Systemization of the Biodiversity Restoration and Community Development through Analog Forestry Project

From theory to implementation in the Reventazón Model Forest (Costa Rica), Atlántida Model Forest (Honduras) and Colinas Bajas Model Forest (The Dominican Republic)
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Tropical Agricultural Research and Higher Education Center (CATIE)
Turrialba, Costa Rica, 2010
The Tropical Agricultural Research and Higher Education Center (CATIE) is a regional center dedicated to research and graduate education in agriculture and the management, conservation and sustainable use of natural resources. Its members include the Inter-American Institute for Cooperation on Agriculture (IICA), Belize, Bolivia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Venezuela and Spain.

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Regional Project
Biodiversity restoration and community development through Analog Forestry Project. Reventazón Model Forest (Costa Rica), Atlántida Model Forest (Honduras) and Colinas Bajas Model Forest (The Dominican Republic).

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Presentation

On completion of the regional project, *Restoration of biodiversity and community development through Analog Forestry*, conducted in the Reventazón Model Forest (Costa Rica), Atlántida Model Forest (Honduras) and Colinas Bajas Model Forest (The Dominican Republic); the Ibero-American Model Forest Network, Falls Brook Centre and the International Analog Forestry Network present a summary and a reflection on the experiences gained by the producers, technical staff, extension workers, national and regional coordinators and other collaborators who helped develop this project.

The project has presented various challenges, testing the participants’ professional abilities and encouraging flexibility, creativity and perseverance that has allowed for challenges and defined goals to be reached. Project participants’ efforts helped to generate and exchange knowledge on issues related to Analog Forestry. There is still a long way to go, but we are sure that in order for Analog Forestry to advance, more partner organizations should be identified, volition needs to be generated and more technical and financial support like that provided by the Canadian International Development Agency is needed, without which, the results that we have achieved through this project would not have been possible.

It has been a great challenge to get the different actors involved to internalize the profound sense of working the land under the Analog Forestry concept. Thanks to the training and the motivation of those involved, there has been substantial progress in this regard. However, the internalization and application of the Analog Forestry concept represents a paradigm shift from the current conventional production methods used; it is a continuous process that we hope to strengthen in the future and have an impact on the practices of other producers and productive organizations.

The document presents the main outcomes of the project, the systemization of the lessons learned and the recommendations that were identified through a participatory and constructive process by those involved in the project. We hope that the topics addressed in this document will be useful for those involved in areas of forestry, agriculture and biodiversity conservation, among others, and that it will allow them to support and promote Analog Forestry is a strategy for simultaneous restoration of degraded areas and production.

Marie-Eve Landry
Regional Coordinator, Regional Project
*Biodiversity restoration and community development through Analog Forestry*
Biodiversity restoration and community development through Analog Forestry regional project

This document presents a summary of the key achievements and lessons learned from the regional project, Biodiversity restoration and community development through Analog Forestry executed during the period 2008-2010 and funded by the Canadian International Development Agency (CIDA). This project aims to train local actors, support the implementation of biodiversity restoration activities and improve sustainable rural livelihoods.

To this end, the project examined the establishment of Analog Forestry demonstration sites in three Model Forests: Reventazón (Costa Rica), Atlántida (Honduras) and Colinas Bajas (The Dominican Republic) including training of trainers and farmers, the development of tools to facilitate the implementation of Analog Forestry and the dissemination of experiences and tools to other areas of the Model Forest and organizations with a common vision.

The projected endeavoured to promote the participation of small producers, local organizations and municipal governments, among other groups, en the recuperation of degraded areas with the goal of restoring their biodiversity, increase their productivity, diversify their products and services, increase rural peasants’ income sources, increase intrinsic land value and educate the population about good productive practices.

The project helped to strengthen the foundations of the training centre in each Model Forest where the demonstration sites, the producers involved and trained partner organizations will be key to spread the application of Analog Forestry. Visit the project’s virtual portal: www.portalre-gionalFA.ning.com

The Ibero-American Model Forest Network and Falls Brook Centre of Canada assumed the overall coordination of the project, in collaboration with the International Analog Forestry Network and the Tropical Agricultural Research and Higher Education Centre (CATIE). In the Reventazón Model Forest (Costa Rica), the project was coordinated by the Ministry of Environment, Energy and Telecommunications (MINAET); in the Atlántida Model Forest (Honduras), by the Association of Municipalities of the Center of Atlantida (MAMUCA) and in the Colinas Bajas Model Forest (The Dominican Republic) by Enda-dom. In addition, several other organizations collaborated on the project in the three countries.

Presented below are the developments and results of the project. The document consists of three sections. The first section of the document is a general description of the Analog Forestry concept. The second section presents the scope of the project in Costa Rica, Honduras and the Dominican Republic and their regional products. Finally, the third section shows the main outcomes of the project identified by the participants involved (lessons learned, recommendations and analysis of its strengths, weaknesses, opportunities and threats) and may contribute to the strengthening of existing Analog Forestry projects and the development and implementation of new ones in Latin America.
Member organizations of the project at the regional level

The Ibero-American Model Forest Network (IAMFN) was established in 2002. The headquarters of the Presidency and the Secretariat of the IAMFN is located in the CATIE in Turrialba, Costa Rica since 2004. The network is composed of 24 Model Forests and 13 member countries of Latin America, the Caribbean and Spain, which work together towards a common goal of participative governance of natural resources.

The IAMFN is affiliated with the International Model Forest Network. The international network represents 50 sites in over 20 countries around the world. IAMFN promotes the consolidation of the Model Forests, connections between Model Forests, capacity building for financial sustainability, dissemination of knowledge and technology transfer and contributions to advocacy processes. Being part of a global network, the lessons learned at the regional level are catalyzed at a higher level. Contact: info@bosquesmodelo.net

The Falls Brook Centre (FBC) was established in 1990 in the province of New Brunswick, Canada. The organization is a demonstrative community and training centre. Through education and outreach programs, the FBC promotes awareness and environmental activities with the surrounding communities. The centre promotes better relations between Canadian NGOs and other countries. Contact: Jean Arnold ja@fallsbrookcentre.ca

The International Analog Forestry Network (IAFN) was established in 1996 in response to the need for an exchange of knowledge, experiences and information between organizations that were interested in learning, promoting and implementing the Analog Forestry system in their communities. The main objective of the Network is to restore environmental stability and ecosystem biodiversity through research, design and the application of the Analog Forestry system. The IAFN is a group of local organizations around the world that are adopting the Analog Forestry methodology and applying it in their local environment. Contact: Milo Bekins info@analogforestrynetwork.org
Introduction to Analog Forestry
World Context

Forests are the most productive terrestrial ecosystems. They have a global importance as a provider of sustenance for human populations. In addition, both natural and planted forests contribute significantly to national and local economies. Their importance in the production of atmospheric oxygen, soil conservation, climate regulation and shelter for countless species, make forest ecosystems indispensable for the preservation of life on the planet.

Water demand for energy production, agriculture, consumption, production and other needs is increasing rapidly. Extensive agriculture continues to represent the largest proportion of human land use. It is also a major cause of degradation of forest areas, with the removal of forest cover and pressure on the soil. Urbanism, or excessive growth of populations, is causing a number of changes and pressures in the same urban populations and their natural surroundings that are almost irreversible.

Biodiversity loss is caused, among other causes, by the type of economic development that takes place in environmentally fragile regions. The global ecological situation is a reflection of how some human activities change, destroy or completely alter different ecosystems. Among the main factors are: changes in land use, climate change, the introduction of exotic or invasive species and the contamination of terrestrial and aquatic ecosystems.

There is a need to improve humanity’s efforts to manage natural resources more sustainably at the global level and encourage restoration of degraded areas. The ability of current generations to meet their basic needs without compromising the needs of future generations must be translated into practices of natural resource management with an approach that considers the entire ecosystem. Therefore, it is important to look at forest ecosystems from the point of view of their operation and structure.

Several studies have shown that it is possible to stabilize the environmental damage by designing architectural structures of vegetation that avoids soil erosion, maintains adequate conditions for the development of plant and animal species and increases natural enemy populations. Analog Forestry is one of these options and was created as an alternative to current production systems as an effective way to stop deforestation and provide habitat for species that are being displaced due to destruction of forests.
Dr. Ranil Senanayake, a Sri Lankan ecologist, studied the interactions within the mature forest (climax), seeking to discover what link in the complex dynamics had the most importance for the creation, operation and restoration of habitats used by species. He identified that the forest structure, in other words the spatial organization of both the horizontal and vertical strata and the types of forest vegetation (grasses, palms, shrubs, trees, epiphytes, etc.) was the key factor, rather than the composition of species. Based on the results of his studies, he developed a methodology seeking to increasingly restore ecological functions and biodiversity of mature forests or “climax” in degraded areas through the establishment of systems “analogous” to the natural forest, mainly in terms of structure. He named this method “Analog Forestry” in 1987. His idea of creating an agricultural system adapted to the local context has subsequently been researched by the Neo Synthesis Research Centre (NSRC) in Sri Lanka. In 1995, Analog Forestry was accepted by the international scientific community as a methodology for integrating biodiversity protection in the context of landscape-scale management, during the session “Open-ended Intergovernmental meeting of scientific experts on biological diversity” held in Mexico City and funded by the United Nations.

Considering the strong pressure on forests today, the need to restore degraded areas and the needs of rural families, the Analog Forestry concept endeavoured to offer flexibility in order to meet producer’s objectives. Thus, Analog Forestry guides the restoration process, but gives the farmer or landowner the freedom to select the species that respond to their needs and interests and define their spatial location on the farm. This approach has been adopted in Asia and Latin America in diverse ecological and climatic conditions.
What is Analog Forestry?

Analog Forestry is a system of highly diverse trees and plants species, that seeks to establish a tree dominated ecosystem analogous in architectural structure and ecological function of the original mature forest or climax of the area. This system allows for the recovery of degraded areas (vegetation and/or soil), biodiversity restoration, protection and increased environmental services, while meeting the objectives of the owner and/or producer. A mature or climax forest corresponds to a plant community dominated by trees that is in the completion stage of the natural succession in a specific place and environment. This type of forest is considered to have a higher level of balance between its diverse components.

According to Dr. Senanayake, the structure of a forest can be restored without human intervention, but ecological restoration needs intervention in order to reintroduce certain vulnerable species and accelerate the maturing process of the system.

Analog Forestry offers the opportunity for innovation on farms and communal farms as well as offering an alternative to monocultures in the tropics, which produce a high deterioration of soil erosion and require a large amount of pesticides and fertilizers. The two main purposes for developing an analogous system are: (i) the preservation and beautification of a site (including tourism) and (ii) the production of food and other products for self-consumption and income generation.

Analog Forestry uses species that are ecologically, socially, economically and culturally compatible with the environment. The species can be used in the production of goods and services such as: water supply, food, spices, medicinal plants, timber, fuel wood, fibre and genetic resources that are essential for human population, industry and science, climate regulation, cultural services such as recreation and aesthetic values, and the formation of soils.

The Analog Forestry concept guides the restoration process to re-establish the ecological functions of forest, but is consistent with the producers’ objectives, which allows for the selection and use of species ecologically, socially, economically and culturally compatible with the environment and that meet their needs or interests. This will generate a wide range of products and services that reduce farmer risks from dependence on a single product. Furthermore, by establishing a system that is highly diverse in its composition and structure provides habitat for species that are being displaced due to the destruction of forests. Finally, Analog Forestry is also a tool to stop deforestation.

In order to create a forest analogous (or forest garden) in structure and ecological functions to the original forest, it is important to understand the functions of forest ecosystems, in particular those related to biodiversity conservation and life cycles. Consequently, Analog Forestry becomes
an innovative alternative that uses natural processes of ecological succession to progressively increase the stability and biodiversity in a certain place and accelerate the maturity range of the system.

Organic production and management of species diversity on a property used for the production of goods and services (distinct from monoculture production) are some of the basics of Analog Forestry. These are very old concepts, but were replaced by unsustainable practices promoted during the Green Revolution decades ago. In total, Analog Forestry follows 12 principles to guide land intervention, promoting a more sensitive and integrated relationship between humans, their surroundings and sustainable production.

The 12 principles of Analog Forestry

Principle 1 – Observe and record
Observe and record everything in the farm or the site and all modifications over time, but primarily the changes in conditions. It is important to feel at one with the natural environment, observing the changes that are presenting themselves; this will bring us closer to nature’s rhythm.

Principle 2- Understand and evaluate
In order to aid ecosystem development on the farm, the producer should questions about aspects that are not understood. It is important for producers, extension workers and researchers to exchange experiences so that scientific, traditional and local knowledge can be used in combination to allow for better opportunities to improve conditions of the farm.

Principle 3- Know your land
Principles 1 and 2 are about getting to know your property, allowing for decisions about design and intervention to be made with more confidence. Knowledge of the terrain is key to figuring out how to promote harmony with the natural environment.

Principle 4- Identify levels of yield
Good knowledge of land use capability helps identify where each element of the system will perform best.

