Participatory Vulnerability Analysis Profile Updated 2021

IIRR
INTERNATIONAL INSTITUTE OF RURAL RECONSTRUCTION

SEAL OF THE MUNICIPALITY OF GUINAYANGAN QUEZON

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

Barangay Arbismen

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and updates on interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approachthat addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local governmentunit (LGU)

of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts.

The PVAs were designed to generate knowledge of theserisks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 villages or barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affect their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions that the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

1. Establish (with the community) the livelihood conditions in the village;
2. Determine community's perception of changes in climate, its impacts on their livelihood and other factors/drivers;
3. Determine and establish small farmers' level of exposure to climate risks; and
4. Conduct an in-depth analysis of climate-change related risks faced by farmers, existing coping mechanisms, possible adaptation measures; and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment was conducted last September 11, 2014. The PVA was conducted with 2 separate groups to ensure representation of all livelihoods. The first group was composed of farmers who are engaged in rice farming, copra production and banana.The second group's main livelihood is fishing though some are engaged in land-based livelihoods. The farmer group had seven (7) participants composed of one male and six females provided all the necessary data to successfully analyze the community, while only six (6) participants with two females and four males attended for fishing group.

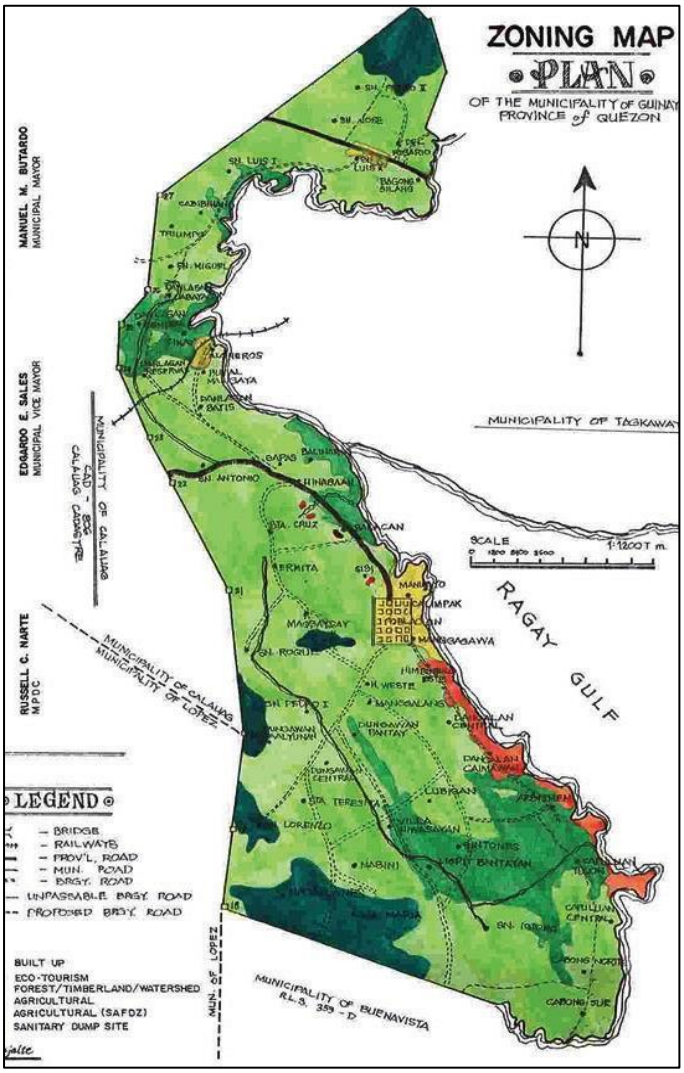
Focused group discussion was the method used using the following participatory appraisal tools: seasonal calendar, timeline, livelihood matrix and problem tree (See Annex B for description of each tool).

Additional data and information for this report was also gathered through key informant interview to Barangay Officials. Secondary data were further gathered at the Municipal Planning Office, the Office of the Municipal Agriculture, and at the Department of Social Welfare and Development. Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information. This updating in April 2021 was done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Arbismen is 11 kms from the town center. It is accessible through an all-weather road that has been declared recently as provincial road. The barangay can also be accessed through boat from the town's municipal port.



Basic Information

Topography: Lowland/coastal,
Elevation: 58.3 meters above sea level
Cellphone Signal: Partial
Location: 11 Km from the municipal town center
Road Condition: Dirt 2%, Gravel 58%, Concrete 40%
Area: 525 ha
Boundaries: Brgy. Dancalan Caimawan (N), Ragay Gulf(E), Capuloan Tulon(S), Sintones(W)
Population (2018 data): 947 individuals (Male: 498 Female: 449); 4Ps Beneficiaries (Feb 2021): 98 (Female: 82, Male: 16)
No. of Households: 238, **No. of Families:** 245
Community infrastructures: 1 Barangay Hall, 1 health center, 1 basketball/solar dryer, 1 multi-purpose building, Bagsakan center, Day Care Center, Stores, Elementary School
Community-based Organizations: 4H (youth), RIC (women), KALIPI (59 women), and Barangay Arbismen Rice Farmers Ass'n: 17 members (15 males, 2 females), Irrigator's association
Unique infrastructures/features: The Hiwasayn River runs through its boundary with Sintones and Capuloan Tulon. Some few areas lately start benefiting from the NIA irrigation. Distribution system is already in place with irrigation canals constructed.
With its unique location the community is blessed with coastal resource and land resource where ricefarms abound and coconut and banana trees are planted in the peripherals. Many rice areas converted to corn and vegetables due to frequent and prolonged drought since 2018 until late 2020.

4.2. Village History

The barangay used to be part of Dancalan Central. It was initially known as Hacienda Iba. The landscape was mostly planted with cassava, corn with few rice plots planted with traditional varieties such as *Balibod*, *Magdami* and *Dinorado*. It became a barangay in 1970. The name of the barangay was derived from the three landowners: Aro, Biscocho and Mendoza.

In 1973, an earthquake hit the municipality. It created fissures in their land but no significant damage was reported.

The community came together in 1985 to do a protest rally against the perceived lack of peace and order. Many farmers had to leave their farms early as they do not feel safe. A military detachment was established to bring order and prevent further unrest. However, unrest came back to the community in 1992 due to political conflict. Many were displaced and chose to transfer to other barangays and in the main town. Military detachment in the area now no more.

Majority of the residents were agrarian reform beneficiaries who are awarded with certificates of land ownership in 1997. The average land awarded was 3 hectares per household. On that same year construction of the irrigation system was started by the National Irrigation Authority (NIA) to benefit agrarian farmers not only in Arbismen but adjoining baragays -- Sintones and Ligpit Bantayan. Some farmers from Arbismen are starting to benefit from the irrigation facility late in 2020.

It was only in the late 90's to early 2000 that other infrastructure such as road, electricity and level 2 water from the local water district was set up in the barangay. The entry of level 2 water has ensured domestic supply and spring source can be solely use for farm. Interestingly, the FGD participants agreed that with the arrival of electricity, some household chores can already be done even at night so farming activities can be done solely during daytime.

The launching of the government's cash transfer program or 4Ps in 2009 was considered as a major community event as it provided the needed help for families living below the poverty line. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that 25% of populace in Arbismen reside along coastal areas. Rice fields are much expose to saltwater intrusion during storm surges due to strong winds.

4.3. Land Use and Tenurial Arrangements

The barangay covers a total land area of 560 hectares where 34% (more than 50 hectares are now developed for rice farm but a total of 150 hectares is potential for expansion according to the agrarian reform office) is for rice and 63% for coconut and banana, the rest are residential land. Majority are land owners due to agrarian reform program. However, selling of agrarian land rights was practiced. Of the more than 100 farmer beneficiaries, around 10-15% has sold their rights according to the records of the barangay. This is due to the inability to develop the land due to lack of capital. The delay in the irrigation system contributed to this practice as it affected rice production. Most buyers are from the well-off families in the Poblacion area.

Rice production is dependent to the "*talok ani*" system where labor requirement for planting and harvesting is provided by the same people and labor is paid according to the agreed share in the harvest (e.g., the 5th sack will go to the laborer/"*ikalima*"). In coconut production, the 60/40 is being practiced. For fishing as many do not own motorized boats, small fishermen also are paid through shares of the catch, mostly 50/50 after the net. 20% of the population provides labor ("*magtatalok*").

5. Livelihood Profile

5.1. Barangay Arbismen in Guinayangan, Quezon is essentially relying on two key livelihood activities namely farming and fishing. A few engaged in trading of agricultural products such as vegetables and banana.

5.2. Main crops in the barangay are rice and coconut. Banana is considered a secondary crop. Rice is generally seen as very important crop as it ensures food for the household. Copra and banana are sold as source of income.

5.3. For rice season, planting is done starting August to September and harvest them in November to December as rains come on the late month of the 3rd quarter. No rice farming activities from January to July due to low rainfall.

5.4. In 2010 and 2011, pests like *Tungro*, *Pasik*, *Kuhol* and *Atangya* were encountered by the local farmers whose infestation had greatly affected their farming activities, though they were able to formulate techniques that mitigated some of the pest infestation such as, by placing *Kakawati* at the corners of the rice field to prevent *Atangya* incursion.

5.5. Coconut farming which involves copra production (*paglulukad*) and broom stick production (*pagtitingting*) came out to be the most preferred sources of income in the barangay. April and November are the months the community considers as the highest time for production as prices usually goes up during these months. Normal production resumes for the rest of the year production except during August which is considered the lowest price of copra thus many are not engaging in the production. Meanwhile, broom stick production serves as an additional income and done between November and December.

5.6. Banana comes next to rice and coconut in Arbismen. Production is high in April, May and December though prices also go down. As prices come up during September and October where production is low. Farmers consider December as the lowest production due to completion from other fruits. Farmers claim that they can produce jeep loads and are marketed in adjoining municipalities.

5.7. Vegetable, in particular eggplant, bitter gourd and string beans are another alternative for some farmers. November is the month where demand is highest.

5.8. Less than 10% of the population is engaged in fishing. The most productive fish species recorded during the community meeting were *Alumahan*, *Tulingan*, *Kabayas*, *Kalaso*, *Tambong*, *Saging-sagaing*and *Bugaong*, whose catch was high throughout the year, while *Tusoy* catch was low from January until April and high for the rest of the year. Additionally, *Balatan* catch was high from January to July and low from August to December; *Tambakol* catch was low from January to August and high from September to December; and shrimp catch was high from January to May and low from June to December.

5.9. The core issue identified by the farmers for coconut, banana and other vegetables is their inability to haggle the right price. Many of them are dependent for capital support which are provided by local businessmen (they call it Casa) who also buy their product. These local businessmen dictate the price as much as they want to add value to their products to command a higher price or even store products so they can haggle. Lack of post harvest facilities discourages them. As most of their produce are perishable (vegetables) they have limited choice but to sell to available price.

5.10. For fishing, the main problem is inability of the local government to curb use of illegal fishing methods (fine mesh net, cyanide fishing, and dynamite fishing). These methods result to less catch as young fingerlings are untimely gathered and killed and could not be replenished.

6. Climate Change Perception

6.1. Perceived Climate Patterns

6.1.1. The timeline results revealed that the barangay has gone through more typhoon than drought. However, the farmers and fisherfolks also observed that frequency of typhoon has decreased (once in the past two years) and that extended dry season has been frequent for the past 4 years[1] that affected rice production in particular.

6.1.2. Meanwhile the seasonal calendar shows that there is a significant change in the start of rainy season compared to the last decade. In the past (10-20 years ago), rains and storm are expected between June to December. However, in the recent years, there are only occasional rains and participants claim that August has constantly been hotter and generally with no rain. Rainy season now starts in the last quarter of the year and usually with strong typhoon if it enters the municipality.

6.1.3. Cold weather is still experienced between January to February. However, in the past decade to present, farmers shared that temperature is colder as compared to 30 years ago. Summer is hotter and more prolonged as recently experienced.

6.2. Impacts

6.2.1. Of the three (3) major typhoons, participants were one in saying that Rosing (1995) brought the biggest impact to their livelihoods as it affected their rice, coconut and banana production. It took them a year to recover from this calamity. Typhoon Glenda destroyed houses, coconut and banana trees as this typhoon brought more wind than rain. Good thing that rice planting has not started yet due to longer dry season. Typhoons Tisoy in 2019 and Quinta, Ulysses and Super typhoon Rolly in 2020 brought so much destructions to livelihood sources, houses and government infrastructures.

6.2.2. Typhoons affect farm land as flood is formed due to converging of sea water and water with mud coming from the upland. Crops were submerged and livestock were drowned. Fishing boats and gears were damaged. As a result, difficulty in food as there was no source of livelihood for at least a year.

6.2.3. However, farmers observed that the soil was more fertile after that event. They attributed this to the mud that came with the flashflood. Water also became scarce as water sources such as spring and wells were flooded.

[1] Key informant interview with farmers during monitoring visits

6.2.4. In the timeline, extended dry season was identified to occur in early 1990s. It generally affects rice production as water is scarce and farms are rainfed. Long dry season more often result to low production or no production at all. In key informant interviews and workshops conducted by IIRR in 2014, extended dry season was felt in the past 2-3 years. Many are saying that it only rains when there is a low pressure.

6.2.5. Increased incidence of hypertension among male farmers during long period of dry season.

6.2.6. Long dry season resulted to scarcity of water supply for domestic use. Women are most affected as perceived by the participants as they do most of the work though water sourcing is done by both male and female. Children are often tasked to fetch water.

6.2.7. Long dry spell also affects coconut production as nuts are observed to be smaller in size due to lack of water.

6.3. Who are most affected?

6.3.1. The participants defined vulnerable as those people who have no rice farm lands and with young children. They specifically identified the farmers that provide labor for rice production ("*magtatalok*"). The latter are usually farmers from the upland part of Arbismen. They own small parcels of coconut area. They provide labor during rice production as a way for them to secure their own supply of rice during the year. Some of them are farmers who used to own land but chose to sell their rights due to inability to develop the land. A few are migrants from other barangays who chose to live in Arbismen due to opportunity of labor.

6.4. Coping Mechanisms

6.4.1. It can be gleaned that people in the community cope to the stresses (typhoon, drought, peace and order problem) through temporary migration. Short term income comes from work outside of the municipality to buffer them during difficult times. Many go to Laguna, Cavite and Manila. Men mostly go for factory jobs and labor (e.g., construction and carpentry). Women mostly apply as a domestic helpers or sales clerks in small businesses. They go back when production season starts which is usually between June-December.

6.4.2. Farmers with multi cropping system cope better as they just switch to crops not affected.

7. Summary and Findings

7.1. The most vulnerable group in Barangay Arbismen as identified by the participants are those who provides labor for rice farming (*magtatalok*). Majority of these are farmers are those living in the upland area of Arbismen who owns small parcels of coconut area. They do not get enough income from their coconut farm that brings them to rice areas and provide labor. A number of the "*magtataloks*" are agrarian beneficiaries who chose to sell their land rights and are now landless. While some belong to the 2nd generation (a few are migrants from other barangay or from adjoining municipalities), they do not have their own farm lands as their parents are the agrarian beneficiaries and still tilling the land. Though they provide family labor, their share is not enough to provide for their own family. They opt to engage in providing labor to other farmers to augment their income. In fact, if harvest is good, these laborers can get more share of rice than the farmer themselves as they can be engaged to more than one land owner. However, they have limited farm assets as their only land is a residential lot with small backyard.

7.2. As prolonged dry season has been observed to occur more frequently than typhoon in the past 2-4 years, the *magtatalok* will continue to be vulnerable if this trend continues, as they are dependent on rice farming. Programs and interventions should be designed for this group.

7.3. Further, rice area comprises 34% of the total land area and seen as an important crop as it is consumed by the household. Addressing irrigation is the key in ensuring food security. The absence of water source is not the problem but ACCESS to water as the Hiwasayan river is a major untapped resource of the community. Infrastructure (distribution canals) has been in place since a year ago. Some farmers are now having water access.

