



BRIEF

Agroforestry

for a Changing Climate

2015-2018 OUTCOMES

Against the backdrop of rapid acceleration of changing land uses and increasing climate challenges there is a potential for a wider role for agroforestry. To achieve environmental sustainability, food and nutritional insecurities, while successfully mitigating impacts of climate change, it is necessary to revoke the long neglected and crucial role of trees.

Climate stability, reduction of biodiversity loss and restoration and maintenance of above ground and below ground biomass and biodiversity, creation of biological corridors between protected forest fragments, the safeguarding of ecosystem services, regulation of biogeochemical cycles including water, maintenance of watershed hydrology, soil conservation, reduction of pressure on natural forests, can contribute to food security and range of environmental benefits, and social co-benefits such as increased income.

Adapted from:

(PDF) *Role of agroforestry in achieving food and nutritional security, climate change mitigation and environmental resilience: a review*. Available from: https://www.researchgate.net/publication/314284332_Role_of_agroforestry_in_achieving_food_and_nutritional_security_climate_change_mitigation_and_environmental_resilience_a_review [accessed Dec 14 2018].

The International Institute of Rural Reconstruction (IIRR), with support from CCAFS Southeast Asia, has implemented a small agroforestry project in the municipality of Guinayangan, in Quezon Province, Philippines. The introduction of fruit trees was started in three upland areas and by the end of Phase 1 of the CCAFS project, the number of target villages increased to nine. The introduction of quality seedlings sourced from reputed nurseries was designed to create a culture of fruit tree growing in the upland communities of Guinayangan for income, nutrition enhancement, and for enhancing carbon sequestration. Participatory trials allowed farmers to test and compare at least nine varieties of fruits to assess local adaptability. Fruits served as understory crop in coconut based systems. Clusters of growers in each village provided the basis for learning groups to emerge over time. In some cases, coffee and cacao were added to diversify income sources. Black pepper and tubers such as purple yam and taro further promoted the use of spaces in these multiple canopy systems. In a country faced with extreme weather events, agroforestry-based climate smart agriculture is relatively more resilient than annual crops to climate risks such as drought and typhoons.

Background

Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Sometimes livestock are included into these systems. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increased soil capacity for water and moisture retention. Trees not only help climate change mitigation (by absorbing CO² an important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro climates (through respiration) and helps reduce the desiccating action of wind. Trees store carbon in their biomass. Agroforestry is a good example of sustainable climate smart agriculture (CSA). Agroforestry offers some of the best opportunities for a community to achieve both mitigation and adaptation objectives. Fruit trees, coffee, cacao, banana, and roots crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits and can generate additional income for the farmers. Diversification through understory crops, fruit trees, livestock, and root and tuber crops can help farmers cope with future climate by diversifying their income through less risky enterprises.

Agroforestry systems are being recognized as a resilient form of agriculture. IIRR, with support from CCAFs and Local Government Office of the Municipal Agriculturist, has implemented an agroforestry project in the municipality of Guinayangan, Quezon. It started in 2013 in three (3) villages near a protected area (Magsaysay, San Pedro 1, Himbubulo Weste) and later on expanded to nine (9) upland villages and four (4) coastal villages. Currently, these agroforestry projects can be found in Himbubulo Weste, San Pedro 1, Magsaysay, Ermita, San Roque, Sta. Cruz, Dungawan Paalyunan, Bukal Maligaya, and Dancalan Caimawan amongst others.



The IIRR LGU collaborative effort facilitated the planting of fruit trees under coconut trees and side by side with other food crops. Fruit trees planted includes guyabano, rambutan, mangosteen, jackfruit, and durian. Because of their drought and temperature tolerance, Jack fruit is receiving special attention : over 2000 seedlings have been distributed in coastal and upland villages. Typically in each target village between 12 to 30 households are engaged in mixed system agroforestry with mixed species: over 5000 fruit trees were distributed (6 types) in these villages over the past three years (see Figure 1).

Coffee and cacao are being promoted by the Government of the Philippines. These tree crops are also considered important diversification options in coconut-based systems (see Figure 2).

