Research Report

Generating portfolios of

Climate Resilient Options for Farming and Fishing Communities in Guinayangan, Quezon

Kharla Vianca S. Mendez
Rene R. Vidallo
Magnolia M. Rosimo
Darlyn R. Angeles
Belina O. Rosales
Eisen Bernard Bernardo
Julian F. Gonsalves

IIRR
INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

DEPARTMENT OF AGRICULTURE
AMIA

CGIAR
RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security
CCAFS

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Correct citation:

Mendez, K.S., Vidallo, R.R., Rosimo, M.M., Angeles, D.R., Rosales, B.O., Bernardo, E.B., and Gonsalves, J. 2021. Portfolio of Climate Resilient Options for Farming and Fishing Communities in Guinayangan, Quezon. International Institute of Rural Reconstruction, Philippines.

Design & layout
Dulce Dominguez

ABSTRACT

The main purpose of this portfolio is to document climate-smart agricultural options tested and implemented in Guinayangan, Quezon, Philippines. The intention is to use evidence-based recommendations to promote out-scaling and upscaling. Participatory vulnerability assessment and action research helped in identification of climate resilient options. A community innovation fund supported the farmer-led action research. The investigators used a landscape approach in capturing how community-managed technologies worked in lowland, upland and coastal areas. The portfolio presents the rationale of the technologies, details of the implementation process, actual farmers' learnings and observed benefits. The compiled technological options resulted in a unique portfolio best-fitted to alleviate impacts of climate change while also addressing livelihood goals.

Keywords

Action research, climate resilient options, climate smart, community innovation, climate change, farmer learnings

ABOUT THE AUTHORS

Kharla Vianca S. Mendez

Kharla is IIRR Philippine Program's Researcher and has been with the Institute since 2016. She handles research protocol and data management of Quezon and Ivisan Learning Communities. She is stationed at Quezon Field Office in Guinayangan. She works closely with Learning Community Project Managers and Facilitators in documenting participatory action researches and other community-based adaptation strategies on climate resilient agriculture. Kharla holds a Master of Science degree in Agronomy, major in Crop Physiology cognate in Soil Science from the University of the Philippines Los Baños. Email: kharla.mendez@iirr.org

Rene R. Vidallo

Rene is the IIRR Philippine Program Director. He previously held posts in the Institute as RCA Program Specialist for Agriculture and Natural Resource Management and later as Program Manager for Food Security and Sustainable Livelihood. Aside from providing guidance and assistance to Philippine staff in program development, he also provides technical assistance to Cambodia and Myanmar staff on climate smart agriculture programming. He is a licensed Forester. Email: rene.vidallo@iirr.org

Magnolia M. Rosimo

Maggie joined IIRR in 2006 with a wealth of experience in project management, community organizing and participatory planning, monitoring and evaluation. Before joining IIRR, she was Research Monitoring and evaluation Officer with Kaisahan, Inc., and Project Manager with Mediators for Sustainable Development, where she focused on social acceptance and preparation. In her current position, Maggie manages learning community programs like the Quezon Program where she advances people centered approaches and participatory community development. She assists in establishing M&E framework and systems for projects and prepares concept notes and proposals for new IIRR initiatives. Email: maggie.rosimo@iirr.og

Darlyn R. Angeles

Darlyn is IIRR Philippine Program's Research Assistant beginning 2017. She handles project with connection to Low External Input on Rice Production and other connected projects under Climate Resilient Agriculture. She also worked as Community Facilitator under JDC Program in Quezon Field Office of IIRR in Guinayangan and was in-charge of MEMC in coordinating projects facilitated in Protected Areas. Darlyn holds a Bachelor's Degree in Agri-Business Management from Polytechnic University of the Philippines, Lopez Branch, Lopez, Quezon (2014). Email: darlyn.angeles@iirr.org

Belina O. Rosales

Belina is the Municipal Agriculturist in the Municipality of Guinayangan, Province of Quezon. She took a Bachelor of Science in Agriculture at Manuel S. Enverga University Foundation in Lucena City. Email: selasor_elen@yahoo.com

Eisen Bernard Bernardo

Eisen is the Senior Communications Specialist of CCAFS Southeast Asia based in Hanoi, Vietnam. He finished both his bachelor's and master's degree in Development Communication in the University of the Philippines Los Baños. Before joining CCAFS SEA, he worked as the Creatives Officer of the ASEAN Centre for Biodiversity. He also works as a digital artist and children's book illustrator. Email: e.bernardo@irri.org

Julian F. Gonsalves

Dr. Julian Gonsalves is a Senior Advisor at the International Institute of Rural Reconstruction. In the past, he served as Vice President of IIRR. He represents IIRR on CCAFS global partnerships committee. He has previously served on the Scientific Advisory Committee of the CIFSRF program of IDRC and on the CGIAR NGO Committee. He is Rockefeller Fellow and a UNEP Global 500 awardee. He obtained his PhD from Cornell University. Email: juliangonsalves@yahoo.com

ACKNOWLEDGMENTS

Alicia Ilaga	Director, DA-AMIA
Dr. Nicomedes Eleazar	Director, DA-Bureau of Agricultural Research
Dr. Leocadio Sebastian	CCAFS SEA Regional Coordinator
Hon. Cesar Isaac III	LGU-Guinayangan (Municipal Mayor)
Engr. Russell Narte	LGU-Guinayangan (MPDO)
Belina Rosales	OMA-Guinayangan (Municipal Agriculturist)
Roderick Allegria	OMA-Guinayangan
Byron Cadarit	OMA-Guinayangan
Joel Fabricante	OMA-Guinayangan
Virgilio Florido	OMA-Guinayangan
Gerardo Hernandez	OMA-Guinayangan
Aris Pitogo	OMA-Guinayangan
William Lopez Jr.	OMA-Guinayangan
Ineke Sornito	OMA-Guinayangan
Jefrey Boñon	IIRR Quezon Learning Community
Melvin Castillo	IIRR Quezon Learning Community
Maribel Deseo	IIRR Quezon Learning Community
Angelo Ken Flores	IIRR Quezon Learning Community
Jeffrey Grajo	IIRR Quezon Learning Community
Argie Jardin	IIRR Quezon Learning Community
Ruel Jordan	IIRR Quezon Learning Community
Rico Locaba	IIRR Quezon Learning Community
Ma. Christina Lorenzo	IIRR Quezon Learning Community
Carlo Palima	IIRR Quezon Learning Community
Rafaela Joy Villanueva	UPLB-CDC
Mary Joy Grefaldo	UPLB-CDC

Building community-based models for climate resilient agriculture and fisheries across landscape within municipalities

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ACRONYMS

CCAFS	CGIAR Research Program on Climate Change, Agriculture and Food Security
CIF	Community Innovation Fund
CLUP	Comprehensive Land Use Plan
CRA	Climate Resilient Agriculture
CSA	Climate-smart agriculture
DA-AMIA	Department of Agriculture - Adaptation and Mitigation Initiative in Agriculture
DA-BAR	Department of Agriculture - Bureau of Agricultural Research
DA-SWCCO	Department of Agriculture - Systems-Wide Climate Change Office
FGD	Focus Group Discussion
FLG	Farmer Learning Group
GHG	Greenhouse Gas
GLM	Green Leaf Manure
IIRR	International Institute of Rural Reconstruction
LEIRP	Low External Input Rice Production
LGU	Local Government Unit
MAO	Municipal Agriculture Officer
OMA	Office of the Municipal Agriculture
PAR	Participatory Action Research
PTD/PID	Participatory Technology/Innovations Development
PVS	Participatory Varietal Selection
PVA	Participatory Vulnerability Assessment
SRI	Systems of Rice Intensification

Community participatory action research is an approach for generating knowledge and experience in addressing location-specific climate risks and vulnerabilities. It is process-oriented and designed to test various technological options in terms of its effectiveness relative to a set of CRA/ CSA outcomes such as food security, livelihood, adaptation, and mitigation.

A. INTRODUCTION

A wide portfolio of climate change mitigation and adaptation options are needed, if both climate risks and people's livelihoods need to be addressed. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes. A wide range of ecosystem types need to feature in such approaches (e.g., coastal communities will consider mangrove restoration while also addressing coastal agriculture in homestead areas; similarly, an upland community will have to consider crop-tree-livestock interactions and lowland systems will have to similarly explore diverse cropping and links with small livestock and, possibly, fish). These complex systems not only address livelihood needs, but they can also enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

A range of approaches are relevant in a community level effort to develop portfolios of climate smart/resilient agriculture. Participatory Action Research and Participatory Technology/Innovations Development (PTD/PID) are well known approaches that can be deployed in efforts to develop locally relevant options. Capacities of local communities to experiment (to find local solutions that are relevant and can be sustained) need to be enhanced and nurtured. Participatory Action Research (PAR) can be used to develop best-bet options. Such innovations are developed by integrating local practice with concepts or materials (e.g., seeds) drawn from agricultural science. Modern science and traditional knowledge are blended through such an engagement of farmers in Participatory Action Research. In many cases this is a continuing process which though introduced via a project intervention might eventually evolve (in scope and content) into a process that is farmer-led. The process of evolution means that technologies and associated processes are constantly modified in response to local situations, needs, and considerations. An important outcome of such an approach is the capacity to adapt are nurtured and developed, often outliving specific technologies.

The process of arriving at a portfolio of options can also be nurtured via the provision of material support and local financing to support community level adaptation processes. The community adaptation fund is one such approach which can support decentralized farmer-led experimentation and innovation and, modest scaling out of Climate Resilient Agriculture (CRA)/Climate-Smart Agriculture (CSA). This fund is made available mostly through materials input support and in a few cases, direct monetary support (small fund grants

only). Management, utilization and accessibility mechanisms are usually developed by the project management team, tested, then revised (based on feedback during a trial phase).

The fund is designed as a community-based support facility that enhances local access to climate smart crop varieties, planting materials and improved breeds of local or modern livestock. These community support facilities invariably include decentralized crop or livestock or tree or fish propagation centers. The facilities support local outscaling.

Examples of community-based support facilities (community adaptation funds relying on propagating and distributing) tested with primary funding support from the Department of Agriculture-Bureau of Agriculture Research (DA-BAR) and supplementary support of the CGIAR Program on Climate Change, Agriculture and Food Security (CCAFS) Southeast Asia office (which funds the Guinayangan Climate-Smart Village and the Ivisan outreach site) are presented in this report.

Aside from facilitating local access to ideas, technologies and materials (seeds) which foster resilience, these facilities can provide access to strategic production inputs beyond the project period. These facilities are community-based. Most are managed by individual farmers. A few are communal over the interim initial period, but all are eventually farmer-managed. They serve a community support function based on payment or revolving mechanisms.

Community adaptation support funds and facilities tested in Ivisan and Guinayangan

- Decentralized small livestock and poultry breeding and multiplication centers for improved native pig breeds, goats, native chicken, and ducks.
- Decentralized farmer-managed fish fingerling nurseries for Tilapia
- Propagation centers for improved local and modern root and tuber crops (e.g., purple and orange flesh and commercial varieties)
- Tree nurseries to support on farm forestry and agroforestry (shelter belts, green manure trees, fruit trees, etc.)
- Demonstration sites for rainwater harvesting and management for small farms
- Community level propagation centers for ginger, turmeric, and pineapple (to support diversification with quality planting materials
- Seed production centers for resilient crop cultivars (e.g., upland rice, drought tolerant rainfed rice) peanut, open pollinated corn, and legumes (pigeon pea, mung bean, cowpea)
- Seed kits to support farmer-led participatory varietal selection
- Community-based mangrove nurseries relying on local species

The DA-BAR and CCAFS have supported IIRR and its local government partners in Guinayangan, Quezon and Ivisan, Capiz in the Philippines to test and develop a portfolio of CSA/CRA technologies and practices. These have generated observable evidence of development outcomes at household, community and municipality levels.