Principle 5- Existing and potential system maps
A map representing the current property use, with indications of the wind and sun direction, the water supply and distribution of vegetation, along with a review of scientific studies in the area, helps to assess the potential of the land and to determine how to optimize its management in the future.
**Principle 6- Reduce ration of external energy**

Attempt to minimize external inputs (gasoline, pesticides, etc.) used on the farm during production, replacing them with organic fertilizers, like organic compost.

**Principle 7- Be guided by landscape needs**

Alter the landscape as little as possible. Determine landscape features such as the farm’s watershed and work in harmony with the natural and human elements that are present in the area. It is important to consider the neighbours who live in the territory around the farm and to understand their common concerns and needs regarding the land.

**Principle 8- Follow ecological succession**

Respect the natural phases of ecological succession to achieve a more stable environment and improve the welfare of the family and community.

**Principle 9- Use ecological processes**

Attempt to mimic nature, not reverse it. We should study ecosystem functions to understand and imitate them for farm use.

**Principle 10- Value biodiversity**

Biodiversity levels directly affect the environmental stability on the farm. Therefore, we must appreciate and understand the rhythms of nature to properly manage the land.

**Principle 11- Respect maturity**

Respect the natural evolution of the site in the long term letting it develop to its maturity, which will ensure a high level of sustainability to the site.

**Principle 12- Respond creatively**

Use creativity to adapt activities and solutions to the conditions of the farm. Analog Forestry allows us to be artists of the landscape.
Methodology

The process of establishing an Analog Forestry site can be started with producers, community organizations, local governments and also in collaboration with local NGOs or any other person or group interested in the concept that has an area of degraded land available to be restored by using the Analog Forestry methodology. Very briefly, the establishment of an Analog Forestry site includes the following steps:

1. Data collection and analysis of surroundings of the farm and landscape (includes mapping the area, the biotic and abiotic characteristics such as topography, water supply, direction of the sun and wind, production systems; ecological assessment; identified problems and threats; etc.). The log book is used to gather information about the site.

2. Determining the physiognomic formula of the mature or climax forest nearby (F1) and the site of action (F2). Then calculate the physiognomic gap (F1-F2) of the vegetation structure in the two areas.

A. Growth Categories
B. Structure Categories

1. Basic Growth Forms

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Woody plants</th>
<th>&gt; 35 m</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Broadleaf evergreen</td>
<td>20 – 35 m</td>
<td>7</td>
</tr>
<tr>
<td>D</td>
<td>Broadleaf deciduous</td>
<td>10 – 20 m</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>Needleleaf evergreen</td>
<td>5 – 10 m</td>
<td>5</td>
</tr>
<tr>
<td>N</td>
<td>Needleleaf deciduous</td>
<td>2 – 5 m</td>
<td>4</td>
</tr>
<tr>
<td>O</td>
<td>Aphyllous (Without leaves)</td>
<td>0.5 – 2 m</td>
<td>3</td>
</tr>
<tr>
<td>S</td>
<td>Semi deciduous (B+D)</td>
<td>0.1 – 0.5 m</td>
<td>2</td>
</tr>
<tr>
<td>M</td>
<td>Mixed (D+E)</td>
<td>&lt; 0.1 m</td>
<td>1</td>
</tr>
</tbody>
</table>

2. Coverage classes

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Forbs (ferns)</th>
<th>&gt; 75% (Continuous)</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Herbaceous Plants</td>
<td>50 - 75% (Interrupted)</td>
<td>i</td>
</tr>
<tr>
<td>L</td>
<td>Lichens and mosses</td>
<td>25 - 50% (In patches)</td>
<td>p</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 - 25% (Rare)</td>
<td>r</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 - 6% (Sporadic)</td>
<td>e</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 1% (Almost absent)</td>
<td>a</td>
</tr>
</tbody>
</table>


3. The producer determines the objectives of the site. For example, food and other products for self-consumption and income generation, ecotourism, overall restoration with native species found in the climax forest nearby, etc.

4. Select species that are suited to the site conditions the objectives of the producer and the physiognomic formula gap, referring to the Analog Forestry database to identify those that best meet the defined criteria and considering the available species in the area.

5. Spatial and temporal distribution design of plants and infrastructures to be established on the site, considering which products and services will be generated during short, medium and long terms.


7. Construct and manage a community nursery to produce plants that are to be introduced to the site (seeds can be bought or collected from trees).
8. Plant and enrich the site periodically by planting more species depending on their requirements (light, succession stage, etc.) mortality rate, interest of the producer and existing markets (if there is a demand for services and products).

9. Site maintenance (shade management with pruning and thinning, management of weeds and pests, fertilization, harvesting, etc.).

10. Continuous improvement of the site.

Some considerations:

- Analog Forestry is an organic production system that promotes the use of natural fertilizers and pest control techniques.

- The International Analog Forestry Network developed the certification system, “Forest Garden Products,” which producers can access.

- Each site can be promoted as a demonstration site and a space for community education.
Project Status
Biodiversity restoration and community development through Analog Forestry
Project Status
Atlántida Model Forest
Honduras
Location of the project

The Analog Forestry (AF) sites in the Atlántida Model Forest are composed of demonstrative micro-sites within three local communities (La Ausencia, Las Delicias, Agua Caliente) and the Atlantic Littoral Regional University Center (CURLA).

Staff

The staff includes a national Project Coordinator and three extensionists (one per site). Each work team member is from a partner organization of the Model Forest and they support the Project in topics such as research, socio-environmental activities, forest management, training and commercialization). The coordinator is also the extensionist in charge of one of the sites.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Position</th>
<th>Type of support</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscar Robles</td>
<td>Municipal Environmental Unit of La Ceiba</td>
<td>National coordinator</td>
<td>Coordination of the Project activities</td>
<td>June 2010-Dec. 2010</td>
</tr>
<tr>
<td>Joaquín Canales</td>
<td>Association of Municipalities of the Center of Atlantida (MAMUCA)</td>
<td>National coordinator</td>
<td>Coordination of the Project activities</td>
<td>May 2008-April 2010</td>
</tr>
<tr>
<td>Lili Acosta</td>
<td>MAMUCA</td>
<td>National coordinator</td>
<td>Coordination of the Project activities</td>
<td>Dec. 2007- Apr. 2008</td>
</tr>
<tr>
<td>Aldo Flores Piarrm</td>
<td>Madera Verde Foundation</td>
<td>Extensionist</td>
<td>Execution of the Project activities</td>
<td>Feb. 2009 – Nov. 2010</td>
</tr>
<tr>
<td>Orlando Murillo</td>
<td>CURLA</td>
<td>Extensionist</td>
<td>University scientific research and development</td>
<td>Jan. 2008 – Sept. 2010</td>
</tr>
<tr>
<td>Walter Salgado</td>
<td>MAMUCA</td>
<td>Extensionist</td>
<td>Socio-environmental activities</td>
<td>June 2010 – Dec. 2010</td>
</tr>
</tbody>
</table>
Productors’ work progress

Local producers involved in the project are generally satisfied with the progress of the project. Currently there are 14 producers (9 men and 5 women) involved in productive activities through the Analog Forestry Project. Said activities have been completed at the garden level and at the farm level using the following types of productive species: fruit bearing, timber trees, medicinal, ornamental, banana (*Musaceae* sp.) and Cassava (or manioc).

Initially the producers mentioned above had few timber and fruit bearing species in their production units (garden and farm). Now that they are gradually promoting the diversification of crops mentioned above, they are seeing an improvement in their family’s diet, and an increase in income with the products that they harvest from their production units.

Data about the Demonstration Sites

La Ausencia Site (9 AF micro-sites)

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
<th>Consumption</th>
<th>Sale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geovany Rivera</td>
<td>Total area of the property: 0.16 ha</td>
<td>Improve production; Increase diversity of the property</td>
<td>Traditional fruit bearing species: guanabana, mango, guayaba</td>
<td>Fruit bearing, spices, roots and tubers, bananas</td>
<td>Production in the main greenhouse and purchase from other greenhouses.</td>
<td>Consumption: Manioc y plantain. Sale: Manioc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area dedicated to AF: 0.08 ha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Altitude: 50 MASL</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physiognomic formula 2008: V5psn,V6ps;H4e,R4c</td>
<td></td>
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<tr>
<td></td>
<td>Physiognomic formula 2010: V7pzg,V6pzg,V6pdm;V4pdp;P5r;H3r;H2r;R3e;T4r;F1r;T3e</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Rosa Amaya</td>
<td>Total area of the property: 0.16 ha</td>
<td>Production for sale and subsistence</td>
<td>Traditional fruit bearing species: coconut, cacao, orange; Bananas (Musaceae): Plantain, semi-permanent crops: sugar cane</td>
<td>Fruit bearing species, spices, bananas</td>
<td>Production in the main greenhouse and purchase from other greenhouses.</td>
<td>Consumption: Plantain</td>
<td></td>
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<tr>
<td></td>
<td>Area dedicated to AF: 0.08 ha</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Altitude: 40 MASL</td>
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<tr>
<td></td>
<td>Physiognomic formula 2008: V4esp;G1i,H3a,L1-3a,T1e,R2-4r,P4r,G1i</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Physiognomic formula 2010: V7idg,V6pdm,V6pzg,V4pdp V4p;V5pdm,D6pdg;P5r;H2r;T4r;H1a</td>
<td></td>
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</tr>
<tr>
<td>Name of the site proprietor</td>
<td>Characteristics of the AF area</td>
<td>Proprietor’s objectives for their AF site</td>
<td>Previous use of site</td>
<td>Species diversity</td>
<td>Nursery management / Current state of the site</td>
<td>Products and services generated / Consumption</td>
<td></td>
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<tr>
<td><strong>María Quintano</strong></td>
<td><strong>Total area of the property:</strong> 0.08 ha</td>
<td>Property diversification, subsistence</td>
<td>Traditional fruit bearing species: bitter orange, coconut, lime y sour sop</td>
<td>Fruit bearing species, spices, bananas,</td>
<td>Production in the main greenhouse and purchase from other greenhouses.</td>
<td>Consumption: Plantain</td>
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<td></td>
<td><strong>Area dedicated to AF:</strong> 0.04 ha</td>
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<td><strong>Altitude:</strong> 40 MASL</td>
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<td></td>
<td><strong>Physiognomic formula 2008:</strong> V5psn, V4esp, V3asg; L7i; T6r, P5r R3e, F3i; H2r, G3p, G2p</td>
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<td></td>
<td><strong>Physiognomic formula 2010:</strong> V6pdm, V6pzg, V4pdp, P5r; R3e; H2; T4r;</td>
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<tr>
<td><strong>Aracely Chávez</strong></td>
<td><strong>Total area of the property:</strong> 0.08 ha</td>
<td>Property diversification, subsistence</td>
<td>Natural pasture and legume plants (inga)</td>
<td>Fruit bearing species, spices, bananas.</td>
<td>Production in the main greenhouse and purchase from other greenhouses.</td>
<td>Consumption: Manioc y plantain</td>
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<tr>
<td></td>
<td><strong>Area dedicated to AF:</strong> 0.08 ha</td>
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<td><strong>Altitude:</strong> 60 MASL</td>
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<td></td>
<td><strong>Physiognomic formula 2008:</strong> V7esn, V5csp, V5pi, V4csn; G1-2c; L1-5p; R4c,T2-5i</td>
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<td><strong>Physiognomic formula 2010:</strong> V5pdm,H1a,V6pzg,V4pdp,R3e;T4t;T3e;P5r;H2r;V3e</td>
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<tr>
<td><strong>Humberto Díaz</strong></td>
<td><strong>Total area of the property:</strong> 5.6 ha</td>
<td>Traditional fruit bearing species: Coconut, cacao, orange, Mango, sour sop, guava, lime, Banana (Musaceae): Chata. Roots: elephant ear (Xanthosoma).</td>
<td>Fruit bearing species.</td>
<td>Fruit bearing species and wood trees</td>
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<tr>
<td></td>
<td><strong>Area dedicated to AF:</strong> 0.7 ha</td>
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<td><strong>Altitude:</strong> 150 MASL</td>
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<td></td>
<td><strong>Physiognomic formula 2008:</strong> V7idg,V6isg,V5pdm,V2-4is,D7esm;F2i;L(1-6)p; T(1-6)p; E(5-7)p;P4r</td>
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<td><strong>Physiognomic formula 2010:</strong> V7pdm,V7pdxg,V6pdm,V6pzg,V5pdm,V4pdp,V3asg, F3i;H2r,G3p,G2p;P5r;L7i;R3e;T4r</td>
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<tr>
<td></td>
<td><strong>Total area of the property:</strong> 0.08 ha</td>
<td>Property diversification, subsistence</td>
<td>Traditional fruit bearing species: bitter orange, coconut, lime y sour sop</td>
<td>Fruit bearing species, spices, bananas,</td>
<td>Production in the main greenhouse and purchase from other greenhouses.</td>
<td>Consumption: Plantain</td>
<td></td>
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</tr>
<tr>
<td>Names of the site proprietor</td>
<td>Characteristics of the AF area</td>
<td>Proprietor’s objectives for their AF site</td>
<td>Previous use of site</td>
<td>Species diversity</td>
<td>Nursery management</td>
<td>Products and services generated / Current state of the site</td>
<td>Consumption</td>
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</tbody>
</table>
| Julio Fúnez                | Total area of the property: 8.40 ha  
Area dedicated to AF: 0.35 ha  
Altitude: 80 MASL  
Physiognomic formula 2008: V6esn, V5csp, V4esp; H4e,Tie, R4c, P4r  
Physiognomic formula 2010: V7idg,V7pzg,V5asm, V4asp,V4asg,V4pdp, V6pdm,V6pzg,D7pdg,Hc(1-2);G1p,H3r;H2r,R3g;Tr(2-5);(P5r) | Fruit bearing species production for subsistence and to generate income. | Timber trees: san juan.  
Legumes: Inga. Fruit bearing species: Persian lime | Fruit bearing species, spices, manioc | Production in the main greenhouse and purchase from other greenhouses. | Consumption: Manioc y plantain |
| Apolonio Ramos             | Total area of the property: 0.16 ha  
Area dedicated to AF: 0.16 ha  
Altitude: 40 MASL  
Physiognomic formula 2008: This producer initiated with the Project in 2010  
Physiognomic formula 2010: V4pdp, V5psp, V6pdm; H2r, H3r, R3e | Production of fruit bearing species, banana (*Musaceae*) and roots to generate income and for subsistence | Traditional fruit bearing species | Fruit bearing species, bananas, climbing plants, roots and tubers | Production in the main greenhouse and purchase from other greenhouses. | This producer is pending to establish the crops indicated in the column on species diversity. |
| Carlos Munguía            | Total area of the property: 0.08 ha  
Area dedicated to AF: 0.08 ha  
Altitude: 50 MASL  
Physiognomic formula 2008: Este productor ingresó al Proyecto FA en el 2010  
Physiognomic formula 2010: V4pdp, V5psp; H2r, Pr5, R3e, T4r | Production of fruit bearing species, banana (*Musaceae*) y roots to generate income and for subsistence | Traditional fruit bearing species: Coconut, mango, avocado, guava.  
Legumes: Inga. Roots: cassava. | Fruit bearing species, bananas, climbing plants, roots and tubers | Production in the main greenhouse and purchase from other greenhouses. | This producer is pending to establish the crops indicated in the column on species diversity. |
| Rosy García               | Total area of the property: 0.08 ha  
Area dedicated to AF: 0.08 ha  
Altitude: 40 MASL  
Physiognomic formula 2008: This producer initiated with the Project in 2010  
Physiognomic formula 2010: V5psp, V5pdm, V4pdp, Pr; R3e, T4r, H2r | Production of fruit bearing species, banana (*Musaceae*) and roots to generate income and for subsistence | Traditional fruit bearing species: Coconut, cacao, lime.  
Legumes: Guama. Semi-permanent crops: Sugar cane  
Spices: Achiote  
Roots: Elephant ear (Xanthosoma).  
Industrial crops: Coffee | Fruit bearing species, spices, bananas, climbing plants, roots and tubers | Production in the main greenhouse and purchase from other greenhouses. | This producer is pending to establish the crops indicated in the column on species diversity. |
### Las Delicias Site (3 AF micro-sites)

