), methodology for bioindicator monitoring and update of the Environmental Land Reordering and Watershed Management Plan for Lake Apanás and Lake Asturias and the Ramsar site Plan.
- 
- 98 leaders of the micro-watershed committee and the potable water and sanitation committee were trained in water management, the concept of micro-watershed committees, and the payment for environmental services (PES) mechanism.

- 472 local actors, including NGOs, foundations, associations, and community leaders participated in two educational forums. One was led by a TECNIC consultant who made a presentation about the PES mechanism. The other one was led by UNAN's Nicaraguan Aquatic Resources Research Center (CIRA) with the objective of disseminating information about the socialization of hydrological studies in the Apanás sub-watershed.

- 1,661 project protagonists and beneficiaries were guided through the process of creating their own farm plan, and were trained in establishing and managing agroforestry systems, watershed management, pest and disease control, developing

environmental educational values, biodiversity conservation, and PES mechanism operations.

- 42 actors and beneficiaries with PNRs were trained in managing biodiversity conservation infrastructures, as well as captive animals, orchids, and how the PES mechanism works.

294. *Formation of environmental values and biodiversity conservation.* In the context of the 2015 World Wildlife Day that promotes the preservation of the habitat of wildlife species, 452 actors were trained, 287 of which were families from the communities, and 165 of which were student leaders from the 28 schools located in the sub-watershed.

295. *Technical Assistance.* In order to manage the project successfully, institutional actors, protagonists, and community members in the project area were provided with technical assistance. Also, regular tours around the intervention area were coordinated in a timely manner, as well as frequent meetings with the various actors involved.

296. 2,905 actors participated in training activities, which had a positive impact on project management and project area. Local and institutional capacities were built on sustainable watershed management, leaders were trained, and the skills of community actors and institutions were improved. Because of this, the institutional constraints at the beginning of the project were overcome and the expected goals were met. This is why the overall institutional strengthening is deemed satisfactory.

297. Environmental and social management was included throughout project implementation and execution as part of the institutional strengthening and technical capacities themes, which were developed with the participation of the actors. Below is a summary of areas of training and number of beneficiaries.

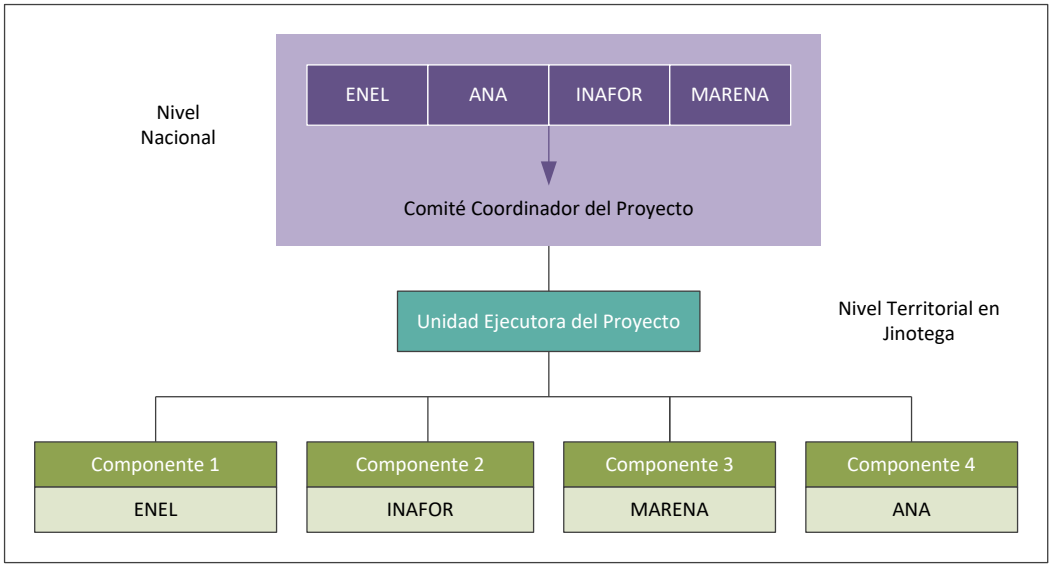
**Table 38. Summary of Areas of Training and Participating Beneficiaries**