Anticipating the global impact of climate change on coffee, the focus is increasingly on Liberica species of coffee. Specialization in smallholder coffee systems is discouraged, so cacao is also integrated into these coffee farms. The Department of Agriculture and the Provincial Agriculture Office have distributed over 25,000 coffee and cacao seedlings. Anticipating rising temperatures, IIRR and the LGU is working on multi storied and mixed species systems in order to create micro climates. Such climate smart approaches help the coffee and cacao farmers to address forecasted temperature increase and drought periods.

In 2016, an organization dedicated to coffee development, Asosasyon ng Responsable at Organikong Magkakape (AROMA) was established with 35 members from the following barangays: Magsaysay, Dungwan Central, Sta. Cruz, Ermita, San Pedro I, Dungawan Paalyunan, San Roque (these are



barangays with moderately suited elevations for coffee). The cacao farmers are also getting organized and formed a group of growers (see Figure 3). Cacao is more adaptable to lower elevations and so more widely grown/promoted. Farmer groups meet once a month with the technicians of the Municipal Agriculture Office.

**Figure 1. Enriching Landscapes through Fruit Tree-based Intensification:
Outputs from CCAFS Phase 1 - 9 Project Villages**

Ermita

16 farmers



221 rambutan
319 mango guimaras
91 calamansi

Bukal Maligaya

9 farmers



45 rambutan
9 santol bangkok
135 black pepper
45 guyabano

Himbubulo Weste

24 farmers



317 rambutan
80 guyabano
40 mango guimaras
6 langka
15 mango carabao
6 durian
250 calamansi
3 santol bangkok
225 black pepper

Magsaysay

28 farmers



390 rambutan
30 guyabano
10 mango guimaras
4 langka
4 durian
180 calamansi
2 santol bangkok
380 black pepper

San Pedro I

37 farmers



475 rambutan
335 guyabano
40 mango guimaras
3 langka
17 mango carabao
6 durian
363 calamansi
3 santol bangkok
165 black pepper

**Dancalan
Caimawan**

35 farmers



25 rambutan
5 santol bangkok
75 black pepper
25 guyabano
518 langka
600 cashew

Sta. Cruz

15 farmers



195 rambutan
5 mango guimaras
5 mango carabao
30 calamansi
90 black pepper
270 langka

