



*Restoring and
conserving
natural
ecosystems for
improved
environmental
services and
well-being for all*

*Patricia Prieto C
Ecóloga
Rafael Rosero
Biólogo*

*Piendamo, febrero
2020*

Table of Contents

	<i>Pag</i>
<i>1 Summary</i>	<i>1</i>
<i>2 Beneficiary population</i>	<i>2</i>
<i>3 Objectives</i>	<i>2</i>
<i>3·1 Overall objective</i>	<i>2</i>
<i>3·2 Specific objectives</i>	<i>2</i>
<i>4 Description of the problem and justification for the project</i>	<i>3</i>
<i>5 Methodology</i>	<i>4</i>
<i>5·1 Characterization of flora</i>	<i>4</i>
<i>5·2 Ecological restoration</i>	<i>4</i>
<i>5·3 Science participatory</i>	<i>6</i>
<i>6 Action Plan component</i>	<i>7</i>
<i>7 Detailed budget</i>	<i>10</i>
<i>8 Bibliographic reference</i>	<i>14</i>

1. Summary:

Colombia has one of the highest rates of deforestation. About 124 hectares (data from 2015) are lost each year, according to official data from the Institute of Hydrology, Meteorology and Environmental Studies - IDEAM, which reduces environmental services.

Therefore, it is necessary to improve the natural ecosystem conditions. Corpotunia has created a program "Restore and conserve one hectare of natural reserve", to invite all the people, companies and organizations to join us in the task of taking care of our forests.

We contribute to support public institutions that have acquired land to improve water resources and also biological diversity. We also accompany people in the community who have natural reserves for the conservation and recovery of forests. We are located in one of the areas of great biological and cultural importance, the páramos, high Andean and sub-Andean forests, where CORPOTUNIA carries out its programs, projects and activities for the good management of natural resources through joint work with the communities that inhabit these regions.

The program offers the following actions:

- Floristic inventory to know what there is, how much and how will be its conservation management.*
- Ecological restoration in areas degraded by agricultural and livestock activities.*
- Participatory science to link people in conservation, restoration and nature monitoring programs, is binding because all those who participate contribute to the construction of their own knowledge of nature.*

2. Beneficiary population:

The project directly and indirectly benefits public and private landowners and the community in general located in areas of the reserve that receive environmental services from natural ecosystems.

3. Objectives

3.1. General objective:

To promote the maintenance of ecosystem services by restoring and conserving areas of nature reserve.

3.1. Specific objectives:

- *To strengthen and promote the development of applied research and the generation of basic information on both flora and fauna species for subsequent biodiversity conservation management work.*
- *Induce ecological restoration processes, in order to maintain ecosystem services and improve ecological connectivity.*
- *To promote processes of participative citizen science that allows the change of attitude of the community in front of the responsibility in the management of the biodiversity.*



4. Description of the problem and justification of the project:

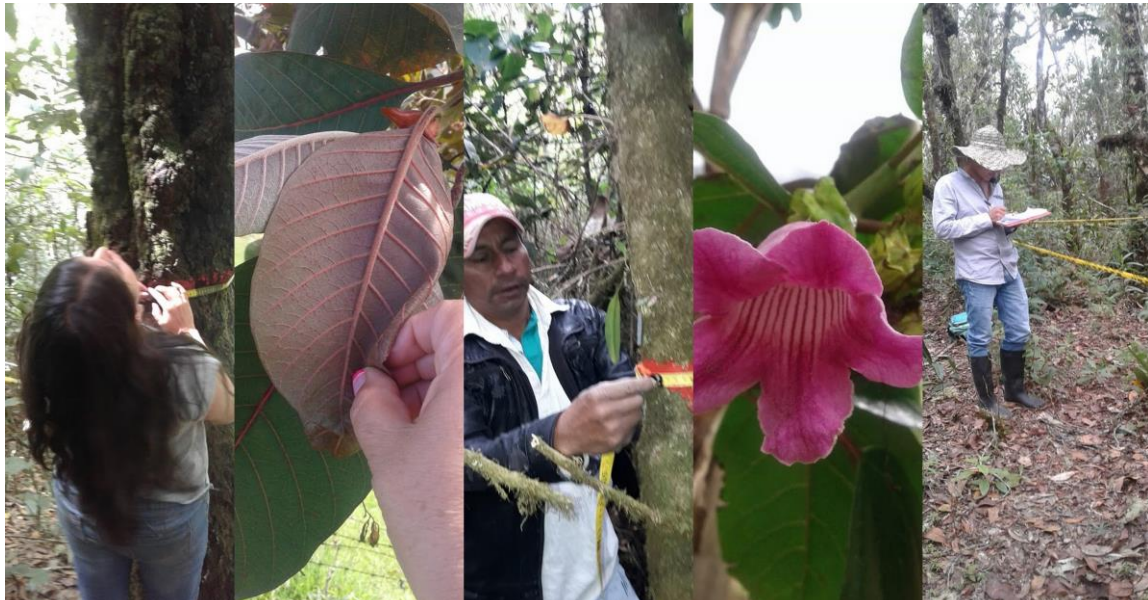
87 Hectares have been acquired to preserve nature and 70% are deteriorated, which ends up affecting the loss of some ecosystem services such as the reduction of water, which is the resource most felt by the community since it affects both its agricultural activities and human consumption. Another problem is the loss of native species and some are threatened, affecting the health of natural ecosystems.