| No. | Actors | Topics | Men | Women | Total |
|---|---|---|---|---|---|
| Component 1: Training on water management and carbon monitoring throughout project lifecycle. | | | | | |
| 1 | Institutional technicians from ENEL, INAFOR, MARENA, ANA, and the municipal offices of Jinotega and San Rafael del Norte; and PNR owners who have a higher technical or academic level. | ✓ Land-use planning, soil conservation practices, and integrated watershed management.<br>✓ Carbon estimation and monitoring tool.<br>✓ Bioindicator monitoring (terrestrial fauna and flora, and aquatic fauna).<br>✓ Update of the Environmental Land Reordering and Watershed Management Plan for Lake Apanás and Lake Asturias and the Ramsar site Plan.<br>✓ Diploma course in natural resources management with a focus on watersheds.<br>✓ Payment for environmental services. | 95 | 60 | 155 |
| Component 2: Training for communities, community leaders, and farmers in topics such as hygiene, environmental education, and environmental regulatory framework. | | | | | |
| 2 | Student leaders from 28 schools in the Apanás sub-watershed. | ✓ Watershed protection and management.<br>✓ Formation of environmental values. | 85 | 80 | 165 |
| 3 | Leaders of the micro-watershed committee and the potable water and sanitation committee. | ✓ Organizational structure of the micro-watershed management committee.<br>✓ Watershed management.<br>✓ Conceptualization of the payment for environmental services. | 54 | 44 | 98 |
| 4 | Farmers who implement environmental restoration systems. | ✓ Farm reordering plan.<br>✓ Establishing and managing agroforestry systems.<br>✓ Watershed management.<br>✓ Soil and water conservation.<br>✓ Pest and disease management.<br>✓ Conceptualization of the payment for environmental services. | 961 | 700 | 1661 |
| Component 3: Workshops for stakeholders to coordinate the establishment of biological corridors, collect feedback on sustainable land- and forested-area reordering practices, and monitor project outcomes. | | | | | |
| 5 | Private nature reserves (PNR). | ✓ Strengthening of PNRs.<br>✓ Management of biodiversity conservation infrastructure projects.<br>✓ Management of animals in captivity and orchids.<br>✓ Conceptualization of the payment for environmental services. | 28 | 14 | 42 |
| 6 | Community youths. | ✓ Course for tourist guides. | 12 | 13 | 25 |
| 7 | Families from the community. | ✓ Formation of environmental values and biodiversity conservation. | 160 | 127 | 287 |
| Component 4: Workshops for officials and local actors and protagonists to promote the payment for environmental services mechanism among landowners and local authorities. | | | | | |
| 8 | Local actors (NGOs, foundations, associations, community leaders). | ✓ Forum "Payment for Environmental Services" (TECNIC).<br>✓ Forum to socialize hydrological studies of the Apanás sub-watershed created by CIRA-UNAN. | 234 | 238 | 472 |
| | | **Total** | **1,629** | **1,276** | **2,905** |

## 4.5. Evaluation of Project Strategy and Execution Mechanisms

298. **Project's Institutional Structure** In order to achieve a successful project execution, an institutional framework was required to facilitate the coordination, participation, decision-making, and workflow among the various participating institutions at the different functional levels for the operationalization of the components. The project's institutional structure design was ideal for the development of the project and included the creation of an execution unit within ENEL (PEU), which would report to a project coordinating committee. Also, cooperation agreements were signed with specific key actors, such as INAFOR, MARENA, and ANA, whereby they were asked to provide liaison offices for implementing these four components. This institutional framework, as well as the roles and responsibilities of each institution were defined in the operating manual, which also served as a guide for project execution. Figure 9 shows the proposed institutional structure at project start, which worked as such during project execution. This institutional design worked and operated according to plan, and achieved the desired outcomes.