This publication features experiences in community-based adaptation efforts in two sites. A wide range of CRA/CSA was generated through participatory action research in local municipalities. This program was developed within the limits of what a local government can offer by way of human and technical capacities. This was intentional: to promote their outscaling mainstreaming and eventual upscaling. Such approaches are targeted to small-holders who might not have access to credit private sector sources of inputs.

Related knowledge products are also developed on the processes associated with this effort. These are packaged separately, are copyright-free and freely shared.

Readers are invited to this presentation of CSA/CRA portfolios developed in the Philippines. These are CCAFS-funded and IIRR-managed sites (partnerships with local governments). The engagement of the Department of Agriculture (DA) via its Bureau of Agriculture Research (BAR) and its System Wide Climate Change Office (SWACCO) has been for purposes of identifying technological, social, and institutional approaches that can be used by the Department of Agriculture -Adaptation and Mitigation Initiative in Agriculture (DA-AMIA) villages across the country. IIRR and the UPLBFI have also managed three roving workshops (with DA BAR support) conducted at the two IIRR sites. These are significant capacity strengthening efforts targeted to representative from the DA from all the regions of the country. This is consistent also with the IIRR partnership with CCAFS to generate and develop strategies for outscaling and upscaling CSA/CRA concepts, community-based adaptations, social learning approaches at sub-national and national levels in the Philippines.

The diversification and intensification of monocrops of coconuts were a priority adaptation measure.

B. BACKGROUND

TO GUINAYANGAN, QUEZON, PHILIPPINES

Guinayangan, in Quezon province, is a 3rd class municipality composed of 54 barangays, and covering 22,800 hectares. The town's topography is generally hilly and mountainous with some barangays located in coasts fronting the Ragay Gulf. It has at least 6 distinct ecosystems (public forestlands, protected watersheds, upland coconut-based agroecology, lowland rice-based agroecosystems, river systems and coastal areas). Sixty-eight percent (68%) or 14,235 hectares of its total land area is devoted to agricultural production. Much of the upland forest that once dominated the town's landscape before the 1970s was converted to mono-crop coconut plantations, which has been the dominant production system in the municipality since then. The municipality has a population of 45,155 (2015), most of which are engaged in the agriculture and fisheries sectors. Half of the total population live below monthly per capita poverty threshold of USD 33.

Guinayangan's agricultural production is dominated by the coconut sector. Coconut is the main crop grown by farmers, with 79 percent of the total agricultural land devoted to its production. Other crops are corn, rice, banana, citrus, root crops, vegetables and coffee. The majority of the farmers also raise livestock and poultry for family consumption and also as a source of additional income for their families. Other existing animal productions are basically for home consumption. With 10 coastal villages, fishery is another key sector in the municipality.

Participatory vulnerability assessments (PVA), was conducted by IIRR and the local government of Guinayangan highlighted the following farmers' perceptions of changing climate since the 1980's:

- Variations in the length and duration of the wet and dry seasons – dry seasons are longer now than 30 years ago.
- Increasing unpredictability of the onset and duration of rainy seasons – onset of the rainy season usually starts in the months of May and June and lasts until September and October, with the months of October to December as the "typhoon season," when strong typhoons pass by the municipality. Participants observed that rains now occur only when there are typhoons or low-pressure areas passing or near the

province. This is most evident in the early onset of this year's dry season (in December 2013), which lasted up to this reporting period (August 2014).

- Increasing irregularity of rains in terms of intensity and duration – participants observed that rains were "stronger" (more, in terms of volume) before but occurs more regularly and do not cause flooding. They also observed that rivers clear faster (in terms of turbidity) before. Current rain patterns are described as strong (high volume) but in short duration thus causing flooding or at times in very low volumes (drizzles) that occurring in longer durations.
- Increasing incidence of flooding.
- Increasing temperature – as evidenced by the changing daily working schedule of farmers in their farms. Conditions 30 years ago permit them to work in their farms even up to noontime. Farmers claim that the sun's heat is now unbearable for field work from 10:00 am up to mid-afternoon.

GUINAYANGAN VULNERABILITY PROFILE

The PVA process also resulted in the identification of two climate-related risks to the agricultural sector of Guinayangan: (1) storms/typhoons; and (2) drought conditions which can be due to the occurrence of El Nino or due to prolonged dry/summer season. Temporary Migration is the default coping mechanism for climate risks wherein farmers go to urban areas such as Cavite, Laguna, Manila, and Batangas to seek work. Impacts and coping mechanisms to typhoons and drought-like conditions are indicated below:

Table 1. Impacts of extreme events coping mechanisms

1. Typhoons	
Uprooting of trees, disruption of production and livelihood; PVA participants recognize typhoon as the hazard they are most affected with as it has the capability to inflict damage to their main livelihood – coconut farming/copra production	• Growing post-typhoon crops • Livestock serves as an alternative source of food and income. • temporary migration to nearby urban provinces (Laguna, Cavite, Batangas) to work as paid laborers • Salvage materials/resources that can provide livelihood (e.g., charcoal from fallen trees) • Charcoal production
It took three years before farmers (mainly coconut) recovered from 1995 typhoon	
Damage to community forestry: physically from storm and also as aftermath due to increased charcoal production and illegal timber harvesting	

Losses in rice production	
Losses in banana production	
Flooding in lowland farms (i.e., Barangay Arbismen) when high tide and water from uplands converge	
Some livestock and poultry died	
General difficulty in securing food for households due to lack of livelihood after strong typhoons	
Disruption of work patterns as additional work is needed in cleaning households and farms from typhoon aftermath	
Typhoons are sometimes even beneficial to rice sector (and at times corn) as it brings rains that enable farmers to till their lands and start cropping cycle.	
2. Drought conditions (Prolonged dry season)	
Increased pest infestation such as *cocolisap* in coconut, which is observed to occur during very dry months but disappear when the rains and typhoons come	• Growing of other crops such as sweet potato, cassava, taro and banana • Small-scale charcoal production as alternative livelihood source • Farmers fetch waters in other springs and water source using draft animals • Raise livestock as additional livelihood source • Planting of crops that are more resistant to drought such as mung bean and corn • Temporary migration. Many go to Laguna, Cavite and Manila. They go back when production season starts which is usually between June-December. • Women sought jobs outside in nearby towns as house helpers • Men worked as laborers in construction and coco lumber production. • Intensifying banana production • Women washed clothes in the
Livestock affected by limited supply of forage	
Rice farmers and vegetable farmers are most affected during drought as it become very difficult for a productive cropping	
Drying of springs	
Some of the springs in the village went dry and farmers had to use draft animals to fetch waters elsewhere	
Coconut only affected when there are serious drought conditions: production is lessened and quality of nuts is lesser (smaller)	
In drought conditions though, price of	

coconut increases so it is a positive impact for those who are still able to produce coconut	river instead • Borrowing money • Broomstick making as additional source of income • Fishing as alternative livelihood
Most affected are transplanters locally called as "*magtatalok*" (laborers in harvest-sharing scheme) since they lose opportunity to earn in one cropping season.	
Local forest ecosystem directly affected as farmers tend to resort to charcoal-making (long-standing alternative income source)	

Two hundred ninety-eight (298) of these farmers are members of thirteen (13) Farmer Learning Groups (FLG), and are engaged in testing and knowledge generation on nine CRA options.

Learning from champion farmers: black pepper does well under coconut trees.

C. RICE-BASED TECHNOLOGICAL OPTIONS

A total of 1,054 hectares of the municipality's agricultural land is dedicated to rice production. Rice fields in Guinayangan are under rainfed condition, which is 90% of the total rice area.[1] Barangay Cabibihan has the largest rice area, with a total of 200 hectares. Other major ricefed areas are located in Barangay Arbismen and Triumpo. Irrigated lowland rice farms are situated in Barangay Sintones, Danlagan Central and Dancalan Caimawan.

In Barangay Danlagan Central, a field day was conducted headed by farmer cooperators and FLG members. Farmer participants assessed different stress-tolerant varieties based on crop stand, grain appearance and sensory test of cooked rice.

[1] Municipality of Guinayangan, Quezon Proposed Comprehensive Land Use Plan (CLUP) 2016-2025. University of the Philippines School of Urban and Regional Planning. May 2016.

The cropping cycle in most barangays, ranges from 1 to 2 crops a year. The wet season starts in June and ends in September while the dry season is from November to March. Local farmers avail of seed subsidy from the Office of the Municipal Agriculturist. Seed exchange with other rice farmers remains the most popular method of acquiring planting material for the next season. PSB Rc18 is the most preferred variety due its good eating quality, high yield and adaptability to local condition. Other rice varieties planted in the area are NSIC Rc218 and Rc238.

Crop establishment in many barangays is randomly spaced, locally called as "*Waray*" method. Farmers roughly transplants 7-10 seedlings per hill. To prevent Golden Apple Snail infestation, seedlings are transplanted 25 days after seeding. Lack of money results to minimal application of fertilizer and pesticides. Usually, farmers apply foliar fertilizer (i.e., Crop Giant) for basal application followed by topdressing of 1 sack of urea in 1 ha rice area. Common pest and diseases include rice blast, brown spot, blight, golden apple snail, rice bug and weeds.

The annual average production of Guinayangan is 5,248 MT. Laborers are paid following the system called *talok-ani*, wherein the same set of people who did transplanting will also harvest the crop. One-fifth of the total is given to the laborers and the rest to the land owner. Other land owners directly pay laborers amounting to Php250 to Php300 per day. Harvests are typically consumed as the household's staple food, planting material, or sold to millers who typically finance the production. In Danlagan areas, farmers trade with individuals residing in the Municipality of Calauag. Palay or unmilled rice is sold at Php100 a can, which is about 11 kilos. The price of milled rice is Php30 to Php35 per kilo.

Despite having 7 irrigation facilities (located in Barangay Ligpit Bantayan, Arbismen, Sintones, Dancalan Caimawan, Danlagan Central, Cabibihan, Sta. Cruz and Balinarin), inadequate water supply remains the topmost constraint in the sector. Prolonged dry season heavily affects the availability of water source. Other rice production related problems include high input cost, natural calamities, salinity in coastal areas, limited access to seed source and new varieties, inadequate post-harvest facilities and water pumps, and under developed farmers organization in rice sector.

Gloria Macaraig tested different stress tolerant varieties in Barangay Arbismen. Her most preferred variety is NSIC Rc296, since it can withstand drought, has good eating quality and yields well.

1. Four (4) key principles of low external input rice production (LEIRP) system to address issues of high production cost and water availability issues: dry nursery method, transplanting using 1-2 seedlings per hill, straight planting with 20 – 25 cm interval, and trial use of green leaf manure

LEIRP AS CLIMATE RESILIENT OPTION

LEIRP is a low-cost, ecologically sound and sustainable rice-based production technology that is characterized by:

- Reduction of chemical inputs through the introduction of bio-fertilizers/green leaf manure;

- Diversification of farm enterprises - integration of crops, livestock and fish; and
- Promotion of systems of rice intensification (SRI) principles.

