

Example of an AF Design

at Mirahawatta, Sri Lanka

Introduction

After completing +100 hrs of *in situ* training at Belipola Arboretum and Research Centre, Agustina Cozzitorto integrated her past knowledge in Environmental Science to improve her observations of ecology and human impacts on the environment through the window of AF.

As an advanced TOT, Agustina decided to implement an AF Home Garden design at one of Belipola's neighbouring farms in order to demonstrate how Analog Forestry helps to develop rural livelihoods in the face of Climate Change. While reinforcing the social outreach happening through Belipola, this design is also part of the Mirahawatte Home Garden Improvement Project, which main objective is to assist the community to make the transition from an extractivist, non-sustainable farming system to the creation of mature forest gardens with long-term sustainable economic returns by uplifting socio-economic and fair trade standards as well as capitalizing Primary Ecosystem Services (PES). These last ones have not been valued or economically recognized yet, and are critically important for developing new value structures that will make allowances to increase the conservation of biodiversity, ecological resilience and restoration of landscapes while providing pleasant living environments in rural areas.

Nowadays, soil quality and water reserves are highly affected, causing increasingly severe droughts and an increase in pollution due to the indiscriminate use of agrochemicals and the lack of vegetation that filtrates and remediates soils and water streams. There's also a notorious increase in the dependency of external inputs as well as pest outbreaks.

It can also be said that there's a great potential to conduct a restoration process at a broader scale by taking into account the proximity of the studied plot to the original Analog Forest (located downstream) and a remnant natural forest patch (located upstream). By promoting landscape connectivity and the creation of an ecological corridor between natural and analogue forest patches, the total vegetated area will increase considerably creating the conditions for genes and species flow and, therefore, accelerating the maturity of these ecosystems.

This AF design can be easily replicated in other degraded neighbouring lands within the same village, expanding the area of influence and reinforcing the ecological resilience at a broader landscape level.

Summary of the initial considerations for carrying out this AF design:

- The landowners' requirement is to improve the family livelihood and upmarket their yield while increasing the canopy cover area on their land. They acknowledge the cooling effect when visiting the Analog Forest while it's dry and hot at their farm. They also understand the importance of creating habitat for different organisms and how

farming for biodiversity will bring benefits in the long term. They recognize that transitioning to (and beyond) organic would have been difficult without the knowledge and support of holistic practices learned with Belipola's support.

- Both husband and wife are willing to change or adapt their ways of working and want to become an example for their children and the community. They assume responsibility for taking care of the plants while the design is established and are committed to start implementing more sustainable practices such as composting, mulching, creating patches that serve as habitat for local biodiversity, among others. The farmers even show interest in adding other valuable marketable species, like a Durian tree (V9), that were not contemplated in the original design and don't compromise but rather improves it.
- Some decades ago, the studied plot was used for the cultivation of rice. Due to the increasingly common shortage of water in the area and new market demands the landowner started growing mainly seasonal vegetables. They also count with some perennial crops such as Kithul and Areca Nut trees, as well as a few fruit trees for family consumption. There's also a nursery and a tea garden in other areas within the same land. Most of the products are distributed in the village or taken to the local market.

This AF design was focused on the following key points:

- Maturity (Tend to more stable and mature ecosystems).
- Increasing the B:B ratio (Biodiversity to Biomass) by at least 30%.
- Building a more informed rural community that responds to integrated ecological farming practices.
- Developing an economy for stabilizing the transition from industrial or traditional farming to beyond organic practices.
- Considering global and regional perspectives for restoration while defining development into the future.

A complete assessment of the studied area was carried out including Mr and Ms Wijekoon farmland, Belipola's Analog Forest and the surrounding areas. Including:

1. Gathering physiognomic formulas

Natural forest patch (regional) formulae

V7i, V6p, V5c, V4p, V3r; T7e, T3e; P7p; R3r; K3e; F2e; C1-6r; X5a; L1-7c; G2r; A2r; H3e

Studied site formulae

V6e; T5r, T4e, T3e; P7e; C1-4r; L1-6p; G4r, G2r; A2e; H3e

GAP formulae

V7i, V6>>p, V5c, V4p, V3r; T7e; P7e>>p; R3r; K3e; F2e; C1>>6r; X5a; A2e>>r

(selected species are detailed in this [economic estimation spreadsheet](#))