**Figure 9. Project's Institutional Framework**




299. **Project Coordinating Committee** This committee was made up of a representative from each institution—ENEL, INAFOR, MARENA, and ANA—as well as a representative from the municipalities of Jinotega and San Rafael del Norte. This committee was the entity in charge of monitoring project strategy and operations aspects. It facilitated operative coordination between the participating institutions and local, national, and sectoral agencies. This committee held regular meetings to discuss, analyze, and assess the planning instruments, such as PER, AOP, and PP. It also established the guidelines for activity achievement and monitored progress made in project execution and performance.

300. **ENEL's PEU** was the ad hoc unit designed by ENEL to be in charge of the administration of the project. It was based in Managua and had technical professionals in Jinotega. This team was made up of a General Coordinator, a Technical Coordinator, an Administrative Assistant, a Financial Specialist, and a Procurement Specialist. Also, ENEL designated an environmental specialist to implement each component. Throughout project execution, ENEL's PEU provided technical support and permanent oversight, thus promoting the active participation of co-executing institutions and agreement among involved actors. Moreover, it was in charge of

managing the resources made available by the agreement, and conducted procurement of goods and service in adherence with the Bank's policy.

301. **Liaison Offices of Participating Institutions.** While the project was being executed, the national- and territorial-level liaison offices were leveraged; these offices took over the role of and lead the way in executing and implementing project components. The designated offices are shown in **Table 39**, broken down by institution.

**Table 39. Liaison Offices of Participating Institutions**

| Institution | National-level liaison office | Territorial-level liaison office |
|---|---|---|
| ENEL | Project General Management (PGM)<br>ENEL's PEU | ENEL Office – Jinotega<br>ENEL's PEU |
| INAFOR | Directorate of Forestry Development and Protection | Forestry District 8 Delegation |
| MARENA | Biodiversity Office | MARENA's Territorial Delegation – Jinotega |
| ANA | Directorate of Watersheds | Watershed Office |

302. Project's institutional structure ensure successful resource management and the completion of each organization's activities. Its implementation resulted in the proper use of communication tools and correction of functional errors found during project execution. Moreover, it promoted actor engagement and set the foundation for the creation of the PES mechanism's institutional structure—a Component 4 output.

303. **Institutional Structure of the PES mechanism.** Due to the complexity and the need for institutions taking ownership of the PES mechanism, the participation of another organization was needed for Component 4. The institutional structure of the PES mechanism was made up of a Board, a technical administrative unit (TAU), a leading organization—ENEL—, a financial entity—BANPRO—, and an audit firm. This structure is running and operational, and it is expected to continue operations until 2021 when the last disbursements for beneficiaries are made.

304. **PES Mechanism Board.** The Board was presided by MARENA, and ENEL, INAFOR, ANA, and the municipalities participated as members. It guided the implementation strategy for Component 4. It approved planning instruments for the mechanism, among which was the AOP and technical reports. It also participated in the selection of priority intervention areas.

305. **Technical-Administrative Unit (TAU)**. It is an instance of ENEL and was located in the project area. As the entity in charge of the coordination activities technical/operative oversight of the PES mechanism. It led the summoning processes, contract signing, and training for the PES beneficiaries. It also made policies and created PES mechanism's plans and programs for later discussion by the Board.

### 4.6. Performance Evaluation of Key Actors Throughout Project Execution

a. Bank's performance

Rating: Satisfactory

306. **Bank's performance in ensuring quality since project start**. The project benefited from the studies, experiences, and lessons learned provided by PAGRICC, as well as from discussions and consultations for project preparation, which helped determine priorities and key areas of action. A Core Team with ample experience working in Nicaragua and in environmental project design helped design the operations. When preparing the project, identification missions were made with the participation of environmental and operations specialists. The IDB team provided strong technical guidance during the preparation of operations. They combined the right level of expertise and gave advice on the design on the basis of an extensive background analysis and ENEL's studies. They also provided guidance during the contracting of CABAL, S.A.

307. **Oversight.** The IDB team maintained ongoing dialogue with ENEL's PEU to assess the progress made in project execution and continue to provide technical support by making official oversight and administration missions after agreement's eligibility. The team was in close collaboration with ENEL and its PEU. It supported coordinating efforts with all participating institutions to ensure goal achievement. After the grant agreement was closed, IDB and ENEL held a dissemination workshop in order to review outcomes and discuss lessons learned from project execution.