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuel López #1</td>
<td>Total area of the property: 20.9 ha</td>
<td>Production and ecotourism; Wildlife restoration</td>
<td>Tilapia, rambutan, sugar, banana, plantain, mahogany, pineapple in a agroforestry system</td>
<td>Fruit bearing species, timber trees</td>
<td>Production in the main greenhouse and purchases from other greenhouses</td>
<td>Tourism potential, biological laboratory, model demonstration site</td>
</tr>
<tr>
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<td>Area dedicated to AF: 0.4 ha</td>
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<td>Altitude: 180 MASL</td>
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<td>Physiognomic formula 2008:</td>
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<tr>
<td></td>
<td>V6esg, V5esg, V5rsm, V5psg, V5rsr, V5psp; Lsi; T6r, P5r; R3e; F3i; H2r; G3p, G2p</td>
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<td>Physiognomic formula 2010:</td>
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<td></td>
<td>V6esg, V5esg, V5rsm, V5psg, V5rsr, V5psp; Lsi; T6r, P5r; R3e; F3i; H2r; G3p, G2p</td>
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<td></td>
<td>Total area of the property: 20.9 ha</td>
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<td></td>
<td>Area dedicated to AF: 0.5 ha</td>
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<td>Altitude: 180 MASL</td>
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<td>Physiognomic formula 2008:</td>
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<td></td>
<td>V6esg, V5esg, V5rsm, V5psg, V5rsr, V5psp; Lsi; T6r, P5r; R3e; F3i; H2r; G3p, G2p</td>
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<td>Physiognomic formula 2010:</td>
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<td></td>
<td>V6esg, V5esg, V5rsm, V5psg, V5rsr, V5psp; Lsi; T6r, P5r; R3e; F3i; H2r; G3p, G2p</td>
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<td></td>
<td>Total area of the property: 20.9 ha</td>
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<td></td>
<td>Área dedicada a la FA: 0.5 ha</td>
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<td>Altitude: 160 MASL</td>
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<td></td>
<td>Physiognomic formula 2008 and 2010:</td>
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<tr>
<td></td>
<td>This producer initiated with the Project in 2010</td>
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<tr>
<td></td>
<td>Production and subsistence</td>
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<tr>
<td></td>
<td>Corn and bean</td>
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<tr>
<td></td>
<td>Timber tree, fruit bearing species, medicinal plants.</td>
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<tr>
<td></td>
<td>Plants are bought at the CURLA greenhouse</td>
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<tr>
<td></td>
<td>Family consumption</td>
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</tbody>
</table>

### Cuero y Salado /Agua caliente Site

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscar Alvarenga</td>
<td>Total area of the property: 0.4 ha</td>
<td>Production and subsistence</td>
<td>Corn and bean</td>
<td>Timber tree, fruit bearing species, medicinal plants.</td>
<td>Plants are bought at the CURLA greenhouse</td>
<td>Family consumption</td>
</tr>
<tr>
<td></td>
<td>Area dedicated to AF: 0.4 ha</td>
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<td>Altitude: not available</td>
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<td>Physiognomic formula 2008:</td>
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<tr>
<td></td>
<td>V8asg, V7asp, V7asg, V6adg, V4asg, V3as; L7i, F5i; P6a, R5r; E3e, F2e; H2p, G5p, G2p</td>
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<td></td>
<td>Physiognomic formula 2010:</td>
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<tr>
<td></td>
<td>V8asg, V7asp, V7asg, V6adg, V4asg, V3as; L7i, F5i; P6a, R5r; E3e, F2e; H2p, G5p, G2p</td>
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### CURLA site

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
</table>
| **CURLA** | Total area of the property: 1.90 ha  
Area dedicated to AF: 1.90 ha  
Altitude: 30 MASL  
Physiognomic formula 2008: V8ism, V7edg, V5ism, V4hsp; F2e, H2i, L1-7e, T17c, R3h, Egr, P5h  
Physiognomic formula 2010: V8ism, V7edg, V5ism, V4hsp; F2e, H2i, L1-7e, T17c, R3h, Egr, P5h | Production of a germplasm bank; education and research | Natural pasture | Teak, pine, mahogany, beechwood | Plant production to establish areas with education purposes | Production of forest seeds |

### Salado Barra Site (2 AF micro-sites)

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
</table>
| **Fátima Rodríguez** | Total area of the property: 0.4 ha  
Area dedicated to AF: 0.4 ha  
Altitude: 5 MASL  
Physiognomic formula 2008: V5isn; G2p, E2p, L1-4p; T1-4c  
Physiognomic formula 2010: V5isn; G2p, E2p, L1-4p; T1-4c | Production of food for subsistence; regeneration of protected area | Traditional Fruit bearing species | Timber trees and fruits bearing species, medicinal plants, ornamental plants | Plant production at the main tree nursery and plants are bought at the CURLA greenhouse | Family consumption |
| **Francisco Rodríguez** | Total area of the property: 0.4 ha  
Area dedicated to AF: 0.2 ha  
Altitude: 5 MASL  
Physiognomic formula 2008: V6esn, V5esn; G4c, L4a; T4e  
Physiognomic formula 2010: V6esn, V5esn; G4c, L4a; T4e | Production and marketing of various products; Recovery of forest area | Guamil | Wood and fruits trees | Plants purchased in other tree nurseries | Family consumption |
Key moments of the project

- In 2008, diagnostics in some potential sites were model producers were selected and the first training sessions for extensionists and producers were completed.

- At the end of 2008 and the beginning of 2009 were exclusively for training and the establishment of the sites, seed collection, and vegetative material.

- More than 6 different inherent training sessions for the project, including experts from the International Network of Analog Forestry (INAF)

- Recognition of the Analog Forestry strategy by authorities and institutions at the national level (quality identity of the concept)

Main challenges

- Political problems: June 2009

- Coordination change in March 2010

- Sites consolidation

- Financial discontinuity

- Resources administration

- Upon taking on these challenges, the AF project always continued and had an institutional presence, the producers outlook has not faltered throughout the continuation of the project.

Contact Information

Oscar Robles, national project coordinator, La Ceiba Municipality | oscarroblesorellana@yahoo.com

Hector Rojas, manager of the Atlántida Model Forest, | hectorojas49@yahoo.com

Lili Acosta, ex national project coordinator, SOCODEVI | magnolia_05@yahoo.com
Location of the project
The Analog Forestry (AF) sites in the Colinas Bajas Model Forest are located on private farmers land in the communities of El Limpio, Sabana del Rey, Tojín, Los coquitos, Los Jobos, Los Mogotes, Hernándo Alonzo and in the National Botanical Garden in Santo Domingo.

Staff
There are 5 organizations involved with the project, including the Association of Agroforestry Producers (APA for its acronym in Spanish) from Zambrana and individual rural families. The staff embraces a national Project Coordinator and two extensionists. The project coordinator and one of the extensionists are from the same partner organization (Enda-dom) of the Model Forest. The other extensionist is an individual producer and greenhouse manager. They provide support for training, supervision, activities coordination, monitoring progress and research under the project framework.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Function</th>
<th>Type of support</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mamerto Valerio</td>
<td>Enda-Dom</td>
<td>National coordinator</td>
<td>Activity management and coordination</td>
<td>Jan. 2008-Dec. 2010</td>
</tr>
<tr>
<td>José Miguel Acosta</td>
<td>Enda-Dom</td>
<td>Extensionist</td>
<td>Implementation of activities</td>
<td>Mar. 2008-Dec. 2010</td>
</tr>
<tr>
<td>Pedro Ferreiras</td>
<td>Federación Campesina de Zambrana</td>
<td>Farmer</td>
<td>Training coordination training, spreading experience and plant production</td>
<td>Mar. 2008-Dec. 2010</td>
</tr>
<tr>
<td>Francisco Encarnación</td>
<td>Federación Campesina de Zambrana</td>
<td>Farmer</td>
<td>Training coordination training, spreading experience. Plant production with an emphasis on fruit bearing trees and medicinal plants</td>
<td>Mar. 2008-Dec. 2010</td>
</tr>
</tbody>
</table>
Producers’ work progress

Local producers involved in the project are generally satisfied with the progress of the project. They already had their own timber tree species planted on their land, so they earn income through the extraction of these trees, allowing them to take care of their families financially, while they are introducing other species from the AF work plan. The producers with small parcels, who from the beginning started with a new AF parcel, indicate that there are limits of having a small property and because of that, reduced sources of incomes. The level of satisfaction of producers in the beginning of the project is lowered.