2. Carrying out Ecological Evaluations and analysing and comparing the results

Ecological Evaluation			
Fill out this form with the data of the Analog Forestry parcel. Complete one form for each part of the parcel that is ecologically different.			
Form for recording data from the ecological evaluation.			
Name: <u>Agustina Cozizorto</u>	Date: <u>23/10/2020</u>		
Parcel: <u>S. & N. Wijekoon farm</u>	Lot number: <u>ER/0.94/UP/004</u>		
Location: <u>Mirahawatta</u>	Province: <u>UVA</u>		
Altitude: <u>1264m</u>	Geographic Coordinates: X: <u>06°51'438"</u>		
Median annual rainfall: <u>1000</u> mm	Y: <u>080°56'990"</u>		
INDICATORS			SUSTAINABILITY VALUE
1. SOIL QUALITY INDICATORS		AVERAGE SOIL QUALITY	1.35
a. Soil Profile	2	Sum of indicator values divided by three. 0.8	
b. Apparent Density	3		
c. Macroorganisms	2		
Total	2.3		
2. BIODIVERSITY INDICATORS		AVERAGE BIODIVERSITY	
a. FLORA	3	Sum of flora total value and fauna average, divided by two. 2	
Total	3		
b. FAUNA			
Birds	1		
Mammals	3		
Amphibians and/or reptiles	3		
Insects	1		
Total	8		
Fauna average (fauna values divided by four)	2		
3. STRUCTURE INDICATORS		AVERAGE STRUCTURE	
a. Seral Stage	3	Sum of indicator values divided by two. 1.3	
b. Complexity	2		
Total	2.5		
4. PRODUCTIVITY INDICATORS		AVERAGE PRODUCTIVITY	
a. Economic productivity	3	Sum of indicator values divided by two. 1.3	
b. Ecological Services and Conservation	2		
Total	2.5		

The sustainability value of the studied plot (1.35) is well below the average, meaning there's work to do in terms of improving every aspect that has been evaluated. These improvements have been contemplated when making the design as well as discussed with the landowner, who will be assisted during the establishment and initial management and monitoring plan stages. (*continues...*)

3. Mapping out and delimiting the intervention plot, and defining flow and reservoir systems within the farmland

Land area delimited using GPS



Intervention plot mapped using manual techniques and GPS



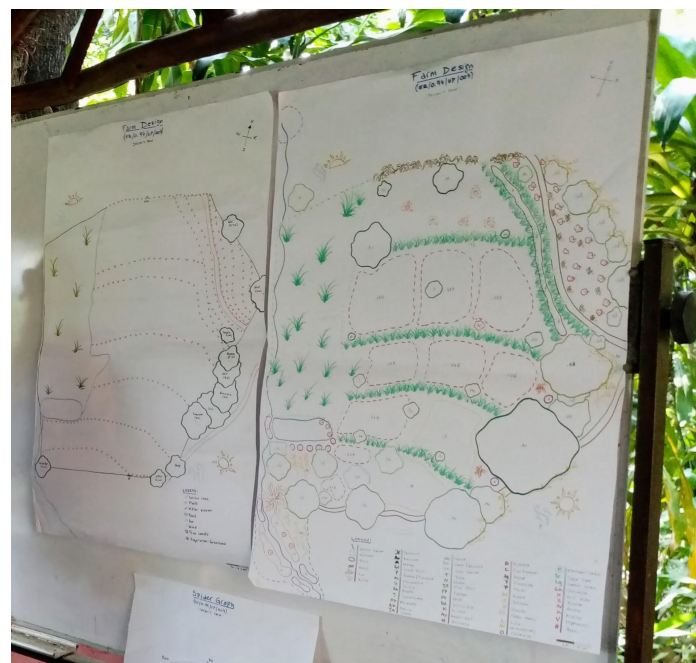
4. Selecting species using a Plant Database

Together with the landowners, socio-economically valuable species similar in structure and functions to the ones found in the natural forest were selected using Belipola's tree database and included in the design with the aim of increasing production while strengthening forest functions. Examples of selected species are: fast growing fruiting tree species such as Asarola (V4) and Guava (V5); a native variety of Papaya (T5) which seeds are highly valuable for saving and reseedling; medicinal and insect repellent plants such as Lemongrass (G2), used as well for edge rows as contouring cropping and root retention; native and exotic marketable perennial creepers such as Niviti (C1-3) and Winged beans (C1-5); orchids with a high market value such as Vanilla (X) that also adds complexity to the forest structure; fat growing native ground covers such as Gotu kola (A1) that will create income for the first years while the design is established; big trees such as Toona (T7) which wood can be harvested after +30 years of providing multiple ecosystem services; wetland species such as Cardamom (R3) and Kankun (A2) used for waterway restoration, phytoremediation as well as marketable crops, among others.