308. **Justification of Bank's Performance Rating**. Given that design quality was rated 'satisfactory' and oversight quality was also rated 'satisfactory,' the IDB's overall performance is 'satisfactory' as well. As explained above, oversight was ongoing and it included administration missions and support from individual consultants. It should be pointed out that the technical advisory was strong and it promoted and supported the creation of the PES mechanism as a way to ensure project sustainability.

b. Government Performance

Rating: Satisfactory

309. **Government Performance**. The government took ownership of and committed to the policies promoted by the project. It ensured the right number of staff and resources to guarantee adequate institutional capacity and support for co-executing institutions. The grant operation was based on initiatives by ENEL.

d. Performance of Participating Institutions

Rating: Satisfactory

310. The four co-executing institutions from the GoN took ownership in the implementation process, as they participated in project design, execution, and evaluation—depending on their specific role.

311. **ENEL.** ENEL, through its PEU, was in charge of project execution. It provided ongoing leadership and oversight since the IDB found the project eligible to receive GEF funds. It ensured the active participation by the co-executing institutions, with which it signed cooperation agreements for project execution. In addition, ENEL's PEU (i) achieved harmonious agreement between the various local/regional actors involved in the project through technical meetings and informative assemblies; (ii) facilitated the management of IDB/GEF resources and the local match, as shown in the audited financial statements; (iii) designed and implemented an innovative computerized system for monitoring, evaluation,

and reporting; and (iv) ensured compliance with IDB's fiduciary policies, to which the project adhered, and fulfilled all the roles assigned to it.

312. ENEL's PEU also executed the implementation of Component 1 successfully. In order to do so it created and presented the instruments for watershed management to the involved municipalities. It ensured the creation of a legal framework for such instruments, among which are the Environmental Land Reordering and Watershed Management Plan for Lake Apanás and Lake Asturias. Likewise, ENEL's PEU created and introduced the Carbon Monitoring System (CMS) and strengthened the Cadaster Information System (SISCAT) for the municipal offices of Jinotega and San Rafael del Norte. Both the CMS and SISCAT were required as the technical foundation for other processes to take place. They were even incorporated as part of the information systems of both municipal offices.

313. Additionally, ENEL's PEU performed other key activities that made it the project leader. It coordinated actions in collaboration with co-executing institutions to overcome challenges. It supported INAFOR in the design of gabion structures. It expedited the negotiation process with UNA to sign a cooperation agreement in October 2016. It should be noted that ENEL's PEU also implemented the PES mechanism—an output of Component 4—successfully. Even though there were significant delays in its implementation, the desired goals were reached in a short amount of time. ENEL's PEU created technical, legal, and financial instruments for the mechanism, it signed a financial services agreement with BANPRO to manage funds, and incorporated the farmers applying the systems into the mechanism. ENEL took ownership of the project by performing these activities, and became a reference for other institutions.

314. **INAFOR.** During the implementation of Component 2, INAFOR coordinated, advised, and delivered the material incentives (plant and non-plant materials) to the protagonists; such incentives are necessary for establishing environmental restoration systems. It also certified plantation forests and agroforestry systems. Concurrently, INAFOR constantly promoted trainings for actors, which were in line with other initiatives of them, such as the Community Forestry Fair and the Plan Reordering Plan workshops. The institution performed the key roles assigned to them in the cooperation agreement with ENEL, and also actively participated in coordination activities with the other co-executing institutions.

315. **MARENA.** MARENA was in charge of implementing Component 3. It promoted actor engagement during project execution by holding consultation workshops to create management instruments, such as the Ramsar site Management Plan. It also led the criteria formulation process for the selection of project intervention areas and identification of the corridors with the highest potential in the micro-watershed. During the implementation of Component 3, MARENA gave the actors advice on the creation of business plans and ecotourist circuits, in a timely manner. It also developed an accreditation course for 25 local tourist guides. Also, MARENA monitored the establishment of breeding centers by signing pledges with the actors. Moreover, it declared PNRs through ministerial decrees in order to ensure the conservation of these areas.