Data on demonstration sites

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
</table>
| Zenón Urbano, “Zambrana Abajo, paraje es Limpio” demonstration site | Total area of the property: 6.44 ha  
Area dedicated to AF: 0.95 ha  
Altitude: 95 MASL  
Physiognomic formula 2008: $V_i,sg-m, V_j,hd-sg-m, A_k,p, V_i,rgsm, V_j,hsg-n, V_i,jsn-g, V_k,esm; H_e; L_1,e; T_1,a; R_3,a$  
Physiognomic formula 2010: $V_i,psm, V_j,esm, A_k,e V_i,psm, V_i,rgsm, V_j,psm, V_l,sg, V_k,esm, V_l,esm; H_e; L_1,e; T_1,a; R_3,a$ | Analogous system for products and services. Production oriented towards: timber trees, fruit bearing species, aromatic plants and medicinal plants. | Conventional and traditional agriculture (short and annual cycles), pasture, agro-forestry system, pure wood lots, Beechwood plantation. | More than 30 native and introduced timber species to alleviate pressure on remaining native forests, the production and services, as well 15 fruit species and 6 spice species. | Probably the most successful nursery of the project in terms of the finances. Although it has a low diversity of species, the quantity of plant sales is the highest of all the nurseries in the project. This is due to the supply and demand of plants that are produced. Exchange with the greenhouses from the project in the area. | Wood, seeds, fruit, fruit plants, medicinal plants from timber, from the site related commercial greenhouse. Potential tourism for bird watching. About 200 cubic metres of wood have been harvested from the site. Model for rehabilitation of soil, biodiversity, production and improvement of family entry, family business. A highway stop, and near to community centres. |
<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
</table>
| Pedro (Pipi) Ferreira, “Zambrana Abajo,” paraje Sabana Del Rey, demonstration site | **Total area of the property:** 7.24 ha  
**Area dedicated to AF:** 1.18 ha  
**Altitude:** 88 MASL  
**Physiognomic formula 2008:** V7csm, V6hdg, V5rsg, V4rdm, V3esm; G2isg; L1-8; P1-6e; E2-5e; T1-7h  
**Physiognomic formula 2010:** V7rsm, V6rdg, V5esg, V4pdm, V3rsm; G2psg; L1-2; P1-4e; E2-4e; T1-5e. | Analogous system for products and services. Production: timber trees, fruit bearing species, aromatic plants and short-cycle crops. Conservation and improvement of soils, production of biomass with an increase of biodiversity. | Conventional and traditional agriculture (short and annual cycles), pasture, agroforestry system, monocrop forests, small remaining native forest. | More than 30 native and introduced timber species to alleviate pressure on remaining native forests, the production and services, as well 15 fruit species and 6 spice species. | **Family greenhouse of fruits (cacao), woods, other fruit and medicinal plants.** Currently the production is oriented towards the following species: passion fruit and cacao, due to the great demand that exists in the area for these species at this time. | Over the last 9 months the land has been used in two major ways, one with the extraction of approximately 300 cubic meters of wood from *Acacia mangium* and two, that open spaces are used in the association of traditional crops. Potential tourism for bird watching. Model of production for soil improvement, quality of life and increase in the biodiversity of native species and exotic fast growth species. |
| Asociación de Productores Agroforestales, Los Coquitos, demonstration site | **Total area of the property:** 9.5 ha  
**Area dedicated to AF:** 1.8 ha  
**Altitude:** 115 MASL  
**Physiognomic formula 2008:** V5adm, V4adm, V3adm; H3i, p5a  
**Physiognomic formula 2010:** V5 rdm, V4 rdm, V3adm; H3i, p5a | Analogous system of 2.3 years of age, for the production of products and services. Planting timber trees, fruit bearing trees and aromatic plants. | Conventional and traditional agriculture (short and annual cycles), pasture. | 23 native and introduced tree species, 7 fruit species for production, medicinal plant species. | No greenhouse | Improvements in indicators of soil (a greater quantity of worms) and biodiversity indicators such as tree and non-tree species and amphibians. The structure has been improved as described above. The plot has problems with the *Meliaceae* species due to attacks from *Hypsipyla grandella*. Demonstration site for the region, the local communities and the country within cooperatives and association. |
<table>
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<tr>
<th>Names of the site proprietors</th>
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<th>Species diversity</th>
<th>Nursery management / Current state of the site</th>
<th>Products and services generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francisco Encarnación, Tojin demonstration site</td>
<td>Total area of the property: 1.15 ha</td>
<td>Analogous system for the production of timber trees, fruit bearing trees, aromatic species and medicinal plants. Furthermore maintenance and/or improvement of the structure, productivity, indicators of soil and biodiversity and possibilities of genetic improvement</td>
<td>Conventional and traditional agriculture (short and annual cycles), pure woodlots, mono and polycrop forests and small remaining native forest.</td>
<td>Family and community greenhouse of multiple species, The high diversity of fruit, wood and medicinal plants.</td>
<td>Family greenhouse. The production is oriented toward fruit trees species, aromatic and medicinal plants. It distributes the plants mentioned to the other demonstration sites. It also sells to other buyers and diffuses the species in the region.</td>
<td>The production is oriented towards timber trees. There is also, fruit bearing species, aromatic and medicinal plants. The services: Biomass production, habitat for animal species and vegetables; improvement of ecological indicators. The parcel presents an improvement of the soil indicators and biodiversity indicators (amphibians, mammals and insects)</td>
</tr>
<tr>
<td>Alfonso Brito, Los Jobos de Chacuey demonstration site</td>
<td>Total area of the property: 9.33 ha</td>
<td>Analogous system. Collecting germplasm; education; forest garden, production of timber trees, fruit bearing trees, aromatic plants, ornamental plants and medicinal plants; and genetic improvement.</td>
<td>Traditional and conventional agriculture (short and yearly cycles) pasture, agroforestry system, pure woodlots and polycrops.</td>
<td>230 species of wood, fruit and medicinal plants.</td>
<td>Legendary greenhouse strengthened by the Analog Forestry project. Operates with family and regional economic unit.</td>
<td>Seeds, seedlings, medicinal, decorative, wood, fruit plants, various third party services. The father and various children worked together throughout all production. Primary pilot agroforestry site and today the first AF model for the formulas throughout the entire project. Subsistence agriculture and surplus market of multiple types. Pilot model for the region and for the country. Its success will be used in reference to copying.</td>
</tr>
<tr>
<td>Names of the site proprietor</td>
<td>Characteristics of the AF area</td>
<td>Proprietor’s objectives for their AF site</td>
<td>Previous use of site</td>
<td>Species diversity</td>
<td>Nursery management</td>
<td>Products and services generated / Current state of the site</td>
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</tr>
<tr>
<td>Leónidas Carrasco, Los Mogotes demonstration site</td>
<td>Total area of the property: 9.01 ha Area dedicated to AF: 1.3 ha Altitude: 90 MASL Physiognomic formulas 2008 and 2010: Pending</td>
<td>Analogous system for production and services.</td>
<td>Sugar cane plantation</td>
<td>40 species of native and introduced species, species of fruits, medicinal plant and short cycle agricultural crops</td>
<td>Do not have a greenhouse. Is supported by the other greenhouses, regionally and from the government.</td>
<td>This demonstration farm has diversified its production with the inclusion of timber, fruit, aromatic and medicinal species. Services: Increase in ecological and productive indicators like the structure of the parcel. Biodiversity enrichment with rehabilitation of soils. Regional model in this municipality. Model for this half region of Colinas Bajas Model Forest</td>
</tr>
<tr>
<td>Teresa Acosta</td>
<td>Total area of the property: 9.25 ha Area dedicated to AF: 1.5 ha Altitude: 190 MASL Physiognomic formulas 2008 and 2010: Pending</td>
<td>Analogous system of 1.8 years for production and services.</td>
<td>Conventional and fallow agriculture systems.</td>
<td>45 native and introduced wood species, fruits, medicinal plants and short cycle agricultural crops</td>
<td>Multiple greenhouses</td>
<td>Production: fruit bearing trees, timber trees, ornamental and traditional plants. Services: Planting the Titorea species for protection and conservation of soil; production of biomass and habitat for animal species; production of vegetables.. Model and demonstration site in the municipality’s communities to the south of the Yuna river.</td>
</tr>
<tr>
<td>National Botanical Garden</td>
<td>Total area of the property: 200 ha Area dedicated to AF: 0.5 ha Altitude: 46 MASL Formula fisonómica 2008: V7hsn, V6isp, V5rdm, V3asg, V1adm; G1-4c; L1-7c; R4a; E3-4e; P1, 4-8h.</td>
<td>Increase the biodiversity in the Botanical Garden, create a visual tool to create awareness and educate the public, using Analog Forestry principles, create an extension network between rural producers and biological resources of the Botanical Garden.</td>
<td>Horse stable</td>
<td>More than 40 species within the 2500 that the Botanical Garden possesses.</td>
<td>Associated with the big greenhouse that has the largest endemic plant species in the country. The nursery plant material is achieved by collecting seeds, cuttings, grafting and layering. Also, through exchanges with other nurseries. All nursery producers represent revenue sources as indicated.</td>
<td>National Model for biodiversity rehabilitation for the purpose recreation. Site initiated through some of the main internal paths of the Botanical Garden. Place for classes and discussions for students, the general public, national and daily visitors, and producers interested in biodiversity rehabilitation of the island.</td>
</tr>
</tbody>
</table>
Key moments of the project

1. Regional AF workshop in 2008 in the country.
2. Accumulated experience gained by the beneficiaries through demonstration plots through enda since 1984.
3. The importance of the transference of knowledge and experience through the training via courses and workshops.
4. The tool of learning by doing through the implementation via producer to producer, technician to technician and technician to producers training sessions and vice versa.
5. The project dissemination through the website of enda-dom and the project website. In addition, the involvement of technicians in a regional radio project.
6. Adoption of AF as a tool for implementing projects in the Colinas Bajas Model Forest.
7. Support from institutional or partner organizations (building relationships with other institutions and affinity groups to ensure follow-up and replication of AF outside of the framework of the project as it was with cacao producers in the region).

Main challenges

1. Create awareness in the government sector.
2. The location of the remaining native forest in order to complete the formula guide in the project implementation areas.
3. For producers to develop an understanding of formulas, structures, gaps.
4. Ensuring that the management of ecosystems in study sites continue to follow the original design and criteria for a particular parcel.
5. Use of available resources, experiences of producers, courses and training workshops on technology and methodology implementation to do and learn.
6. Monitoring the dynamics of AF production systems. Serial stages and ecological indicators are affected by the use of resources within the parcels.
7. Provide financial continuity from external support to consolidate the lessons learned and ensure the continuation and extension of the project.
8. Convince the producers of the potential for the prosperity of Analog Forestry, integrating them in alternative, sustainable production from the point of view of productivity in the parcels and key aspects of biodiversity.
Recommendations

- AF is a tool to be implemented in future projects within the Colinas Bajas Model Forest.
- To disseminate the methodology, it is suggested that the training already initiated with technicians and producers in traditional crops from agroforestry systems (coffee and cocoa) is strengthened.
- Conduct an annual review of the demonstration plots’ status by doing an ecological assessment.
- Redefine the concept of analog systems design under the dynamics of parcel treatments (management, extraction, harvests and changes in land use, vegetation and biodiversity etc.)
- Create a database of animal biodiversity.
- Achieve a better inter-institutional exchange with local municipal governments.

Contact Information

Mamerto Valerio, national project coordinator and acting manager of the Model Forest,
Enda-dom | direccion@endadom.org.do
Project Status
Reventazón Model Forest
Costa Rica
Location of the project

In the Reventazón Model Forest, which corresponds geographically to the province of Cartago, there are 8 Analog Forestry (AF) demonstration sites. There are 5 sites located in Turrialba County: Pacayitas; CATIE; Guayabo; La Trinidad; y El Triunfo. Alvarado County and Oreamuno County each of 1 site each, Pacayas High school and Braulio Carrillo High school respectively. Lastly, the main nursery is located on a property owned by the Turrialba Municipality, the Project partner institution.

Staff

The staff includes the national coordinator of the Project and an extension worker. The coordinator is an official of the Ministry of Environment, Energy and Telecommunications (MINAET) and the extension worker works at the CATIE, organization headquarters of the regional AF project.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Function</th>
<th>Type of support</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscar Fonseca</td>
<td>MINAET</td>
<td>National Coordinator</td>
<td>AF activities, the regional newsletter and revision of the regional database.</td>
<td>Jan. 2008 - Dec. 2010</td>
</tr>
<tr>
<td>Manuel Sojo</td>
<td>CATIE</td>
<td>Extensionist</td>
<td>Producers and extension support in planning and follow-up for demonstration sites and training.</td>
<td>Jan. 2008 - Dec. 2010</td>
</tr>
<tr>
<td>Bernal Pereira</td>
<td></td>
<td>Labourer</td>
<td>Support nursery work and maintenance of demonstration sites</td>
<td>May 2009 – Sept. 2010</td>
</tr>
<tr>
<td>José Masis Retired</td>
<td></td>
<td>Support staff</td>
<td>Management support of the main nursery</td>
<td>Jan. - June 2009</td>
</tr>
<tr>
<td>Martin Flores</td>
<td>Turrialba Municipality</td>
<td>Nursery gardener</td>
<td>Collection and selection of seeds; planning and execution of nursery work.</td>
<td>June 2009 - Dec. 2010</td>
</tr>
<tr>
<td>Charles Georgeot</td>
<td>Intern - France</td>
<td>Intern</td>
<td>Support to the national coordinator in determining operation costs</td>
<td>March - Aug. 2010</td>
</tr>
<tr>
<td>Rosanna Breiddal</td>
<td>Intern - Falls Brook Centre</td>
<td>Intern</td>
<td>Support to the national coordinator</td>
<td>Aug. 2010-Jan. 2011</td>
</tr>
</tbody>
</table>
## Data about the Demonstration Sites