The LEIRP system is considered a climate resilient technology because it helps sustainably increase productivity. Less water is consumed in alternate wetting and drying technique. Water is used efficiently. Use of wider spacing results to increase seed productivity. Application of GLM also reduces input. Lesser use of resources and improved yield means higher benefit-cost ratio.

While LEIRP is multi-faceted, IIRR and MAO's interventions in this aspect is still limited to the promotion of the most basic principles of systems of rice intensification (SRI), which are: use of quality and nursery-raised seeds, transplanting of young seeds (10-15 days), single seed planting in 20 to 25 cm interval, minimal use of water (alternate flooding of paddies), and minimal use of commercial inputs (fertilizers and pesticides). The promotion of SRI has allowed farmers to increase their net productivity (lesser input) through a shift in the management of plant, water, soil and nutrients toward a more favourable environment for the growth of rice plants.

In this system, rice resistance to various stresses is improved. Less irrigation water is needed because the plants developed deeper and larger root system. Proper spacing reduces competition among crops thus developed stronger and deeper roots. The tillers are thicker and sturdier which prevents if not lessen the damage caused by lodging. Silica uptake also increases with AWD. Increase in rice stems helps improved its tensile strength. Pest and diseases cannot easily damage the strong and healthy tillers. Sunlight can easily penetrate between rows creating a less humid micro-climate. A less humid canopy is not a favourable condition to most pathogens and pests.

The increase in grain and biomass yield is parallel to higher amount carbon sequestered in the atmosphere. Carbon footprint is minimized in using locally available nutrient source. Use of GLM as a substitute to synthetic N fertilizer leads to minimal increase in nitrous oxide production. In addition to that, GLM increases soil N. The soil condition is not always aerobic in LEIRP production and GHG is relatively reduced.

The longest sustained adoption of Systems of Rice Intensification can be seen in Barangay Sta. Cruz where Eugenia Marjes, has been practicing the rice-based CSA technology for approximately 4 years.

TESTING LEIRP IN GUINAYANGAN

LEIRP is tested in farmers field through establishment of observation trials. About 0.5 to 1 kg of rice seeds is provided to interested farmers. The rest of the inputs are the farmer's counterpart. Farmers are not required to submit formal reports. However, during FLG meeting they are expected to share their observations. The parameters include actual yield, inputs used, observed differences compared to common practice, resistance to pests and diseases, tillering ability and other basic agronomic traits. At the end of the season, twice the number of seeds shall be given back to the FLG or other farmer in the area willing to try the LEIRP system.

FARMERS' LEARNINGS

Increase in grain yield is the usual learning shared by farmers during meetings. Farmers who tested the technology also experienced cost-efficient management of inputs. According to them, rice plants are sturdier, the number of tillers increased and more resistant to pest and diseases. Seedlings can also easily recover after transplanting. The use of GLM reduces the

farmers' expenses. They lessen the application of synthetic fertilizer and pesticides. Based on their observation, the result of incorporating GLM can be observed after some time. They noticed that the seedlings grow vigorously and there are more panicles per plant after 2 seasons. On the other hand, farmers consider the technology labour intensive. They said that with GLM application they hired or asked a family member to help them in hauling the leaves. It takes same time to finish and it can be only practiced in small parcel of land.

2. Participatory varietal selection and trial planting of the stress tolerant rice varieties to address issues on limited access to seed source

PVS AS CLIMATE RESILIENT OPTION

PVS is the systemic observation and comparison of stress tolerant rice varieties in comparison with local varieties. As opposed to trial planting, selected farmer co-operators who conduct PVS are expected to accomplish a simple monitoring form and present their weekly observations during FLG meetings.

According to the International Rice Research Institute:

"Participatory varietal selection (PVS) is a simple way for breeders and agronomists to learn which varieties perform well on-station and on-farm and to obtain feedback from the potential end users in the early phases of the breeding cycle. It is a means for social scientists to identify the varieties that most men and women farmers prefer, including the reasons for their preference and constraints to adoption."[2]

The approach provides options to farmers. Rice farmers in Guinayangan tend to replant same variety, specifically PSB Rc18. Continuous use of the same variety in the same areas builds resistance to pest and diseases. Introduction of new varieties serves as management control. The PVS provided access to stress tolerant rice varieties.

[2] Lifted from: Guide to participatory varietal selection for submergence-tolerant rice. T.R. Paris, D. Manzanilla, G. Tatlonghari, R. Labios, A. Cueno, D. Villanueva. (Available in: http://irri.org/ resources/publications/books/guide-to-participatory-varietal-selection-for-submergence-tolerant-rice)

The photo was taken in a farm owned by Myrna Bauyon in Barangay Sta. Cruz. She is one of the farmer pioneers of LEIRP systems in Guinayangan. For about four years, rice seedlings are transplanted in straight rows. They use a wooded planting guided to create mark in the soil.

PVS OF RICE VARIETIES IN GUINAYANGAN

In conducting a PVS, the FLG members identified salinity and prolonged drought condition as two major problems in the rice fields. The group agreed to conduct a participatory action research which aims to determine the best-suited variety in their area. Three participatory varietal selection (PVS) sites were established by selected farmer cooperators. Each farmer cooperator was provided with community innovation fund (CIF) amounting to Php2,000. The CIF covered seed and partial fertilizer inputs. The farmer cooperators shouldered the rest of the expenses including labor and land preparation. All submitted a proposal and signed a memorandum of understanding to avail the CIF.

The PAR sites are in a valley and share the same landscape. They followed the same management practices. All of them shared their experiences to other FLG member during their monthly meetings. Basic parameters observed were plant height, number of tillers, resistance to pest, susceptibility to diseases and yield. Saline tolerant varieties tested are NSIC Rc296, NSIC Rc326, NSIC Rc328, NSIC Rc334, NSIC Rc340 and NSIC Rc392. On the other hand, the drought tolerant varieties tested are NSIC Rc192 and NSIC Rc278. The

check variety is PSB Rc18. The tallest saline variety is NSIC Rc334 while NSIC Rc278 among the drought tolerant selection. PSB Rc18 is the shortest among all tested rice varieties. NSIC Rc296 has the highest tiller number among tested saline tolerant varieties. It has 16 average number of tillers. The observed tiller number of check variety and NSIC Rc278 is both 12.

FARMERS' LEARNINGS

A farmers' field day was held in April 3, 2017 to showcase the result of PVS trials. Farmer cooperators shared their 3 months experience in conducting a PVS trial. Based from the average result, NSIC Rc334 has the highest yield among all saline tolerant varieties. It is higher than the observed yield from the check or local variety. Other varieties also out-performed the local variety. Interestingly, PSB Rc18 produced higher yield compared to the tested drought tolerant varieties. According to farmers' observation, this is probably because a serious drought was not observed during the season when the trials were conducted. They recommended that another PVS trial should be conducted in the dry season.

Intra-species diversification helps enhance climate adaptation and mitigation while also improving micro-climate (here, cacao, coffee and fruit trees are featured as understory crops under coconut.

D. COCONUT-BASED TECHNOLOGICAL OPTIONS

Most farmers depend on coconut as their main source of livelihood. About 79% of the agricultural land is devoted to coconut production. Other agricultural products include corn, rice, banana, coffee, vegetables and root crops. These crops are grown separately, hence the widespread monocropping technique.

Harvesting is done eight times a year, with 30-45 days interval. During the wet season, the average coconut yield is 1,200 nuts per hectare in a single cropping cycle. Lower yields are observed during the dry season, with only 200 to 250 nuts per hectare in one cycle. Maximum yield is 3,000 nuts per hectare in single harvest. Peak season falls during the months of August to March. On an average, the sector produces 271,773 MT per annum. Typically, farmers earn Php 7,000 to Php 10,000 per hectare in one cropping cycle. Agricultural tenancy, usually leasehold, is typical in coconut plantations. The landholders get 60% of the gross profit and 40% is shared to the tenant or among field workers.

Coconuts, however, are vulnerable to calamities and take longer before they can recover. This is very evident in the aftermath of typhoon Rosing in 1995 and in the most recent Typhoon Glenda in 2014. Prolonged dry season produces lesser and smaller nuts. To make coconut-based systems more climate resilient, long-term interventions in should be geared towards the intensification of diversified production in coconut plantations. The best technological option for coconut-based system is the transitioning of coconut plantations into coconut-based agroforestry systems. This helps ensure increasing the quantity of production per unit area of farms through the multi-story cropping (re-integration of trees, and other low and mid-story plants, including root crops into coconut farms) and diversification of production (more plant types and the integration of animals into farming system).

3. Multi-storey systems in coconut production areas

To facilitate the incorporation of more crops into coconut plantations, farmers were introduced to fruit trees and cash crops in 2014 to provide them an additional source of income.

Some of the fruit trees and cash crops introduced were cacao, banana, coffee, and black pepper. These are intercropped with the coconut following a proper spacing. It is mainly practiced in barangays San Pedro 1, Magsaysay, Himbubulo Weste, Ermita, Sta. Cruz, and San Roque. There are about 130 farmers who have adopted this technique, most of which are tenants living in upland areas.

MULTI-STOREY CROPPING AS CLIMATE RESILIENT OPTION[3]

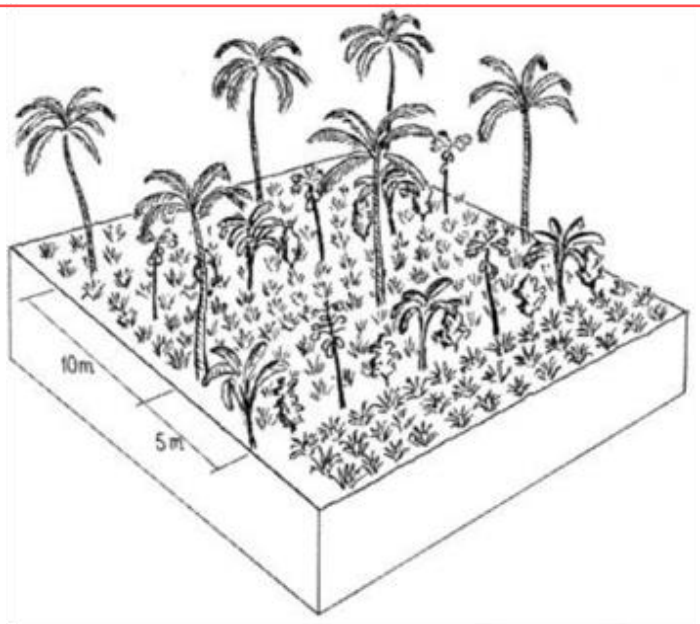
The main purpose of multi-storey cropping system is the optimization of land by mixing perennial crops (coconut and fruit trees) with annual and biennial crops (vegetables, root and tuber crops) in order to maximize productivity. Multi-storey cropping systems are characterized by different layers of crops wherein the tallest layers (storeys) are occupied by coconuts, middle layers by fruit trees and banana. At full establishment, the system develops different layers: coconut (tallest) followed by banana, coffee, papaya (middle), root crops and pineapple (lowest). In recent years, because of its relatively low productivity and decreasing price, coconut has tended to be replaced in the system with higher value crops like the fruit tree santol (*Sandoricum koetjape*), papaya and sometimes black pepper.