**Dungawan
Paalyunan**

9 farmers



45 rambutan
9 santol bangkok
135 black pepper
45 guyabano
18 langka

San Roque

21 farmers



292 rambutan
410 coff ee

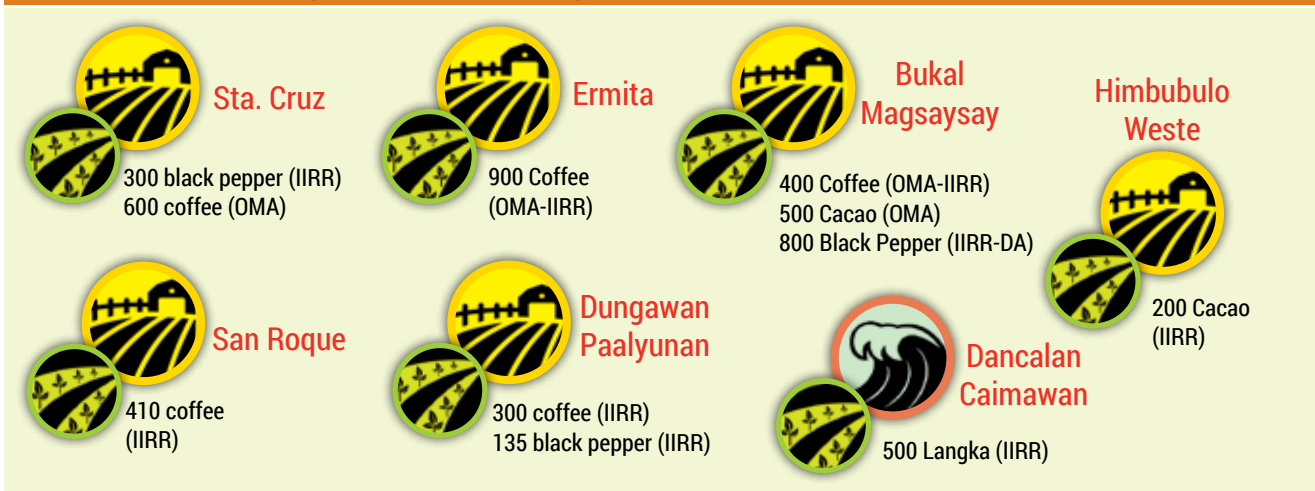


Figure 2. Coffee and Cacao Initiatives of Various Stakeholders in Guinayangan



Cacao Sikap Guinayangan Association organized in 2016	Department of Agriculture distributed 20,000 Cacao and Coffee seedlings to 1000 farmers in 2013	5,000 Liberica seedlings distributed by the Office of the Provincial Agriculture (OPA) Quezon Province in 2016
Fertilizing are done as support to coffee trees in 2017	Rejuvenation and rehabilitation are being done in 2018	Coffee appreciation workshop conducted by DLSU in coordination with IIRR and LGU/OMA in 2018
A working coffee de-pulper and dehuller is being sourced in 2018.	G Cafe (Guinayangan Coffee), an association of coffee farmers, started in January 2007 and regularly attends DTI meetings	Coffee farmers association regularly meets every last Friday of the month.
Production group AROMA (Asosasyon ng Responsible at Organikong Magkakape) established in 2016 with 35 members from the following villages: Magsaysay, Dungwan Central, Sta. Cruz, Ermita, San Pedro I, Dungawan Paalyunan, San Roque		

Figure 3. Revitalizing Small Coffee and Cacao Farms



Coastal areas received prominent attention, starting with a couple of villages where root crops, small livestock and trees were introduced to homesteads. More recently cashew seeds were secured from an analogue site in Coron, Palawan and raised in the nursery managed by the LGU. 2000 cashew seedlings in combination with jackfruit are now being raised by as many as twenty households in each of four coastal village, creating a critical mass of trees and growers in each village. This is one of the last activity support by CCAFs in the last year of its direct engagement in Guinayangan, Quezon. Climate smart coastal agriculture offers special opportunity to enhance the bio shield roles of trees even as mitigation, adaptation, and nutrition goals are achieved.

CCAFs and LGU supported initiatives have allowed farmers to experiment and test options. Other investors are now becoming engaged: Resource institutions such as the National Coffee Research and Training Center of the Cavite State University are involved (they have already made an site assessment and undertaken GIS based studies of suitable areas for coffee liberica). The Food Institute of De La Salle University, Taft Avenue is also already engaged and is assisting in product development and quality control for coffee. Recently a coffee appreciation workshop was undertaken for farmers. It is not just the consumers but the produces of coffee that need to learn and understand what makes a good cup of coffee!

Other research institutions such as STIARC and the DA AMIA project have started to support the LGU in other initiatives were incubated in Guinayangan with CCAFs initial support over the past three years (2015-2018).



The Future for Climate Smart Agroforestry

The coastal and upland areas of Guinayangan will be targeted in future for mixed species agroforestry. CCAFs' support to the Municipality of Guinayagan climate smart village (CSV) will be ending December 2018. In future, a bigger focus on tree-based mixed systems (livestock included wherever relevant) will be considered as a climate resilient approach which can meet the need for the coastal municipality to protect itself from typhoons, winds, and floods.

An action research program will be developed to better understand the role of Agroforestry as an adaptation and mitigation mechanism in the wake of climate variability, drought, etc. Coffee and cacao-based systems with prominent roles for fruit trees, small livestock and under story crops will also be explored. The use of shrub-based



green manure (*Gliricidia*) to reduce the reliance on chemical fertilizer, to provide shade in summer (shade management) and as source of leaf litter will be studied. Building on past CCAFs supported work in coastal areas in Guinayangan, the LGU will target 8-10 coastal villages for demonstrating how CSA based agroforestry can be used to serve as bio shields. Agroforestry is emerging as a tool for climate change mitigation and adaptation Guinayangan, Quezon. These CSA systems are also emerging as a potential form of ecosystems adaption method helping reduce the impacts of extreme weather (typhoons) on lives and livelihoods of the people. A total of 16 villages (11 in upland areas and 5 in coastal areas) are targeted for IIRR/LGU Climate Resilient Agroforestry Program for year 2019 to 2022. Figure 4 provides a snapshot of what is planned for each village.