<table>
<thead>
<tr>
<th>Names of the site proprietor</th>
<th>Characteristics of the AF area</th>
<th>Proprietor’s objectives for their AF site</th>
<th>Previous use of site</th>
<th>Species diversity</th>
<th>Nursery management</th>
<th>Products and services generated / Current state of the site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buenaventura Núñez, Pacayitas Demonstration Site</strong></td>
<td><strong>Total area of the property:</strong> 2.48 ha</td>
<td>Fruit bearing species, medicinal plants and timber trees. Environ-mental services.</td>
<td></td>
<td>More than 20 native wood tree and multipur- pose species for environ- mental uses, 23 species of fruit trees, 30 medicinal plants and also orna- mental and plants palms</td>
<td>Production in own nursery for replanting, restoration and enrich- ment.</td>
<td>Timber, seeds, fruit, medicinal plants, potential tourist attraction with local organization Rural Community Tourism. Additionally, subject to the Payment for Environmental Services (PES).</td>
</tr>
<tr>
<td></td>
<td><strong>Area dedicated to AF:</strong> 2 ha</td>
<td></td>
<td></td>
<td>Sugar cane, forest</td>
<td>Top of Form There is a small nursery, located next to the house of the producer.</td>
<td>Created a path, which starts in the forested site near the river, then continues into the project area. Planting was carried out in the second stage with several species such as kapok, Saragundi, guava, Cortez Amarillo, oaks and others. Part of the site was also planted with medicinal plants.</td>
</tr>
<tr>
<td></td>
<td><strong>Altitude:</strong> 870 MASL</td>
<td></td>
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<td></td>
<td>With the collaboration of Alfonso Canossa, a farmer involved in the FA project, a mini greenhouse for the production of subsistence crops was installed.</td>
</tr>
<tr>
<td></td>
<td><strong>Physiognomic formula 2008:</strong> V6h, G3c</td>
<td></td>
<td></td>
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<td></td>
<td>Two small groups of tourists have already visited the site as part of the Rural Community Tourism project that the owner is involved with.</td>
</tr>
<tr>
<td></td>
<td><strong>Physiognomic formula 2010:</strong> V6h, V5, V4i, V3r, V2e; D4i; P3i (highland) V5h, V4h, V3e; D4a; R4e; H2h; E4a (lowland)</td>
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<td></td>
<td></td>
<td></td>
<td>There is a plan to build a rustic cabin and put up illustrative signs indicating and explaining different components of the property, with the purpose of providing the site with the idea of offering a recre- ational and leisure component to the site.</td>
</tr>
<tr>
<td><strong>Tropical Agricultural Research and Higher Education Centre – CATIE, CATIE Demonstration site</strong></td>
<td><strong>Total area of the property:</strong> 1000 ha</td>
<td>The objective of the site is didactic and environmental education.</td>
<td></td>
<td>Abandoned coffee plan- tation</td>
<td></td>
<td>Working in the shade management and enrichment. The site is being used to carry out practical trainings FA. And you may notice some results as cocono and bananas.</td>
</tr>
<tr>
<td></td>
<td><strong>Area dedicated to AF:</strong> 1 ha</td>
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<td></td>
<td>Manages shade and enrichment. The site serves as a place where AF training sessions take place. Some of the fruit bearing species are beginning to bear fruit, like the cococon and banana.</td>
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<tr>
<td></td>
<td><strong>Altitude:</strong> 600 MASL</td>
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<td>With demonstrative and teaching purposes as well as environmental services and biological connec- tivity.</td>
</tr>
<tr>
<td></td>
<td><strong>Physiognomic formula 2008:</strong> V8i, V7p, V(5-6)c; T(2-3) e, R6p, R(3-4)p, P5r, H1c, E(2-7)p, L2-7p, G1c</td>
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<tr>
<td></td>
<td><strong>Physiognomic formula 2010:</strong> PENDING</td>
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<tr>
<td><strong>Laffite Fernández, Guayabo Demonstration Site</strong></td>
<td><strong>Total area of the property:</strong> 4 ha</td>
<td>Protection of water and biodiversity. Ecotourism and birds. Environmental services.</td>
<td></td>
<td>Natural field, bean production.</td>
<td></td>
<td>In this property, there has been almost no mortality, so that the tasks being carried out are basically maintenance and the introduction of other species.</td>
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<tr>
<td></td>
<td><strong>Area dedicated to AF:</strong> 1.5 ha</td>
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<td></td>
<td>Rescue of biodiversity (mainly birds) and environ- mental services. Great potential for tourism. Subject of Payment for Environmental Services (PSA).</td>
</tr>
<tr>
<td></td>
<td><strong>Altitude:</strong> 1000 MASL</td>
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<td></td>
<td><strong>Physiognomic formula 2008:</strong> V7h, V5h, G1c. (section 1) V7e, V6h, V5e; R4e; G1c. (section 2 bridge)</td>
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<td></td>
<td><strong>Physiognomic formula 2010:</strong> V7h, V5h, V4h, R3i, R2i; P3e; G1i (Section 1) V7h, V6h, V5e, V4r, V3e, D3e, R4e, R3e; P3e; G1i (Section 2)</td>
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</tr>
<tr>
<td>Name of the site</td>
<td>Characteristics of the AF area</td>
<td>Proprietor’s objectives for their AF site</td>
<td>Previous use of site</td>
<td>Species diversity</td>
<td>Nursery management</td>
<td>Products and services generated / Current state of the site</td>
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<tr>
<td>Turrialba Municipality, La Trinidad Demonstration Site</td>
<td>Total area of the property: 76 ha</td>
<td>Environmental services</td>
<td>Forest for protection of water springs; pasture; <em>Cedrela tonduzzi</em> trials.</td>
<td>Approximately 20 species of native timber trees of multiple uses, shrubs and flowering plants</td>
<td>The site belongs to the Municipality and vegetative material is obtained from the main nursery</td>
<td>The growth of the vegetation of this type of ecosystem (high altitude areas) tends to be slower than from vegetation of lower altitudes. However the restoration effects can already be seen comparing the current landscape with that of before. Above all the hope is that the quality and quantity of water will be improved. This year, the second stage was planted, adding approximately 1 ha, making the total planted area 3.6 ha. Restoration of the ecosystem (high wetland), biodiversity rescue, water production and biological connectivity.</td>
</tr>
<tr>
<td>El Triunfo Demonstration Site</td>
<td>Total area of the property: 4 ha</td>
<td>Mushrooms in the forest, fruit bearing species of high altitude and trees for birds. Environmental services.</td>
<td>Edible mushroom production, cattle, goats, hens.</td>
<td>Some 8 species of native timber trees of multiple use, 3 high altitude fruit tree species, a garden with more than 6 products</td>
<td>Does not have a nursery. Vegetative material is obtained from the main nursery.</td>
<td>Due to fumarolic activity of the volcano, the owner of the site needed to evacuate the site and cease all activity on site, which is affected by acid rain. The National Emergency Commission (NEC) has still not allowed entrance to locations surrounding the volcano, which is why a real assessment of the site has not been an option.</td>
</tr>
<tr>
<td>Pacayas High School Demonstration Site</td>
<td>Total area of the property: 26 ha</td>
<td>Medicinal plants, ecotourism, trees for birds and timber trees. Environmental services.</td>
<td>High school infrastructure, dairy cattle, medicinal plants, pasture.</td>
<td>Approx. 10 species of native timber trees of multiple use, 30 species of medicinal plants. Also ornamental plants and fodder</td>
<td>Production in own nursery for replanting, restoration and enrichment.</td>
<td>The path in Section 3 has been finished and the beautification of the path using ornamental plants of various colours continues. Restoration of forest, biodiversity rescue, water production and biological connectivity. Potential for tourism, leisure and study site for the student community. The site has changed the high school’s landscape, and the site is an important place for the student population. It is an open classroom for tourism programs and agroecology.</td>
</tr>
</tbody>
</table>
### Key Project Milestones

- Site selection by conviction and commitment of the producer or recipient.
- Comprehension of vegetation structures, physiognomic formulas and gaps, and implantation techniques of AF by the producer or beneficiary including their creative input and experience.
- The use of available resources, the experiences of the producers and the workshops and training courses about the methodology of implementation.
- Establishment and evolution of a main nursery with strategic alliances.
Key Challenges

- The empowerment and continuity of actions for achieving the objectives, respecting the design criteria and evolving over time.
- Environmentally friendly production in a sustainable manner.
- Recovery of areas of forest used by private companies
- Increasing the biodiversity and environmental services
- Increasing vegetative coverage and decreasing degraded sites
- The continuity of the process
- Many producers trained in AF committed to achieve the multiplier effect

Recommendations

- During the training sessions, emphasize the importance of water resources as one of the principal benefits of site restoration.
- Begin the restoration process with high species variety and diversity.
- As part of the site’s design include a space for ponds, an area for edible crops for the family and aromatic plants all over the site for their pest repellent qualities.
- To encourage and facilitate exchanges between producers
- Continue the enrichment process
- Monitor progress
- Maintain an organic fertilization regime

Contact Information

Oscar Fonseca, national project coordinator, Ministry of Environment, Energy and Telecommunications | ofon2010@gmail.com

Mildred Jiménez, manager of the Reventazón Model Forest, CATIE | mildred@catie.ac.cr

For information about the CATIE demonstration site: Marie-Eve Landry | landry@catie
Location of the headquarters

The headquarters of the regional Project of Analog Forestry (AF) “Restoration of biodiversity and community development through Analog Forestry” (period 2008-2010) is located in the CATIE in Costa Rica. The regional project counts on the national coordination of the activities of the Model Forests: Atlántida (Honduras), Reventazón (Costa Rica) and Colinas Bajas (The Dominican Republic).

Staff

At the regional level, the team is basically comprised of the regional coordinator who works for the Ibero-American Model Forest Network (IAMFN), partner organization of the Falls Brook Centre (FBC). The FBC is the link for the coordination and financing of the project in Canada. Recently, an intern from the Falls Brook Centre joined the coordination team to assist in issues of regional interest such as the preparation of a regional workshop, the updating of documents and other relevant tasks.

<table>
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<th>Position</th>
<th>Type of support</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marie-Eve Landry</td>
<td>IAMFN/CATIE</td>
<td>Regional coordinator</td>
<td>Coordination of activities of the project in the Model Forests, the production of regional products and reports</td>
<td>Apr. 2009 - Dec. 2010</td>
</tr>
<tr>
<td>Carlos Navarro</td>
<td>CATIE</td>
<td>Regional coordinator</td>
<td>Coordinated the activities of the project in the Model Forests</td>
<td>Jan. 2008 – Mar. 2009</td>
</tr>
<tr>
<td>Julio Gonzalez</td>
<td>Universidad Nacional a Distancia</td>
<td>Consultant</td>
<td>Creation of a regional virtual portal, production of an interactive training CD in Analog Forestry and signs for the CATIE demonstration site</td>
<td>Nov. 2009 – Oct. 2010</td>
</tr>
<tr>
<td>Joanna Dowbiggin</td>
<td>Falls Brook Centre</td>
<td>Intern</td>
<td>Assistance in national coordination</td>
<td>July – Nov. 2010</td>
</tr>
</tbody>
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## Regional initiatives and products

<table>
<thead>
<tr>
<th>Initiative Names</th>
<th>Description</th>
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<tbody>
<tr>
<td>The Great Analog Forestry Guide</td>
<td>The Great Guide is an educational tool primarily used for the transfer of AF concepts and methodology to extension technicians and producers. It can also be of interest for professionals and other people interested in AF. The guide has also been updated and reprinted annually.</td>
</tr>
<tr>
<td>Guide For Monitoring Biodiversity</td>
<td>The Guide for Monitoring Biodiversity is a tool developed in order to be able to periodically measure the biodiversity of the AF sites and, in the medium and short term, be able to identify the changes occurring in the biodiversity of each site. The guide is intended to be used primarily by extension technicians.</td>
</tr>
<tr>
<td>Consolidated Database</td>
<td>After combining the databases of species used in the AF project in Costa Rica and the Dominican Republic, a consolidated database was generated on the website Zohosheet.com. This tool allows the management of a single file, providing public access for reading and restricted access for updating and expanding the database. This system encourages the centralization of information and at the same time avoids creating duplicates and confusion when using and updating the database. The database is being expanded with species used in other AF sites established outside of the present AF project. Professionals, extension technicians and other people interested in establishing and enriching AF sites are the primary beneficiaries of the database.</td>
</tr>
<tr>
<td>Electronic Newsletter “Regional AF Link”</td>
<td>The quarterly electronic newsletter, “Regional AF Link” informs about the activities, outputs and impacts that the project in each Model Forest is having and also communicates news about the International AF Network and the regional coordination of the project. The newsletter’s target audience is professionals, technicians, extension workers, professors, researchers, other people implementing AF systems and those interested in the subject.</td>
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<tr>
<td>Virtual Portal</td>
<td>The “Regional AF Portal” is a website that functions as a social network and where you can find a variety of information about AF, primarily under the Project itself, but also from other sources (bulletins, guides and other documents/public tools, articles, photos, videos, etc.). Each Model Forest has a group where interested members can share about activities and initiatives in detail. The beneficiaries of the portal are primarily professionals, technicians, extension workers, producers and other people interested in AF in Latin America and the Caribbean.</td>
</tr>
<tr>
<td>Virtual Analog Forestry Training Program</td>
<td>The Virtual Analog Forestry Training Program is a tool that will not need the internet and that will allow those interested in learning about the concept and application of the methodology of AF to do so through various means of self-education, for example: narratives, powerpoint presentations, readings, animated photos and videos and quizzes to check learning. The target audience of the DVD is primarily composed of professionals, technicians, extension workers and other people interested in knowing the basics of AF to implement the methodology.</td>
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### Initiative Names