[3] Multi-Storey Cropping. DA-BSWM. From: http://bswm.da.gov.ph/philcat-slm/slm/getslmtech/9/ multi-storey-cropping

However most multi-storey farms adhere to no specific planting layout. The multi-storey agroforestry system is intended to make the best use of resources (soil, moisture and space) for increased farm income. It is also very effective against soil erosion. The continuous monocropping of annual crops resulted in erosion and serious soil fertility decline. Even though the land is sloping and rainfall during the monsoon is extremely intensive, multi-storey cropping provides adequate soil cover throughout the year, protecting the land from erosion.

Fertilizer application, weeding and pruning are necessary elements of maintenance. 'Natural' mulching through fallen leaves from leguminous trees helps restore and maintain soil fertility. The system is applied in a volcanic-derived soil with distinct wet and dry periods (6 months wet season, 6 months dry season). There is the risk of a destructive typhoon every 10 years. Farm income is relatively high, but labor and input costs are also high- and the technology is mostly used by relatively wealthy landowners. There is strong spontaneous adoption, as "*maramihang pagtatanim*" has been proven to be effective and remunerative. This technology has been practiced in Cavite since the 1970s. Implementation is by individual farmers with strong extension support from the Local Government Units (LGUs), NGOs, and the Cavite State University.

Successful adoption of Systems of Rice Intensification in Barangay Sta. Cruz by Eugenia Marjes, who has been practicing the rice-based CSA technology for approximately four years.



Multi-storey cropping includes various species inter-planted systematically to optimize use of resources: pineapple and other root crops (lowest storey); rows of banana trees, coffee and papaya (middle storey); rows of coconut (highest storey). Farmers usually adjust this layout to meet their needs.

TESTING VARIOUS CROPS TO DIVERSIFY COCONUT-BASED SYSTEM

The strategy of coconut area diversification surfaced from PVA and commodity profiling, which was conducted with FLG members mostly residing in Reserba Barangays (Barangay Magsaysay, San Pedro, and Himubulo Weste). Local farmers aim to integrate crops such as black pepper, banana, and cacao. However, it must be noted that results of focus group discussions may differ from one barangay to another. For example, in Barangay Magsaysay, farmers identified black pepper as their chief preference in implementing multi-storey cropping. They suggested to diversify their coconut areas with banana and cacao. Previously, upland-based farmers tried growing coffee but soon stopped the production due to lack of market in early 2000s. Also, managing coffee plantation is labor intensive and competes with coconut in terms of time and effort. This consideration is important to be identified as early as planning stage.

Two strategies were executed in order to operate this CSA option: distribution of direct materials and provision of innovation fund. Different fruit trees were distributed among farmers, particularly those dwelling in multi-use zone located in the borders of Maulawin Spring Protected Landscape. Fruit tree species dispersed were rambutan, mango, *atis*, *guyabano,* jackfruit, durian, and lime. In average, each individual received 15 to 20 seedlings. Unlike the usual system of distribution, farmer recipients were well guided by field technicians. Appropriate CSA technologies were shared to them: planting in deep and wide pits, use of compost, and the concept of having multi-storey or diversified system. Another

community-based adaptation method is doing participatory action research with innovation fund. The action research was agreed upon by FLG members, with support from OMA staff. The activity is called PAR validation. Learning agenda, selection of farmer cooperators and action plan were discussed during the activity. The innovation fund provided in groups belonging to coconut-based ecosystem ranges from Php4000 to Php5000 for each farmer cooperator. Allocated innovation fund for diversification-related action research is bigger compared to other PAR, since farmers need more input to test the concept. The fund covered payment for inputs and hauling expenses. To minimize cost, farmers agreed to purchase the materials together with the assistance of agricultural technicians. Planting materials were bought from private plant nurseries or local farmers who produces seedlings. Labor cost is considered as farmers' counter-part. The details of each PAR are well documented in a form attached to a memorandum of agreement signed by the farmer cooperator and the office providing the innovation fund. Interestingly, based on an assessment through FGD and scoreboard, farmers prefer this system compared to simply receiving inputs. Though the innovation fund is a relatively small amount of money, the signed document reminds them of the agreement and their responsibility to come up with an output that must be shared to other FLG members.

After 2 to 3 months after crop establishment, farmers start seeing progress. Farmer cooperators share their immediate observations during FLG meetings. The process of sharing, specifically in a small group, tickles farmers curiosity and ignite group discussion on how to address local issues related to climate change. The learning sites on diversification are currently in progress but the FLG is looking forward to share their stories to other farmers living outside Reserba Barangays.

FARMERS' LEARNINGS

Immediate benefits of having multi-storey system are achieving food security. The tenant or land owners' family now consume their initial harvests and shared them to neighbour for free. For most farmers, mostly those who received fruit tree seedlings, shared that there is no additional income gained yet. But upland farmers are sure to propagate these trees because they consider them as investment that will soon add value to their asset. According to them, they are doing diversification not for themselves but for their children.

The different CSA technologies in line with multi-storey cropping is laborious and time-consuming for coconut farmers. Though they appreciate the benefits of compost and planting in deep and wide pits, these techniques though seen as inconvenient due to labor requirements, they were sustainable in the long run. Fruit trees, though still young, exhibits resistance to drought and better root anchorage.

Filomena Esmana and Vicencio Vertucio, both farmer cooperators from Barangay Magsaysay, agreed to diversify a portion of their coconut area with 10 suckers of banana (señorita), 40 cacao seedlings and 10 native black pepper.

Deep and wide pits system – a technology followed by farmers who received fruit tree seedlings. Cornelia Alfiler, a female farmer from Barangay Himbubulo Weste, digs the pit by herself. According to Cornelia, fruit trees are more vigorous and sturdier if planted following this system.

Testing different species made them aware of differences in suitability. Rambutan and durian grew poorly in the upland areas of Guinayangan. The rest performed well, particularly langka. Same with funded action researches, farmer cooperators learned that cacao is most suited in Reserba Barangays with near 100% survival rate. Innovative ways for water conservation were developed. For example, farmers used coconut husks to conserve soil moisture.

Both FLG members and farmer cooperators appreciate having quality planting materials, proper management and timing of establishment. Farmer cooperator agree that these factors are critical in successfully testing how to diversify a monocrop coconut farm. Marketability of selected crop is also given importance by farmers. Farmers who decided to diversify their area with black pepper, they look forward to earn more (at present a kilo of dried black pepper is sold at Php800).

4. Trial planting and varietal selection of coconut under-storey crops

Crops that can be integrated into the otherwise monocropping system of coconut production are those that can serve as understory of coconut trees. The primary purpose of understory cropping is to increase the production capacity of coconut farms and in the process also increase the livelihood options of coconut farmers. At least 7 crops (pineapple, cassava, sweet potato, peanut, upland rice, corn, and *ube*) were tested in developing learning sites of coconut-based multiple cropping systems.

CROP TRIALS AS CLIMATE RESILIENT OPTION

Before, numerous fields in Guinayangan were left untilled since most of the people worked in coconut farms. They are also involved with banana plantation, coal production, and vegetable farming. However, these kinds of livelihood are greatly affected when drought hits the province of Guinayangan. They are not able to earn enough money since harvests from coconuts and bananas decrease during a prolonged dry season. They just sell the coconut whole and refrain from producing coal since these two products cost the same at this time of the year. Farmers also struggle with vegetable production since they do not have enough water supply for the plants which causes them to wither easily.

TESTING IN GUINAYANGAN

In 2014, OMA Guinayangan started distributing cuttings of the Lakan 2 variety of cassava. They gave the cuttings to 14 farmers from different barangays. Later, they distributed the Formosa variety of pineapple to eight barangays. They use the harvests for personal consumption or sell them in the market for additional income. Some of the barangays also shared their pineapple with nearby barangays so that they can adopt and start the practice on their own as well. There are some farmers who have completely neglected their fields, but there are also those who continue to plant pineapple so their lands will not remain untilled. Ube production is also practiced by five farmers in San Luis I and five farmers in San Luis II as well. Planting of cassava, ginger, *kamote*, and *ube* is mainly practiced in the Cadig area. Pineapples, on the other hand, are mostly grown in barangays Himbubulo Weste, Magsaysay, Ermita, Sta.Cruz, San Pedro 1, San Roque, Mabini, San Luis 1, and San Luis 2.

Farmer cooperators in Barangay Himbubulo Weste, Virgilita Alfiler and Lilia Pureza, who tested black peppers together with fruit trees and coconuts.

Testing of pineapple in between coconut rows in Barangay San Luis II, conducted by Feliza Victoriano.

Farmers received support from the community innovation fund (CIF) in 2016, in order to test various cash crop under coconut. Nineteen (19) farmers joined the testing and agreed to share their learning to other FLG members. The action research is rooted in the learning agenda identified by the farmers group through PVA, commodity profiling and PAR validation. Common learning agenda includes suitability test of drought tolerant crops and comparison of crop varieties (local and introduced). The amount of CIF depends on the designed action research. In the case of testing cash or coconut under-storey crops, the budget ranges from Php2000 to Php4000 per farmer. Farmer sharing happens every quarter during meetings. However, the action research areas are open to visitors and interested farmers.

In Barangay San Pedro, for instance, members of agroforestry-based FLG decided to conduct a participatory varietal selection. They selected *ube* – a drought resistant crop – because it has local market. However, they lack *ube* varieties with purple colored flesh which is fondly called as "*ubenaube*". An FLG member, named Rey Macasuhol, committed to do the PVS. He signed an agreement and received Php4000, which was used to purchase 50 kg

of planting materials and compost. Based from his observation, *ube* is a good under-storey crop – both white and purple colored. They grew vigorously without any infestation.

FARMERS' LEARNINGS

Production of climate change resistant crops such as pineapples and root and tuber crops has helped farmers earn additional income, especially at times coconut harvests are low. These plants can also be processed into other products which they can sell for a higher price than when it is sold as it is. It promotes value addition which motivates the farmers to plant more of the crop and the producers to increase their production. Farmers also use their harvest for personal consumption or as feeds for their livestock, if they have any. Ariel Flores, for instance, plants root and tuber crops aside from working in a coconut farm. There are times when his family consumes their harvests of RTC. He also sells these crops and saves his earnings for his child's expenses in school (who were already able to complete college education).

Aside from economical gain, farmers were able to developed the skill of planning and implementing action research. Farmer cooperators, most specially, are more confident in

Testing of two different *ube* or purple yam varieties in Barangay San Pedro, conducted by Rey Macasuhol.

sharing CSA technological options because they were engaged in the trials. Some of the action researches implemented in Guinayangan, particularly with annual crops, are still under development. Sharing of insights is undertaken inside the villages and among neighboring farmers. Through farmers' field days, farmers aim to promote their evidence-based knowledge to other barangays within Guinayangan and nearby towns. Aside from which, the different FLGs intend to improve ways on how to efficiently market their produce.

5. Utilization of idle land and testing of intercropping with leguminous crops

Aside from coconut monocropping, idle lands are common in Guinayangan. Mainly because coconut production alone consumes most of the farmer's time. Living on a day-to-day basis, farmers tend to forget the potential risk if their main livelihood gets destroyed. In relation to this, open vegetation functions as pasture area for cattle and goats alone. The potential of the areas is not maximized.