5. Design sketch (based on the initial considerations mentioned above)

The studied plot is in a 2nd seral stage, with a predominance of grasses and annual crops. There's also the presence of some shrubs and trees along the east boundaries. The present conditions reflect a degraded land where the soil quality, existent biodiversity and ecosystem structure are impoverished due to poor farming practices and lack of a long-term land management vision.

With the implementation of this design, a structural improvement will take place creating the



right conditions for ecological succession to happen and regeneration to undergo. This is



reflected in the 2, 5 and 10 years plan. With an economic estimation done for each year, the landowners can perceive how their earnings will come from diverse sources while the design moves towards maturity and to the desired conditions: **a landscape with increased biodiversity and ecological resilience that adds environmental stability to an integrated production system.**

The studied plot presents a really steep slope, with the highest point towards the north. In order to stabilize erosion-prone hillsides (the contour lines are represented with red crosses on the baseline map) it was considered to plant perennial crops following a zig-zag pattern along differentially spaced contours. A body of lemongrass along all the contours was included in the design, as well as other perennial crops such as Gotu kola and Pineapples placed at the steepest face, found at the NE boundary. In the same sector and all along the north boundary, the number

of Gliricidia trees will be increased. These are a multipurpose legume tree (N2 fixer) that increases soil productivity and yields in addition to reducing soil erosion and controlling pollution associated with the use of chemical fertilizers. Afterwards, it will serve as a structure for creepers and as a natural fence for wild animals and fires. A body of Heliconias will also be established here as their flowers can be sold at a high marketable price.

Along with the Arecca Nut trees, the Kithul tree line at the SE boundary corresponds to the P7 structure, which needs to be increased according to the GAP analysis. It is worth mentioning that the honey and juice tapped from the last one are one of the main products and most stable income source for the farmers.

Considering the sun's direction, and that the highest canopy in the regional natural forest is composed of broadleaf evergreen trees and compound leaf evergreen that are between 20-35 m tall, Avocado, Mango, Jackfruit and Toona trees were placed at the NW boundary, leaving plenty of space for the lower canopies to develop. As it can be seen in this 2-5 years design sketch, there was a consideration for creating beds with sun loving plants such as vegetables and herbs, as well as perennial crops such as Spinach, Chow Chow and Roselle, contributing to the family economy in the short term while the fast-growing trees

yield will come afterwards, as well as generating another layer of vegetation and improving the soil quality.

Furthermore, it can be observed that at the SE boundary, below the Elephant Grass patch, there's an existing pond recently created by the landowners as a water reservoir. This area and the sector following the seasonal stream that runs from NW to SE towards Belipola, crossing the original Analog Forest total width of and reaching the river afterwards, was designed as a wetland restoration zone. Plant species were chosen with considerations for soil and water remediation, as well as for slowing down the water runoff and placing non-target crops for habitat creation. All these correlated efforts contribute to watershed restoration at a broader scale. Rhizomatous plants such as Bananas and Cardamom, and forest food leafs such as Tebu and Kohila were also included in this sector, together with Sugarcane and other native plants that happen spontaneously.

Other growth forms such as ferns and epiphytes were also contemplated in the initial design and will come along while Mr & Mrs Wijekoon future AF Home Garden is being established!

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- The plant species list, used symbols and AF notes can be found here: [economic estimation spreadsheet](#).
 - More pictures of the establishment of this AF design and other registries are attached [in this folder](#).
 - All the files (Base map, Schematic diagram, Spider graph, etc) are archived at Belipola. If needed, ask for copies.
 - Regular monitoring of this project has taken place. The plants that were grounded (period Nov 2020 - March 2021) have been well established. According to the initial plan, the second implementation phase will be carried out during the next rainy season (2021-2022).