316. **ANA.** ANA was given the responsibility of implementing Component 4. It successfully formalized the sub-watershed component and micro-watershed committees through the RPNDA. The committees were accompanied by the institution along the process of creating the micro-watershed management plans. In the context of the implementation of Component 4, the technical foundation of the PES mechanism as well as the preliminary version of the governing legal instruments were designed and developed. With this, ANA partially fulfilled the roles assigned to it at project start. ANA delegated the leadership and administration roles for the PES mechanism to ENEL through an interinstitutional agreement signed on February 3,

2017 between ENEL, MARENA, INAFOR, and ANA. This agreement established the creation of the Technical-Administrative Unit (TAU), which is in charge of managing and overseeing the fund, and will operate until 2021.

### 4.7 Level of Participation and Ownership by Stakeholders and Local/Municipal Institutions

317. This section sets out the level of participation and ownership by stakeholders and beneficiary local/municipal institutions. From a social sciences perspective, participation is the association between one individual and another one(s) in more or less structed situations and processes where the individual acquires higher empowerment with regard to given final objectives, which can be consistent or significant for the individual.

318. In order to assess the level of participation in the project, a methodology—and its various instruments—was developed to measure the level of participation and ownership based on feedback or recommendations collected in the processes implemented by the project. **Annex 3** delves into the methodology, sample design, and instruments for a focus group with PNR owners. The results show a panorama of the impact by the project on the target population. The instruments (surveys) were applied to 35 actors— nine female farmers, 26 male farmers, and eight PNR owners (two women, six men)—who participated in a focus group as actors in the implementation of the various systems promoted by the project. Also, two officials were trained. One from the municipal office of San Rafael del Norte and another one from the municipal office of Jinotega. The infrastructures built by the project were visited as well. All methodological instruments were reviewed and approved by ENEL's PEU.

319. Below are the perceptions by local actors for each project component.

320. **Component 1:** Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management. As part of the capacity building actions for local actors, the persons in charge of the cadaster units of the municipal offices of Jinotega and San Rafael del Norte were interviewed. They confirmed their participation in the trainings held by the project and received equipment and updates to the alphanumeric data of the Cadaster Information System. Also, two meteorological stations were visited. These stations are in good shape and partially operating. The watershed committees were created and trained, but they have not been responsive to the required actions for watershed reordering during project execution. It is important to note that it is INETER’s responsibility to keep these stations operating and up-to-date. The project provided for training for committee members, but there was a set budget for operating these stations.

321. **Component 2:** Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration. These activities were executed by INAFOR in coordination with, and under the leadership of, ENEL's PEU. Owners identified the processes developed by the project, responded to survey questions, and took ownership of the implemented processes that were promoted by the project. They expressed they have attended the training, but they demand more and better technical assistance for their activities. Through this process, owners gave recommendations as to the type/quality of plants and improvement of turnaround times, which should be in keeping with the season in order to ensure plant engraftment.

322. **Component 3:** Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site. The activities for this component were executed by MARENA, under the coordination and leadership of ENEL's PEU. These owners seemed actively engaged in the activities. They took ownership, participate in the activities, give recommendations, and seek

mechanisms to get the benefits to which they are entitled as PNRs, such as property tax exemption. One of the main demands is institutional accompaniment from competent authorities to ensure natural resources conservation.

323. **Component 4:** Design and implementation of the Payments for Environmental Services mechanism in the Apanás-Asturias watershed. The activities provided for in Component 4 were executed by ENEL's PEU in coordination with ANA. The PES mechanism started operating at the end of 2017, and the first disbursement was made in February 2018. The protagonists of the PES mechanism are the farmers from components 2 and 3 who received the incentive. They said this is great initiative that should go on, and, in general terms, they recommend that the value of this mechanism be improved and enhanced.

324. Generally speaking, the results derived from the evaluation of the level of participation and ownership are deemed satisfactory. The reason is protagonists are able to recognize, implement, criticize, and give recommendations on the development of the processes, as a result of their involvement. In summary, farmers took ownership of the project and the processes, and are able to give recommendations about the needed improvements.