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<tr>
<td>Publication summarizing the regional AF project</td>
<td>The publication seeks to present the systematic experience of the regional project’s lessons learned, best practices and recommendations. The document will be published in Spanish and English and its primary beneficiaries will be professionals, extension workers, donors and other people interested in the experience of the regional AF Project and, potentially, offering support for the continuation of the sites.</td>
</tr>
<tr>
<td>Regional train the trainer workshops</td>
<td>The regional train the trainer workshops were conducted during the first two years of the project and took place in each of the participating Model Forests on a rotating basis. The participants were primarily professionals, technicians and extension workers.</td>
</tr>
<tr>
<td>Regional workshop for the systemization of the experiences of the AF Project.</td>
<td>The last regional workshop of the project seeks to gather the lessons learned, best practices and recommendations generated during the three years of the regional AF project with the national and regional coordinators, extension workers, producers and other people involved with the project.</td>
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### Key Challenges

- To produce tools that are relevant, useful and applicable in whichever AF site
- To generate knowledge on topics such as economics (real value of the sites, profitability, initial investment, etc.) of AF, value chains, markets of products and services of the sites, in order to better inform those interested in AF

### Contact Information

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Jean Arnold, regional coordinator – donor link, Falls Brook Centre | ja@fallsbrookcentre.ca
Learning
gained through the application
of Analog Forestry
The last regional workshop of the project was held at CATIE, Costa Rica from September 20-23, 2010. Its objective was to systematize the experiences of the project “Biodiversity restoration and community development through Analog Forestry.” The workshop was attended by 27 people including farmers, extension agents, national and regional coordinators of the project as well as others involved in related aspects of the project. The workshop identified lessons learned and recommendations on a number of subjects as well as an analysis of the application of the Analog Forestry methodology in the participating Model Forests.

**List of Subjects**

1. Site logbook
2. Initial mapping
3. Physiognomic formula
4. Site design
5. Preparation and maintenance
6. Planting and enrichment
7. Activity planning
8. Management of soil conditions
9. Management of weeds and
10. Periodic mapping
11. Site evolution indicators
12. Obtaining vegetative material and seeds
13. Management of tree nurseries
14. Establishing and managing infrastructure
15. Adding value to the farm or land
16. Products and services: their actual and potential markets
17. Sustainable economics
18. Social aspects
19. Gender
20. Training and extension strategies

**SWOT analysis**

21. Strengths
22. Opportunities
23. Weaknesses
24. Threats
## 1. Site Logbook

### Lessons Learned

- The log book records all activities of the AF site and allows changes to be seen over time, provides the opportunity to learn from errors and to improve the future activity timeline (from seed collection to the planting season and site maintenance).

### Recommendations

- Use AF site log to record activities, maps, formulas, physiognomic gaps, investments, fertilization dates, extracted products, volume and prices for the sale of products and services, changes in site conditions over time, seed collection periods, results from experiments on species that have very little information about their production in a particular zone, notes about what species will be incorporated in the site in the future, etc.
- Provide each producer with a database of species planted on their site.

## 2. Initial Mapping

### Lessons Learned

- The initial map is of great importance for site activity planning.
- It is a visual tool that facilitates the observation of site conditions as a whole
- The initial map should consider:
  1. Ecological Evaluation;
  2. Wind direction (day and night);
  3. Sun direction;
  4. Land contours
  5. Water resources (rivers, streams, lakes, springs, etc.)
  6. Soil types;
  7. Zones with erosion or other soil problems (compaction, salinity, contamination from chemical products, etc.);
  8. Crops;
  9. Woodland and tree seedling areas;
  10. Potential Use Map (Taking into account the Ecological Evaluation and the actual use); to take advantage of more light and available space in the farm in order rapidly advance structure.
- The initial conditions map is designed free hand by the producer
- All of this information is in the Site Logbook.

### Recommendations

- Initially it is recommended to make an initial map drawn by hand and later use a design system to make a more professional map, although this second step is optional.
- The initial map should highlight areas where there are existing conflict of use between actual use and potential use. An example of a conflict: if there is a water source in a certain area there shouldn’t be agriculture there.
- The initial map should be updated when changes in the conditions of the site or its surroundings are detected.
- Make more diagrams of crops and make maps that use colours.
- The initial map should reflect elements that take neighbours into account.
- Indicate the direction of the winds both at night and in the day.
3. Physiognomic Formula

Lessons Learned

• The physiognomic formula is a tool that producers use to better understand the vegetation structure in different systems, to analyze the physiognomic gap and to determine that the first steps towards restoration of degraded areas are; someone with experience in ecology and with restoration processes that knows how to compare structure of the area of the natural forest does not necessarily require the use of the physiognomic formula.

• In general the physiognomic formula of mature forests is more difficult for producers to complete because it is more complex.

• The physiognomic formula gap is never closed. One must always continue filling the gap.

• By knowing the soil type, the type of forest can be determined, which simplifies the identification of structure and biodiversity of the site.

• If the producer’s parcel of land is far away from a mature forest, the formula can be applied to an advanced secondary forest, but it should be supplemented with information from elders from the area who can share information about the forested areas in the region that existed in the past, or with literature with similar information.

• Adapt the analysis of the physiognomic formula: Look at the structure of the forest without the formula, but know that the physiognomic formula is not an obstacle; Gain a distinguished vision of the forest.

Recommendations

• Always apply the formula from the top of the canopy down.

• Supplement the formulas with diagrams representing forest structure of the natural forest and the parcel of land to illustrate each code letter of the formula, in order to facilitate comprehension by the producers.

• Prepare diagrams in order to facilitate the distinction of different forms of growth.

• Give more explanation about the gap calculation.

• Eliminate the terms ("continuous”, “in patches”, “rarely”, etc.) associated with the coverage percentages; creates confusion.

• The formula should indicate if the woody and non-woody plants are pioneers or not.

4. Site Design

Lessons Learned

• The design of the AF site is both a science and an art that requires creativity.

• The gap is never filled; the site must continue to be enriched, advanced and periodically adapted to the ecological succession stages always with the goal of achieving the structure of a mature forest.

• When parcels are small, it is not always possible to integrate all the components of the physiognomic gap, especially in the case of tall trees that may occupy most of the space available once they get to maturity and consequently limit the growth of most of the other site components. Therefore it is important to adapt the selection and the management of the species to the smaller space based on the site conditions (especially with respect to the area required by some species to grow).

• Although one might not necessarily like the product of a species (for consumption), one can integrate it in the system in order to fulfill other services that it offers (shade, shelter, food for birds, etc.) or to donate or sale the products once the species produces in order to not waste it.

• The size of a plot may limit the selection of species to integrate depending on the conditions of the plot. Species might not make available the required conditions of light, water and nutrients to other species (too wide crown, for example).

• After a first AF parcel is established that generates products and income in the short and long terms, other parcels with a different vision for the long term could be implemented.

• The key is the long term vision of an FA site.
**Recommendations**

- The FA site should be designed in a way that introduces various species in a multi-stratum (structure) and multi-stage (age) manner. In other words, species should be introduced progressively, so they reach different vegetation strata and reach maturity at different moments in time.
- Design the AF site keeping in mind the goal to obtain products and services in the short, medium and long terms: Make a list of species that will produce in the short (0-5 years), medium (5-15 years) and long term (15 or more years).
- Prioritize the species that will be introduced and choose producing species based on existing markets and the market price (if one of the principle objectives is production and generation of income) and later add other species with ecologic value that will not generate income, but that offer other benefits.
- Before designing an AF site, visit other AF farms and later define with the producer which species to introduce so that he/she is motivated by the design and vision of the future for his/her site.
- It is recommended to do a market study and an analysis of the objectives of the producer; the communities know various markets (based on demand).
- It is important to introduce species that are adaptive to the site conditions (for example, compaction, high humidity, salinity, etc.)
- Always look for new ideas, be creative, learn; the gap never closes.
- Consider the producer’s objective: market; location of trees, infrastructure is needed to remove timber.
- Three elements that should always be established in FA sites are:
  - A garden or a greenhouse beside the house, to produce vegetables
  - A pond, for biodiversity
  - A plant nursery
- Including animals in the AF site is optional and a great source for fertilizer ingredients.
- Another option is to plan to have a seed bank in order to supply the farm’s nursery and that of the neighbours in the future.
- Updating and adapting products and services from the AF site allows access to new markets

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**5. Preparation and Maintenance**

**Lessons Learned**

- The first year is difficult, even though the transformation that will take place can’t be seen yet, but it is important to have faith.
- In the short term it is important to have patience and continue to work; that is development. Later new opportunities will appear for subsistence in the medium and long terms.
- The AF site is very dynamic; because of this, the site should be visited every week to respond to whatever situation presents itself (pests, weeds, etc.) and intervene when needed.
- By taking advantage of various canopies and vegetation strata (annual crops, shrubs and trees) the area is used to its maximum, making the site more easily maintained (especially with the control of weeds) and ensures products of short, medium and long terms.
- The denser the planting of crops at the beginning, the less maintenance will be necessary later; Spacing must be managed to ensure correct amounts of shade.
- During the establishment phase of the AF site (a period of approximately 0-5 years) it is difficult to find and pay for manual labour if there is not any tangible income from the parcel.
- Animals that trespass on AF sites can do great damage by crushing and eating little trees. Collaboration with neighbours and the community is essential to combating this challenge.
- If the focus of the site is only on restoration and conservation, only make thinning for the new plants and not for the whole site.
### Recommendations

- At first, plant annual crops and species that grow quickly and later, according to how the plants grow, manage the system by extracting crops and letting trees generate conditions that are more conducive to introducing new species (ornamental plants, shrubs, vines, orchids, etc.).
- Cover crops (squash, pumpkins, beans, etc.) are a way of controlling pasture in the first stages of the AF site and they also offer the producer short term products.
- Make a chronology of activities: Who will maintain the site and when? Are the people doing the maintenance aware of which plants should be cut and which species can be kept?
- Applying organic material around the plants and trees and planting legumes with Pinto peanut (Araquis pintoi) at the foot of plants is a way of reducing the needed frequency of site maintenance during periods where said intervention cannot be assured.
- Pruning is a way of controlling shade; put cut branches and foliage at the foot of each plant or tree.
- Use dried plants as mulch to enrich the soil.

### 6. Planting and Enrichment

#### Lessons Learned

- After three years, high growth species can reach a canopy of 7 meters in height and shade. At this point shade tolerant species can begin to be planted.
- Plant a high variety of plants very densely as it is easier to remove plants than add them.

#### Recommendations

- The planting should be under taken with technical criteria:
- The AF site should be approached in a way that creates multi-strata (structure) and multi-stage (age). That is today, species should be introduced progressively so that different strata of vegetation can be reached and so that species will reach maturity at different
- Plant trees with enough spacing to be able to integrate more species and create more canopies over time.

### 7. Activity Planning

#### Recommendations

- The technician and the producer should make a plan together: Think about how much time the producer has.
- Plan weekly, monthly and annual activities as well as activities that are less frequent.
- Know the farm’s history, including prior uses (products and techniques used), perform an analysis of the site in order to take be able to intervene appropriately and improve the soil conditions (especially if a lot of agrochemicals were used in the past). Investigate. Make an inventory and after, compare subjects of fauna, productivity, response to cultural treatment, fertilization, weed control, etc.
- Think about neighbours when planning activities so as not to damage their crops, fences, etc.
**8. Management of Soil Conditions**

**Lessons Learned**

- Soil compaction can be resolved in time with the help of plant roots.
- The introduction of species adaptive to wetlands and/or conditions of local soil (drought, acidity, salinity, etc.) facilitates a better growth of plants in the AF site.
- Using cover crops for long periods of time facilitates the use of a variety of other crops in the future.
- Planting coral tree (*Erythrina*) and or *Gliricidia sepium* 6x6m together with heliconias and musaceas when establishing an AF site fixes nitrogen, increases the production of organic material, shade and also facilitates weed control.
- Introduce phosphorous fixing plants like “Tora”, legumes and musaceas; Phosphorous contains the element most difficult to incorporate into soil and it is the most static of all the elements. Tora can be distributed around the edges of AF sites and if it propagates well, it can be cut and incorporated as fertilizer.
- Compost recipe: chicken manure, cow manure, Gliricidia leaves and loose soil.
- Soil that has been exposed to a high amount of chemicals over time suffers the effect of residual chemicals. In these cases and with degraded soil from other causes, the introduction of cover crops and legumes for at least a year can have a positive impact on increasing the organic material and with time can improve soil conditions.
- Observing good soil conservation practices (live barriers, dead barriers, planting according to land contours, etc.) in other farms and then later applying them to AF sites can affect neighbours once they see the positive results.