For these reasons, it is necessary to implement actions to safeguard the native flora and fauna, which is why a characterization and inventory diagnosis of the flora should be carried out to promote knowledge about the existing species in the area, as well as to generate basic guidelines to be able to subsequently generate strategies for conservation. In addition, ecological restoration mechanisms should be implemented in order to redirect the development of natural resources to a balanced condition in the reserve. The project also contemplates the training of teachers, students and communities in general present in the area of the nature reserve.

5. Methodology:

- 5.1. Characterization of the flora:



he structure and tree composition of the Andean forest is characterized, where the dynamics and tree composition are described in a transect of 0.1 hectares, composed of 10 plots of 2x50 m, where all individuals with DBH \geq 2.5 cm, cover, fustal height and total height were studied. Also identified by category were endemic species, cultural use, threatened, wild relatives and rare.

- 5.2. Ecological restoration:

Recover specific ecosystem services for their preservation, which consists of the enrichment of natural regeneration, planting of plants in blocks, nucleation, strips, perches, eradication of pest species, and others. The techniques that we will apply in our restoration practices are the following

Alignment or fencing of the area: Physical demarcation of an area by means of wire fences to isolate it from any source of disturbance, mainly agricultural activities.

Planting of trees and shrubs: We use nucleation for extensive pasture areas.

Perches: These are artificial niches with physical or biological structures that serve to attract seed dispersing animals to the restoration area to increase the supply and distribution of seeds in the field, usually birds, bats and mammals.



- 5.3. Participatory science:

It is a dialogue of knowledge where efforts are joined in benefit of people, science, education, and naturally the environment, where every day the participatory science aims to incorporate people with their own tasks of applied research, is how the project "Flora With Science" studies the flora in natural reserves and asks for collaboration from the community to make the recognition of the flora through floristic inventory, maintenance of ecological restoration and monitoring that allows to observe the progress of restoration and improvement of ecosystem services.



<i>Action Plan component: Ecological Restoration</i>			
<i>Specific objective: To induce ecological restoration processes, in order to maintain ecosystem services and improve ecological connectivity.</i>			
<i>results</i>	<i>Indicators</i>	<i>Activities</i>	<i>verification means</i>
<i>Alinderamientos live in water nearly round.</i>	<i>440 linear meters for water alinderamientos round</i>	<i>Recesses for anchoring posts Pull wire line Bended wire</i>	<i>Invoices for purchase of materials. Photographs progress report</i>
<i>Ecological restoration in damaged area by agricultural activities and livestock.</i>	<i>7500 square meters restored nucleation techniques, perches and shelters. A document according to maintenance and monitoring</i>	<i>Development of design and mapping restore restoration. Preparing the ground Planting of shrubs and trees Installation of hangers Replacement of dead material Preparation and monitoring of maintenance agreements Preparation of final document</i>	<i>Bill restoration materials Agreements Act Progress report Photographs Progress report</i>
<i>Monthly time: 2 months</i>			

Action Plan component: Participatory Science

Specific Objective: To promote processes of participative citizen science that allow a change in the community's attitude towards responsibility in the management of biodiversity

<i>results</i>	<i>Indicators</i>	<i>Activities</i>	<i>Verification means</i>
<i>Implementation of environmental school project "Flora With Conscience"</i>	<i>Community awareness on the importance of improving ecosystemic services nature reserve.</i>	<i>Characterization work plan flora, restoration and training.</i> <i>Community meetings: joint village aqueduct and local administrative board.</i>	<i>List attendance of participants.</i> <i>Record of meeting</i>
	<i>2 schools were trained in the school environmental project "Flora With Conscience"</i>	<i>Implementation of theoretical-practical workshops, on the subject of What is a forest, the diversity of trees in a forest, how do they interrelate? The importance of trees, actions for the conservation of the flora resource, the elders tell us about their knowledge of trees.</i> <i>Days recognition of the flora of the environment.</i> <i>Tree planting days.</i>	<i>Commitment to implement the environmental project school "Flora With Conscience"</i> <i>Records of educational sessions.</i> <i>Attendance of participation of students and teachers.</i> <i>Document final report</i>