7.4. Although they consist only of 2%, fishermen are also vulnerable as majority do not have land which they can readily shift for other sources of income.
7.5. The barangay has a history of cultivating cassava and corn. Shifting or incorporating this to the farming system as these are drought tolerant crops should be considered.
7.6. Banana is considered to be the second major crop next to rice and coconut and brings big income. Program intervention should be considered (e.g., dwarf variety, wind breaks) to capitalize on this opportunity.
7.7. In 2019, the MDRRMC identified that some 25% of populace (236 persons) reside along coastal areas, rice fields are much exposed to saltwater intrusion during storm surges due to strong winds.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Communities such as Arbismen explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

Farmers' adoption of climate smart agriculture options:

- 111 farmer beneficiaries trained and adopted the low external inputs on pig production (LEIPP).
- 111 farmer beneficiaries adopted the low external inputs rice production (LEIRP)

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic,political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in thecommunity, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard mayimpact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by menand women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles; if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

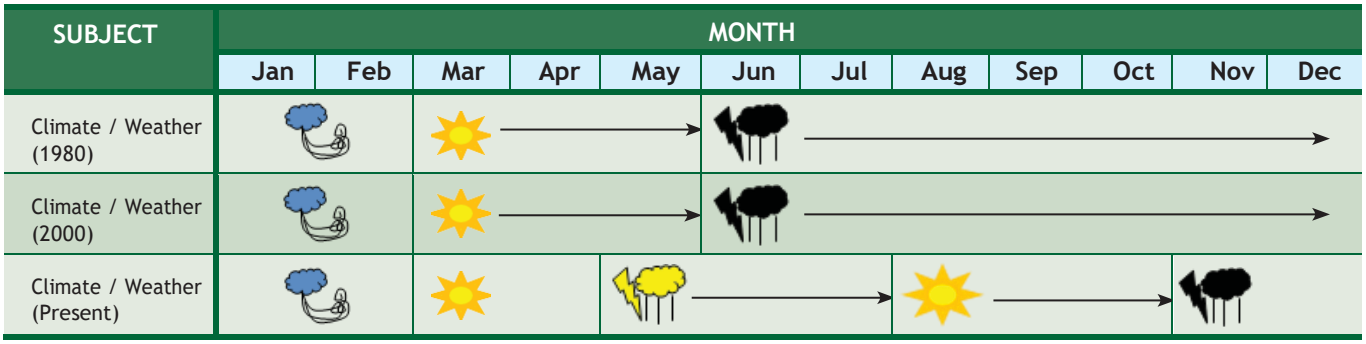
1. Historical Timeline

Year	Events	Impacts	Coping Mechanisms
1973	Strong earthquake	The ground cracked but no significant damage was done	
1985	Rally in the community due to peace and order	People were in constant fear that affected farming activities. People cannot stay long in their farms.	Military camp was established to allay fear
1991-1992 from	Extreme drought/ El nino	Water supply became scarce that limited farm activity which resulted to low productivity.	The community sourced water other places as far as adjoining barangays for domestic use. Some even utilized coconut juice as alternative source for water
1992	Political Conflict	People were displaced.	Many left the barangay and settled in other areas in Guinayangan.
1995	Typhoon Rosing	The typhoon caused flooding as sea water and water with mud coming from the upland converged in food as there was no source in the barangay. Crops were submerged and livestock were drowned. Fishing boats and gears were damaged. As a result, difficulty of livelihood for at least a year. However, farmers observed that the soil was more fertile after that event. They attributed this to the mud that came with the flashflood. Water also became scarce as water sources such as spring and *balon* were flooded. Houses were damaged.	Affected farmers sought jobs outside the community. Coconut fruit that fell were immediately sold as source on income.
1997	Tenants were awarded with CLOA	Tenants have become owners of their land and security of tenure that allows them to make decisions on the land.	
1999-2000	Most infrastructure were set up (e.g., electricity, road, level 2 water supply)	• Increased expenses • Ease in studying • Population growth was decreased as people have other things to do • Safe travel • With the road, farm products are easier to transport. • Household chores can be already done in the evening as there is available light that means more time can be devoted in the farm.	
2006	Typhoon Milenyo	Destruction of farmlands due to storm surge and mudslides that came from the highlands. But impact is lesser than Rosing	Livelihood focus shifted to fishing while agriculture is recovering from the impact.
2009	The 4Ps program of the government was implemented	It provided relief from school expenses as the program provides for it.	

2014	Typhoon Glenda in July	Destroyed coconut and banana farms Destroyed houses as this typhoon brought more wind than rain. Good thing that rice planting has not started yet due to longer dry season	Many farmers resulted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) outside of the Municipality. Many went to Cavite area to fish.
2018	Prolonged drought	Many of the rice farmers did not harvest their crops, same with the vegetable growers.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.
2019	Typhoon Tisoy	Destroyed coconut, vegetables, banana farms and fruit trees. Destroyed fishing boats, houses communications facilities and government infrastructures.	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief operations and cash for works programs.
2020 (Oct-Nov)	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.

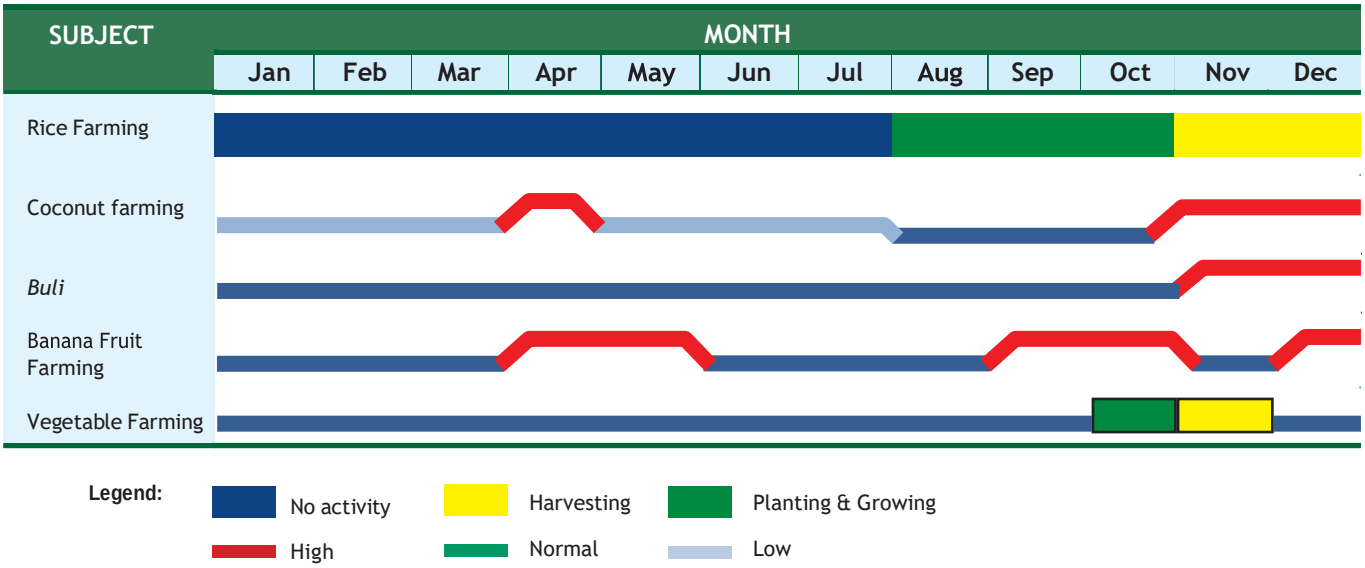
2. Seasonal Calendar

CLIMATE / WEATHER



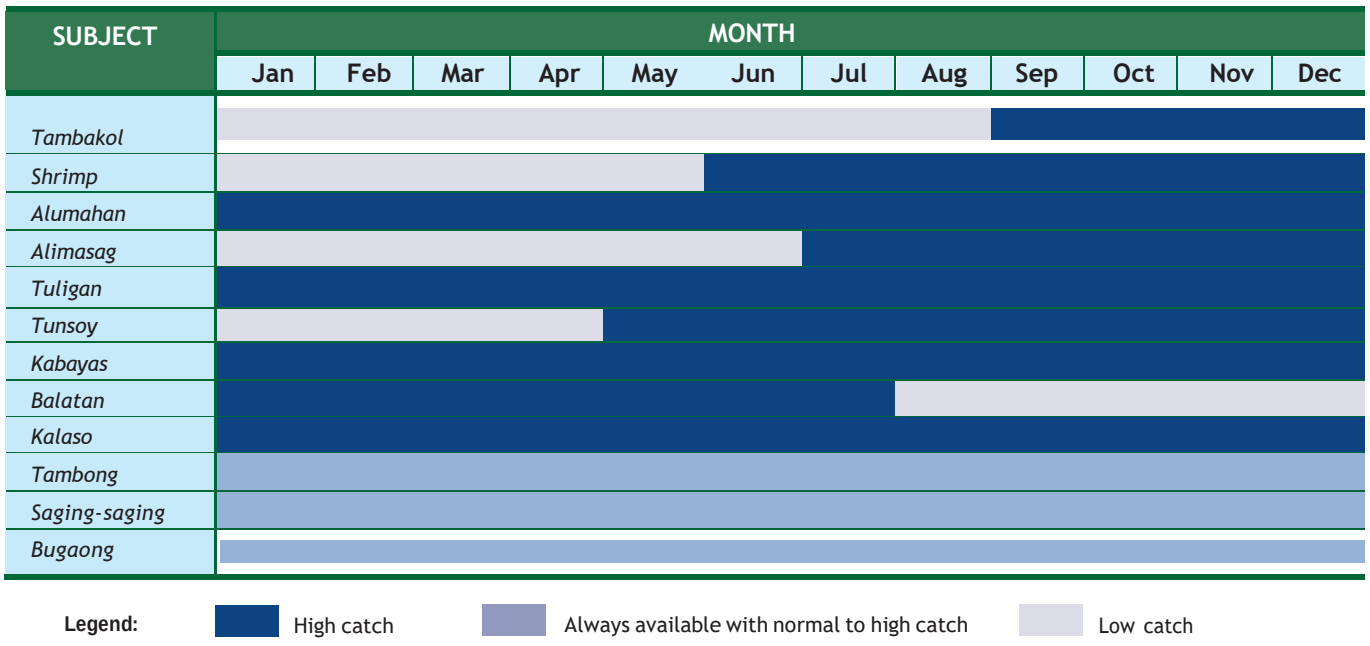
AGRICULTURE

Table 2. Crops and fruit trees farming data obtained from the farmers of barangay Arbismen, Guinayangan, Quezon.



FISHING

Table 3. Fish catching data obtained from the farmers of barangay Arbismen, Guinayangan, Quezon.



HUMAN HEALTH and DISEASE

Table 4. Practical data obtained for land and water-based farming systems in Barangay Arbismen, Guinayangan, Quezon.

	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cultural	Feast of Sto. Nino				*Feast of Barangay * Brigada Eskwela		*MSK Anniv. *Nutrition Month	PTA Night		United Nations	All Souls Day	Christmas Events
Health & Disease (10 years ago)	Colds, Cough, Diarrhea										Colds, Cough, Diarrhea	
Health & Disease (2 years ago)	Colds, Cough.						High Blood Pressure and Stroke				Colds, Cough, Diarrhea	

CULTURE, INCOME and EXPENSES

	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cultural	Feast of Sto. Nino				*Feast of Barangay * Brigada Eskwela		*MSK Anniv. *Nutrition Month	PTA Night		United Nations	All Souls Day	Christmas Events
Expenses												
Income Sources												
Water Utility (10 years ago)												

Legend: High Normal

3. Livelihood Matrix

The 2 climatic related hazards that impacts livelihood in the barangay are the frequent extended dry season andstrong typhoons. The matrix below shows the specific impact to the five capitals of livelihood.

LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS	ADAPTATION
NATURAL			
Land/soil	Farm lands have been reduced to parched soil due to longer dry season. Soil has become dense that farmers liken it to adobe.		
Water (Dug Well, River, LWUA)	Decreased water in wells and rivers sometimes dries up.	Farmers look for alternative source but mostly for domestic use. They just do not do rice and vegetable farming and wait for the rain. Those with coconut focus in copra production and intensify banana production instead.	During the FGD, participants have recognized the importance of mangroves in protecting their village from storm surge.
Fish	Farmers observed decreased in catch during hot months. They claim that it seems fish go to deeper areas, therefore farther. Many fishermen in the village are using small and non-motorized boats. Only a few fishermen (1%) have motorized boats and can afford to go farther in the sea. Fishermen claim that usually after a storm there are more abundant fish stocks. They attribute this to churning of the sea as fish food is more available. Storm usually destroys fishing gear and boats.	Fishermen with no land opted to find manual labor jobs within the municipality but most of the time they go out of the Guinayangan. Some leave for Cavite, usually in Ternate to fish. Those with land go back temporarily to farming. For those that lost fishing gears and boats during a storm opt to fish with bigger fishermen in the village or adjoining village ("*maki bakas*"). Learning from previous disaster, many are already safekeeping their gears, boats are kept in higher areas, some are tied between mangrove area.	
PHYSICAL			
Rice Farm	Long dry season more often result to low production or no production at all.	Farmers who are dependent to rice farming most of the time temporarily migrate and find work in Laguna, Cavite, Manila. They come back during start of production.	
Coconut Farm	Nuts and leaves fall as strong winds batter coconut trees. Farmers claim that when trees are wobbled violently production capacity is reduced. Long dry spell meanwhile results to smaller nuts.		
Banana Farm	Strong typhoons damages banana by bending or even totally break trunks.		
Vegetable Farm	Long dry spell resulted to low production or no harvest as crops dries up.		
School	Extreme hot weather affects children's concentration School's roof was destroyed by strong wind	School purchased electric fan Classes were conducted in other buildings while the Department of Education is reconstructing	

HUMAN			
Male Farmer	Increased incidence of hypertension among male farmers during long period of dry season	Women helped in the field	
Female Farmer	The long dry season resulted to scarce water supply for domestic use. Women are most affected as perceived by the participants as they do most of the work. Though water sourcing is done by both male and female. Children are often tasked to fetch water.		
FINANCIAL			
MFI (Card, TSPI)	Due to disaster brought by either long drought or typhoon, many find it difficult to pay their loans	Difficulty in paying out loan. Opted for restructuring.	

4. Problem Tree

1. FARMING

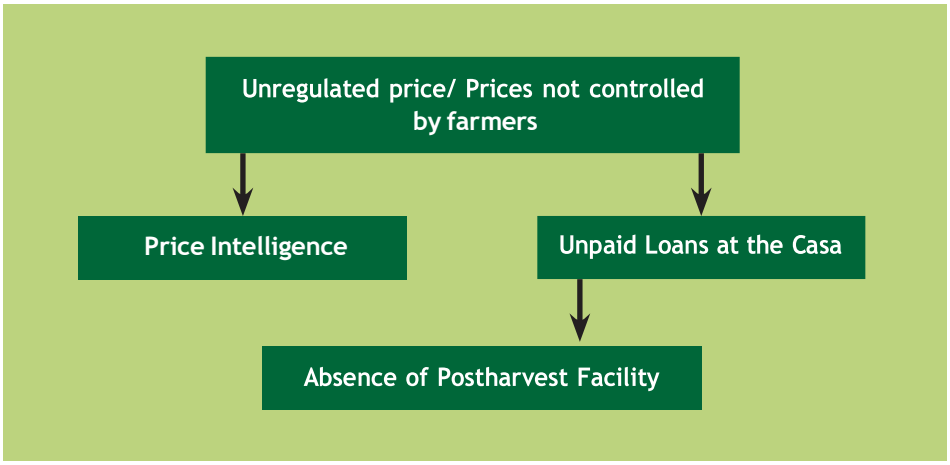
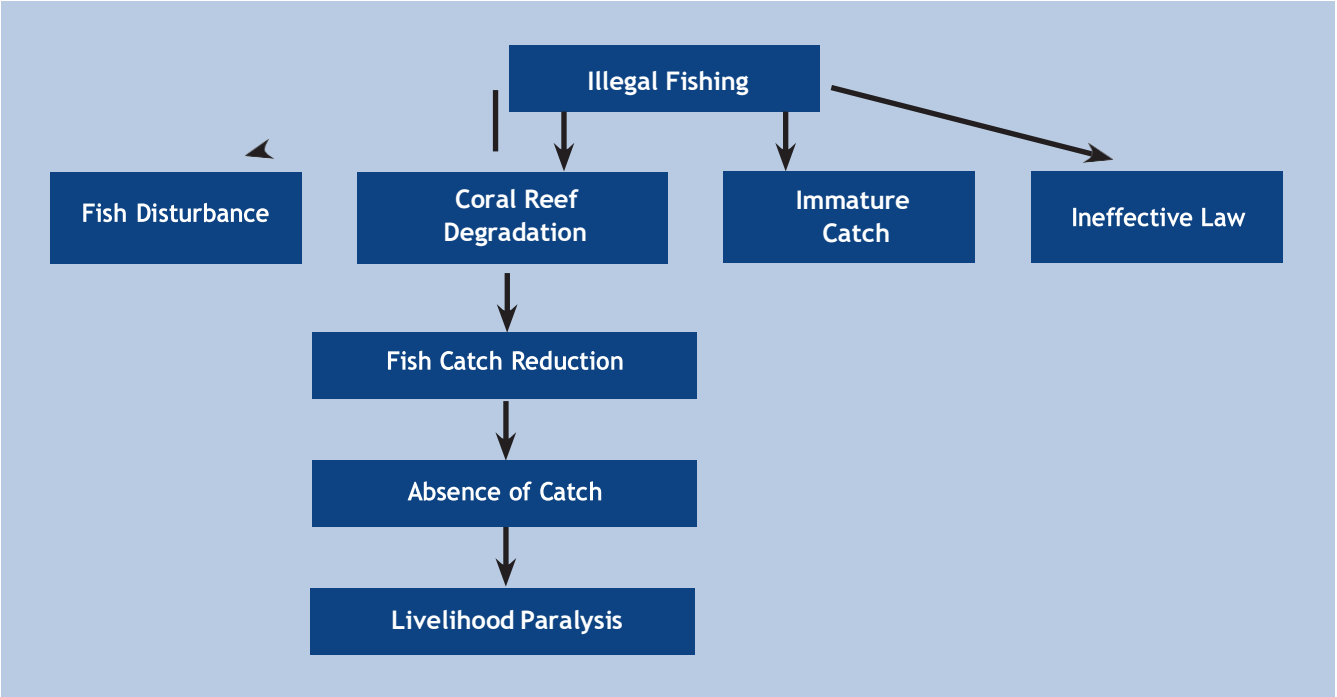