Figure 4. Suggested Villages for Intensive Agroforestry Initiative



Dungawan Paalyunan

Description: Upland -780 ha.; 221 households
Adjacent villages: San Pedro 1, Dungawan Central, Pisipis
Crops: Coconut, banana, vegetables, coffee, cacao
Notes: Initial IIRR intervention (fruit trees); focused on cacao and fruit trees; targeted for 4Ps
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Dungawan Central

Description: Upland-350 ha.; 185 Households
Adjacent villages: San Lorenzo, Dungawan Pantay, Sta. Teresita
Crops: Coconut, Banana, Vegetable, Coffee, Cacao
Notes: New village; focused on cacao and coffee
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Lubigan

Description: Upland-351 ha.; 156 households
Adjacent villages: Dancalan Central, Villahiwasayan, Manggalang, Sintones
Crops: Coconut, banana, fruit trees
Notes: Targeted for 4Ps - initial intervention from IIRR (native pig)
Ideal focus in the area: Small household agroforestry planted with fruit trees



Manggalang

Description: Upland-188 ha.; 91 households
Adjacent villages: Himbubulo Este, Dungawan Pantay, Himbubulo Weste, Lubigan
Crops: Coconut
Notes: Targeted for 4Ps- initial intervention from IIRR (native pig)
Ideal focus in the area: Small household agroforestry planted with fruit trees



Magsaysay

Description: Upland near protected watershed; 333 ha.; 92 households
Adjacent villages: Himbubulo Weste, Sta. Cruz, Sisi, San Roque
Notes: Targeted tenured migrants near Maulawin Protected Area- initial intervention from IIRR, DENR and OMA (Agroforestry, Native pig)
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



San Pedro 1

Description: Upland- 424 ha.; 130 households
Adjacent villages: Himbubulo Weste, Dungawan Palyunan, Magsaysay, San Roque
Notes: Targeted tenured migrants near Maulawin Protected Area - initial IIRR, DENR and OMA intervention (Agroforestry, Native Pig, Confined Goat Raising and Organic Vegetable Farming)
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Himbubulo Weste

Description: Upland near protected watershed - 440 ha.; 153 households
Adjacent villages: Magsaysay, Calimapk, Manggalang, San Pedro
Notes: Targeted tenured migrants near Maulawin Protected Area - initial IIRR, DENR and OMA intervention (Agroforestry, Native Pig, Confined Goat Raising and Organic Vegetable Farming)
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Sta. Cruz

Description: Upland near protected watershed - 253 ha.; 97 households
Adjacent villages: Salacan, Hinabaan Ermita, Magsaysay
Notes: With initial intervention from the IIRR and OMA (Agroforestry, Native Pig, Confined Goat Raising and Organic Vegetable Farming)
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Villa Hiwasayan

Description: Upland - 999 ha.; 505 households
Adjacent villages: Dancalan Caimawan, Sta. Teresita, Ligpit Bantayan, Dungawan Pantay
Crops: Coconut, banana
Notes: Targeted Vulnerable from 4P's - With initial intervention from IIRR (Native Pig)
Ideal focus in the area: Small household agroforestry planted with fruit trees



Ermita

Description: Upland near protected watershed - 253 ha.; 97 households
Adjacent villages: Himbubulo Weste, Dungawan Palyunan, Magsaysay, San Roque
Notes: Initial IIRR and OMA intervention (Agroforestry, Native Pig, Confined Goat Raising and Organic Vegetable Farming)
Ideal focus in the area: Coffee and cacao with banana intercropped in coconut plantation



Dancalan Caimawan

Description: Coastal with upland - 554 ha.; 273 households
Adjacent villages: Villa Hiwasayan, Lubigan, Sintones
Crops: Coconut, banana, root crops
Notes: Targeted for 4Ps - initial intervention from IIRR (Native Pig and Coastal Agriculture)
Ideal focus in the area: Coastal agriculture to focused primarily with kasoy and langka



Dancalan Central

Description: Coastal with upland - 239.4 ha.; 129 households
Adjacent villages: Ragay Gulf, Lubigan, Dancalan Caimawan Himbubulo Este
Crops: Coconut, banana, root crops
Notes: Targeted for 4Ps - initial intervention from IIRR (Native Pig and Coastal Agriculture)
Ideal focus in the area: Coastal agriculture to focused primarily with kasoy and langka



Arbismen

Description: Coastal with upland - 239.4 ha.; 129 households
Adjacent villages: Ragay Gulf, Lubigan, Dancalan Caimawan Himbubulo Este
Crops: Coconut, banana, root crops
Notes: Targeted for 4P's - initial intervention from IIRR (Native Pig and Coastal Agriculture)
Ideal focus in the area: Cashew and jackfruit