Women farmers in Barangay Ermita tried planting upland rice in between corn alleys. Previously, farmers practice slash and burn. According to the farmers, their long-standing method is unsustainable because after planting several crops (upland rice, peanut and corn) they just leave the area until it recovers on its own.

INCREASED IDLE LAND'S PRODUCTIVITY AS CLIMATE RESILIENT OPTION

Cultivating underutilized open vegetation immediately increase the resiliency of farmers who solely depend on coconut production. The produce from newly cultivated lands will immediately supply food to the household and could add up to the family's budget. If viewed in the perspective of climate smart agriculture, increasing the population of species grown in an area leads to improved carbon sequestration and additional soil organic matter. In the long run, farmers will not only benefit from this approach but the environment as well.

However, it must be noted that converting an idle land needs a systematic plan on which crop to establish – making sure that there is genetic diversification. Part of this approach is the introduction of intercropping of leguminous crops and fertilizer trees. Inability to purchase inputs is another reason why farmers ignore idle land. Legumes – peanut, mung bean, rice bean and cowpea to name a few, has the ability to fix atmospheric nitrogen. This is a sustainable system which lessens the introduction of external inputs like synthetic fertilizers. Diverse ecosystem can also help mitigate the occurrence of soil erosion.

SUITABILITY TESTS IN UNPRODUCTIVE OPEN VEGETATION

In partnership with various groups such as the IIRR and the local agricultural office, farmer groups experimented with various methods and techniques in cultivating upland rice that could prove helpful in enhancing soil productivity – these include (but are not limited to) the introduction of crop spacing, application of intercropping patterns with leguminous crops, discovering natural ways of pest management, among others. Around sixteen (16) farmers in barangays Ermita, Cabong Norte, and Mabini have been involved in participatory varietal selection efforts in which they were reintroduced to planting traditional local varieties such as Magdami, Kamoros, Pirurutong, Bihod-Dalag, Kinalangkan to identify which of these would be resilient to formidable weather conditions while ensuring a sustainable degree of productivity.

Another successful story was in Barangay San Luis I and San Luis II, also known as part of Mt. Cadig area. This area has vast grasslands. Farmers tested resilient crops, including cassava. Through participatory varietal selection, they identified Lakan 2 grown alternately with legumes in all of Guinayangan.

Saturnino Olis utilized previously idle hilly areas in Barangay Cabong Norte. He did intercropping of peanut and corn.

Other crops tested in idle vegetations are open pollinated corn, cassava, upland rice, legumes and vegetables. Farmers tested techniques such as intercropping with legumes, crop rotation and micro-dosing. Aside from knowledge sharing, LGU purchased 2 units of tractors which tremendously helped farmed cultivate their area. OMA supervised the operations. The LGU subsidized the machine operators labor while farmers pay for the gasoline and maintenance cost.

In 2017, there are 3 farmers field day conducted in Guinayangan (Barangay Ermita, Cabong Norte and San Luis II). The activity is line with the testing conducted by FLG members and aimed to promote the strategy of maximizing open areas thru crop diversification. Around 150 farmers attended the field days.

FARMERS' LEARNINGS

Planting leguminous crops can offer a lot of benefits to the farmers. The harvests can be an alternative livelihood and additional source of income for the family. Peanut and cowpea, for example, can also be used for household consumption. In the case of Emma Alfiler, she gained additional income and support the needs of her family because of the leguminous

crops she plants on her field. It also prevents the land from being idle leading to the loss of its nutrients and moisture.

By making the most out of the geographical advantages of upland communities, farmers involved in the practice are learning about varieties and methods that could best equip them resilient in the face of climate change. These practitioners are also reportedly refraining from the use of artificial pesticides, guaranteeing the high nutritional content and safety of their produce. Excess from the harvest can also be utilized as source for additional income.

However, since most of the practitioners are tenants, they cannot easily plant the crops when they want to. They need to ask permission from the land owners first. There are also times when the weather conditions greatly affect the crops. Pest such as rats are a problem for the farmers as well.

Despite these advantageous returns, some farmers are still hesitant to adopt, specifically the practice as upland rice production. For farmers, it takes relatively longer time to grow and be ready for harvest. Issues of planting space and land areas for cultivation remain a significant area for consideration for interested and would-be practitioners of upland production.

Monthly sharing of farmers' know-how in Barangay Cabong Norte including PAR results and other CSA technological options. Byron Cadarit, one of OMA staff, join their discussion and provides additional technical inputs.

E. SMALL-LIVESTOCK PRODUCTION

AS CROSS-CUTTING DIVERSIFICATION STRATEGY ACROSS SECTORS AND LANDSCAPES, INCLUDES THREE RESILIENCE BUILDING OPTIONS

Farmers, mostly marginalize and vulnerable, do not own livestock and merely rely on their income coming from coconut monocropping. Livestock production is primarily seen as mechanism to provide food on the table, specifically during special occasion. In fact, based from OMA data gathered in 2016, 75% of the accounted units of livestock owned by farmers are chicken – commonly consumed only at home. The rest is comprised of swine, carabaos, cattle, goats and horses. Small livestock, mainly goat and swine, is only 13% of the total number of livestock. Aside from food source, small li vestock serves as source of emergency

Godofredo Rosales from Capuluan Tulon takes care of his native pigs.

fund. A commercial pig is locally sold at Php4,500 to Php5000 per unit while goat is priced at Php2000 to Php3000 per unit. Technical assistance and other services, including artificial insemination and vaccination, are provided by OMA. However, only the technicians' service is free and farmers need to buy their own medicines. As a result, owners prefer to use indigenous materials to cure their animals.

Main concern of small livestock owners, particularly commercial white pigs, is the high cost of feeds. Not all farmers are capable of providing the recommended amount of feed. As a strategy, they lessen the amount of commercial feeds but the quality of their produce is sacrificed. Farmers also observed that small livestock are easily affected by harsh weather condition. Introduced breeds catch diseases easily. Goat owners shared that free grazing often results to conflict between neighbors, because unconfined animals feed on crops grown nearby. As a result, some would rather not integrate small livestock in order to avoid disagreements.

6. Breed improvement using stocks from NSPRDC

Native pigs have been raised by farmers in the past, however, there has been a shift to commercial breeds of pigs to meet the demands of the market. A two-day training on how to raise native pigs was conducted in Tiaong, Quezon last 2015 to re-introduce native pig practice. Participants were given one *bulaw* or a young suckling pig each after the event which allowed them to form their own association of native pig growers. These farmers were the first ones to adopt the technology. They pass around or share native pigs with other farmers who are interested and capable so that they can also do such practice.

Farmers who are interested to grow native pigs are required to build a house and maintain a garden which will serve as a food source for the pigs. They need to meet these requirements to ensure that the pigs are properly taken care of. The housing is made of materials which can be collected from the surroundings. Rice hulls are used as flooring. The walls, on the other hand, are made of bamboo grass. A material called *buli* is used as the roof. It should be cleaned (ask how often) so that the environment of the pigs

Native pigs are not usually provided with commercial feeds. There are others who feed them with this type of food when they are still young suckling pigs just to make them grow faster. However, they are mostly nourished with plants such as trichanthera, *puso ng saging*, rice hulls, trigo, *gabi*, and *kamote*. These are cut into small pieces and pounded to make it

easier for the pigs to eat. They are sometimes mixed with other ingredients to make it more appetizing.

Native pig growers experience various benefits from the practice. Native pigs can grow as heavy as fifty kilos and can be sold for 120 pesos per kilo. Some practitioners butcher the pigs and sell them for at least 180 pesos per kilo, depending on the agreed price. Value addition is evident when it comes to the market of native pig meat. The pig can also ensure a household's food supply for its meat can be consumed by the family.

Juliana Belmin from Arbismen grows native pigs despite her poor leg condition. She started in January 2014 after IIRR gave her and her son one young suckling pig each. According to her, caring for native pigs helped them reduce their expenses for

feeds and other materials. It also helped her with her regular medication and personal expenses such as food and supplies. The meat of the native pigs also serves as food for the home. There was a time she butchered one of the pigs and used its meat as the *ulam* for the workers building her family's house.

Godofredo Rosales from Capuluan Tulon, also takes care of native pigs. He is currently the president of the group of native pig growers in Barangay Capuluan Tulon. According to him, the pigs are helpful in times of emergency. They can just sell the native pigs to earn the money they need. He was personally able to buy materials for the house he is planning to build when he sold one of his native pigs.

Aside from the benefits, the practice of taking care of native pigs has its limitations as well. One is that it is a bit laborious. Just like a parent taking care of an infant, the practitioner must ensure that the house of the pigs is properly maintained to ensure that the environment is conducive for their development. They should have a garden where plants which can act as food sources may thrive. It somehow requires physical strength to be able to accomplish the responsibilities of a native pig grower.

7. Improved feed management by growing forage species

In the past, farmers can grow pigs or goats in their own area, they are required to build a small housing and maintain a garden which will serve as a source of food for their livestock. The intensive feed garden is where a variety of crops, especially those that are drought-tolerant, are planted. These are mostly observed in barangays Himbubulo Weste, San Pedro

Farmer-led technology demonstration on how to prepare feed for native pigs using different indigenous materials. In Barangay Arbismen, farmers usually incorporate San Fernando *gabi,* trichantera, five fingers, *kangkong* and root crops.

1, San Roque, Capuluan Central, Dancalan Central, Arbismen, Magsaysay, Sta.Cruz, Ermita, Capuluan Tulon, Dancalan Caimawan, Sintones, Ligpit Bantayan, and Dungawan Pantay where goats and pigs are grown.

Practitioners of this technique are farmers who own a space where the crops can be planted and those who do not have the capacity to always buy commercial feeds in town. Some of the drought-tolerant varieties which can be found in an intensive feed garden are *gabi, kamote, kangkong*, tricantera, and cassava.

FARMERS TESTED DIFFERENT FEED MANAGEMENT TECHNIQUE AND FORMULATIONS

A total of 3 participatory action researches were conducted in 2017 – specifically in Barangay Arbismen, Sta. Cruz and Capuluan Tulon. The learning agenda is to develop feed formulation which is composed of locally available materials yet effective in raising good quality stocks. Each learning developed their own action plan. They selected different breeds of swine: pure native pig for Barangay Sta. Cruz, upgraded native pig in Barangay Capuluan Tulon, and pure commercial pigs in Barangay Arbismen.

Three farmers were selected in each barangay and funded with Php1500 to Php2500. Difference in CIF depends on the support that a cooperator needs. All bought piglets to be fed with different feed formulation designated and agreed upon during PAR validation and planning. Some cooperators were given additional innovation fund to support feed cost, only if necessary and part of the research plan. For 3 months, farmer learning group members actively monitor the action research. No strict plan was imposed among farmer cooperator but they were tasked to take note all their activities and feed management techniques. Every month, together with local agricultural technicians, the stocks where weighed. The physical and health status of the stocks were also monitored.

A farmer field day was conducted at the end of each testing. The idea is not to impose the result of the feed management test but to make farmer aware that indigenous materials are good and sustainable way of feeding animals, specifically pigs which are commonly dependent on expensive commercial feeds. A sensory evaluation was conducted to allow participants or invitees to observe the differences of the samples' meat quality. Cuttings of intensive feed gardens were also shared by FLG members to visiting farmers.