Figure 1. Problem tree for crops and fruit trees farming

2. FISHING



5. Community Mapping

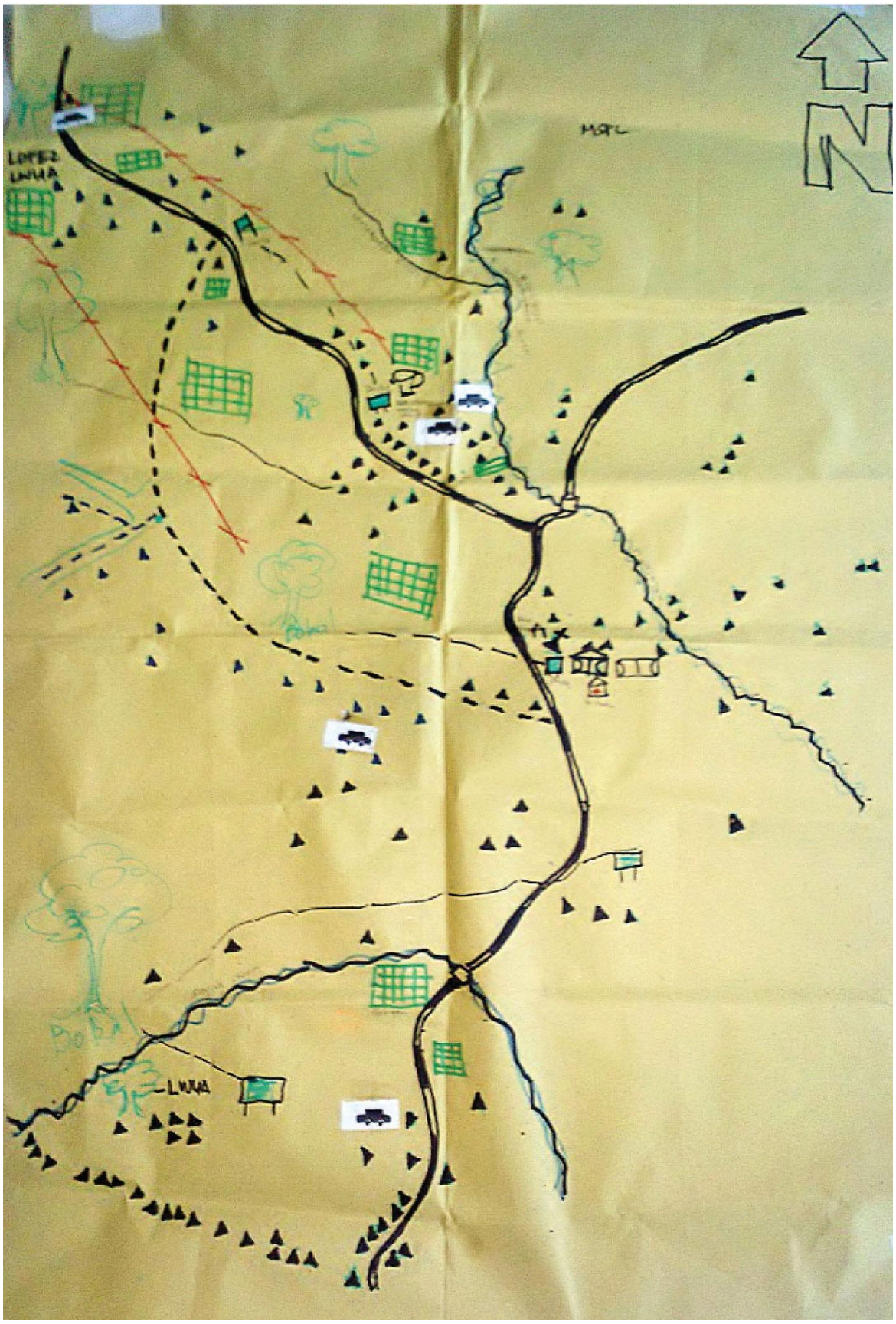


Figure 1. Community-generated Map of Barangay Arbismen, Guinayangan, Quezon

Barangay Balinarin

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local governmentunit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays of Guinayangan to help the community achieve a better understanding of the conditions and factors that affect their vulnerability to climate change impacts. Once the community receives this information, it will be in a better position to increase its resilience and react to disasters.

Specifically, the PVA has the following objectives:

1. In collaboration with the community, establish the livelihood conditions in the village using the 5 capitals.
2. Determine the community's perception on changes in climate, its impacts on their livelihoods and other factors/drivers.
3. Determine and establish the level of exposure of smallholder farmers to climate risks in the 11 villages where IIRR works.
4. Establish an in-depth analysis of the climate-change-related risks faced by farmers, existing coping mechanisms, possible adaptation measures, and perceived interventions for increasing their adaptive capacities.

3. Methodology

The PVA study was conducted at the barangay hall on November 3 November 2014. The meeting was attended by a total of 14 participants (10 men, 4 women), representing the barangay council members and some coconut farmers.

A focused group discussion (FGD) was held using participatory appraisal (PRA) tools such as community mapping, seasonal calendar, timeline and livelihood assets matrix. These tools are described in Annex 1.

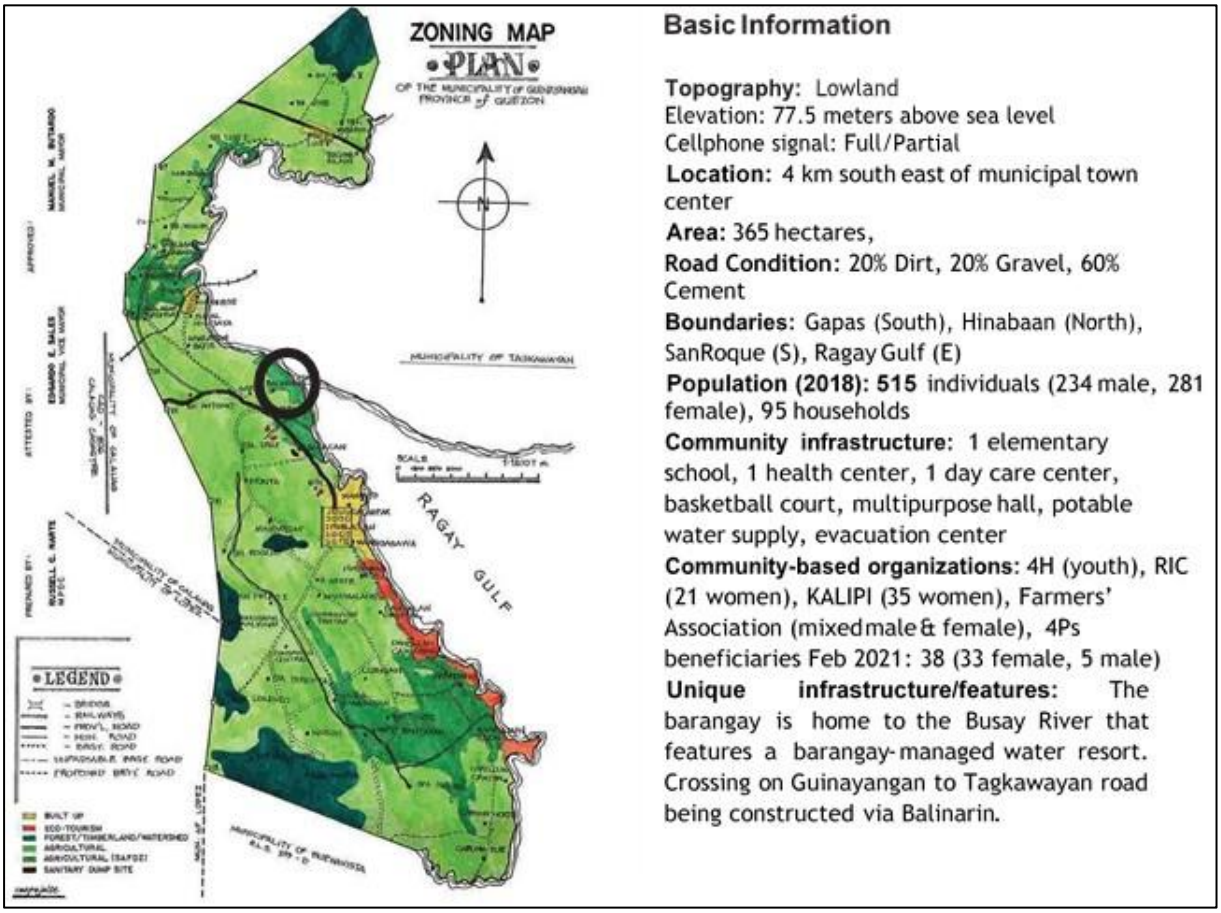
Additional data and information for this report was also gathered through a key informant interview (KII) to barangay officials. Secondary data were further gathered from the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, documentation of a stand-up meeting, and project reports augmented needed data and information.

The study was limited to agriculture as main source of livelihood of the community. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Balinarin is a lowland village with a land area of 365 hectares with 30 hectares devoted to rice farming and 300 hectares for coconut production. Most residents own the land they live on; only a few (about 2%) are tenants. Most of the population are daily wage earners working either for the government or for private organizations.



Basic Information

Topography: Lowland
Elevation: 77.5 meters above sea level
Cellphone signal: Full/Partial
Location: 4 km south east of municipal town center
Area: 365 hectares,
Road Condition: 20% Dirt, 20% Gravel, 60% Cement
Boundaries: Gapas (South), Hinabaan (North), SanRoque (S), Ragay Gulf (E)
Population (2018): 515 individuals (234 male, 281 female), 95 households
Community infrastructure: 1 elementary school, 1 health center, 1 day care center, basketball court, multipurpose hall, potable water supply, evacuation center
Community-based organizations: 4H (youth), RIC (21 women), KALIPI (35 women), Farmers' Association (mixed male & female), 4Ps beneficiaries Feb 2021: 38 (33 female, 5 male)
Unique infrastructure/features: The barangay is home to the Busay River that features a barangay-managed water resort. Crossing on Guinayangan to Tagkawayan road being constructed via Balinarin.

4.2. Village History

Until the 1940s, when agriculture was introduced, the barangay was fully covered by grasslands and forest areas. Since then, agriculture has become the economic mainstay of most people, yet it is also responsible for environmental concerns.

In the 1950s, a place called Sitio Gapas was elevated to a barangay status and named Balinarin. Since then, administrative efforts have been made to make life more convenient for the community and the barangay is now able to control its own funds for development projects and activities. In 1952, the community became open for product trading when the Farm to Market Road Project was implemented. Various improvement in transportation and infrastructure have been made regularly, and in 1997,a community day care center was constructed to provide basic education.

In the 1980s, electricity services reached the barangay, significantly improving livelihoods. People now had greater convenience to work as well as access to basic information through television and radio. While the economic status of most people has improved, the barangay's population growth rate has ebbed as a result of busier lifestyles.

In the 1960s, the number of coconut trees began to increase, and today many people identify coconut farming as their key source of income.

Between 1984 and 1986, the clash between the New People's Army (NPA) and Armed Forces of the Philippines caused fear in the community, causing many individuals to migrate to safer locations. Some people who refused to leave their place served as civilian volunteers to resist the presence of the rebels.

4.3. Land Use and Tenurial Arrangements

Barangay Balinarin is a lowland village. Most residents own the land they live on; only a few (about 2%) are tenants. Many of the residents are daily wage earners working either for the government or for private organizations within and outside the municipality.

With this land ownership, agricultural production is dependent on farm labor. For coconut, there are 4 sharing arrangements. These are:

- first, 60% of the harvest goes to landowner and40% to the laborer (evenly divided by the number oflaborers);
- second, the tercio system in which 1/3 of the harvest goes to the laborer or partial division of harvest;
- third, the 90/10 share in which 90% goes to the tenant and 10% to the landowner; and
- the 50/50 system in which the harvest is dived evenly among the land owner and tenant.

Meanwhile for rice, average daily wage is Php 200. But forrice lands with tenants, more often, 95% of the harvest goes to the tenant while the remaining 5% is given to the landowner.

5. Livelihood Profile

5.2. Coconut and rice are the main crop in Barangay Balinarin. Several are into vegetable farming and fishpond culturing. Coconut production provides the largest share of income to many farm-based families.There are 14 activities performed here as identified by the locals. Men are more involved in the coconut production that requires physical strength such as harvesting, collecting, removal of husk and preparation of fire. Women share in the labor for the rest of the copra production activities such as shelling and yield counting. Usually, coconut production begins to ebb in May. The month of August is the lean month. Production is normal throughout most of the rest of the year.

5.3. Rice farming is a subsistence farming system in barangay Balinarin. The labor requirements for rice production usually involve men. Land preparation, threshing, spraying, fertilizing and weeding are mostly performed by men. Transplanting, harvesting, drying and "*bayo*" are evenly performed by both men and women. In preparing the land, a farmer usually spends PHP160/hour for tractor use. The farmers also harrow their land for a week; soak their land for 24 hours; germinate their seeds for 2 days; plot their land for 15 days; weed their land for 3 days after transplanting; and apply urea fertilizer at the 35th day. Additionally, postharvest activity like threshing costs 2 PHP/kg of brown rice.

Table 5 shows a more detailed list of activities being shared and performed by both genders as linked to rice farming. Rice is grown twice a year. The first crop is harvested by June and second by December. Because farms in the area are rainfed, the farmers try to ensure that their planting time suits these seasonal conditions. Usually, May is the lean month because it is often reserved for land conditioning activities.

5.4. Banana farming is also visible in this community. Bananas are usually planted between April and July when moderate weather conditions prevail. These conditions are necessary to avoid damaging the banana shoots. Unspecified months are the normal harvest periods of this commodity.

5.5. Last in the list of typical livelihoods of this barangay is the fishpond culturing. Villagers often have one economic season for this system that eventually begins by December. Taking 3-4 months of growing period, marketable fish sizes will be harvested by April or May. Culturing fish is only performed when there is high precipitation rate. Usually, *chanos-chanos* (milkfish, locally referred to as *bangus*) is the most common fish species grown in the area. Different kinds of activities are involved in this system for successful operations.

Men usually work in the ponds where they are mostly involved in pond preparation and maintenance. Women help in releasing fingerlings in the pond and harvesting. Usually, 20% of the harvest goes to the pond owner and 80% to the lessee. Aquaculture is very laborious in terms of water maintenance, especially when technology is not yet very sophisticated, so men supply most of the required work force. The common pesticide used in this system is *tisid*, an organic procedure that removes undesirable foreign biota that compete for the available food in the pond.

5.6. In terms of pests and diseases, coconut production is threatened by as a number of trees decompose throughout the year due to infestation of micro-organisms that gradually damage every part of the tree until it completely dies. Moreover, termites occur in high numbers from January until April and decline thereafter until December. For rice, *tungro*, stem borer, and black bug affects rice crop and occur during the first quarter of the year until they reach their peak season during the second until the last quarter of the year.

5.7. Water supply is often low from January until August and high for the rest of the year. Surface water and groundwater are abundant in the area but these water systems will only recharge when rainfall is heavy.

5.8. In terms of expenses and income, many residents in barangay Balinarin are largely based on copra production. Other farming activities are conducted on a small-scale basis for food self-sufficiency. High cash inflows of a typical farmer in Balinarin take place from January to February, from April to May, from July to August, and from November to December. The months not mentioned are typified by low cash inflows. Expenses of a farmer in this community are high in March, June, July, November, and December because of cultural events and school expenses.

6. Climate Change Perceptions and Coping Mechanisms

6.2. Perceived Climate Patterns

6.2.1. The most recent data shows that the wet season now starts in May and ends in November. This period coincides with typhoon season. According to participants, earlier climate patterns were similar to the current weather, but the climate these days is more unpredictable and extreme than ever. Summers used to be a little cooler than they are today. Comparing sets of climate patterns over the past years, wet seasons decades ago were similar to recent conditions, but they lasted a month longer. The dry season, both then and now, runs from January to February.

6.2.2. In years past, typhoons were common events. In 1995, 2006, and 2014, three typhoons inflicted massive damage to the infrastructure and livelihoods in the barangay. Typhoon Rosing was the strongest in terms of precipitation rate, while Glenda was the most deadly in terms of wind speed. Both of these typhoons killed numerous coconut trees, affecting the production and income of many farmers. Summer is hotter and more prolonged as recently experienced.

6.2.3. Typhoons Tisoy in 2019 and Quinta, Ulysses and Super typhoon Rolly in 2020 brought so much destructions to livelihood sources, houses and government infrastructures.

6.3. Impact

6.3.1. Another deadly climatic event was the El Niño phenomenon in 2014, which badly affected farming systems of the community. Many farmlands were totally parched and several wells went dry. People were able to recover by saving and maximizing the remaining quantities of water, but fruits and other crop commodities did not achieve sufficient growth for marketing.

6.3.2. Coconut farmers were the most impacted, and many were obliged to seek work as helpers, construction workers, and laborers to support their families. Subsistence farming also became an option for some

farmers in their efforts to cope with the calamities. Others relocated to nearby areas to harness water for their families, while still others took up broomstick and charcoal production or fishing to mitigate the impacts of the climatic disasters. Meanwhile, damaged infrastructure was quickly repaired by everyone pitching in together.