325. Farmers gave the following recommendations: (i) more technical assistance and more frequent visits; (ii) plants should be native and must be delivered in keeping with the harvest season to ensure proper engraftment; (iii) environmental education should be given in the communities of the area as a cross-cutting theme; and (iv) future infrastructure projects should be suited to the area of intervention.

## CHAPTER 5. FINDINGS AND RECOMMENDATIONS

326. Based on the interviews, surveys, and workshops for both actors and leaders during project execution, the following findings and recommendations were identified for each project component:

### Table 40. Project Findings and Recommendations

| Findings | Recommendations |
|---|---|
| **Component 1**: Strengthening of institutional structures and local land use planning capacities, soil conservation practices, and integrated watershed management. | |
| A Communications, Promotion, and Engagement Plan for the key actors was designed. This made it possible to get ongoing feedback throughout project execution. The plan was drafted by ENEL and focused on identifying—through a mapping—key actors in the work for the integrated watershed management in the project area. However, it does not establish the way they will interact nor the common watershed management goals they can support from their own roles. | When designing similar projects, a Communications, Promotion, and Engagement Plan should be designed, in a cross-cutting way, for key actors and, above all, for the municipal authorities. Moreover, during the initial project execution phase, a mapping of actors in the watershed must be created. This would give information about the various actors working on similar initiatives, and would make it possible to learn their actions and engagement objectives for a more effective management of the systems. |
| The municipal offices were recipients of institutional strengthening actions and they incorporated a new version of SISCAT[29] together with the corresponding equipment. The objective of this was to improve the existing municipal cadaster systems in the watershed. However, there was low participation of the municipalities where the watershed committees and micro-watershed committees were established. Especially, there was low participation in activities related to reordering and application of the PES mechanism. | |
| According to the grant proposal, Component 1 included specific activities to support the formulation of three municipal decrees to aid the creation of plans for the originally proposed micro-watersheds. When execution was underway, the project scope was broadened to cover 11 micro-watersheds, which, in turn, required the incorporation of the additional micro-watershed committees. | Decrees are a local legal implementation instrument. Through them, municipal authorities can participate in a responsible way in the process of managing the land and the natural resources, as per their mandate set forth in Law 40, "Law of Municipal Offices." Therefore, it is advisable, for future operations, to adjust and/or broaden the goals in keeping with the modified outcome. As a result, 11 micro-watersheds were added, whose operations were improved. |
| The high level of commitment by the involved institutions led to an efficient management of the interinstitutional coordination efforts in order to reach the proposed goals for each component and expected outcomes. The involved institutions include INAFOR, MARENA, and ANA, under the leadership of ENEL, through its PEU. | Executing a project where there is participation from various institutions requires a strong and ongoing leadership, especially when there is involvement of several ministries and entities that have different objectives but share the same purpose. Once operations come to an end, ENEL must continue to lead the same way they have done it so far. This will help further, together with ANA, the implementation of the Watershed Management Plan for Lake Apanás and Lake Asturias. In turn, water production and electric power |

[29] Prior to project start, the municipal offices already had a SISCAT which was created and managed by the Nicaraguan Institute of Municipal Development (INIFOM).