Capuluan Central

Description: Coastal - 1500 ha.; 367 households
Adjacent villages: Capuluan Tulon, Cabong Norte, Ligpit Bantayan, Ragay Gulf
Notes: Targeted for 4Ps - With initial intervention from IIRR (Native Pig and Coastal Agriculture)
Ideal focus in the area: Coastal agriculture to focused primarily with kasoy and langka



Capuluan Tulon

Description: Coastal with lowland - 1549.35 ha.; - 282 households
Adjacent villages: Capuluan Central, Sintones, Ligpit Bantayan, Villa Hiwasayan River
Notes: Targeted for 4Ps - Initial intervention from IIRR (Native Pig and Coastal Agriculture)
Ideal focus in the area: Coastal agriculture to focused primarily with kasoy and langka



Bukal Maligaya

Description: Lowland - 440 ha.; 70 households
Adjacent villages: Cabugwang Tagkawayan, Danlagan Batis, San Antonio, Aloneros
Crops: coconut, rice, backyard vegetables
Notes: Targeted for 4Ps - Initial intervention from IIRR (Native Pig and Fruit Trees)
Ideal focus in the area: Small household agroforestry planted with fruit trees

stories from

Agroforestry for Changing Climate



Guillerma Alfiler, 53, known as Emma to her friends, lives in the village of Himbubulo Weste in Guinayangan, Quezon with her husband Felix Alfiler, 56, and three of their seven children. The family cultivates a one hectare of land under the Multi-Use Zone of the Maulawin Spring Protected Landscape (MSPL) in Guinayangan Quezon. MSPL is a declared protected area by the Department of Environment and Natural resources (DENR).

In 2013, IIRR, with support from CCAFS and Forest Foundation Philippines (former PTFCF), implemented an agroforestry project in Guinayangan. It covered the villages of Himbubulo Weste, Magsaysay, and San Pedro, which are near the protected area. Upon learning about the project, Emma was one of the farmers who joined the group. She was very interested in the planting of fruit trees and other cash crops since it is also required from them by the DENR. Tenured migrants are required to cover least 20% of their land planted with forest trees.

As part of the agroforestry project, IIRR partnered with the local government of Guinayangan through the Office of the Municipal Agriculture (OMA) in training farmers and providing them with various kinds of plants like fruit and forest trees, vegetables, and legumes. Emma also received a native pig through the pass-on scheme, which multiplies material inputs and improves the farmers' goodwill with their neighbors. Now, Emma's current crops include string beans, pepper/chili, eggplant, and fruit trees like star apple, durian, jackfruit, citrus, guyabano, and banana.

According to Emma, planting different kinds of vegetables and fruit trees around her house has supported her family's food needs and they gained additional income. Prior to joining the project, they relied heavily on gathering forest products and harvesting coconuts that have unstable prices. Emma happily shares that last planting season, she earned Php3,000 to Php4,000 per week from selling her vegetables. This supported the study of her two children in college.

the field

“Malaki ang tulong sa aming kita dahil na susuportahan nito ang aming mga pangunahing pangangailangan pati ang dalawa kung ana kna nag-aara!” (The income we gained from selling the crops is a big help. It supported our children’s studies). Emma is a member of the Himbubulo Weste Farmer Learning Group (FLG) for Agroforestry and Native pig. She has a female native pig with seven piglets, two upgraded breed white pigs with 11 piglets, and free range native chicken in her area.

Emma is one of the 380 farmers implementing agroforestry in Guinayangan. Her enthusiasm in farming ushered for her farm to be chosen as Demo site for organic vegetable plantation and a venue of the Farmer Field Day for Organic Farming. She is very inquisitive and always want to learn new things.

Emma is very grateful to IIRR and the LGU-OMA for the planting materials and knowledge on agroforestry she received from them. ***“Hindi na ako titigil sa pagtatanim dahil malaki pakinabang sa akin at sa mga estudyante ko,”*** (I will continue practicing agroforestry as this helps us a lot, especially in providing for the needed expenses of my children) she declares. ■



IIRR and the LGU are now looking for investors and partners to support future work in the Agroforestry Program in Guinayangan Quezon, Philippines in 2019-2022.





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