6.3.3. Past typhoons damaged some houses situated near the Ragay reef when giant waves dragged everything they reached back into the sea. Coastal erosion was extreme – even the perimeter dikes were not able to withstand the strong tidal force coming from the sea. Some animals were drowned and killed as owners were not able to completely secure them. General infrastructure such as roads, barangay halls, and utility poles were also damaged. Accessibility became inconvenient because of blocked passages, council meetings were canceled, and communications and electricity services were interrupted.

6.3.4. Damages were repaired through *bayanihan*, while many people relied on backyard farming to at least address the threat of hunger after the destructive events. Others procured solar-powered devices and gas-powered lamps to deal with the burden of widespread blackout.

6.3.5. Production deficits were also experienced because of the large-scale damage to coconut plantations and ricefields. Some trees were either uprooted or heavily damaged.

6.3.6. In contrast, available water resources in the barangay exceeded the recharge rate, making them sufficient for public, agricultural and private use. Some water sources became turbid but people were able to prime them up to make the water clear again.

6.3.7. Many people caught colds, fevers, and other common diseases due to the sudden change in environmental conditions, while additional working loads such as repairing of damage and land clearing were completed by farmers to be able to get back to their normal lives.

6.3.8. When water supply became deficient due to below average precipitation rates, the ecosystem and agriculture of barangay Balinarin experienced substantial damages that were reflected by animal migration and average farm yields. In the past situations, pond farming was forced to stop because of unstable water supply. Several coconut plantations were hit, affecting overall copra production, while natural water systems were either producing low discharge or totally parched up. People responded by securing every water droplet that they could harness from their water banks or by collecting water supply from nearby areas.

6.3.9. Power interruption was also experienced during hot weather condition when the electric company, QUEZELCO, imposed a maintenance shutdown to avoid overheating their cable wires. In contrast, regardless of the occasional brownouts, many people still declared that their electric bills increased as a result of increasing dependency on electric-powered devices to avoid the undesirable weather conditions.

7. Findings

7.2. Participants defined the conditions of vulnerable households in their community with the following characteristics:

- Very sick individuals/incapacitated persons
- No other sources of income
- Widows/single parents
- Large family size

7.3. The majority of farmers own their land and most of the constituents have regular jobs and sources of income.

7.4. Typhoons and prolonged dry seasons have been identified as climate-related hazards that affect the barangay. However, the participants do not see themselves as vulnerable as they can easily bounce back given their regular sources of income from their day jobs.

7.5. The community has sufficient water sources. Access to these sources is the issue.

7.6. Several people of barangay Balinarin expect that an institution will be put in place that can provide them with an early warning system so that they can gather information related to weather to secure their lives and assets. They also anticipate a seminar on effective farm management with new technologies to upgrade the farming systems in their barangay. In addition, the issue of an irrigation system has been consistently raised by the local authorities of this community to various organizations including the LGU, but a response has not been forthcoming.

7.7. As a result of their experiences with both typhoons and drought, barangay residents today are more vigilant concerning the rapid changes that occur in their area. They are now able to prepare themselves for incoming storms or droughts by securing their assets and preparing their emergency kits. News updates on television and radio are the most reliable sources of information as no local weather station is yet available.

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic,political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether they are changes and adjustment in time, allocation and roles if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where are they located.

Annex B: Outputs of Community Workshops

1. Timeline

Year	Events	Impacts	Coping Mechanisms	Additional Response
1984–86	Insurgency	Migration of population to safer places due to fear	• Civilian volunteer • Cooperation with the military	-
1940s	Forested and grassland areas	-	-	-
1950s	Administrative reformation from sitio Gapas to barangay Balinarin	Community fund	-	-
1952	Earth road	• Improvement of transportation networks • Faster trading process	-	-
1960s	Domination of coconut plantation	Economic development	-	-
1977	Day care center	Improvement in children learning	-	-
1980s	Electricity services	• Reduction of population • Additional expense	-	-
1985	Road widening	-	-	-
1973 (17 March)	Earthquake	• Broken roadways • Fallen nuts	Fertilizer application (Provided by PCA in the 1990s)	-
1995	Typhoon Rosing (Category 5)	• Damage of farms • Damage of general infrastructure • Damaged ponds	• Relocation to other barangays • Repair of minor damages	• Residence in a durable shelter • Preparation of emergency food • Listen to news updates
1997	El Niño/drought (7 months)	• Damaged crops • Poor farming environment • Low coconut production • Scarcity of water supply	• Development of Hinabaan River into a resort • Water collected from high discharge springs	Spring development
2006	Typhoon Milenyo (Category 4)	Same with the 1995 event	Same with the 1995 event	Same with the 1995 event
2014	Typhoon Glenda (Category 4)	Same with the 1995 event	Same with the 1995 event	Same with the 1995 even
2014	El Niño/drought (4 months)	Same with the 1997 event	Same with the 1997 event	Same with the 1997 event
2018	Prolonged drought	Many of the rice farmers did not harvest their crops. Same with the vegetables growers.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.
2019	Typhoon Tisoy	Destroyed coconut, vegetables, banana farms and fruit trees. Destroyed fishing boats, houses communications facilities and government infrastructures.	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief

			on its relief operations and cash for works programs.	operations and cash for works programs.
2020	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.

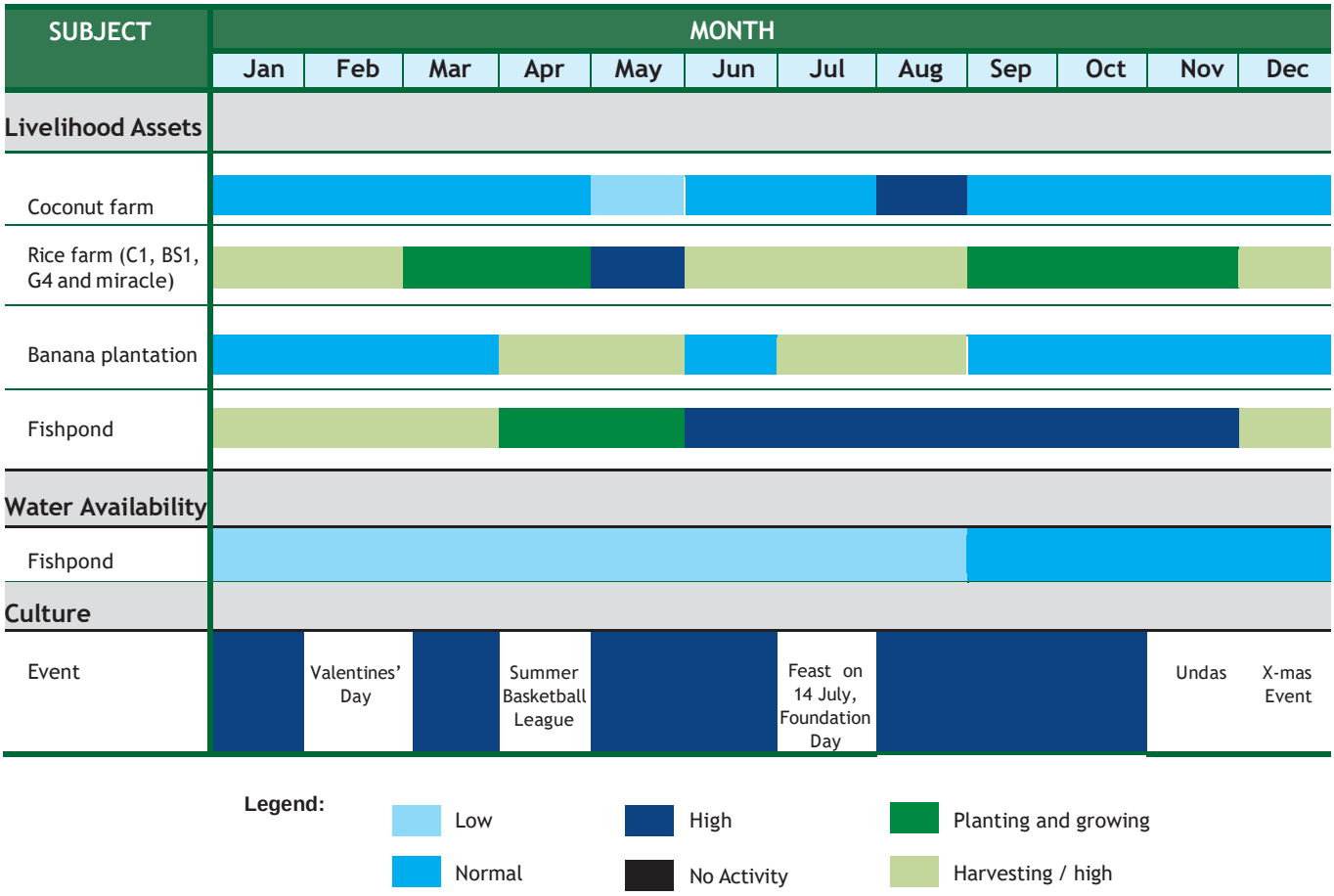
2. Seasonal Calendar

CLIMATE / WEATHER

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recent												
Decades Ago												

Legend: Wet season with occassional storms; Moderate climate; Warm; Summer / very hot

LIVELIHOOD CROPS



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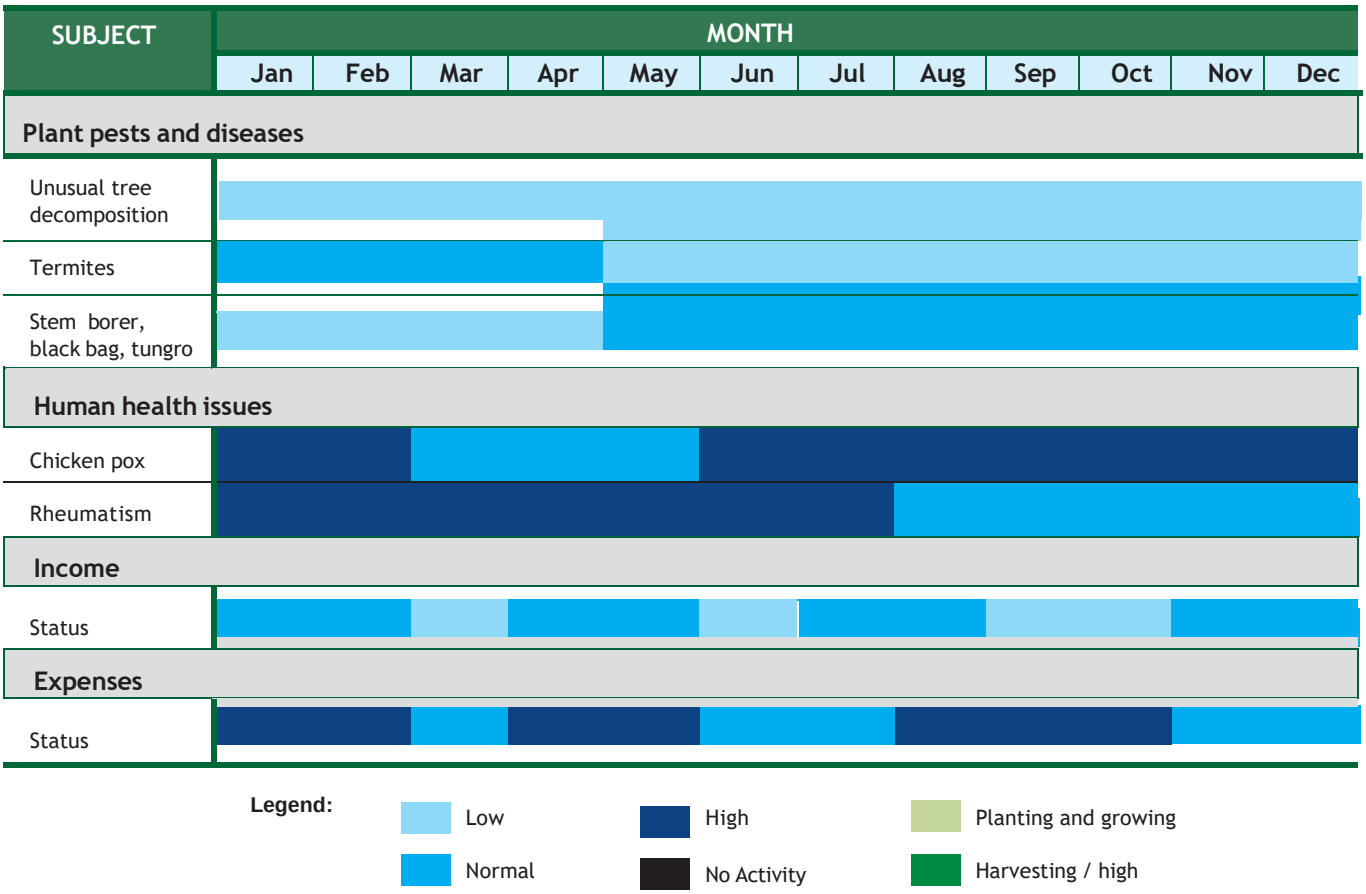


3. Livelihood Matrix

LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS
PHYSICAL		
Fishpond	A) Overflowing B) Absent	A) Discharged
Rice farm	A) Damaged fields B) Dried lands	-
Coconut farm	A) Low income A) Damaged trees	A) Maximized remaining economic parts
Infrastructure (houses, roads, electric and power utility)	A) Blocked roadways A) Damaged houses A) Power interruption A) Signal Interruption B) High current bill B) Brownout	A) *Bayanihan* A) Utilized a generator A) Emergency kits A) Fixed damaged structures B) Energy saving B) Switched to LED bulbs
NATURAL		
Dug well	A) Overflowing A) High turbidity B) Low supply	A) Well priming B) Mineral water B) PAG-IBIG fund
Hinabaan River	A) Overflowing A) Damaged barangay wall B) Low river flow and height	A) Harnessed water from dug wells
Spring	A) Damage on hose connection A) Soiled resource (due to erosion) B) Parched up or low discharge	A) Repaired the damages
Land/earth	A) Soil erosion A) Landslide	
SOCIAL		
Community Organizations (Kalipi, 4P's, 4K, RIC, CFA, Kalahi and SC)		
HUMAN		
Children	A) School absence	A) Assistance in doing household chores
Male farmer	A) Shorter working hours	-
Female farmer	A) More household activities	A) Went to nearby areas to wash clothes
Senior citizen	A) Common diseases and rheumatism	A) Self-medication
FINANCIAL		
MFi, CARD, and lending organizations	A) Debtors could not pay A) Lending groups sent some fee collector	

Legend: A= Typhoon; B= Drought

4. Gender and Livelihood Analysis

Table 1. Comparison of activities performed by both genders under fish farming

FISH FARMING	
ACTIVITY	PIE CHART
1. Land preparation	
2. Pond watering	
3. Fingerlings selection	
4. Throwing in of fingerlings	
5. Pond maintenance	
6. Harvesting	

SIGNIFICANT PERSONS

Owner (pond)

Caretaker

Capitalist

LEGEND: **Male** **Female**

Table 2. Comparison of activities performed by both genders under coconut farming

COCONUT FARMING	
ACTIVITY	PIE CHART
1. Nuts poling/picking (kawit)	
2. Nuts collection	
3. Hila/parada	
4. Tapas	
5. Yield counting	
6. Mechanical shelling	
7. Kamada	
8. Fueling	
9. Hango	
10. Tigkal	
11. Pili/tusta ulit ang hilaw)	
12. Product packing	
13. Imbasi	
14. Sulit	

SIGNIFICANT PERSONS

Owner (land) and Owner (transportation vessel)

Tenants

Laborer

Kasa (buyer)

LEGEND: Male Female

Table 3. Comparison of activities performed by both genders under rice farming

RICE FARMING	
ACTIVITY	PIE CHART
1. Land clearing/weeding	
2. Primary tillage operation	
3. Land soaking	
4. Seed germinating	
5. Secondary tillage operation	
6. Land leveling	
7. Furrowing	
8. Transplanting	
9. Spraying	
10. Weeding	
11. Fertilizing	
12. Harvesting (Gapas)	
13. Piling (Bigkis)	
14. Threshing	
15. Partehan	
16. Drying	
17. Bayo	