Sensory evaluation of different meat samples in Barangay Arbismen.

Monthly monitoring of stocks observed by farmer cooperator, Teofila Macaraig joined the action research in Barangay Arbismen and formulated her own feed management for commercial pigs using locally grown materials.

FARMERS' LEARNINGS

Farmers who maintain an intensive feed garden have experienced its benefits through time. They have observed that they spend a lot less when it comes to the food of their livestock. Their savings can be used for other necessities needed by the pigs or goats they are growing. They have a sure source of food even if they do not have the budget for commercial feeds and can forage the garden as long as there are yields. Nanay Julie Belmin, for instance, grows native pigs at her backyard. Before, she still goes to town and spends about 1,500 for a sack of commercial feeds. Now, she just goes to her garden and collects crops such as *trigo*, *balinghoy*, and *katawan ng saging* to feed her pigs.

Farmer learning groups established community support facilities like nursery for indigenous feed planting materials. Members can freely access the facility to test low external small livestock management.

Table 2. Result of feed management testing in Barangay Capuluan Tulon, presented during the farmers field day.

Farmer name	Primary component	Capital	Income		Profit		Observations
			Live weight (Php 120 per kg)	Meat (Php 230 per kg)	Live weight (Php 230 per kg)	Meat (Php 230 per kg)	
Godofredo Rosales	Trichanthera leaves and wheat bran	Php 2381	Php 4080	Php 5221	Php 1699	Php 2840	Medium back and belly fat
Girly Curato	Copra meal, wheat bran, and fruits such as banana and papaya	Php 3876	Php 4200	Php 5244	Php 324	Php 1368	Thin back and belly fat
Bonifacio Alday	Wheat bran, five finger leaves and coconut	Php 1825	Php 4080	Php 4716	Php 2255	Php 2891	Very thick back and belly fat. Meat sold only at Php180 per kg of meat.

However, there are times when the farmers are not able to manage their intensive feed gardens properly because of other responsibilities, such as attending to their fields. This makes the practice unsustainable for them. It is also limited to those who really have the area to plant the variety of crops for the livestock.

Participatory action research, on the other hand, served as a good strategy in producing results or knowledge. It boosted FLG members confidence in sharing different technologies they discuss among themselves.

8. Improved husbandry by establishing better housing structures and confined livestock raising

The practice of using light materials as housing for small livestock is mainly observed in barangays Capuluan Central, Capuluan Tulon, Arbismen, Himbubulo Weste, Magsaysay, San Pedro I, Sisi San Roque, Sta. Cruz, Ermita, and Danlagan Central. Small farmers who are usually tenants and women are more involved with this practice. It started in 2013 when goat beneficiaries were required to build a housing before they can start with the livestock

Cresenciana built her goats' housing by herself. Today, she has three strong goat stocks and continuously increase her asset. Raising goats provided her additional income and emergency fund.

project. Farmer-cooperators checked if the beneficiary provided the housing for the livestock.

Bamboo and *anahaw* are the main materials necessary to build a house for the goats. It should be at least a meter complete with a slanting board as *pasampahan*. About 100 to 200 *sambakod* are needed for one to two goats. Bamboo, anahaw, coconut husks, soil, and rice hulls are the materials needed to start a house for the pigs. Bamboo poles are used as the walls; the *anahaw* is used as the roof of the house; and the rice hulls, soil, and coconut husks are used as flooring. It should be at least 100-200 sqm big.

This practice allows farmers to decrease their expenses when it comes to buying materials for the housing of their livestock. Their materials come from the environment which they can gather any time convenient for them. The use of rice hulls, for example, also reduces the tasks of the farmers since it absorbs the smell of the livestock's urine and feces. With the housing, farmers are also able to contain their livestock in one area. This allows them to manage the livestock easier preventing them from getting wounds such as *kayuko* among goats. They are also able to collect their manure which can be used in creating organic fertilizer.

The use of light materials gave Cresencia Untalan the opportunity to build the housing of her livestock by herself. Before, she just tied her goats in the field which allowed them to destroy or eat her crops. With the housing, she contained her goats in one area and collect their manure which she uses as fertilizer.

However, farmers have observed that confined goats are relatively thinner than those who are not kept. Farmers must also have the knowledge on confined goat management to still ensure the proper growth and development of the livestock.

A challenge for fishers who are part-time (off fishing season) farmers. Cassava, banana, sweet potato, peanuts and pigeon pea have grown relatively well in degraded coastal soils.

F. COASTAL AGRICULTURE DEVELOPMENT

9. Trial planting of best crops for saline conditions (beach ecosystem): Banana, cassava, sweet potato, arrow root and peanut, *patola*, *upo*, eggplant, amaranth)

There are times when Guinayangan, Quezon is hit by typhoons which destroy the livelihood of farmers and fisherfolks. This livelihood diversification is essential for them so they can have alternative sources of income in times of calamities. In 2016, farmers and fisherfolks of Barangay Dancalan Caimawan were introduced to different crops which they can grow in their fields. Some of these include varieties of *ube*, banana, peanut, *kamote*, cassava, and other vegetables. These were given to them so they can experiment and find out which crop grows best when planted in coastal areas.

Barangay Dancalan Caimawan is a coastal village that mainly depends on fishing as a source of livelihood. Residents, specifically FLG members, are currently integrating peanut production and tests different varieties to determine suitability in coastal areas.

In March 2017, they were also given native pigs to add to their livelihood. They have now formed an association whose members meet regularly to share their situation and progress with the commodities given to them and discuss other agenda. They are continuously monitoring their crops and livestock.

Gemenciano Ricafrente is a fisherfolk who also plants varieties of crops such as cassava, *kamoteng baging, ube*, peanut, and corn. He is still at the experimental stage wherein he is trying to find out which crop is most suitable to grow in his land of about half a hectare. However, he harvested a few from his crops which he uses for his family's own consumption, specifically for *merienda*. According to him, this has helped them reduce their food expenses so they are able to use the savings on other things such as the school needs of his children.

He also uses his harvests as seeds for the next planting season. He does this so that he will not become dependent on IIRR and ask the institution for more supply of seeds. He shares seeds and other commodities given to him with other members of their group so that they can start their own alternative livelihood as well.

FARMER LEARNINGS

Fisherfolks were enthusiastic to try different adaptation strategies and came up with brilliant observations at the end of their crop trials. Among the different species they tested, most preferred peanut because the crop can tolerate severe dry condition. However, farmers noticed that despite peanut's ability to resist heat, they must observe proper timing of planting. Other species tested in trials were banana, cassava, sweet potato, cowpea and *kakawate*. Banana is not well-suited in their area, but the rest resulted to good harvest. Micro-climatic condition improved as farmers diversify the cropping system. *Kakawate*, for example, served as additional coastal bio-shield and provided shade to smaller crops.

Cassava, a climate-resilient crop, is tested by fisherfolks in Barangay Dancalan Caimawan. Fisherfolks observed that cassava thrives well in sandy soil, but not as good if grown in more fertile areas.

Diversifying their lands not only provided food in their table but also provided a source of recreation to both men and women in the community. Furthermore, they notice that local dwellers became more industrious.

Primary challenge among coastal dwellers is the limited space in cultivating crops. Thus, fisherfolks tried raising native pig. For them, the CSA technology is cost-efficient. They feed them with locally available crops. Sometimes they include coconut meat as additives and salt to improve the feed meal. Raising of native pigs is very compatible with their common livelihoods (fishing and copra production). Mainly, because native pigs are easy to tend.

Diversification and introduction of low external small livestock production are effective strategies in increasing resiliency in coastal area. Thus far, fisherfolks continuously develop their adaptation strategy.

G. SUMMARY

TREND ON CRA OPTION TESTING AMONG GUINAYANGAN FARMERS

A total of 601 farmers in Guinayangan tested a range of climate resilient options from late 2016 to 2017. Fifty-five percent of the total number of farmer researchers/ innovators conducted crop trials. In a typical crop trial, planting materials were distributed to interested farmers willing to test stress tolerant crops or new varieties aimed at diversification. Farmers are expected to return twice the amount of seed/materials by offering these to other farmers in their own village or the neighboring communities. Many farmers adopted the strategy because there was no cash outlay. The seeds and planting materials served as assets inputs among farmers who cannot otherwise afford to buy these materials. This strategy helped them to innovate and experiment in small areas. Farmers were pleased to return a part of the harvest to share learnings to new farmers.

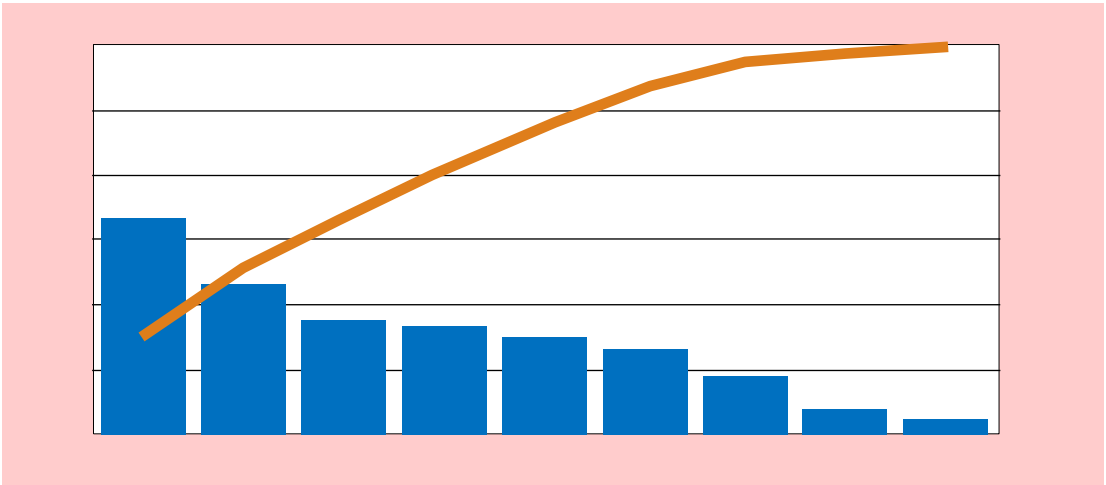
Guinayangan is a copra-producing municipality. Most of the agricultural lands are situated in the uplands. Thus, it is not surprising that most farmers participated in testing multi-storey cropping options. As shown in the graph (see next page), around 35% of the farmer innovators adopted ways to intensify their cropping. Farmers consider the planting of fruit trees and other crops as investment for the future. Multi-storey cropping was an attractive option. Despite a slow return of investment on trees, selected farmers were willing to integrate new crop species in between coconut. Farmer adopters planted jackfruit, cacao, black pepper, banana and root crops to diversify their coconut farms.

Adoption of livestock-based CRA options was reported 25-30% of the total number of farmer researchers/innovators who integrate animals into their farming system are specifically those highly vulnerable to weather or economic risks. Livestock entail considerable amount of capital which most farmers cannot raise. Together with the municipal agriculture office, native pigs were dispersed to selected farmers. The strategy of direct provision of small livestock is relatively expensive compared to seed or plant material distributions. Thus, the limited number of total stocks distributed. Farmers were required to pay back when their stock produced offspring. This mechanism is sustainable but involves more time to reach large numbers of farmers. Other CRA practices were introduced to farmers with existing animals such as intensive feed gardens and improved husbandry methods. It was observed that promoting livestock-based CRA options is a good strategy for engaging farmers and boosting their interest in climate smart agriculture building.