Monthly time: 2 months

7. Detailed budget.

1- RECOGNITION COSTS PER HECTARE FLORA				
EQUIPMENT 1- MATERIALS				
<i>Detail</i>	<i>Justification</i>	<i>Quantity</i>	<i>V. Unit</i>	<i>V. Total</i>
<i>Low branches or desjarretadera</i>	<i>Get samples plant</i>	<i>1</i>	<i>\$ 110,000</i>	<i>\$ 110,000</i>
<i>scissors clipper</i>	<i>Sampling plant</i>	<i>1</i>	<i>\$ 20,000</i>	<i>\$ 20,000</i>
<i>Table return type</i>	<i>Data register</i>	<i>1</i>	<i>\$ 5,000</i>	<i>\$ 5,000</i>
<i>Fieldbook</i>	<i>registration activities</i>	<i>1</i>	<i>\$ 2,000</i>	<i>\$ 2,000</i>
<i>News paper</i>	<i>Storage plant samples</i>	<i>30</i>	<i>\$ 800</i>	<i>\$ 24,000</i>
<i>Alcohol 70%</i>	<i>conservation samples</i>	<i>1</i>	<i>\$ 15,000</i>	<i>\$ 15,000</i>
<i>Decameter</i>	<i>Measurement study area and tree structure</i>	<i>1</i>	<i>\$ 20,000</i>	<i>\$ 20,000</i>
Subtotal equipment and materials				\$ 196,000
2- LABOR				
<i>Biologist, botanist</i>	<i>Fieldwork, identification of plant species and report</i>	<i>1</i>	<i>\$ 1,700,000</i>	<i>\$ 1,700,000</i>
<i>Auxiliary Field</i>	<i>Field work</i>	<i>4</i>	<i>\$ 30,000</i>	<i>\$ 120,000</i>
<i>Transport</i>	<i>Workplace</i>			<i>\$ 300,000</i>
Subtotal labor				\$ 2,120,000
Grand total				\$ 2,316,000

2· ECOLOGICAL RESTORATION COSTS				
1· FENCE 440 LINEAR METERS AROUND THE NATURE RESERVE				
DETAIL	UNIT	QUANTITY	V / UNIT	V / TOTAL
1-1· INSULATION MATERIALS				
<i>Barbed C14 x 350mts</i>	<i>rolls</i>	<i>8</i>	<i>\$ 190,000</i>	<i>\$ 1,520,000</i>
<i>Post for about 4 inches in bamboo</i>	<i>Unit</i>	<i>350</i>	<i>\$ 3,500</i>	<i>\$ 1,225,000</i>
<i>Galvanized wire C 16</i>	<i>kilos</i>	<i>30</i>	<i>\$ 6,500</i>	<i>\$ 195,000</i>
<i>cleats</i>	<i>kilos</i>	<i>5</i>	<i>\$ 5,500</i>	<i>\$ 27,500</i>
<i>Burned oil</i>	<i>Keg</i>	<i>1</i>	<i>\$ 13,000</i>	<i>\$ 13,000</i>
<i>Black plastic bags</i>	<i>Package</i>	<i>3</i>	<i>\$ 18,000</i>	<i>\$ 54,000</i>
<i>Pneumatic tape</i>	<i>Unit</i>	<i>20</i>	<i>\$ 1,000</i>	<i>\$ 20,000</i>
<i>immunizing</i>	<i>Gallon</i>	<i>3</i>	<i>\$ 50,000</i>	<i>\$ 150000</i>
Subtotal inputs				\$ 3,204,500
1-2· LABOR INSULATION				
<i>1 hole digging</i>	<i>Wage</i>	<i>two</i>	<i>\$ 30,000</i>	<i>\$ 60,000</i>
<i>Anchoring posts</i>	<i>Wage</i>	<i>3</i>	<i>\$ 30,000</i>	<i>\$ 90,000</i>
<i>Pull wire line</i>	<i>Wage</i>	<i>3</i>	<i>\$ 30,000</i>	<i>\$ 90,000</i>
<i>Bended wire</i>	<i>Wage</i>	<i>7</i>	<i>\$ 30,000</i>	<i>\$ 210,000</i>
<i>external transport</i>	<i>Freight</i>	<i>one</i>	<i>\$ 150000</i>	<i>\$ 150000</i>
Subtotal labor				\$ 600, 000