SIGNIFICANT PERSONS

Farmer/ Landowner

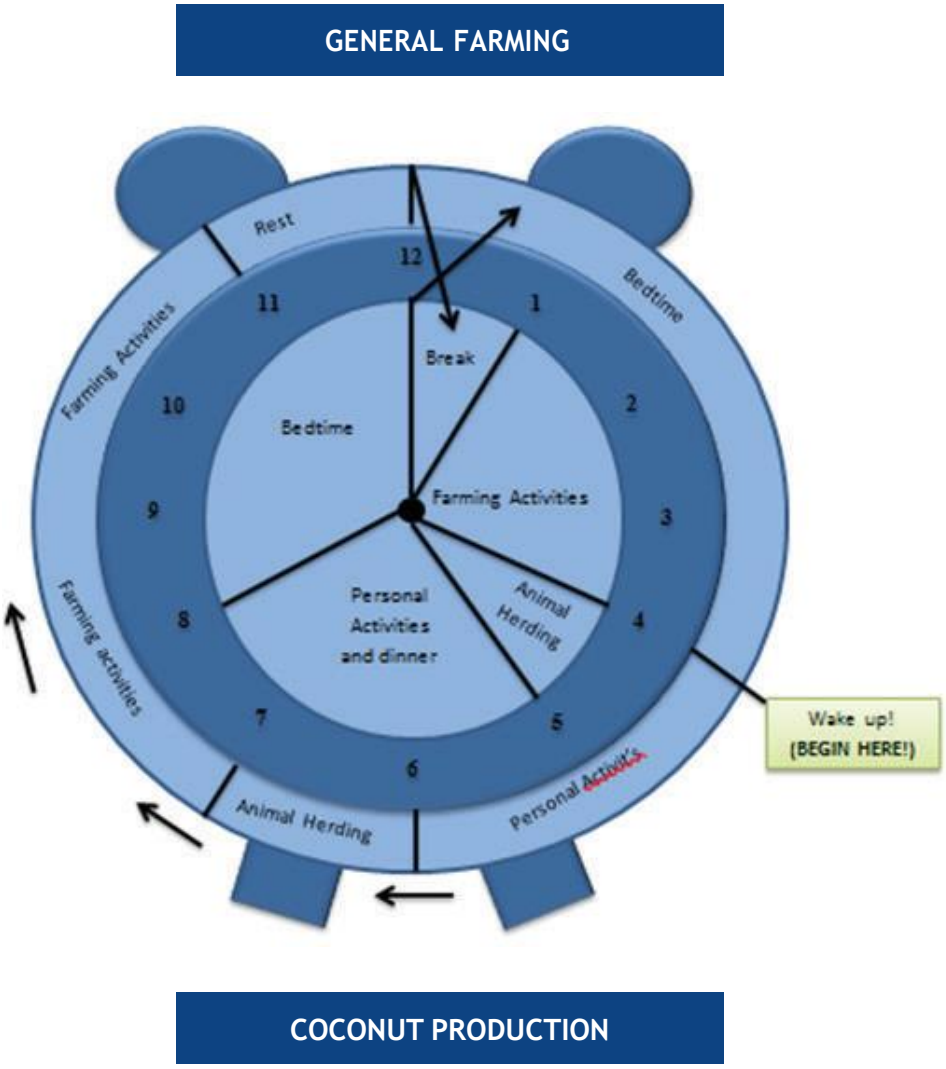
Farm laborer (magtatalok)

Rice mill owner

LEGEND: Male Female

5. Gender Clock Analysis

Figure 1. 24-hour clock of farmer activities in Barangay Balinarin



6. Community Mapping

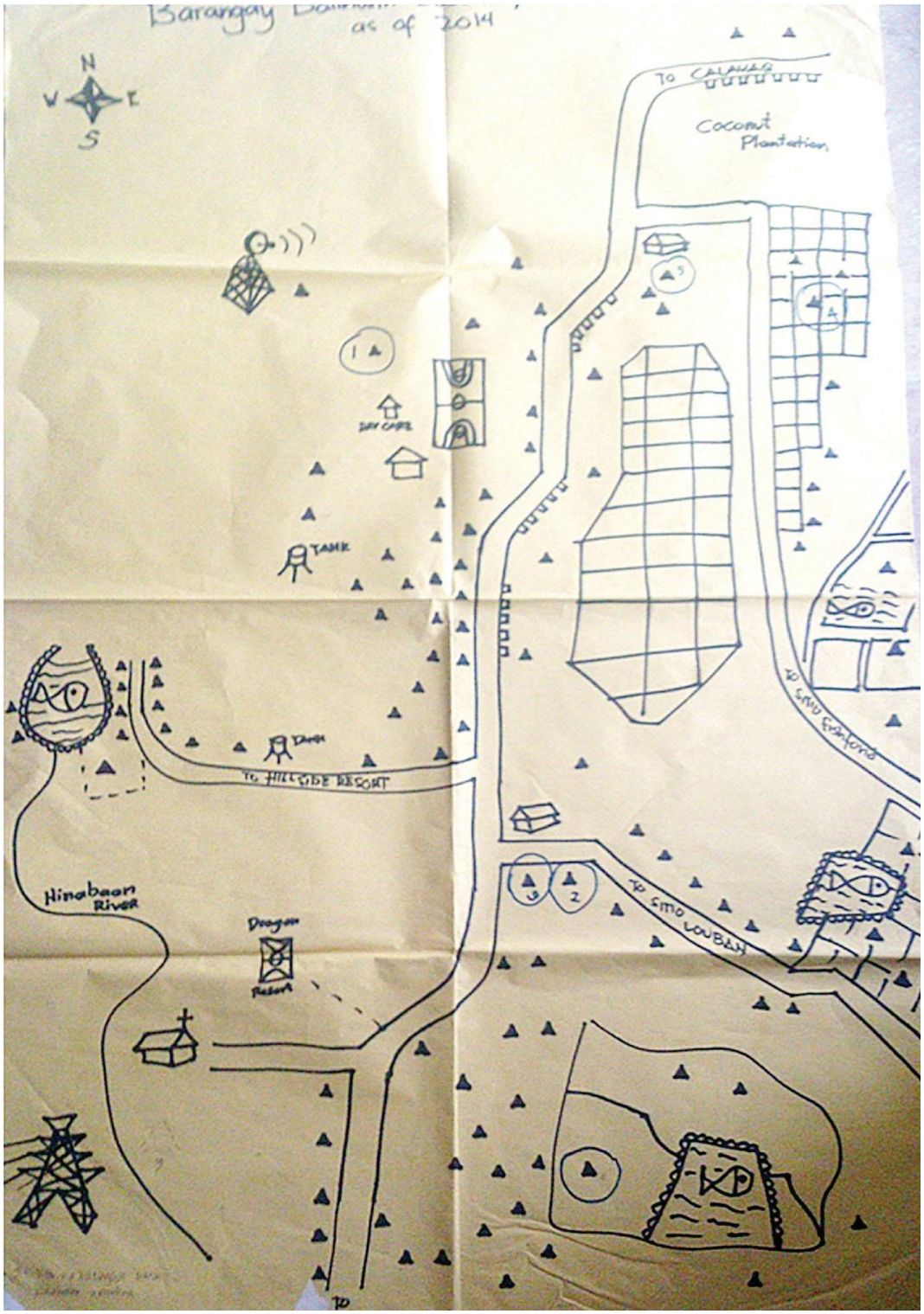


Figure 1. Community-generated map of Barangay Balinarin, Guinayangan, Quezon

Barangay Dancalan Central

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and updates on interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

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This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative

approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

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PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

1. Establish with the community the livelihood conditions in the village using the 5 capitals;
2. Determine community's perception on changes in climate, its impacts on their livelihood and other factors/drivers;
3. Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
4. Establish an in-depth analysis of the climate change-related risks faced by farmers, existing coping mechanisms, possible adaptation measures; and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment (PVA) study was conducted at the Dancalan Central barangay hall on 4 November 2014 with 23 participants (8 men, 15 women), representing the barangay council members and headed by the barangay chair. Participants were coconut and vegetable farmers and fisherfolks. Focused group discussion (FGD) was the method employed using different participatory rural appraisal (PRA) tools: seasonal calendar, timeline, livelihood assets matrix, gender clock, and problem tree (Annex B).

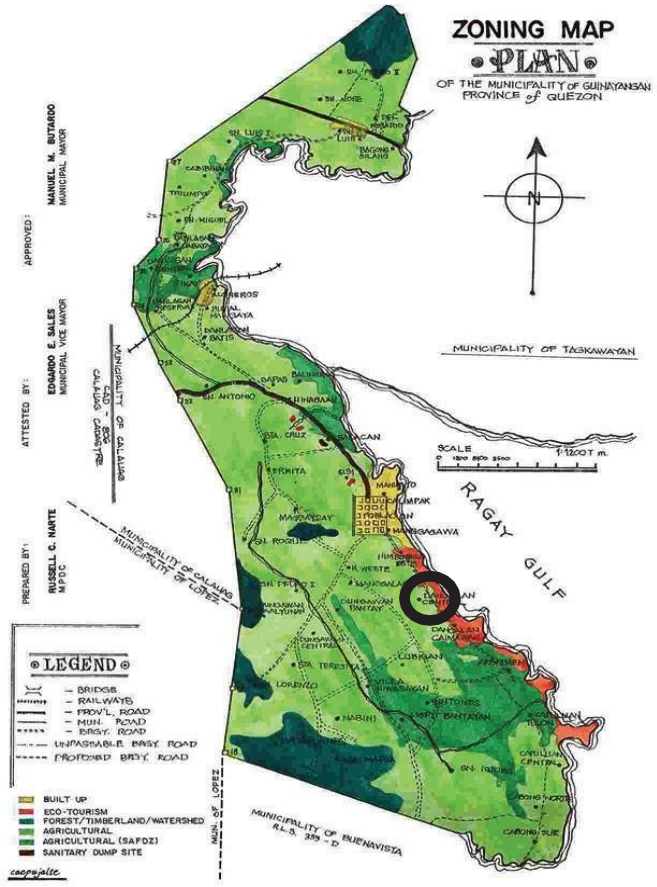
Additional data and information for this report were also gathered through key informant interviews (KIIs) with barangay officials. Secondary data were further gathered at the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, documentation from a stand-up meeting, and project reports provided additional information.

The study was limited to agriculture and fishery as livelihoods of the community. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, Guinayangan Local Climate Change Adaptation Plan 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Dancalan Central is a coastal village located 8 kilometers from Guinayangan's municipal town proper. It is accessible by all types of vehicles due to its concrete road that connects it with the rest of the municipality.



Basic Information

Topography: Coastal
Elevation: 69.3 meters above sea level
Cellphone signal: Full/Partial,
Road Condition: 10% Dirt, 30% **Gravel, 60% Cement**
Location: 8 km northeast of municipal town center
Area: 239.3 ha
Boundaries: Himbubulo Weste (N), Ragay Gulf (E), Dancalan Caimawan (S), Lubigan (W)
Population (2018): 707 individuals (349 male, 358 female); 148 households;
Community Infrastructure: Elementary school, barangay hall, day care center, multi-purpose hall. Health center has 3 barangay health workers, evacuation center, electricity.
Community-based organizations: Rural Improvement Club (RIC) and KALIPI 48 members, Dancalan CentralFarmers Association, Pantawid Pamilyang Pilipino Program (**4Ps) beneficiaries** (Feb 2021): 50 (49 female, 1 male)
Fisherfolk Association: 50 members,

Unique Feature: Site of municipal 82 ha fish sanctuary.

Important community events are celebrated in Barangay Dancalan Central in May (feast day) and December (Christmas). The community has natural spring that provides water supply for household and domestic use.

4.2. Village History

Rice was the main crop in Dancalan Central until coconut was introduced in the 1950s. Coconut replaced rice because it provided higher income for farmers with limited labor requirement. Coconut production increased throughout the 1960s and 1970s from a production area of 30 hectares yielding 50 tons of coconut meat. In the 1980s, coconut yield increased when the government began providing fertilizers. The sharing agreement then was 50% of the harvest went to the tenants while the remaining 50% went to the landowners. Coconut farmers experienced a serious setback when the Marcos administration began enforcing the coconut levy fund. For every kilogram of copra sold, the farmers were required to pay 50 centavos.

Community milestones are typified by the onset of development works. In 1974, the public elementary school was established, providing accessible primary education to the villagers and nearby barangays. This also provided hope for poor families who had previously been unable to provide education for their children due to financial constraints.

The installation of electricity in 1994 improved livelihoods in the community by providing access to basic information through television and radio. This also resulted to decreasing the population growth rate in the community. The construction of a dirt road, which began in 1998 and was completed in 2000, made the barangay accessible by improving the transportation system and facilitating the trading of agricultural products.

In 2004, the Philippine Business for Social Progress (PBSP) conducted community awareness on the fragility and importance of the marine environment. PBSP made it clear that because the community itself is the steward of its marine environment, residents should work together to protect and preserve their natural resources. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that 60% of the population is exposed to storm surge, rice field exposed to salt water intrusion and landslide is possible in high areas.

4.3. Land Use and Tenurial Arrangements

The majority of the community are tenant farmers and the usual sharing agreements in copra production are 40-60 and 30-70, with the larger proportion favoring the land owner.

5. Livelihood Profile

Barangay Dancalan Central is an agricultural and fishing community. Coconut is the main crop in terms of both volume of production and income provided to farmers. Coconut farming is the primary source of livelihood for the majority of families, while fishing is a temporary livelihood for coconut farmers. 60% of the population is engaged in copra production and 40% in fishing. Farmers earn an average income of PHP 400/day in fishing. Other sources of livelihood in the community are banana, charcoal-making and *tingting* from palm midrib. *Tingting* is used for *kwitis* (a type of firecracker).

The traditional process of coconut production is generally termed as *pagkokopra* or *paglulukad* with copra (desiccated coconut) as the main product sold by the farmers to a casa in the town proper.

Mature coconut is normally harvested every 45 days. The highest production of coconut, 500 kg, takes place in the month of August, but the buying price is low. The lowest buying price of copra experienced by the barangay was PHP 12/kg. During other months, farmers produce an average of 200 kg of copra. The average copra price is PHP20/kg while the highest is PHP40/kg. Normally, the copra price is high during the dry months from March to May.

The participants noted that capitalists usually dictate the price of copra. Neither climate nor demand and supply affect the buying or selling price.

Marine products such as crab, squid, shrimp, *bisugo* (thread fin bream), *usuhos*, *tambong*, yellow fin, and *saging-saging* are caught year-round.

Pag-uuling or coconut-based charcoal making is another source of livelihood for the community. *Uling* (charcoal) is sold at PHP 200 pesos per sack, while *tingting* are sold at PHP 60 to PHP 100 per 1,000 pieces. Before Typhoon Glenda, the farmers sold banana (cardava variety) weekly at PHP 70–160 per bundle (100 pieces/bundle). Other crops planted in the community are eggplant, string bean, chili (red pepper), and maize.

The majority of landowners employ laborers to deliver the services required in producing copra. This is mainly because the household cannot do it alone. Most of the laborers come from neighboring households.

Aside from farmers, other important actors in the copra value chain supply are the owners of jeepneys, tenants, workers, and capitalists. Copra products are transported to the casa using jeepneys.

The participants identified 13 different activities done in copra production. These are nut picking, nut collection, *hila/parada*, *tapas*, yield counting, mechanical shelling, *kamada*, *hango*, *tigkal*, *pili*, product packing, *imbasi*, and *sulit* (marketing). Five of these activities (nut picking, product packing, *imbasi*, *tapas*, and *hila/parada*) are hard, laborious jobs that are performed by men farmers only. The rest are easy and light tasks that are equally done by men and women.

Men in copra production spend 8 hours in the field, 2 hours tending their farm animals, 8 hours on personal and family activities, and 6 hours of sleep and rest. Women perform the same activities but also do the housework and tend to family needs as additional tasks. A typical female farmer in Dancalan Central starts her day at 0400. She spends 7.5 hours doing household chores, tending her family and doing her personal activities. Another 7 hours are spent in the field, 2 hours tending animals, and 7.5 hours for rest and sleep.

Some men coconut farmers engage in fishing when their labor in the coconut plantation is not required. If there is no work in copra production, coconut farmers go out at 0400 to catch shrimp along the shoreline. Fishing is done throughout the morning.

Typhoon affects the work duration of farmers as they are required to wake up earlier than usual to check and secure their assets. Extremely hot weather does not impede production as the work can be done under shade in sheds. Figure 1 on Annex B shows the clock of activities of males and females throughout the day.

Pests such as *brontispa* and *cocolisap* are observed throughout the year. *Cocolisap* is a scale insect prevalent during the dry months of February to April that infests the coconut leaves, stems, branches, and fruits. Infestation result in undersized nuts and eventual death of trees at the early stage. *Kadang-kadang* is a disease that also damages coconut production.

The community noted that during Typhoon Glenda, the coastline was eroded when 10-meter waves washed out a portion of their shoreline.

The participants identified typhoon and drought as key issues that damage coconut plantations. Nuts cannot reach their full growth because they are either smashed off the trees by strong winds or wilt because of excessive moisture loss. Unusual climate patterns occur because of continuous degradation of the environment. Charcoal production, which is practiced as a means of alternative income, unfortunately requires deforestation activities.

Another issue faced by coconut farmers is the low market value of copra. According to the participants, there are people who control and set the market price of copra at a very low price. This results in low incomes for coconut farmers.

6. Climate Change Perceptions and Coping Mechanism

6.1. Perceived Climate Patterns

The current climate pattern in Barangay Dancalan shows that the wet season starts in May and ends in January. This period overlaps the typhoon season. The dry season is experienced during the months of March and August. Participants said that they are now experiencing hotter temperatures from around 10:00 am, which limits their farm activities. Heavier rainfall was also reported to arrive frequently, and the northeast monsoon is not nearly as cold as before.

Skin diseases and hypertension were high in February to April during the hot weather, while diarrhea, colds and fever were very evident from May until December during the wet season. In addition, high incidence of health problems with swine occurred in December.

In the case of water availability, it was low during January until May and high for the remaining months. Water recharge is directly related to the precipitation rate for a given time.