**Recommendations**

- Think about what the site was like 300 years ago, note the conditions in the area around the farm, the scale of the landscape, and try to introduce species that were probably present at that time.
- Introduce pioneer species in order to create lateral shade and other micro-climate conditions that promote growth of other species (of the natural forest, etc.).
- Choose non-aggressive legumes and apply as cover crops. Try beans, cucumbers and squash.
- Any work done should respect land conditions. Do not execute interventions to change conditions of the zone (for example the humidity level).
- Check the database for species characteristics and their ability to adapt to certain soil conditions.

**9. Management of Weeds And Pests**

**Lessons Learned**

- The management of very aggressive weeds like *Juncus* sp. can mean a high increase in the cost of site preparation and maintenance.
- The rapid creation of lateral shade using species like heliconias, *Musaceae* (banana family), high altitude guava, etc. helps with weed control in the area around the planted trees.
- Learn about weed and pest control through trial and error.
- Systems that have high biodiversity don’t have serious problems with pests; the system is in balance.
- Cedar always attracts insects. The only way to reduce their impact is to promote high biodiversity.
- Species shouldn’t be planted without understanding their characteristics and how to produce them so as to assure successful growth. There must be sensitivity to the environment, plant evolution and only look for ways to intervene when it is considered necessary (relocation of the plant, planting on another site, fertilization, pruning, etc.).
- Plant the “Canovalia” vine (Jack-bean) as a living fence and it will repel the “zompopo/a” ant.
- Spraying a tea made from crushed “Neem” leaves and soap around AF sites control problems with grasshoppers. A spray made from boiled Neem seeds is also very useful. Also, planting Neem itself as a living fence acts as a natural insect repellent.
- Produce organic fertilizer using chicken manure, livestock manure and *Gliricidia*.
- Cooked *Gliricidia* serves as a control for fleas.
- Aromatic species can be used to control and/or avoid pests.
- *Trichoderma* is a fungus that controls or prevents parasitic fungi from attacking plants and encourages the growth of plant roots. This fungus can be produced through the process of “Efficient Microorganisms” (EM).
- EM is produced by placing white rice, cooked in water only and drained, in a hole lined with large leaves, 20 cm deep. After, cover the rice with more large leaves, soil and a rock. Leave it for 8-15 days and later take out the leaves with the rice. Remove the leaves. The rice should be many different colours because of the fungi, bacteria and yeasts that are present there. Using a blender, liquefy and strain the rice mixture and then add 8 litres of water. Add a litre of molasses and let sit for 8 days in a well closed bucket, with a tube coming from the top to let gas escape. This solution can be kept for one month. Mix 500 ml of mixture with 18 litres of water. Spray the product at the base of each plant, compost or septic tank 3-4 times a week. Chemical products shouldn’t be used with EM as they kill fungi and other active elements of EM.

### Recommendations

- The nursery provides a great variety of plants adapted to the conditions of the AF site. It is recommended that species known for their resistance to pests, their ability to repel pests and/or respond well to organic methods of control.
- Incorporate cover crops in order to create shade and manage weeds with shade.
- Put organic material around plants to reduce competition with weeds.
- Cut down weeds only in the rows where trees are planted. Let other vegetation around the rows grow.
- From the beginning of the land preparation, there should be a focus on weed control in order to stabilize its progress later.
- Using a list of vegetable species that are known to be resistant to pests, improve the family’s diet and can be treated without chemicals assures better success in the production of vegetables in the AF site.
- Study the database to identify which species to plant according to the conditions and problems found in the AF site.
- Have a list of organic treatments for pests (in the database)

### 10. Periodic Mapping

#### Lessons Learned

- Making a map of the AF site by hand is a practical way of mapping. It is not necessary to make a map using a computer.
- The map is one of the activity planning tools.
- The basic maps serve as a reference for intervention at the AF sites.

#### Recommendations

- Update the site map periodically (every 1-2 years) to highlight changes from the effects of planting activities, enrichment and general site development (paths, etc.)
- Demonstrate changes to the site map to the producers and visitors.
- Display the site maps in the producer’s house, like an exhibit.
- A protocol can be developed to guide the producer when the map is made and update the protocol at a later time.
- 1-3 years after establishing the AF site, a digital map can be made when the site is a bit more stable in its composition and distribution of species.
### 11. Evolution Indicators of a Site

#### Lessons Learned

- Big changes can be observed in AF sites after only 3 years.
- With the growth of various tree species in the AF site, species of fauna have been seen that haven’t been seen in many years. E.g.: In various AF sites in Honduras the “chorcha” bird has been seen.
- Regeneration of broad leafed species is an indication that the site is progressively changing from the first serial stage to the second serial stage of ecological succession.

### 12. Obtaining Vegetative Material and Seeds

#### Lessons Learned

- Seeds should be obtained from various sources like seed banks, nurseries known for their good genetic quality seeds, and manual collection in the field.
- In the regional AF Model Forest project, the communal nursery supplies the sites with the majority of vegetative material.
- There can be problems with quality in plants that are produced from collected seeds due to the lack of information about their genetics.
- In order to create diversity, there should be at least 25 varieties of trees planted.
- The database indicates the fruiting season of the species in order to plan for seed collection onsite during the year.
- Organizing a day in the field with participants or those interested, is a good way to collect seeds available in the area and map and identify trees and plants where seeds can be collected. The following year this information can be used to organize seed collection activities.
- It is best of each person has autonomy to propagate seeds.
- For individual nurseries, collecting seeds reduces the associated cost of producing vegetative material.
- Shoots of species of interest found in secondary forests can be replanted in AF sites.
- Seedlings of ornamental and medicinal plants can be found in the gardens of women in the community. With permission, the seedlings can be used to start reproduction in the nursery.

#### Recommendations

- Each person can look for their own seeds.
- Look for seeds outside the community in order to encourage diversification in terms of number of species and their genetic diversity.
- Producers can participate in seed exchanges.
- Make a map of an area, mark where there are trees that produce good seed, include information about their period of production. Later return to harvest seed.
### 13. Management of Tree Nurseries

#### Lessons Learned

- The AF site nursery provides a large variety of seedlings and furthermore, offers the possibility to produce vegetative material for sale to neighbours and others interested in buying seedlings at a reasonable price.
- Seeds can be planted directly into a “Jiffy”, a container made from natural materials, without pricking out from a seed bed, so it is quicker. However, seedlings must be transplanted within 3 months, or they will die.
- Flower production in the nursery was the first income source from a group of women participating in the establishment of an AF site.
- When each producer has their own nursery, they learn to manage it, sell products and generate income.

#### Recommendations

- Each producer has to think about the species that they want to plant in their parcel and what they could sell.

### 14. Establishing and Managing Infrastructure

#### Recommendations

- Each site should consider establishing signs, a network of paths, a nursery, benches, and, optionally, a kiosk (rustic, palm roof type).
- Rustic structures (cabins, ranches, etc.) can be built on the AF site. They should be attractive, safe and clean. The rustic style tends to have less impact on the land.
- Design a path that has several wide areas where groups of visitors will stop, gather round and listen to explanations.
- Along the paths, plant attractive ornamental plants to increase the scenic beauty and to help mark the path.
- Install railings and other safety measures where it is considered necessary, with signs informing visitors about safety rules.
- Consider where the producer lives (on the farm or not) in order to be realistic about the maintenance of the established infrastructure.
- Take advantage of the AF site in order to demonstrate and promote ideas to visitors such as other ecological technology that is innovative and sustainable (in order to become a “sustainable farm) such as solar panels and solar dryers.
- Put a sign at the entrance of the AF site with a site map. Along the path put up signs that explain what is found on the site and why.
- For purposes of ecotourism, identify and label species that are found on the site. Example: Common Name, Scientific Name, English Common Name.
- Sign making is a good opportunity to involve the family in the project.
- An optional idea is to prepare a leaflet for self-guided visitors of the AF site, giving general information about the site (the area, objective, composition of plants and animals, main products and services, etc.)
- Think about the needs of tourists and visitors (restrooms, potable water, among others).
15. Adding Value to the Farm or Land

**Lessons Learned**

- The contribution of AF is ecological more than it is economic, but if it can successfully be dual propose, even better.
- By transforming farm products, they gain more value.
- The promotion and strengthening of networks helps to promote and sell AF products more easily.
- The aesthetic presentation of the AF site is attractive for the owner, their family and visitors.
- When more birds begin to appear at a site, there is potential in ecotourism for birdwatchers.
- The medicinal plants produced at the site can be sold or used in the family.
- Fruit can be consumed by the family, sold fresh, or as part of a transformed product. Fruit is also eaten by birds.
- The education and the formation of an association of producers (to sell products/services) with AF sites is a process.
- Some activities that have demonstrated compatibility with AF are: tilapia production, butterfly farms and paths.

**Recommendations**

- Have clarity about what natural attractions the site offers, but also the services that can be offered to visitors and/or the community.
- Arts, crafts and jewellery can be made from products taken from the AF site.
- Identify the target tourist population to attract to the site and cater the information according to their profile and needs.
- Involve the producer’s kids when greeting the visitors and informing them about the site.
- Promote product transformation training at the AF site in order to learn techniques for transforming products generated at the farm, whatever gives the most value added, and helps to conserve better.

16. Products and Services: Their Actual and Potential Markets

**Lessons Learned**

- In general, the product prices are lower at farmers markets.
- It is not possible to compete with some international products.
- Customers go back to vendors who treat them well (for example, with friendliness, attentive to people’s needs, etc.)
- Respond to requests from customers for better products or new products.
- Certified, inspected products can be sold at a better price.
- Whatever way that a product can be transformed and get a better price is positive.
- The International Analog Forest Network’s Forest Garden Product certification includes international organic standards, but it is adapted to AF; it is a certification of biodiversity. It highlights the difference between organic products that are grown in monocultures and products cultivated under the AF system.
Recommendations

- Avoid selling products to intermediaries.
- Bring the producers and their products together in order to diversify the offerings and increase the volume of products for sale. Form an association or local network of AF organic producers.
- In the farmer’s market and other points of sale, use signs, flash packaging or other decorative elements to differentiate the products coming from AF systems from standard products. Provide information to clients about the system and the benefits of organic agriculture.
- Distinguish organic and AF products visually by using different signs (colours, etc.) in the farmer’s market, to promote the AF concept and organic production and to encourage responsible shopping.
- When selling products, they should be well presented, be clean, be organized and have labels that provide useful information.
- Take advantage of niche “green” markets (if they exist at the local, regional or national level) like hotels or ecotourism companies that look to offer organic products to their clients or communities, but do not have the capacity to produce these types of products, but need to buy products from other sources.
- In order to sell to hotels and restaurants, only sell products of the best quality. Sell added-value products (not just the unprocessed product).
- The producer should guarantee the product quality, form a good relationship with customers, and create confidence them so as to assure purchases in the future.
- Organic products can be sold under the honour system, without international certification.
- With ingenuity, creativity and training, unprocessed products that producers were unable to sell can be transformed, conserved or reused in traditional or new methods (for example, produce damaged during transport can be used to make compost to sell), avoiding loss of income from these damaged or unsold products. This is a good opportunity to involve family members.
- If prices decrease for a product, drying products is a good way to preserve them until prices rise.
- Implement a trial period for new products that are to be sold and adapt if necessary.
- The nursery can generate income through the sale of flowers, seedlings and seeds.
- Look for national and international opportunities to sell AF products.
- Explore the possibility of accessing national or international mechanisms with the purpose of reforestation and protecting natural resources.
- Get in touch with existing groups of producers in order to learn from them, better understand how guilds and associations work and get technical assistance.
- In the log book, record what worked and what didn’t work about sales and/or transformation of products.

17. Economic Sustainability

Lessons Learned

- The principal challenge is to sustain the AF site in the long-term.
- With the introduction of plants, flowers, medicinal plants (short-term), fruit trees (medium-term) a better economic sustainability of AF sites can be achieved.
- When national and international markets are not accessible, it is better to introduce species that are edible and profitable in the regional zone of the AF site.
- While the AF site is being established, producers need to be supported more through training, orientation, help with accessing markets, etc. Later, it is easier for them to work alone.
- Ecotourism can provide resources to support AF sites, through visits to the site and the sale of products.
- Restoration of degraded areas and establishing agroforestry jobs in communities requires a lot of effort and resources and there is a big responsibility to show that AF can succeed financially.
- By creating market niches (where there wasn’t a market before), the producer accesses new sources of income.
Recommendations

- Select species that will produce in the short, medium and long terms to ensure the most stable flow of resources possible.
- In the short term, crops like cassava, plantain and flowers can be introduced.
- While the AF site is being established (approx. 1-5 years), income can be earned through the sale of tilapia and by plants produced in the nursery.
- The nursery can generate income through the sale of flowers, seedlings and seeds.
- Explore the objectives of the producer, the existing markets and the presence of an association of local producers to improve the diversity of species offered and increase the volume of products available therefore achieving a larger impact at the individual and group level.
- Maintain records of production, volume and sale prices of products, including those that are fresh, transformed, reused or wasted, in order to continually adjust the management of the products and their by-products.