2. IMPLEMENTATION OF ECOLOGICAL RESTORATION				
DETAIL	UNIT	QUANTITY	V. UNIT	V. TOTAL
2.1. Planting LABOR AND HOOKS				
<i>adaptation field</i>	<i>Wage</i>	<i>6</i>	<i>\$ 30,000</i>	<i>\$ 180,000</i>
<i>traced</i>	<i>Wage</i>	<i>3</i>	<i>\$ 30,000</i>	<i>\$ 90,000</i>
<i>Plating and repicado</i>	<i>Wage</i>	<i>7</i>	<i>\$ 30,000</i>	<i>\$ 210,000</i>
<i>Planting and fertilization</i>	<i>Wage</i>	<i>7</i>	<i>\$ 30,000</i>	<i>\$ 210,000</i>
<i>inputs internal transportation</i>	<i>Wage</i>	<i>4</i>	<i>\$ 30,000</i>	<i>\$ 120,000</i>
subtotal reforestation				\$ 810,000

DETAIL	UNIT	QUANTITY	V. UNIT	V. TOTAL
2.2. INPUTS PLANTACION				
<i>native seedlings \geq 50 cm height + 10% replacement</i>	<i>trees</i>	<i>1100</i>	<i>\$ 1.600</i>	<i>\$ 1,760,000</i>
<i>Hidroretenedor</i>	<i>lumps</i>	<i>2</i>	<i>\$ 30,000</i>	<i>\$ 60,000</i>
<i>mycorrhizae</i>	<i>lumps</i>	<i>2</i>	<i>\$ 80,000</i>	<i>\$ 240,000</i>
<i>NPK fertilizer chemical</i>	<i>lumps</i>	<i>2</i>	<i>\$ 150000</i>	<i>\$ 300,000</i>
<i>increased transport supplies</i>	<i>Freight</i>	<i>2</i>	<i>\$ 250,000</i>	<i>\$ 250,000</i>
Subtotal inputs				\$ 2,610,000
2.3. MANPOWER PROFESSIONAL				
<i>Biologist</i>	<i>months</i>	<i>2</i>	<i>\$ 1,700,000</i>	<i>\$ 1,700,000</i>
<i>Transport</i>	<i>Global</i>		<i>\$ 500,000</i>	<i>\$ 500,000</i>
Subtotal				\$ 2,000,000

3. PARTICIPATORY SCIENCE COSTS				
1. EQUIPMENT AND MATERIALS				
<i>Detail</i>	<i>Justification</i>	<i>Quantity</i>	<i>V. Unit</i>	<i>V. Total</i>
<i>Stationery (markers, cardboard, tape, etc.)</i>	<i>workshops</i>	<i>1</i>	<i>\$ 200,000</i>	<i>\$ 200,000</i>
<i>Equipment (computer and video bim)</i>	<i>workshops</i>	<i>1</i>	<i>\$ 400,000</i>	<i>\$ 400,000</i>
<i>photocopies</i>	<i>workshops</i>	<i>1</i>	<i>\$ 200,000</i>	<i>\$ 200,000</i>
<i>refreshments</i>	<i>Field day</i>	<i>50</i>	<i>\$ 6,000</i>	<i>\$ 300,000</i>
<i>Paints and paintbrush</i>	<i>Paint a mural at school</i>	<i>1</i>	<i>\$ 300,000</i>	<i>\$ 300,000</i>
<i>Buying trees</i>	<i>100 trees</i>	<i>2,500</i>	<i>\$ 200</i>	<i>\$ 500,000</i>
<i>Subtotal</i>				<i>\$ 1,900,000</i>
2. LABOR				
			\$	
<i>Environmental educator and coordination</i>	<i>implementation workshops</i>	<i>1</i>	<i>3,000,000</i>	<i>\$ 3,000,000</i>
<i>Transport</i>	<i>A site fieldwork</i>		<i>\$ 500,000</i>	<i>\$ 500,000</i>
<i>Subtotal labor</i>				<i>\$ 3,500,000</i>
<i>Grand total</i>				<i>\$ 5,400,000</i>

8. References

- *AH Gentry. 1995. Patterns of diversity and floristic composition in Neotropical montane forests. Pages 103-126 in SP Churchill, H. Balslev, E. Forero, and JL Luteyn, editors*
- *Kattan GH, Lopez-Alvarez H, Giraldo M. 1994 Forest fragmentation and bird extinctions: San Antonio eighty years later. Conservation Biology 8: 138-146.*
- *FH-Zambrano Lozano, editor. 2009 management tools for biodiversity conservation in rural landscapes. Research Institute of Biological Resources Alexander von Humboldt and Regional Autonomous Corporation of Cundinamarca (CAR). Bogotá, Colombia. 238 p., Bogotá.*
- *Nina Duarte, Francisco Cuesta, Inty Arcos. 2018. Guide to restaturacion tropical montane forests.*
- *BE. 2004. Principles SER International for ecological restoration. Society for Ecological Restoration International Science & Policy Working Group.*
- *Shimamoto CY, Padial AA, CM da Rosa, Marques MCM. 2018. Restoration of ecosystem services in tropical forests: A comprehensive meta-analysis. PLOS ONE 13: e0208523*