Typhoons and drought are the climatic hazards that damaged infrastructure and negatively affected assets of many farmers in Barangay Dancalan Central. Five typhoons brought massive damage to infrastructure and livelihoods: Sisang, Rosing, Reming, Milenyo and Glenda. According to the participants,

Typhoon Rosing was the strongest in terms of rainfall, while typhoon Glenda became the most fatal in terms of wind speed and gust. However, both typhoons knocked down several trees. Storm surges also damaged houses along the shoreline as well as the perimeter dikes. Coastal erosion was also observed. Heavy rainfall drowned farm animals, eroded the roads, washed out rice farms and overflowed the river, causing water turbidity, while strong winds uprooted coconut trees, damaged assets such as houses, fish nets and motorboats, toppled electric posts, and caused a power outage for 2 months. Debris blocked the road, resulting to poor transportation. The damage resulted in huge workloads for men farmers in land clearing and rehabilitating farms.

The community also experienced El Niño in 1970 and drought in 2014. Both affected farming activities. Drought resulted in changes in fishing patterns, poor and immature growth of coconuts, and dried up soil and crops. High temperatures caused marine species to move to cooler places. Fishers reported low catches during prolonged drought. Another problem was higher electric consumption and consequent charges. Summer is hotter and more prolonged as recently experienced. Typhoons Tisoy in 2019 and Quinta, Ulysses and Super typhoon Rolly in 2020 brought so much destructions to livelihood sources, houses and government infrastructures.

6.2. Who are most affected – process, criteria, households

The participants defined vulnerability as "the incapability of an individual to easily recover and respond to disaster." The participants defined vulnerable groups in Dancalan Central with the following criteria:

- Families living near the shore
- Families with large numbers of members
- Tenants/non-landowners
- Incapacitated persons
- Widows/single parents
- The elderly
- Those with no other source of income

6.3. Coping Mechanism

To cope with the losses, some members of the community worked in Manila and nearby provinces as house helpers, construction workers, or other temporary jobs to support their families. Some farmers planted rice in *katihan* (lowlands). Farmers saved, harvested, and sold partly damaged crops and the community conducted clean-up after the storm. Some residents engaged in broomstick and charcoal production while others engaged in fishing.

The participants said that the community is now vigilant on the rapid changes that occur in their surroundings. They are now prepared for the upcoming storms or droughts by securing their assets and preparing their emergency kits. Residents near the shoreline conducted pre-emptive evacuation. News and information are now accessible.

7. Summary and Findings

Climate has always been a significant factor for the growth and development of agricultural crops. Water is an important element in growing coconut, rice, and vegetables. Both too much and too little water can hamper production and affect livelihoods.

Barangay Dancalan Central has diversified sources of livelihood such as coconut and copra, broomstick making, charcoal making, and fishing. Coconut, the main source of livelihood, is susceptible to strong typhoons and lack of rain. With hotter temperatures, wetter rainy seasons, and frequency of strong typhoons, farmers' livelihoods are at high risk unless they diversify their crop and sources of livelihood.

Most residents are tenants who depend solely on crop production. They do not have access to or control over their farms to maximize their full potential to grow other crops or to raise swine or other livestock.

Others rely on broomstick making or fishing as an alternative source of livelihood. However, fishing is also at risk of typhoons and drought. To cope and recover, the community practices *bayanihan* and some residents seek temporary non-farm jobs outside Guinayangan.

Interventions

- 1 farmer adopter of low external input rice production (LEIRP)
- 5 farmer adopters of improved goat raising
- The government build road through PDRP.

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes, good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in thecommunity, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that willprevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where are they located.

Annex B: Outputs of Community Workshops

1. Livelihood Matrix

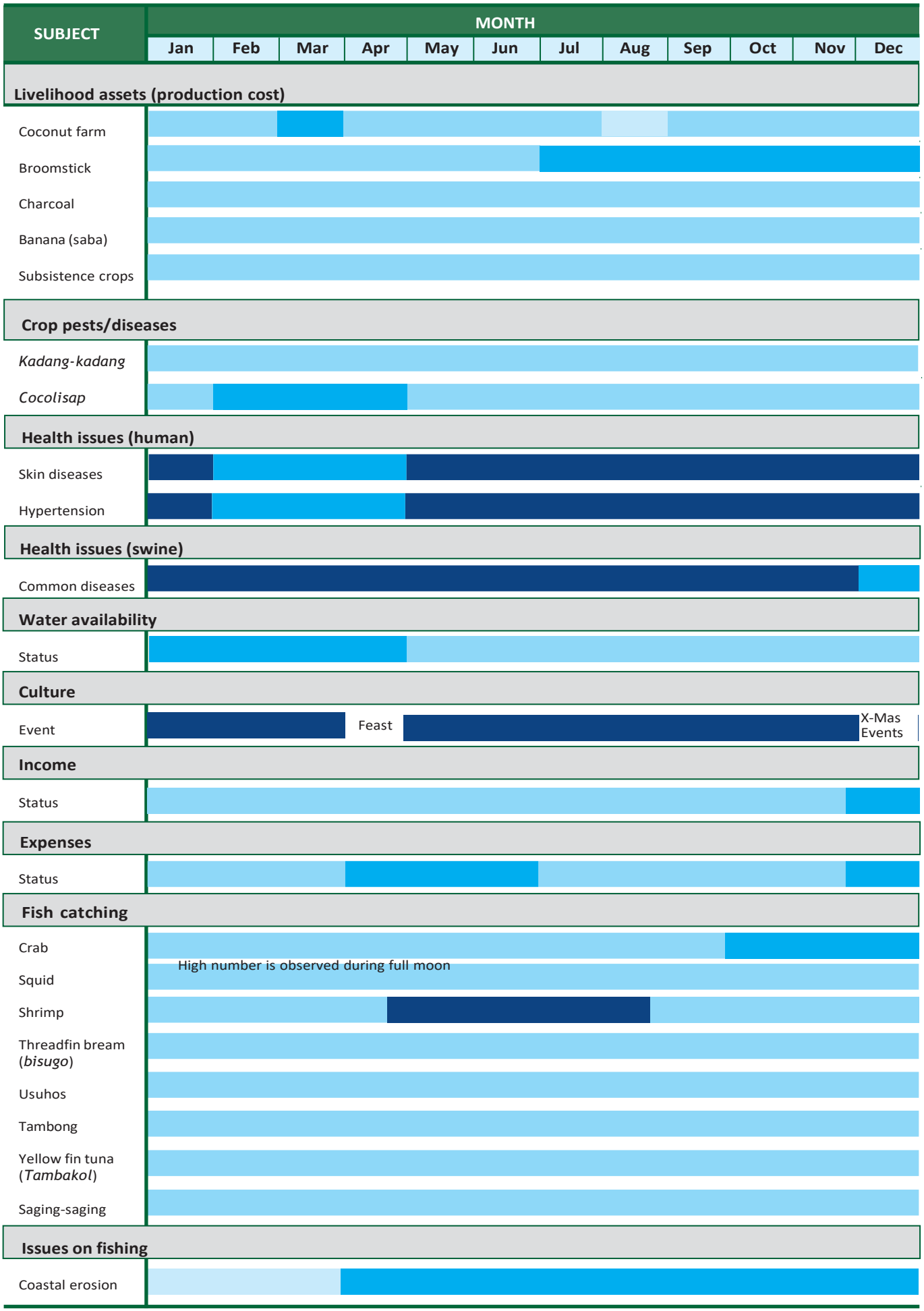
LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS
PHYSICAL & NATURAL		
Shoreline	High coastal waves pounded the shoreline. Typhoons also drowned farm animals. Prolonged dry spells resulted in variation of fishing patterns.	Residents near the shoreline conducted pre-emptive evacuation. Residents planted rice in the lowland (*katihan*)
General infrastructure	Typhoon damaged assets (houses, fishnets, motorboats)	Repaired damages
Roadway (dirt road)	Typhoon eroded the roads while debris blocked the road resulted to poor transportation.	Community clean-up
Coconut farms	Typhoon uprooted and broke coconut trees. Drought resulted in poor and immature growth of coconuts	Saved, harvested, and sold partly damaged crops
Rice farm	Typhoons washed out rice farms while drought dried up the soil and crops.	Rehabilitated partly damaged crops
Electricity post	Typhoon toppled down electric posts and power outage lasted for 2 months. Drought resulted in higher electric consumption and bills.	Procurement of generator, gas, battery, and solar device
Deep well, spring, stream and LWUA	Excessive rains overflowed the river and caused water turbid Absence of rain dried up the water sources	
SOCIAL		
RIC, KALIPI, farmers, *asahan* and *kalahi*	Absence of meeting	
HUMAN		
Male farmers	Typhoons resulted in heavier workloads for land clearing and rehab of farms	-
Female farmers	Women have additional household loads while hotter temperature caused hypertension	-
Children/youth	Strong typhoons choked the children and youth while drought caused common diseases such as colds and flu	Parental counseling Medication
FINANCIAL		
MFi (TSPI, CARD	Relief operations medicine and food) Could not pay	Provisionally paid off by friends

Legend: A= Typhoon; B= Drought

2. Seasonal Calendar

CLIMATE

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Condition (past years)												


SUBJECT
MONTH
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Livelihood assets (production cost)
Coconut farm
Broomstick
Charcoal
Banana (saba)
Subsistence crops
Crop pests/diseases
Kadang-kadang
Cocolisap
Health issues (human)
Skin diseases
Hypertension
Health issues (swine)
Common diseases
Water availability
Status
Culture
Event
Feast
X-Mas Events
Income
Status
Expenses
Status
Fish catching
Crab
Squid
High number is observed during full moon
Shrimp
Threadfin bream (bisugo)
Usuhos
Tambong
Yellow fin tuna (Tambakol)
Saging-saging
Issues on fishing
Coastal erosion
Legend:
Low
Normal
High
No Activity

3. Livelihood and Gender Analysis

Comparison of the activities being performed by both genders under coconut farming

COCONUT FARMING	
ACTIVITY	PIE CHART
Nut poling/picking (*kawit*)	
Nut collection	
Hila/parada	
Tapas	
Yield counting	
Mechanical shelling	
Kamada	
Hango	
Tigkal	
Pili (tusta ulit ang hilaw)	
Product packing	
Imbasi	
Sulit (marketing)	

SIGNIFICANT PERSONS

Owner (land) and owner (jeepney or vessel)

Tenants

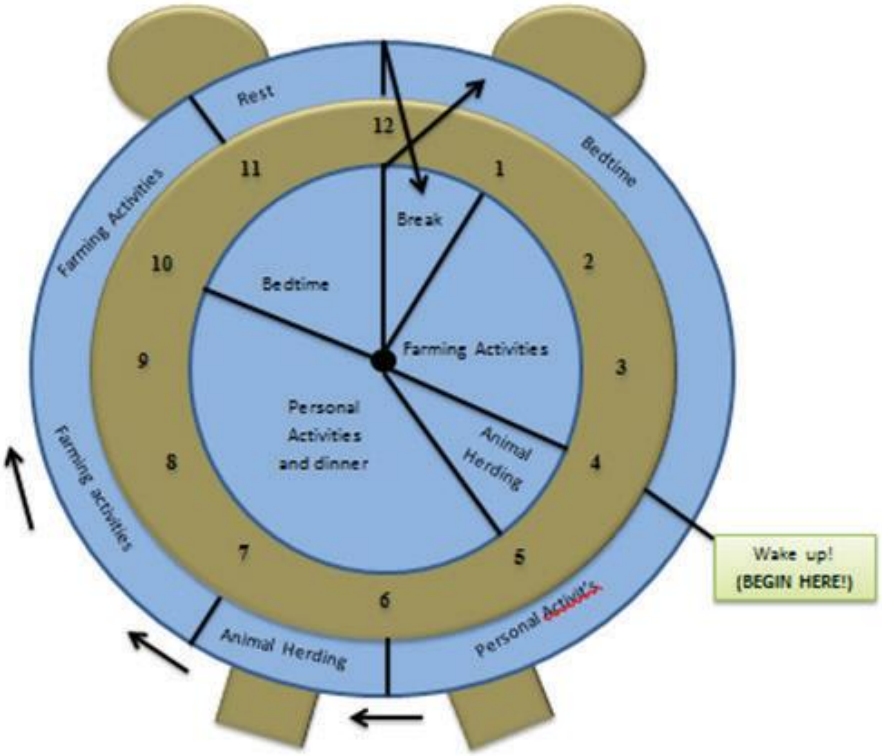
Laborer

Kasa (buyer)

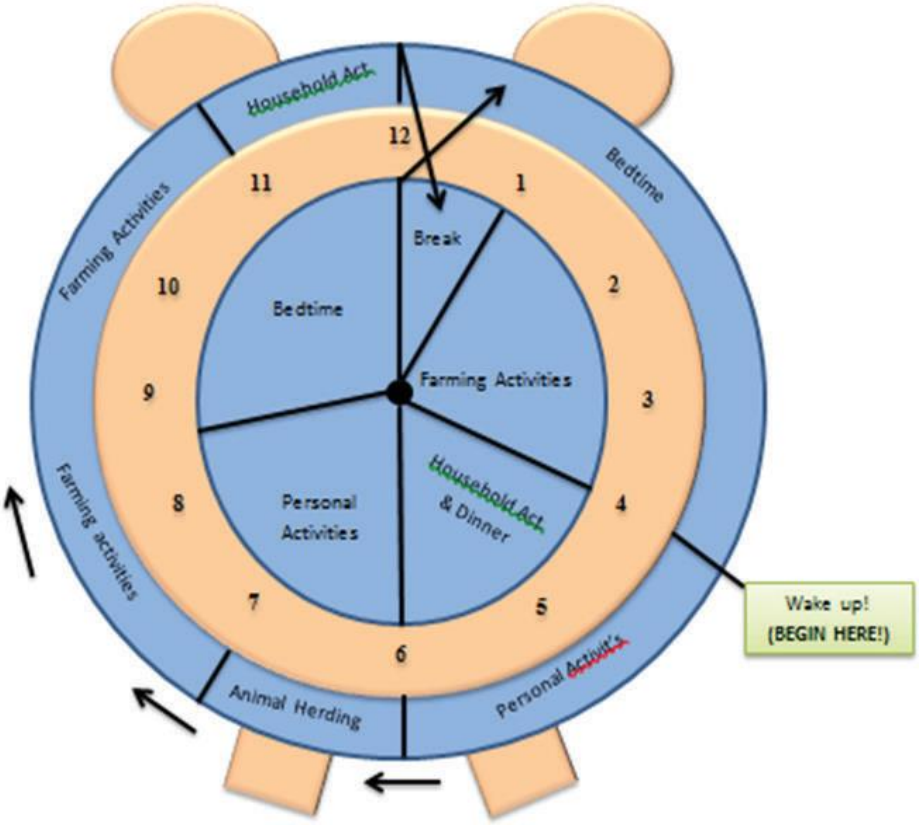
LEGEND: **Male** **Female**

4. Gender Clock

MALE

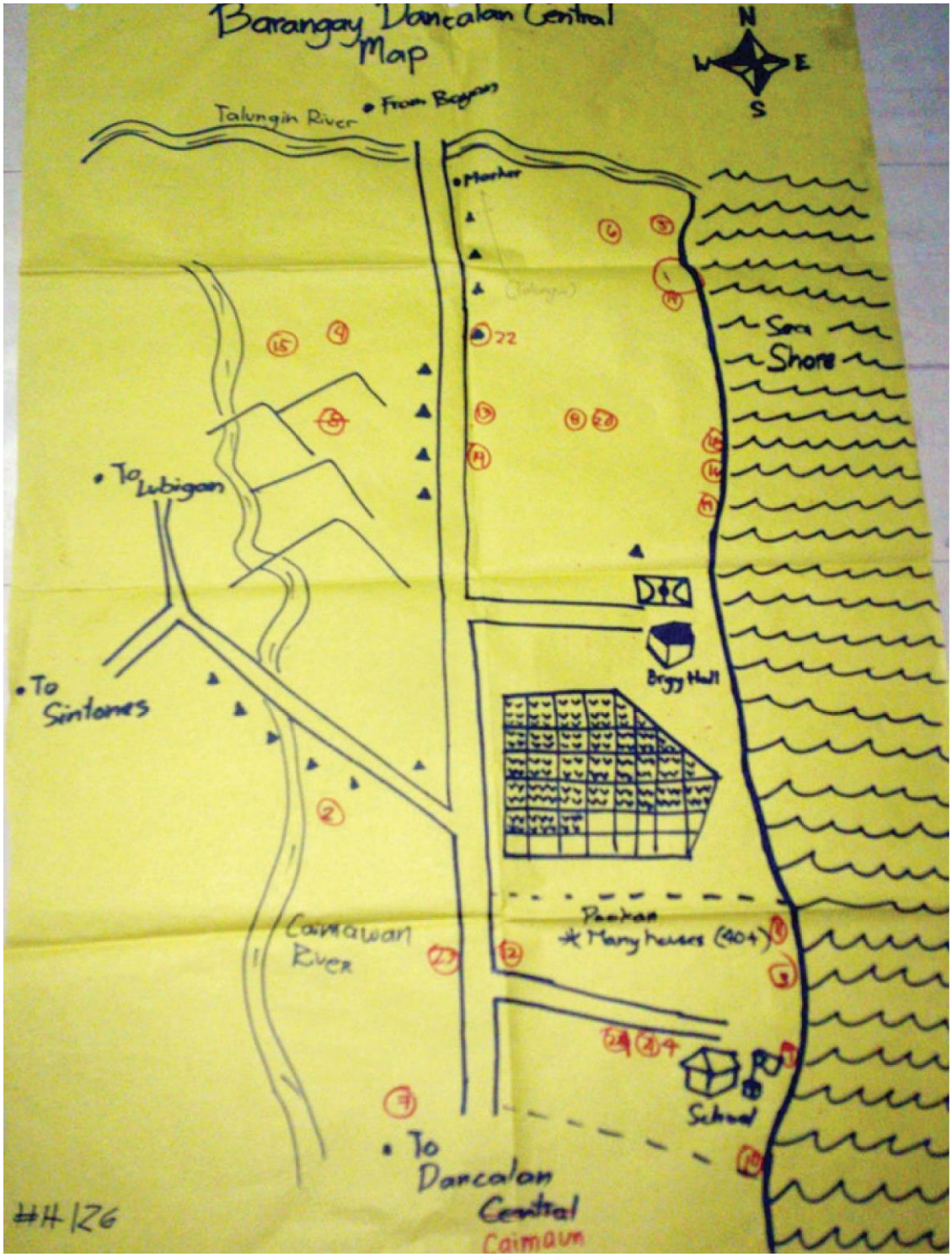


FEMALE



5. Community Mapping

Figure 1. Community-generated map of Barangay Dancalan Central, Guinayangan, Quezon



Barangay Ermita

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and update on interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

1. Establish with the community the livelihood conditions in the village using the 5 capitals;
2. Determine community's perception on changes in climate, its impacts on their livelihood and other factors/drivers;
3. Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
4. Establish an in-depth analysis of the climate change related risks faced by farmers, existing coping mechanisms, possible adaptation measures and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment was conducted last October 24, 2014. The participants totaled to 30 with 18 male and 12 female. After a plenary discussion on the purpose of the activity, the participants were divided in 2 equal groups representing age and gender. The first group was tasked to do the timeline and the seasonal calendar and the other group on livelihood matrix and livelihood and gender role. Workshop was done simultaneously. The group was then again divided according to gender for the gender clock.