18. Social Aspects

Lessons Learned

- It is important that the producer enjoys what he/she does.
- It is difficult to start an AF site. Change and anything “new” generates resistance, but if one continues with faith, the benefits will be seen in time.

Recommendations

- Share the land with others: the community is responsible to protect the land
- Look for support and create alliances with people living closest to AF sites. If communication and understanding are not present there could be outside threats to the site like the introduction of cattle to the area, or problems with product theft, etc. For example, let the neighbours cut an area of pasture for cattle feed, without cost under a formal agreement.

19. Gender

Lessons Learned

- Gender shouldn’t limit anyone. What is important is to enjoy what one does.
- Analog Forestry is a family system and because of that, women are always involved. They are trained and integrated in the activities of the AF sites.
- Women know better what should be planted and harvested in order to keep their family well fed.
- With AF, women have increased production levels and biodiversity through the restoration of family gardens (traditionally managed by the women while the men worked on the farm).

Recommendations

- Keep AF as a family project.
- Create a base line about how each family divides the work in their AF site and monitor the evolution over time.
**20. Training and Extension Strategies**

**Lessons Learned**

*Characteristics of the target population:*
- Producers must want to learn AF techniques and apply them voluntarily. Participants can’t be forced to participate and apply AF concepts to their farm if they don’t want to or don’t believe in it.
- Experts are not necessary to restore degraded areas with Analog Forestry; restoration can be achieved by simply being enthusiastic about AF and looking for answers to questions or doubts in books.

*Strategies for extension and training:*
- The support given to producers by extension workers creates interest and motivation to people and their families about the AF concept and the project, but it also helps to create consciousness about conservation and the environment.
- The trust between extension workers and producers is very important in order to successfully establish AF sites, achieve good site management and have a horizontal exchange of experiences. The producers and extension workers both have their own knowledge and skills to contribute. They can help, advice and mutually learn from each other during the implementation of AF.
- The most effective learning occurs through doing and seeing concrete results in the field.
- Field training about new techniques and visits to other AF sites with producers allows for exchanges of experiences and ideas, observation of concrete results and getting new ideas by seeing how concepts were applied to other AF sites.
- In time, producers applying AF have a multiplier effect in their community or region. New interested people see the work that the producers are doing with AF and learn from them (“producer to producer”); they are a source of inspiration.

*Value added from AF:*
- The AF sites provide the following benefits (i) environmental, (ii) social, (iii) economic (the production part is easy, the marketing is the difficult part).
- Promoting AF in education centres creates interest, involves students in a restoration project (especially through mandatory community work) and creates awareness in the student population about sustainable development, the importance of environmental conservation and restoration and climate change.
## Recommendations

### Characteristics of target population:
- Train those producers who are enthusiastic about trying to apply AF first, not the people who want to see results before they will be convinced and take action.

### Extension and training strategies:
- Provide a short theoretical training for producers and encourage practical training, looking at examples from other sites. Organize periodic visits with producers to farms that have been successful with AF.
- Extension workers should understand the AF methodology very well to be able to support the producers.
- Promote the involvement and training of people with local leadership roles that have a better ability to create confidence with people from the communities and who can support the promotion process, training and extension of AF with rural producers, supporting innovation, the introduction of new objectives and the search for new sustainable production techniques for the AF sites.
- Extensionists should aware and taught to producers so that they can be extension workers in their community as well.
- Promote diversified training to the producers, their family, and the community in a way that encourages the application of various alternatives for sustainable production (for example: Training about organic certification, transformation and marketing of products, including medicinal plants and essential oils. Encourage students to get involved in the establishment and management of AF sites and to help teach communities about sustainable production.
- Promote the idea that wealth does not only mean money.

### Extension and training tools:
- Create an information centre that holds information about AF (manuals and guides, presentations, event proceedings and reports, photos, etc.)
- Spread the Analog Forestry concept through local media (radio, leaflets, etc.) and at the national political level, in a way that encourages incentives for this system.
- Develop tangible tools to give continuity to AF sites.
## SWOT Analysis

### 21. Strengths

#### Human Aspects

- The creation of national and regional projects, networks and communities of practice that are interested in horizontal exchanges between producers, extension workers, technicians and others interested in Analog Forestry allows those involved to share their experience and knowledge, learn from others and support the success of the implementation of the system in the field.
- When people interested in Analog Forestry (whether they have their own site or not) visit other demonstrative sites, they gain confidence in the concept and it motivates them to improve their site or spread what they know to others.
- The development of the Analog Forestry system motivates, animates and creates pride in the people that work the land.
- Analog Forestry encourages integration of family and community (especially across genders) in the implementation of site activities.
- Analog Forestry sites are established and promoted by people interested in the subject, who believe in the concept and that have hope that such a system is better for them, their family and/or community in the future.
- The concept of the AF concept can be spread to producers’ communities through the technical assistance of producers and training producers on AF methodology.
- The Analog Forestry sites are demonstrative units and share educative ideals in order to involve and raise awareness among children, teenagers and other members of the community on conservation, sustainable production of natural resources and the environment.
- Analog Forestry community members and family members can help with site activities (establishment, maintenance, harvesting, etc.).
- Analog Forestry sites create a space for interdisciplinary work and for the preservation of traditional knowledge and cultural identity of towns (in such aspects as the establishment, management and experimentation of the sites).
- The promotion of the diversification of products and services of Analog Forestry sites can help to diversify the diet of rural families.
- The Analog Forestry site can be a place of recreation where the environment can be enjoyed.
- Giving training on Analog Forestry and promoting it can raise awareness about current world issues like global warming among producers and students.

#### Economic and market aspects

- Abandoned and degraded areas of farms can be converted into both a conservation and productive project through the application of Analog Forestry.
- Restoring degraded areas through the application of Analog Forestry is a strategy with fewer costs than other systems and it is more attractive to the producers since the site generates diverse sources of income. The production methods are also more environmentally friendly. Each site can provide a diverse range of products (medicinal plants, edible products, plants that can be used to make jewellery, arts and crafts, etc.) and therefore diverse sources of income.
- Producers have access to diverse markets due to the diversity of organic products that AF offers.
- There is a possibility for producers to certify their Analog Forestry sites.
- The low cost of implementing the Analog Forestry system (for example, accessing seeds, vegetative material and external inputs) allows for its application in remote places on a budget.
- Within the Analog Forestry Project there are many other small projects that can be executed; for example, the construction of a butterfly garden. It is a future opportunity.
Environmental and infrastructure aspects

- Analog Forestry allows for production while at the same time improving the soil quality.
- It is a system that encourages an intense intervention in an available space (multi-strata and multi-temporal management) at the same time looking to achieve harmony with nature.
- Analog Forestry offers rural peasants the opportunity to gain skills and knowledge necessary to produce organically and use techniques that conserve soil.
- The Analog Forestry concept is flexible enough to adapt to every context.
- Each Analog Forestry site is unique and the application of AF is adjusted to the site conditions, in line with the needs and interests of the producer and their family.
- The Analog Forestry sites improve the aesthetics of the landscape.

22. Opportunities

Human Factors

- Training opportunities (and their respective financing) with subjects related to sustainable development and production by various national and regional organizations can offer a great opportunity to producers, extension workers and technicians that can strengthen previous training and can improve the management of Analog Forestry site and the marketing of their products and services in time.

Economic and Market factors

- The growing demand for organic products allows for new opportunities for producers to market their products.
- Transforming and adding value to products of Analog Forestry sites can allow producers to access new markets that could increase their income.
- National or international programs that compensate for ecosystem services and carbon markets can potentially reward Analog Forestry sites of certain countries for the services they offer.
- International programs (REDD+, climate change) are a potential source of financing for Analog Forestry projects.
- Through a communication campaign and dissemination, various NGOs, institutions or programs that specifically promote conservation and sustainable management of natural resources, could potentially be interested in the Analog Forestry concept and could want to finance projects, depending on their priorities and level of understanding of the concept and its potential.

Environmental and infrastructure factors

- Analog Forestry can integrate with regional strategies in the creation of biological corridors.

Regulatory and political factors

- Through a good communication strategy, outreach and advocacy, the adoption of AF as a strategy for mitigating climate change could be achieved by national institutions of some countries.
- The fulfillment of certain commitments at the national and international levels by countries (for example, the struggle for the conservation of biodiversity) could, in part, be demonstrated by Analog Forestry projects.
## 23. Weaknesses

### Human factors

- Resistance to change from a traditional production system to Analog Forestry (even in degraded areas), after obtaining information about the concept.
- Analog Forestry ideally requires intense physical labour.
- After training there is insufficient follow up on subjects covered.
- The establishment or installation phase of the Analog Forestry sites lasts in general for 3 to 5 years. This can provoke some producers to have time conflicts as they must participate in activities off-site in order to generate income.

### Economic and market factors

- The methodology of Analog Forestry only serves as a way to improve life at the local level.
- The system is limited to small producers, not large scale production. The world can’t live from Analog Forestry alone.
- Studies of costs and profitability of Analog Forestry systems are lacking.
- There is a risk of selecting species and producing them with incomplete information about existing markets (at the local, regional, national and international levels), without knowledge of the fluctuations of market and the seasons of sale of the products. This can have negative economic repercussions in the short, medium and long terms.
- The lack of diversity of native species available in the environment, lack of community nurseries and lack of diversity in community nurseries may limit the diversity present in Analog Forestry sites that have limited financial resources.
- The production of a lot of small scale products limits the possibility of producing minimum volumes required to access certain markets.
- Up until now, little emphasis has been given to organizing producers (unions). For example, by organizing themselves, producers can more easily reach a necessary minimum volume of production to sell their products in certain markets.
- The common lack of differential pricing for the product in the organic market.
- The markets for certified “Forest Garden Products” are still unknown.
- There are few Analog Forestry initiatives in Latin America. Not very many people have access to Analog Forestry and less to its funding through a project.

### Environmental and Infrastructure factors

- Lack of maps identifying seed sources (maps of seed giving trees)
- Analog Forestry is a system of trial and error. Sometimes the errors can generate losses of material or income for the producers.
- The Analog Forestry system is not a good choice for mechanization.

### Regulatory and political factors

- Weakness when bringing the concept of Analog Forestry to authorities.
- Analog Forestry has not been promoted to government as a tool for silviculture.
24. Threats

**Human factors**

- Manipulation of information; people, organizations or other institutions that do not believe in the AF concept and do not believe in its power to create change can generate a negative reputation of the concept.
- Deliberate damage to farms such as theft.
- Deficiency of technical assistance to producers can generate a loss of crops and bad planning in the medium and long terms.
- Demographic explosion at the unit level of the farm and global level.
- Migration from rural to urban areas.
- In countries where women were not traditionally involved in farming, Analog Forestry looks for ways to incorporate them in other associated activities (nursery management, product transformation, arts and crafts, etc.)

**Economic and market factors**

- Lack of markets to sell and distribute products for the small producers and for organic products.
- Supermarkets are unfair competition for small producers because of the monopoly that they hold. They set prices at the moment that they purchase them from local producers.
- Intermediaries buy agricultural products directly from the producers’ farms at lower prices.
- Market fluctuations in demand and prices for products.
- Increased costs of oil and costs of living affect the minimum level of income needed to be profitable.
- Global domination of the consumption law (American model) over ecology, the environment and health.
- Mechanized production and the use of genetically modified crops makes production cheaper and more profitable than healthier and more environmentally friendly production methods.

**Regulatory factors**

- Analog Forestry lacks support due to the absence or weakness of laws and other legal tools (forestry strategies, etc.)
- Political decisions about certificates, incentives for other types of agricultural production.
- Problems with land tenure

**Poor governance in institutions and governments**

- Abuse of power over the rational application of scientific and popular knowledge by the governments and governmental authorities
- Institutional bureaucracy (national and international NGOs and institutions) reducing funds that get to the rural people. A lot of funds stay in the office.
- Complexity of linking AF with different governmental institutions that it relates to and its inter-institutional displacement.
- *Environmental and Infrastructure factors*
- Poor quality roads and public transport access in and out of AF sites
- Weather conditions and other extreme events (active volcanoes, landslides, for example)
- Pest attacks
Main partner institutions

Regional
Ibero-American Model Forest Network (IAMFN), Falls Brook Centre (FBC) and the Tropical Agricultural Research and Higher Education Center (CATIE).

National
The Dominican Republic: Enda-dom; Honduras: Association of Municipalities of the Center of Atlántida (MAMUCA), Atlántida Model Forest Association, MaderaVerde Foundation, Cuero and Salado Foundation (FUCSA), Atlantic Littoral Regional University Center (CURLA), La Ceiba Municipality; Costa Rica: Ministry of Environment, Energy and Telecommunications (MINAET), Turrialba Municipality, Braulio Carrillo High School de San Rafael de Oreamuno and the Technical High School of Pacayas.

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The Tropical Agricultural Research and Higher Education Center (CATIE) is a regional center dedicated to research and graduate education in agriculture and the management, conservation and sustainable use of natural resources. Its members include the Inter-American Institute for Cooperation on Agriculture (IICA), Belize, Bolivia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Venezuela and Spain.