| Findings | Recommendations |
|---|---|
| | generation will be benefited as a result of the expansion of the PES and other similar mechanisms to, ultimately, cover the rest of the watershed area. |
| **Component 2**: Implementation of sustainable land and forestry management practices in order to enhance biodiversity conservation and carbon sequestration. | |
| The majority of ERS actors are smallholders who implement subsistence farming with beans, maize, and vegetable crops, which have been added to the project as agroforestry systems. | For future projects, it is advisable to focus on promoting systems with greater cover, such as coffee, NRM, natural forest, and IPF. This can be achieved by improving the incentive, which can have strategy of differentiated rate based on the implemented system. |
| During field visits, farmers suggested that plants should be native, in good shape, delivered during planting season, and come with the necessary substrata to ensure proper engraftment. | It is recommended to improve the logistics in order to optimize delivery times of the plant material. A focus on local vendors should be given based on the needs of the target population. |
| The project financed 65 farm plans for 65 out of the 1,200 registered actors. This only represents 5.4% of the actors who participated during project execution. | Ideally, each actor should have a farm plan in order to achieve an effective watershed management. This way land-use reordering can be better defined by means of conservation practices to be implemented within the next five years. |
| The analysis of the actor surveys on the field identified the existence of weaknesses in the sequential systematization of the technical assistance and in the management and administration of activity achievement records. | The systematization of the developed implementation and technical assistance activities should adhere to a monitoring and follow up system in place, specific to the type of implemented system. This is with the objective of complying with the procedures established in the Operating Manual and improving perception and component evaluation processes. |
| The Government of Nicaragua has been proactively participating in conservation and sustainable management efforts in the Lake Apanás and Lake Asturias watershed. They have done so by drawing on various sources of external financing and aided by IDB's leadership in projects like PAGRICC[30] and FONADEFO, among others. However, it was evident from the site visits that there is no record of the actors who received the various benefits from the GoN. As a consequence, this may lead to duplication of efforts and inadequate follow up for later evaluation and future performance. | For future projects in the same geographic area, it is recommended that INAFOR revisit and assess activities carried out by previous projects. This will ensure the continuity in the watershed management and can be achieved through a beneficiary record or database, which can also be an input for future impact assessments in order to improve the forest cover. |
| **Component 3:** Conservation of forest areas and biodiversity in private nature reserves and the Ramsar site. | |
| The actors stated that the establishment of PNRs is a significant step toward vegetation cover and biodiversity conservation, and brings statutory benefits, but they also added it has been difficult for them to access them. | MARENA should implement a monitoring and follow up strategy for PNR owners in order to ensure the conservation of the areas declared PNRs by law, as well as the promotion of the incentives for the new conservation initiatives in the watershed.<br><br>A performance evaluation should be carried out for all PNRs created by the project. This should be based on the EMP implementation and the development of ecotourist circuits per PNR. This evaluation should take the actors into account—i.e., those receiving a PES incentive. Their benefits, amount of incentive, and sustainability should be evaluated. |

[30] PAGRICC is the Program for Disaster Risk and Climate Change Management (in Spanish). It is financed through an Inter-American Development Bank (IDB) loan (loan contract No. 2415/BL-NI, 2011-2016) and contributions by the Nordic Development Fund (NDF) and the Swiss Agency for Development and Cooperation (SDC).

| Findings | Recommendations |
|---|---|
| PNR owners stated that they require more technical support—tourism promotion and value chains—for the sustainability of their reserves. | An institutional program should be created through MARENA's System of Protected Areas to support resource management and technical assistance to monitor the activities established by the project and promote sustainability. |
| Since the project's budget was not sufficient to establish accommodation infrastructures, it was opted to build sighting ranches. However, these ranches do not have the same economic impact, as far as income generation, as accommodation does. | A fund to develop business plans for eco-businesses should be created, which can lead to higher income as a result of the conservation activities. |
| PNR owners expressed that the species for the breeding centers defined by project—i.e., iguanas and frogs—were not in line with the weather conditions of the area. | For new animal breeding promotional initiatives, native species to the area should be used. |
| **Component 4:** Design and implementation of the Payments for Environmental Services mechanism in the Apanás-Asturias watershed. | |
| The PES mechanism was established as a pilot project with resources form GEF and a local match to cover its administration until the end of 2019. However, resources should be secured to keep the mechanism operating until 2021, but as of present time, no additional financing has been added. It should be noted that the sustainability of the PES mechanism has a high financial risk. | It is recommended that ENEL should do the necessary economic and financial estimates to assess and consider charging a fee for the use of water for electric power generation, as this can generate an income for the PES mechanism. In turn, this can ensure the sustainability of and promote the expansion of forested areas that are protected under the proposed scheme, as a result of the payment for water use in the watershed (potable water, energy, etc.).<br><br>Moreover, it is recommended that ENEL should finance monitoring and administration costs until 2021, and it should search and leverage resources from other government sources and international grants while the PES mechanism is operating. |
| Though there is a technical relationship between the implementation of the environmental restoration systems, including the PNRs, this relationship does not show a link to the PES mechanism. The reason is the areas established by the farmers prior to the project were considered and not as part thereof. | A file record of each farmer about the monitoring and condition of the system implemented by the project should be kept. It should include monitoring and registration information about plants as a requirement to be added to the PES mechanism. |