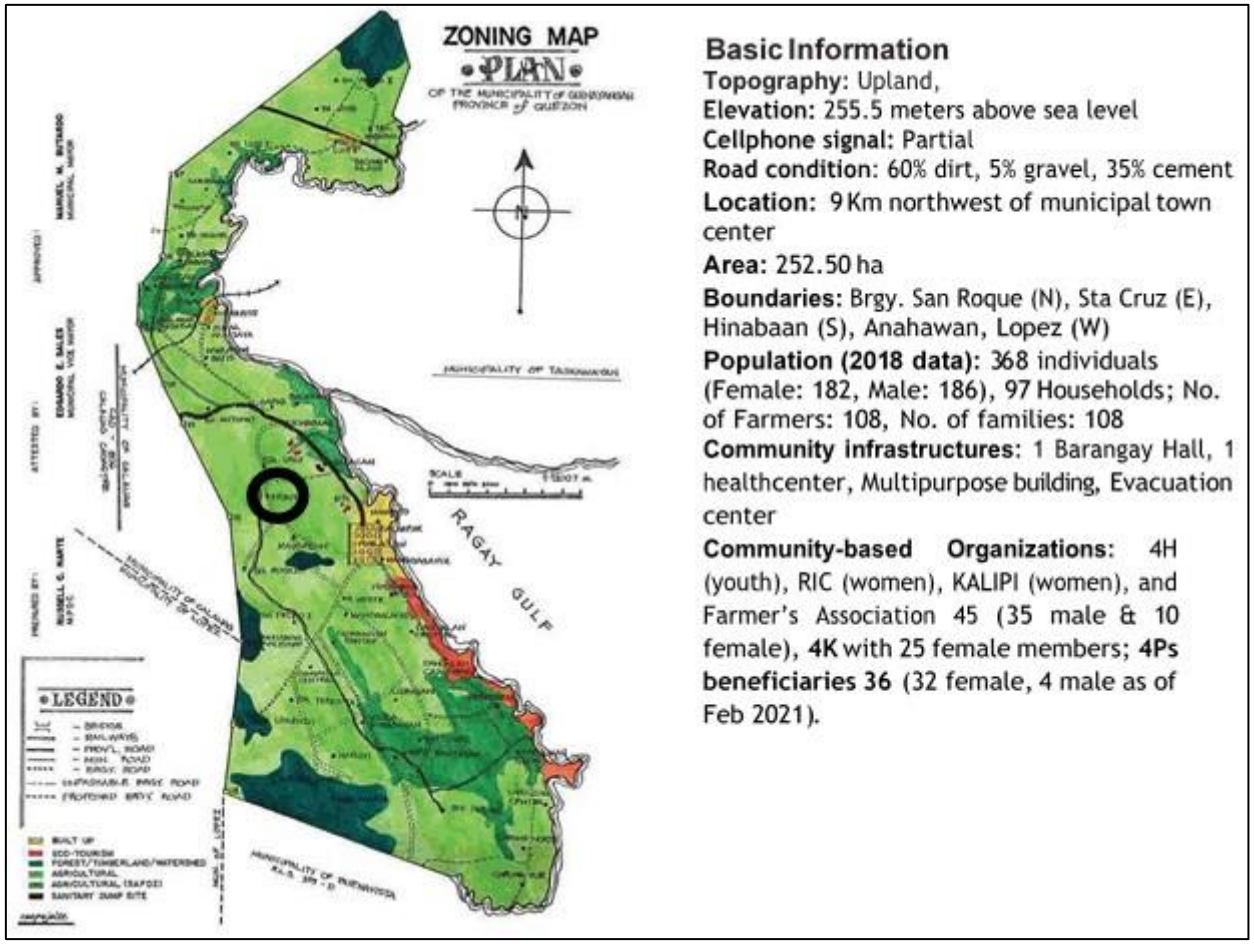
Focused group discussion was the method used using the following participatory appraisal tools: seasonal calendar, timeline, livelihood matrix, gender clock and problem tree (see Annex B for description of each tool).

Additional data and information for this report was also gathered through key informant interview to Barangay Officials. Secondary data were further gathered at the Municipal Planning Office, the Office of the Municipal Agriculture and the Department of Social Welfare and Development. Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Ermita is an upland barangay located 9 kms from the town center. The barangay is accessible from Sta. Cruz through an all-weathered road and from Anahawan in Lopez with dirt road that is passable during dry months.



Basic Information

Topography: Upland,
Elevation: 255.5 meters above sea level
Cellphone signal: Partial
Road condition: 60% dirt, 5% gravel, 35% cement
Location: 9 Km northwest of municipal town center
Area: 252.50 ha
Boundaries: Brgy. San Roque (N), Sta Cruz (E), Hinabaan (S), Anahawan, Lopez (W)
Population (2018 data): 368 individuals (Female: 182, Male: 186), 97 Households; No. of Farmers: 108, No. of families: 108
Community infrastructures: 1 Barangay Hall, 1 healthcenter, Multipurpose building, Evacuation center
Community-based Organizations: 4H (youth), RIC (women), KALIPI (women), and Farmer's Association 45 (35 male & 10 female), **4K** with 25 female members; **4Ps beneficiaries 36** (32 female, 4 male as of Feb 2021).

4.2. Village History

Ermita used to be part of Sta. Cruz. It became a barangay in 1971 though infrastructure improvement already started in the 1960 when the church was built. The area became accessible to motor bikes in the 1970s when an earth road was opened. Between 1992-1996 the multi- purpose hall was gradually constructed. It was only in 1998 that electricity came to the area and establishment of barangay health center in 2013 that provided access to health services.

From 1974 to 1975, civilians were terrorized by the clashes between NPA and AFP. Many residents decided to leave their places for a safer and peaceful life outside their barangay. Ermita was known for its upland rice production and kaingin system with cassava and peanuts as main crops in the early 1970. Only a few are still engaged in upland rice production at present as many preferred copra production when coconut was grown starting in the 1980s. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that the whole barangay with its 100% households engaged in farming is exposed to landslide and strong winds.

4.3. Land Use and Tenurial Arrangements

4.3.1 It has a total land area of 274 hectares, 2.5% (7 hectares) of which is dedicated to rice production and the rest (approximately 97.5% or 267 hectares) to coconut production.
4.3.2 Majority of Ermita's residents are tenants. Lands are owned by absentee landlords who live in the town area or in Manila.
4.3.3 Most farmers are dependent to coconut production. Cassava is also grown as a secondary crop.
4.3.4 Since majority are tenants, lands are not fully utilized and developed as they do not have decisions on land development.
4.3.5 A few farmers (5) are into rice farming. Around 2 are still using traditional varieties and doing upland rice farming.
4.3.6 Water source are dug wells. There is a river that provides to irrigation to backyard vegetables and some rice farmers are accessing it for their rice farm.

5. Livelihood Profile

5.1. Coconut production is presently the key livelihood activity of the barangay. This commodity is available throughout the year with August to December as its peak months while low production happens from January until March and normal production by April to July. In line with this, cost of coco meat and nuts is inversely related to their production quantity.
5.2. In the past decade farmers could usually harvest 10 to 30 pieces of coconut nuts per tree (every 45 days). Their production in this period was definitely higher than today with an average yield of 5 pieces per tree. Current data shows that prices decline from 10-12 pesos as the months of October until December approach.
5.3. Aside from coconut farming, growing of vegetables (pumpkin, eggplant, Chinese cabbage, mustard, lady's fingers, sponge gourd, and bottle gourd), grain (maize), and root crops (Taro and cassava) are considered as the secondary agro products by many farmers. These crops are usually grown for personal consumption only and excess products are sold into the market for additional profit for the family. Most recently obtained data for these products indicated that their planting season was from April or May before harvesting by August.
5.4. In the 1970s, the production of traditional crops (maize, *palay*, and taro) started to decline because the farmers began to shift their attention to coconut farming as it provided more stable income. The residents were also growing chicken and swine during this period though farm animals were not marketed in a large-scale basis but consumed by a family during difficult situations.
5.5. Planting vegetables returned a decade ago but irrigation in the upland barangay, which basically depends on the seasonal rainfall, has been insufficient as yet, thus the residents performed manual irrigation to revive their crops.
5.6. In the 70s, relay cropping was being practiced in the barangay. This means that crops are planted one after another such that traditional crops were usually planted in January and harvested in either May or April followed by maize in either May or June then harvested after three or four months. Months of October and November were prone to weather disturbances before, preventing farmers to risk their chance of growing crops. The next cropping season began in December until January of the following year. However, most current data for vegetable farming showed that planting began by April or May and harvesting occurred by August.
5.7. Ten years ago, ginger and cassava were very abundant in barangay Ermita, but because of the introduction of maize, these crops were dominated and gradually less valued. Ginger was present throughout the year before.
5.8. In the 70s, taro, San Fernando *gabi*, peanut, and cassava were the pioneer crops being grown by the farmers of barangay Ermita. April was the month for planting these crops before harvesting after four months. Taro was planted during October to December because of its adaptability to either dry or wet environment.
5.9. The participants agreed that most of the work for coconut farming is performed by males because females have other household roles to complete daily.
5.10. Significant persons identified for both sectors are: the buyer whose role is to set a fixed buying price for the farmers; the *kasa* that provides the business capital; the laborer who provides the required manpower; and the owner itself whose role is to provide jobs required for the coconut production.
5.11. In copra production, a typical female usually wakes up by 4am and performs all her personal activities which involve family care for three hours. By 7:00 am, the farmer will begin working until 11:00 am before having a 2-hr break. Farming activities will resume by 1:00 pm and lasts until 5:00 pm while personal activities, and meal preparation and dinner will be done six hours past 5:00 pm. The female farmer will then sleep by 11:00 pm that will last for five hours. Similarly, a male farmer performs the same daily schedule except that the food preparation is not part of his job and he spends more time in the farm than at home.
5.12. For rice farming, male has more farm works than that of the female but the former concentrates more of the time in the fields while the latter has to simultaneously integrate household activities and family care into the farm schedule.

5.13. Low production of copra has been identified as a major problem of farmers. This is attributed to infertile land as top soil is slowly washed away by rain. There are no other crops below their coconuts to hold off runoff. They also attribute low production to strong typhoons. Though they are usually hit 3-5 years interval, recovery period of coconut trees takes 1-3 years before it can be productive again.

6. Climate Change Perception

6.1. Perceived Climate Patterns

6.1.1. The climate of barangay Ermita has been consistently changing throughout the past years. Past weather (20-30 years) showed that season was more pronounced with January to March as the summer season and rainy season starts in April until December. However, weather patterns a decade ago showed that farmers could not distinguish dry and wet season as there were rains yearlong. Meanwhile current observations in the weather showed that there are longer dry months starting March until May with less rain starting June to September. Rains come late in October and last until February.

6.1.2. Changes in seasonality trends are shown in the result of the seasonal calendar. Thirty years ago, wet and dry season was more pronounced with wet season occurring longer starting April to December and dry season from January to March. However, patterns started to show changes 10 years ago as rainy months are combined with significant hot and dry days. Current conditions also showed that there are more dry and hot months from March to May and a mix of dry with rain and even storms from June to September. Significantly the three decades indicated dry and hot month in August. In fact, some call August "small summer". People also the farmers emphasized that they could not distinguish dry and wet season due to variability.

6.1.3. Extended dry season is validated both in the seasonal calendar and timeline as the community claims its occurrence every 8 years at the least. People shared that it only rains in Guinayangan when there is low pressure near the Bicol area (north east of the country). Meanwhile typhoon has become intense but occurs not too often. Typhoon Rosing in 1995 wreaked havoc to the coconut industry of the municipality with its strong winds was felt 14 years later with typhoon Glenda.

6.1.4. Cropping season was adjusted early 90s. Rice farming used to be two cropping seasons; first was from March until June; and second was from September until December. Rainfall was abundant in those months therefore farmers could grow *palay* without much worry on the irrigation supply. In the 70s, drought tolerant rice crops (Rc 75 and 36) were usually planted in April and June then harvested by September and October, respectively. The farmers insisted that the aforesaid crops have a good grain quality (pest resilient as well as it is tasty). They even experienced high yield with highly productive seeds that could be grown again for the next season. However, most recent cropping seasons took place only during October through January as dry season becomes longer as it can be gleaned from the weather calendar.

6.1.5. Results of the calendar showed that a decade ago to the present, temperatures are higher with more sunny days (January to September). Farmers revealed that it has affected their time of work in the fields. Both men are women farmers are susceptible to hypertension as they claim that intense heat triggers it.

6.1.6. In the most recent observation of the farmers, water supply was high in January before it slowly decreased afterwards until May. Water resources were at the lowermost level in the beginning of June before starting to recharge again in the next months. Peak period for water resources were observed by October until the end of the year.

6.1.7. In the timeline, 2 climate hazards affected livelihood in the community – prolonged dry season which was more frequent and happens almost every decade and strong typhoons which were almost 2 decades apart.

6.1.8. Moreover, during 1973 and 2013, El Niño phenomenon brought down the livelihoods of many locals. Farmlands were dried up while water resources became either insufficient or totally absent in various districts of the barangay. In line with this, many coconut trees produced poor quality nuts while some became useless. Death of many farm animals also occurred because grasslands were totally wilted and the weather was really intolerable. The residents were able to survive by saving the remaining amount of water in their place and by going through nearby areas to collect water. Summer is hotter and more prolonged as recently experienced.

6.2. Impacts

6.1.1. Though typhoons are felt 3-5 years interval, it was observed that intensity has increased. In fact, both typhoon Rosing in 1995 and Glenda in 2014 are considered to be the most destructive maximum wind of 180-200 km/hour. It has heavily damaged their coconut trees as nuts and leaves fell. A number of trees were also uprooted. Damaged coconut trees take 1-3 years to recover and achieved full production capacity.

6.1.2. Extended dry season affects rice and vegetable production and typhoon impact coconut production.

6.2. Who are most affected?

6.2.1. During the focused group discussions, participants identified the attributes of households and individuals that are vulnerable to the impacts of extreme typhoon and extended drought in their village. These are the following: households with large family, tenants or those with no land; differently abled persons; widow/single parent; senior citizen, and no other sources of income except providing labor for copra production.

6.3. Coping Mechanisms

6.3.1. Coconut production serves as a buffer during long period of dry season as it affects rice and vegetable production. Though during typhoon this crop suffers the worst as strong winds cause nuts and leaves to fall.

6.3.2. Temporary migration was the community's way of coping to these hazards as they seek jobs outside to bring home income for the family. Charcoal production served as an alternative income.

6.3.3. Typhoons Rosing and Glenda which respectively took place in 1995 and 2014 brought large-scale damage that challenged the lives of many residents particularly the farmers. There were individuals who migrated into the other towns to search for jobs while some just stayed in their place and maximized the available resources. Other than that, charcoal production was considered as a life-saving resort for many people but they clarified that this activity only involves those fallen branches that functioned as debris brought by the typhoon. Typhoons Tisoy in 2019 and Quinta, Ulysses and Super typhoon Rolly in 2020 brought so much destructions to livelihood sources, houses and government infrastructures.

7. Summary and Findings

7.1. Majority of Ermita residence are tenants and dependent on copra production. Results showed that coconut were heavily affected by typhoons that hit the village. Though it usually occurs 3-5 years, recovery period for the crop takes 1-3 years before it can achieve full productive capacity. Temporary migration has become the community's coping mechanism as they seek jobs outside of the municipality. In fact, during the FGD, participants revealed that many of the households have at least one family member that works outside of the municipality as this household member provides a more secure source of income that sustains the family.