It required less labor, which is highly in demand in coconut areas. For example, in Barangay Arbismen in Quezon, continuous discussions on how to improve animal husbandry in relation in climate change led to the testing of other CRA options such as trials on drought tolerant rice varieties, small farm reservoirs and duck raising for snail control in paddy fields. Livestock served as gateway to the adoption of other CSA practices.

About 25% of farmer innovators converted idle lands into productive areas. Crops such as corn, upland rice and legumes were grown in what was previously grasslands – areas which are commonly use only as pasture lands. There are still vast areas which are barren occupied by grasses such as cogon (*Imperatu cylindrica*) and *amorseco (Chrysopogon aciculatus*). Utilizing idle lands could improve farmers income and increase sequestration of carbon. A main factor in testing new crops was the provision of seeds and other materials. In the case of Barangay Ermita, seeds of indigenous upland rice varieties were scarce as a result of previous disinterest in upland rice production. Over time, seeds were lost. Genetic diversity was also restored through participatory varietal selection. PVS allowed farmers to decide and select appropriate crops in their area.

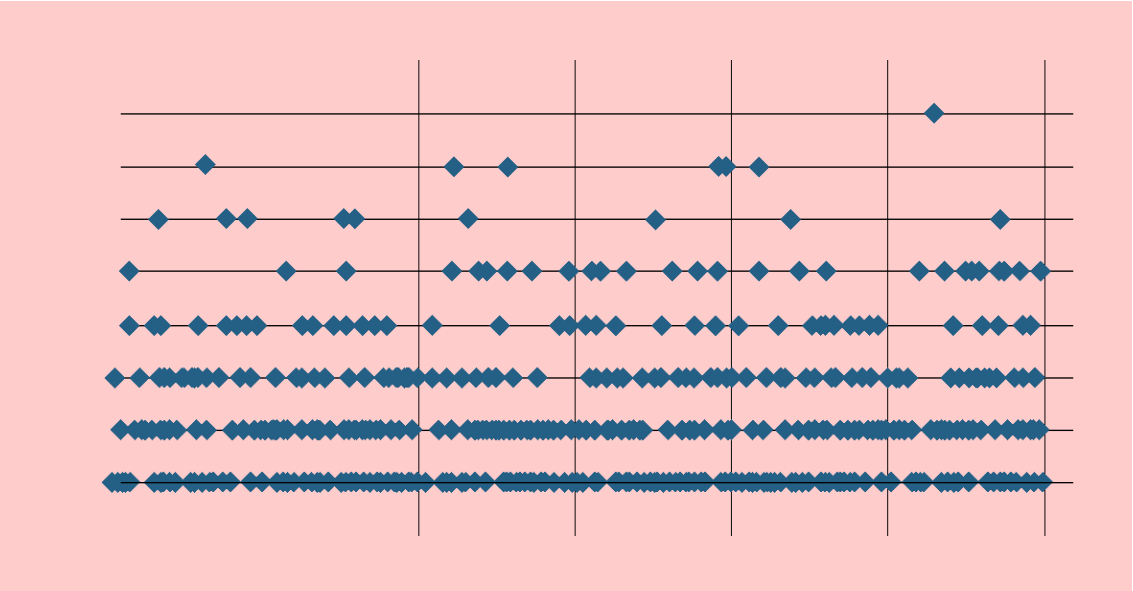
Figure 1: Testing of Climate Resilient Options in Guinayangan, Quezon



The testing of lowland rice-based CRA options was less than 20%. Guinayangan has approximately only 100 hectares of paddy fields. The area decreased due to frequent drought. Although fewer than coconut farmers, rice farmers remain as the main source of food and livelihood in some barangays located in Danlagan areas and some parts of Reserva barangays – specifically in Barangay Sta. Cruz. Primary concerns of rice farmers is the high cost of production, followed by environmental stress such as drought and salinity. To address the issue, selected farmers tried the System of Rice Intensification (SRI) and

conducted Participatory Varietal Selection of stress-tolerant varieties secured from PhilRice and IRRI.

Figure 2: Data showing good indicator of population who tested CRA options



A lower percentage of farmer innovators was observed with coastal agriculture as a CRA option. This was primarily because coastal agriculture was not initially considered feasible due to sandy soils and salinity levels. About 15 barangays, in Guinayangan, were tagged as coastal barangays. Commonly, coastal dwellers are highly vulnerable to typhoons. Diversity of livelihood is relatively poorer compared to upland farmers. The project targeted two villages in two years, namely Barangay Dancalan Caimawan and Capuluan Central. These two learning groups are relatively young compared to other groups established in other barangays. Interestingly, despite the limited experience in growing crops, fisherfolks enthusiastically conducted crop trials including testing of peanut and tuber crops. More fisherfolk preferred raising small animals due to lack of available area for cultivation. An emergence of coastal agriculturemis noted with promising prospects for diversifying livelihoods of fishers.

Out of the 601 farmers who tested various CRA options, 40% of them tested only one option. Nevertheless, the data showed that 44% of the population were willing to try two or three CRA options. While 17% tested four and above. No study has been conducted on the difference of the number of CRA options that a farmer is willing to test. But this is a good indicator of openness for innovation and knowledge generation in the field, given that learning is well supported with materials and technical advice.

Differences in adoption level depends on factors such as the existing farming system in the municipality, main source of livelihood, farmers capacity to risk, existing environmental stresses, available resource and support from the project implementers. Strategies, therefore, are located specific and must be rooted to properly conducted vulnerability assessment.

H. CONCLUSION

Guinayangan, though dominated by coconut tree farming systems, have demonstrated potential for diversification with understory crops. Cacao, coffee and fruit trees, and black pepper were all tested during the period that Guinayangan served as a climate-smart village. Small livestock and root and tuber crops were also found to be promising. Corn, sweet potato, and peanuts from research institutions (Los Baños, Cagayan, and Leyte) were introduced and tested with very promising results. The expansion and outscaling of these biodiverse systems are only limited by the lack of a municipal seed system and financing mechanism for seed acquisition. Storage systems for seeds is another major constraint, which can be easily addressed through appropriate financial investments by the municipality. Seed grants should be viewed as local financing mechanisms (as is being done for rice by the Department of Agriculture under RCEF).

The impacts of climate change are different for each agroecology. Social, cultural and food patterns and dietary preferences differ too as do markets. As such local food systems are invariably unique to different agroecological settings. In order to address the risk associated with climate change, market failure and extreme weather, a case is made that a portfolio of options can help confer resilience, especially to small farms. Local adaptation options need platforms for participatory trials and refinement: here is where climate-smart villages (CSV) can help. CSVs provide platforms for generating adaptation options, testing and, then locally out scaling them. Community based support services can help outscale proven options. Addressing gender considerations is also facilitated by relying on participatory approaches and learning groups and farmer champions.

REFERENCES

Multi-Storey Cropping. DA-BSWM. From: http://bswm.da.gov.ph/philcat-slm/slm/getslmtech/9/ multi-storey-cropping

Municipality of Guinayangan, Quezon Proposed Comprehensive Land Use Plan (CLUP) 2016-2025. University of the Philippines School of Urban and Regional Planning. May 2016.

T.R. Paris, D. Manzanilla, G. Tatlonghari, R. Labios, A. Cueno, D. Villanueva. Guide to participatory varietal selection for submergence-tolerant rice. (Available in: http://irri.org/resources/publications/books/guide-to-participatory-varietal-selection-for-submergence-tolerant-rice)

FURTHER READINGS

Following are some of the researches, education and learning materials from the International Institute of Rural Reconstruction (IIRR)'s Quezon Learning Community in partnerships with the farmers in the field, local government units and donors:

1. Climate Smart Agriculture: Models for Empowering Women Livestock Producers
   Authors: International Institute of Rural Reconstruction
   Date: 2019-01
   Type: Brief
   Link: https://hdl.handle.net/10568/102278
   Description: The brief documents the experience of the International Institute of Rural Reconstruction (IIRR) and its farmer co-operator in implementing the Native Pigs Initiative in Guinayangan Climate-Smart Village in Quezon Province, Philippines. The main objective of the project is to develop an evidence-base for sustainable outscaling of climate-resilient agricultural practices to enhance livelihood, resilience, and adaptive capacities particularly in the livestock sector. CCAFS and the Department of Agriculture, through its Bureau of Agricultural Research, supported this initiative to demonstrate that small livestock are a socially relevant and economically profitable project for the poor.

2. Agroforestry for a Changing Climate
   Authors: International Institute of Rural Reconstruction
   Date: 2019-01
   Type: Brief
   Link: https://hdl.handle.net/10568/102276
   https://bit.ly/3uCkoLD (corrected version)
   Description: The brief tackles the role of agroforestry in achieving food and nutritional security, climate change mitigation and environmental resilience. The publication is based on the small agroforestry project in Guinayangan Climate-Smart Village in Quezon Province, Philippines implemented by the International Institute of Rural Reconstruction and CCAFS Southeast Asia.

3. 8 Guide steps for setting up a Climate-Smart Village (CSV)
   Authors: Sebastian, Leocadio S.; Gonsalves, Julian; Bernardo, Eisen Bernard
   Date: 2019-09-05
   Type: Brochure

Link: https://hdl.handle.net/10568/103527

Description: The brief elaborates the 8 steps in setting up a Climate-Smart Village (CSV). The eight steps are: determining the purpose and scope of CSV; identifying the climate risk in the target area/s; locating the CSV in a small landscape; consulting the stakeholders; evaluating the CSA options; developing portfolio; scaling-up; and monitoring and evaluating uptake and outcome.