## CHAPTER 6. LESSONS LEARNED FROM PROJECT EXECUTION

327. These are the lessons learned from project design and implementation:

328. **Importance of having a committed entity in a leading role.** In order to keep interinstitutional coordination efforts, it is essential for an entity to undertake the leadership in coordinating, developing, and overseeing these efforts. Especially, when the participating entities undergo a learning process and define their roles are defined on interinstitutional participation agreements, which were established in the project design phase. Through its Project Execution Unit, ENEL took on this leadership role in charge of the coordination, execution, and implementation of the project, and secured project success by achieving the goals originally established.

329. **Importance of specific and measurable indicators.** It is essential to have clearly defined reference values and objectives in order to monitor progress made and evaluate outcomes. Also, in a results-oriented process, there should be a set of measurable and meaningful outcome indicators. The system of project indicators was detailed and ambitious, thus making performance monitoring and evaluation much easier.

330. **Creation of an integrated Procurement Plan.** From the design phase, the Procurement Plan should have been conceived with a holistic or comprehensive view of the bidding processes and contracts throughout project execution. It should have taken the scope and the lifecycle—five years—into account. Since only an 18-month (mid-term) was accounted for, this gave rise to excessive modifications to the Procurement initial plan. In less than six years, 33 changes were made. Concurrently, while planning the bidding methods, local market capacity (vendors, prices, purchase of materials, etc.) should have been analyzed. This would have resulted in a type of management that is more suited to the reality of the project, thus making it more efficient. A Procurement Plan should have a deep and detailed analysis of the processes to follow, while considering elements, such as the evaluation of the operational context of the country, vendor and market capacity, mitigation of procurement-related risks, analysis of participants and stakeholders, and a list of vendors and their scope (costs, terms, contract) as the basis of a more efficient procurement strategy. It is important to highlight that the project adhered to IDB policies for contracting works, goods, and services.

331. **Strategic planning the basis of a local actor mapping.** When designing a new phase, it is important to consider a strategic planning that is based on local actor mapping with participation mechanisms geared to address the needs of the actors and adjusted to the territorial dynamics and reality. It should include, as a cross-cutting element, a permanent awareness raising and social promotion campaign in order to facilitate adoption of changes based on the local needs and project guidelines.

332. **Communications plan and awareness raising campaigns.** In order to ensure effective project planning and management, a cross-cutting communications and awareness raising plan should have been developed for potential beneficiaries. The purpose of this plan should have been to facilitate understanding among involved actors, optimize the management of human and financial resources related to project activities, and enhance participation and support from a local perspective. This plan should include a dissemination, training, and technical assistance plan. This will enable the creation of an assessment adjusted to the local reality and the establishment of objective and accurate training activities, a permanent and cross-cutting social promotion campaign, and an awareness raising strategy for the target population at different levels of intervention.

333. **Implementation of a PES mechanism.** The design of a sustainable payment for environmental services mechanism should begin since project start or even before that. This is because a great time investment is required for the planning, development, and implementation phases, as this is a pilot financed with external resources. The creation of future environmental funds should be done on the basis of the analysis and effective analysis of the demand, as well as of more realistic execution plans as to the start and operations period. Furthermore, alternative funding sources should be considered when developing and implementing the fund in order to reduce the financial risk of the mechanism.

334. **Sustainability: A medium-to-long-term challenge.** Sustainability is the most important part of the lessons learned, and it is essential in order to ensure the impact of project activities. There needs to be a project formulation team in charge of securing new income sources. This will ensure the sustainability of the actions related to the implementation of the PES mechanism and the complementary actions to ensure biodiversity conservation and mitigation of greenhouse gas emissions by continuing to apply land use reordering practices in a second phase.