4. 8 Hakbang sa Pagtatatag ng Climate-Smart na Pook (CSP)

Authors: Sebastian, Leocadio S.; Gonsalves, Julian; Bernardo, Eisen Bernard

Date: 2020-07-27

Type: Brief

Link: https://hdl.handle.net/10568/108882

Description: Ang babasahin ay naglalahad tungkol sa walong hakbang sa pagtatatag ng Climate-Smart na Pook (CSP) (o Climate-Smart Village). Ang walong hakbang ay: ipaliwanag ang layunin at sakop ng itatayong CSP; tukuyin ang mga panganib na dala ng nagbabagong klima (climate risk) sa lugar kung saan itatayo ang CSP; maghanap ng potensyal na CSP sa isang maliit ng lupain; konsultahin ang mga kalahok sa pagtatayo ng mga CSP; suriin ang mga pinagpipiliang CSA; bumuo ng portfolio; palawigin ang saklaw ng itatayong CSP; at subaybayan at suriin ang pagtanggap sa CSP at ang mga lalabas na resulta sa pagtatatag nito

5. Policy Briefs/Info Notes

a. Fostering Local Adaptation Platforms: Relating Climate Smart Villages to Local and National Adaptation Plans

Authors: Vidallo, Rene; Bayot, Ruvicyn S.; Rosimo, Magnolia; Monville-Oro, Emilita; Gonsalves, Julian; Ilaga, Alicia; Sebastian, Leocadio S.; Manalo, U-Nichols; Baltazar, Perla

Date: 2020-01

Type: Brief

Link: https://hdl.handle.net/10568/106785

Description: Local adaptation platforms help empower sub-national and local government players, civil society organizations, and public-private partnerships in demonstrating the validity of agro-ecology-specific solutions to current and future climate change impacts. This brief discusses how Climate-Smart Villages, good examples of local adaptation platform, have served as centers for discovery, adaptation, learning, and sharing of climate-smart agriculture in local communities.

b. Mapping the Research and Development Agenda of Food Systems in the Philippines

Link: http://bit.ly/2YaPzOD

Description: Global food systems, including that of the Philippines, are changing fast as a consequence of changing lifestyles, consumer aspirations, and food supply systems. Penetration of fast foods, urbanization, supermarketization, and climate change remain to be the major drivers of food system change. It is important to understand the current food system - particularly the interaction between its components and how these vary in different environments. These help to identify the leverage points for research and innovation to promote more sustainable food systems in the country.

c. Pathways to Attaining a Food Secure Philippines through a Competitive and Climate-resilient Agri-fisheries Sector

Authors: Vidallo, Rene; Bayot, Ruvicyn S.; Rosimo, Magnolia; Monville-Oro, Emilita; Gonsalves, Julian; Ilaga, Alicia; Sebastian, Leocadio S.; Manalo, U-Nichols; Baltazar, Perla

Date: 2019-11-30

Type: Brief

Link: https://hdl.handle.net/10568/106789

Description: This document highlights the key messages drawn from climate adaptation efforts and events done with Philippines' Department of Agriculture-Regional Field Offices (DA-RFOs) across the country. This brief, developed for the Climate Change Consciousness Week, offers DA a synthesis of lessons from the Adaptation and Mitigation Initiative in Agriculture (AMIA) village experience as a bankable model for establishing context specific, local adaptation platforms for developing and disseminating CRA technologies and processes. This brief also offers valuable policy insights for the Philippines' National Adaptation Plan.

d. The AMIA Experience: Supporting Local Actions for Climate Resilient Agriculture

Authors: Vidallo, Rene; Bayot, Ruvicyn S.; Rosimo, Magnolia; Monville-Oro, Emilita; Gonsalves, Julian; Ilaga, Alicia; Sebastian, Leocadio S.; Manalo, U-Nichols; Baltazar, Perla

Date: 2019-11-30

Type: Brief

Link: https://hdl.handle.net/10568/106787

Description: The brief tackles how the Adaptation and Mitigation Initiative in Agriculture (AMIA) Program of the Philippines' Department of Agriculture (DA) served as a platform for supporting local actions for climate resilient agriculture. The document discusses a number of key lessons emerging from the AMIA Village experience on the importance of local platforms for adaptation in the form of Climate-Smart Villages towards overall resilience building of the sector.

e. Addressing Gender-based Impacts of Climate Change: A Case Study of Guinayangan, Philippines

Authors: Rosimo, Magnolia; Gonsalves, Julian; Gammelgaard, Johanna; Vidallo, Rene; Monville-Oro, Emilita

Date: 2018-12-06

Type: Brief

Link: https://hdl.handle.net/10568/98473

Description: This brief summarizes the findings of a case study of a diversification effort undertaken in Guinayangan Climate-Smart Village. Small livestock systems, a climate-smart agriculture practice, present a less risk-prone livelihood venture. It can feature as a diversification agenda, reducing the risks from crop failure and are relevant to all ecosystems. Small livestock initiatives can benefit women as it provides them with a low-labor and manageable economic option, which requires a small startup investment.

f. Scaling the Capacities to Adapt to a Changing Climate: Experiences of the AMIA Climate Resilient Villages, Philippines

Link: https://hdl.handle.net/10568/105717

Description: Since 2015, the Philippines Department of Agriculture (DA) mainstreams climate resilient agriculture (CRA) across all its programs, functions, and agencies through the national and system-wide AMIA program. As part of this AMIA program, DA created "AMIA villages" in 21 regions, following the example of CCAFS Climate-Smart Villages. The learnings from this study suggest that the AMIA villages already possess the needed ingredients for developing into sustained innovation platforms. The functional capacities of the AMIA village leaders could still be strengthened with regard to addressing institutional bottlenecks at all levels, e.g., by developing further change management, negotiation and advocacy skills. This is not surprising

given the early stage of implementation of many AMIA villages, and the iterative design of the process.

6. Reports

a. Adaptation Strategies for Managing Climate and Environmental Risks while Pursuing Sustainable and Competitive Livelihoods: Experiences from AMIA Villages

Authors: Department of Agriculture; International Institute of Rural Reconstruction

Date: 2020-12-21

Type: Report

Link: https://hdl.handle.net/10568/111532

Description: The experiences of implementers of the AMIA Village approach, the Department of Agriculture's Adaptation of the Climate Smart Village Approach identified a portfolio of 9 major strategies for pursuing resilience of agri-fishery sectors in the Philippines: 1. agricultural diversification, 2. Climate resilient crops, 3. Sustainable mechanization, 4. Enterprise development, 5. Climate information services, 6. Soil and water management, 7. Farmers database, 8. Learning platform, and 9. Agricultural financial services.

b. Appreciation Workshop on Climate-Resilient Agriculture for the Local Government Officials of Quezon Province (4th District): A Workshop Report

Authors: Bayot, Ruvicyn S.; Vidallo, Rene; Palima, Carlo; Laco, Jonalyn; Jordan, Ruel; Locaba, Rico; Rosales, Belina; Luistro, Aida; Anda, Girsky; Obligado, Maria Ella Cecilia

Date: 2019-11-30

Type: Report

Link: https://hdl.handle.net/10568/107320

Description: The two-day appreciation workshop on climate-resilient agriculture (CRA) was a collaborative activity among the Department of Agriculture Regional Field Office IVA (DA-RFO-IVA), the Municipal Government of Guinayangan Quezon, the International Institute of Rural Reconstruction (IIRR), and the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The workshop was designed for key local government officials – local chief executives, municipal agriculturists and municipal planning and development coordinators. The delivery involved presentations of concepts, activities, learning; field visits; and participatory action planning. This was an effort to bring the learning from the

implementation of CRA-related interventions in the municipalities of Guinayangan and San Francisco to scale. This used the horizontal scaling approach to widen the spatial or geographic extent of the "product". In this particular case, adaptation strategies were the 'products' that were promoted.

c. Cost-Benefit Analysis of Native Pigs as a Climate-Smart Agriculture Option in the Philippines

Authors: Manilay A, Monville-Oro E, Barbon WJ, Ruba CD, Vidallo R, Rosimo M, Cabriole MA, Gummadi S, Gonsalves J, Rondon M.

Date: 2021-07

Type: Report

Link: https://hdl.handle.net/10568/114389

Description: The Climate-Smart Village (CSV) approach is one of the initiatives that was developed to address the impact of climate change on marginalized rural households, and one of the climate-smart agriculture (CSA) options implemented in the Philippines was raising native pigs. A cost-benefit analysis (CBA) was conducted to assess the financial benefits of raising native pigs by determining the net income generated by the village households. A total of 52 households from Guinyangan, Quezon and Ivisan, Capiz were interviewed as survey participants while, village and municipal officials acted as key informants. Our findings showed that majority of the households surveyed generated positive net income in raising native pigs. However, 2020 profits decreased possibly due to the effect of the COVID-19 pandemic. The study also revealed the reliance of producers in commercial feeds instead of maximizing the available forage; keeping of livestock as inventories resulting to additional costs; and the lack of record keeping practices and absence of a price monitoring system causing the producers to be dependent on the prices offered by the buyers. Thus, providing education and training support on monitoring and assessing costs of raising pigs, and marketing assistance would be valuable to the households.

g. Brochures

a. Climate Smart Agriculture: A Primer for Local Government Officials in the Philippines

Authors: Vidallo, R.; Gonsalves, Julian; Monville-Oro, Emilita; Dalusag, Joanna; Barbon, Wilson J.; Jordan J; Rosimo M; Romero, J.; Servano G; Baguilat, I; Rosales, B.; Narte J; Purdon, Mark; Narte R; Bernales, Lorna L.; Navarra EV; Sebastian, Leocadio S.

Date: 2015-10-30

Type: Brochure

Link: http://hdl.handle.net/10568/68835

Description: Climate smart agriculture concepts and principles must be simplified for local government officials to be able to operationalize key elements into local development programs. Climate smart agriculture needs to be simplified and often demystified in order to enhance its wider up take at sub regional and local levels.

b. Understanding Climate Change: A Primer for Local Government Officials in the Philippines

Authors: Vidallo R, Gonsalves J, Oro E, Dalusag J, Barbon WJ, Jordan J, Rosimo M, Romero J, Servano G, Baguilat I, Rosales B, Narte J, Puno A, Narte R, Bernales ELL, Navarra EV, Sebastian L.

Date: 2015-10

Type: Brochure

Link: https://hdl.handle.net/10568/68834

Description: Understanding the impacts of climate change on agriculture, associated landscapes and natural resources in general is crucial if local development efforts are to be tailored towards addressing the impacts of climate change. Simplification of scientific concepts can help local planners to introduce and then mainstream strategies that have factored in the impacts from climate change.

c. Climate Resilience in Agriculture: Key Concepts for Community-based Adaptation

Authors: Gonsalves, Julian; Vidallo, Rene; Monville-Oro, Emilita; Dalusag, Joanna; Barbon, Wilson J.; Jordan, Jonna; Rosimo, Maggie; Servano, Gonzalo; Lorenzo, Maria Cristina; Mendez, Kharla Vianca; Rosales, Belina; Narte, Julieta; Puno, Arnel; Narte, Russel; Bernales, Lorna L.; Navarra, Eduardo V; Sebastian, Leocadio S.; Joven, Bernadette; Baconguis, Rowena; Tolentino, Caress

Date: 2016-11-25

Type: Brochure

Link: https://hdl.handle.net/10568/79434

Description: This primer was produced for a project under CCAFs, jointly implemented by the International Institute of Rural Reconstruction (IIRR),

Philippines and the World Agroforestry Center (ICRAF), Vietnam Country Office. CCAFS Project No.: P55-FPI-SEA-ICRAF

d. Manual

a. Eight guide steps for setting up a Climate-Smart Village: A trainer's guide

Authors: Gonsalves, Julian; Baguilat, Irish; Bantayan, Rosario; Bernardo, Eisen Bernard; Sebastian, Leocadio S.

Date: 2020-03-12

Type: Manual

Link: https://hdl.handle.net/10568/107725

Description: The training manual presents a step-by-step process of establishing a Climate-Smart Village (CSV), with each step being complemented with learning objectives, session guides, and educational support materials. Additional links were provided for each step to promote further learning for its users. Different forms of visuals such as photos, maps, and graphs make the publication easy to read and thus easy to understand. This is almost a one-stop-shop for implementers to acquire the information, capacity, and other prerequisites necessary for establishing a CSV.

For More Details please contact:

Emilita M. Oro	Country Director, IIRR Philippine Program emily.monville@iirr.org
Magnolia R. Rosimo	Program Director, Learning Communities maggie.rosimo@iirr.org
Julian F. Gonsalves	IIRR Global Senior Advisor juliangonsalves@yahoo.com
Rico V. Locaba	Quezon Learning Community Manager rico.locaba@iirr.org
Belina O. Rosales	Municipal Agriculturist, Guinayangan, Quezon selasor_elen@yahoo.com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