7.2. The community has a history of cassava and peanut production as well as cultivating of traditional upland rice varieties which are still available. Supporting this cropping system and integrated in the coconut system should be explored with the farmers given the threat of long drought and typhoons.

Nature-Based Solution

Communities and LGUs have to be empowered to uptake more the natured-based adaptation for the sustainable management and use of nature for tackling socio-environmental challenges and issues such as climate change, water security, water pollution, food security, human health, biodiversity loss and disaster risk management.

The practice of nature-based solution is supported by nature, and this approach are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solution brings more, and more diverse, nature and natural features and processes into communities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solution further emphasizes the benefits for having biodiversity and support the delivery of a range of ecosystem services.

The nature-based solution initiatives are actions that work with and enhance nature so as to help people adapt to change and disasters. With this practice, healthy, resilient and diverse ecosystems (whether natural, managed or newly created) can provide solutions for the benefit of societies and overall biodiversity.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Ermita explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

These interventions are aimed to enhanced the livelihood options of the farmers through agroforestry and organic farming while educating them on the importance of enhancing intra species biodiversity in the upland coconut ecosystem. This is expected to reduce their current dependence on the forest product, enhance ecosystems services (e.g., pollinators) and enhance carbon sequestration through regenerative agriculture. The intervention is expected to influence the other barangays in the municipality on the importance of restoring biodiversity to the current predominant coconut-based systems.

These interventions also hope to address the challenges associated with the coconut mono-cropping pattern for copra production as revolutionized through the planting of different forest trees, coffee and cacao, and fruit trees species and shade trees and other understory food crops such as camote, taro, ube, banana, legumes, indigenous vegetables with added raising of native pigs and native chickens thereby increasing tree, crop and livestock biodiversity and sustained ecosystem development.

Farmers implemented agroforestry as a means to increase biodiversity in the upland coconut ecosystem. Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Livestock been included in the system as appropriate. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increase soil capacity for water and moisture retention. Trees not only help mitigate climate change (by absorbing carbon dioxide an important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro-climate and help reduce the desiccating action of wind. Trees store carbon in their biomass. Fruit trees, coffee, cacao, banana, and root crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits that can generate additional income for the farmers while ushering for the biodiversity enhancement in this coconut upland ecosystem.

The interventions brough both increase in economic activity in terms of family food security and nutrition and income as compared to the usual coconut dependence alone and positive impact to the environment brought about by the multiple plant and animal species raised in the area.

The increased in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens and honey that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development.

The following are some of the interventions by the collaborative partnerships of different actors at Barangay Ermita:

- Participatory action research (PAR) on Rice: 3 farmer-cooperators participated and 1 farmer on Legumes inter-cropping
- Farmers' adoption of Climate smart agriculture options:
    - 21 farmer beneficiaries adopted the low external inputs on pig production (LEIPP).
    - 21 farmer beneficiaries adopted the upland rice
    - 21 farmers beneficiaries adopted agroforestry
- Farmers trained on the different CSA technologies:
    - 21 farmers trained on native pig raising (LEIPP)
    - 21 farmers trained on agroforestry
    - 21 farmers trained on upland rice farming
    - 2 farmers trained on systems of rice intensification
- Enriching landscapes through fruit tree-based intensification: 16 farmers received the following seedlings:

221 rambutan	319 mango Guimaras
900 coffee	91 calamansi

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in thecommunity, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles; and if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

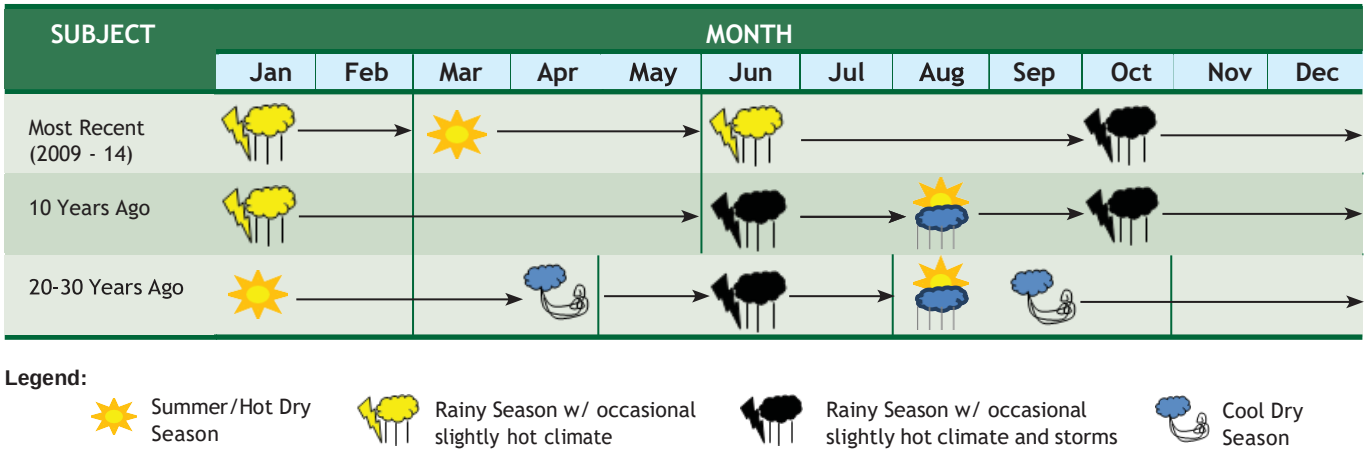
1. Timeline

Year	Events	Impacts	Coping Mechanisms
1970s	The area only accessible by small pathway before an earth road was opened	Agricultural product was easier to bring to the main town	
1973	Earthquake hit the area	Damaged roadways	Marketed farm animals (chicken, swine)
1980s	Coconut started to replace the kaingin and upland rice system of the barangay		
1995	Typhoon Rosing (Category 5)	Damaged houses and road ways as land slide occurred Coconut trees were completely destroyed that took them more than 2 years to recover.	Many left to work outside the municipality. Many resorted to charcoal making
1996	El Niño/ Extended dry season	Water became scarce the few farmers that were planting rice were not able to grow rice that time. Some livestock died as grasses became too dry	
2004-2005	El Niño/ Extended dry season	Rice farmers were affected as they did not grow rice that season	Farmers instead focused in coconut production. Many are seeking jobs outside of the municipality. Searched for the nearest water resource as far as Sta. Cruz
2013	El Niño/ Extended dry season	Water scarcity Very low productivity for rice farmers, some even had crop failure	Dug for wells Accessed water from Sta. Cruz
2014	Typhoon Glenda •(Category 4)	Damaged coconut trees as nuts and leaves fell out Destroyed houses and landslide in some areas	Labor migration (construction, helper)
2018	Prolonged drought	Many of the rice farmers did not harvest their crops. Same with the vegetables growers.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.
2019	Typhoon Tisoy	Destroyed coconut, vegetables, banana farms and fruit trees. Destroyed fishing boats, houses communications facilities and government infrastructures.	Many farmers resulted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief operations and cash for works programs.

2020	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.

2. Seasonal Calendar

CLIMATE / WEATHER

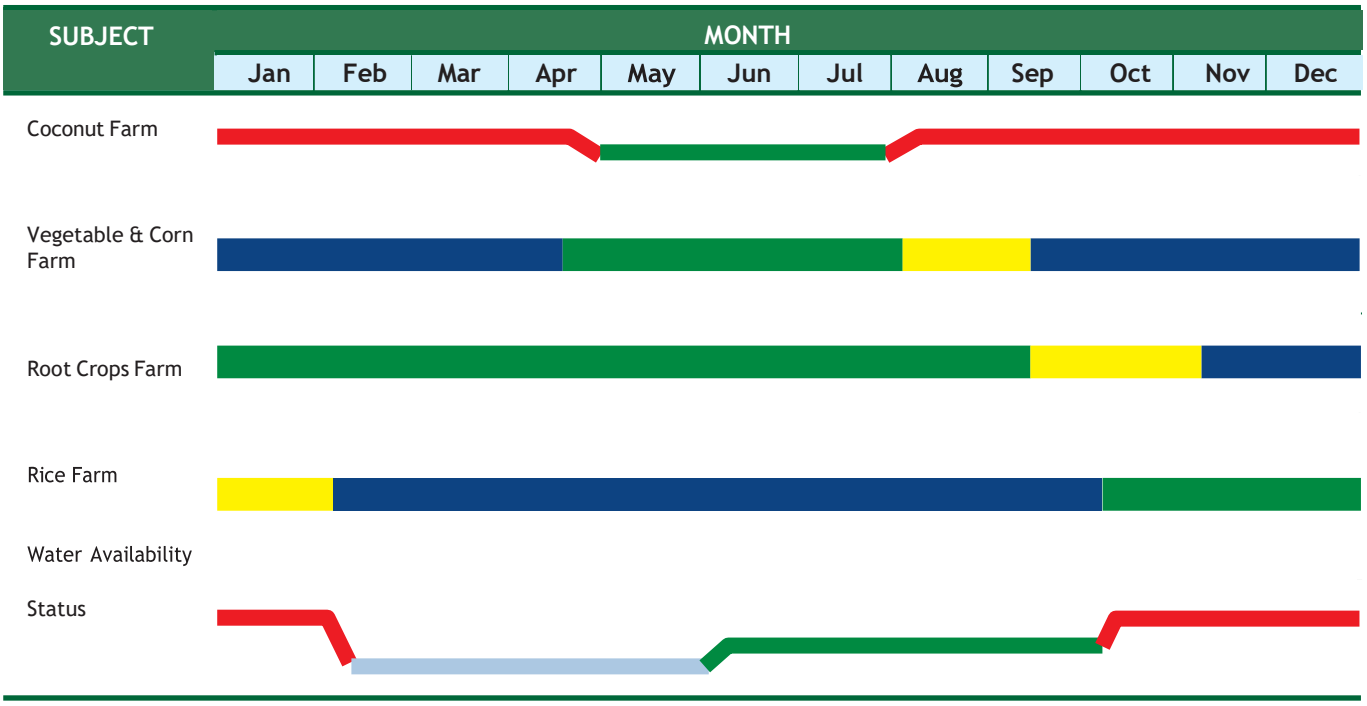


Legend:

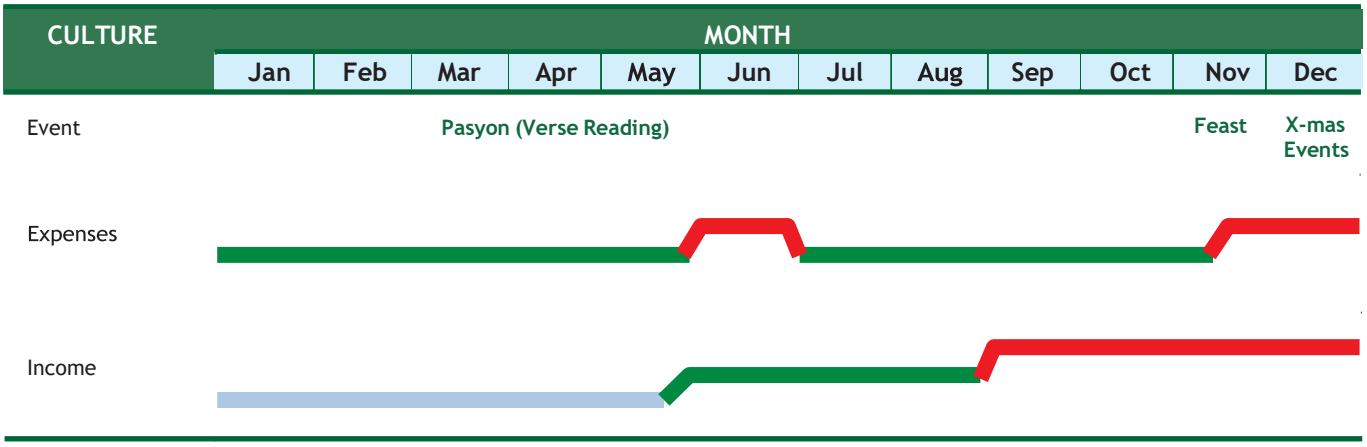
- Summer/Hot Dry Season
- Rainy Season w/ occasional slightly hot climate
- Rainy Season w/ occasional slightly hot climate and storms
- Cool Dry Season

LIVELIHOOD

Livelihood / Cropping Season



EVENTS and INCOME EXPENSES



3. Livelihood Matrix

LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS
PHYSICAL		
Road and Bridge	After a strong typhoon, roads are eroded, some bridges are prone to flashflood that results to inaccessible Roadways	Usually right after a storm, people do road cleanup immediately
House	During long dry season domestic water becomes scarce Houses with thatched roofs are prone to strong winds	Look for other sources either within or in other barangays
Coconut Farm	Nuts are smaller during prolonged dry season and lower production Coconut production is more affected by typhoon than long drought as strong winds batter the nuts and leaves	Shift to charcoal production
Rice Field	A) Unsuitable for crops B) Damaged crops	A) Planted Mungbean B) Grown alternative crops
Barangay Infrastructures	B) Damaged roofs	B) Repaired
Phone & Signal	B) Interrupted	B) Patiently waited
Electric Utility	A) High current bill B) Power interruption	A) Reduced consumption B) Utilized candles
NATURAL		
Well Spring	A) Dried up B) Overflown and turbid Water A) Low supply B) Poor taste	A) Harnessed water at nearby areas B) Well priming A) Saved water
HUMAN		
Female Farmer	A) Burden on household chores, hypertension B) Poor drying of clothes and common diseases	A) Saved water, washed clothes at nearby areas, and self-medication
Male Farmer	A) Late at work and hypertension B) Lent time for repairing damages	
Youth and Children	A) Rashes, measles and controlled shower duration B) Postponed classes	

4. Livelihood and Gender Role

Table 3. Comparison of the activities being performed by both genders under coconut farming

COCONUT FARMING	
ACTIVITY	PIE CHART
1. Tabas	
2. Kawit	
3. Ipon	
4. Tapas	
5. Baak/Hakot	
6. KamadasaLukaran	
7. Gatong	
8. Hango	
9. Tigkal	
10. Sakot (Luto)	
11. Gatong (Hilaw)	
12. Sako	
13. Pahila	
14. Sulit	

SIGNIFICANT PERSONS
Owner
Tenants
Laborer
Kasa (Buyer)

LEGEND: **Male** **Female**

Table 3. Comparison of the activities being performed by both genders under charcoal production

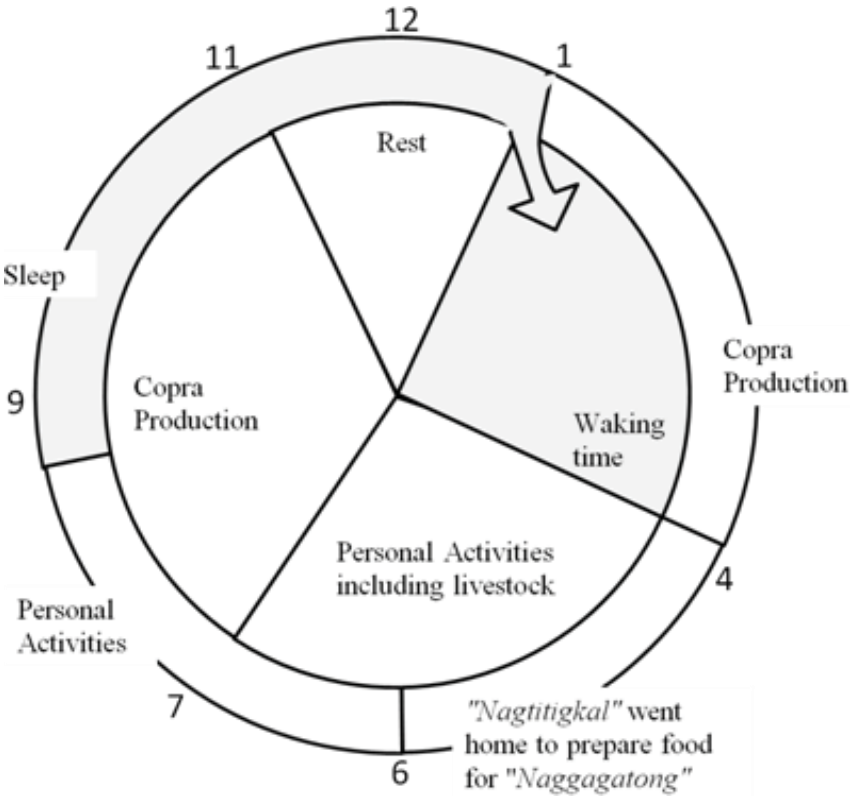
CHARCOAL PRODUCTION	
ACTIVITY	PIE CHART
1. Hapal	
2. Pagtatalas	
3. Hakot	
4. Putol	
5. Patas/Kamada	
6. Ipon dahon/dayami	
7. Taklob ng Lupa	
8. Gatong	
9. Bantay	
10. Paghahango (dilig)	
11. Sako	
12. Tahi	
13. Hila	
14. Sulit	

SIGNIFICANT PERSONS
Owner
Tenants
Laborer
Kasa (Buyer)

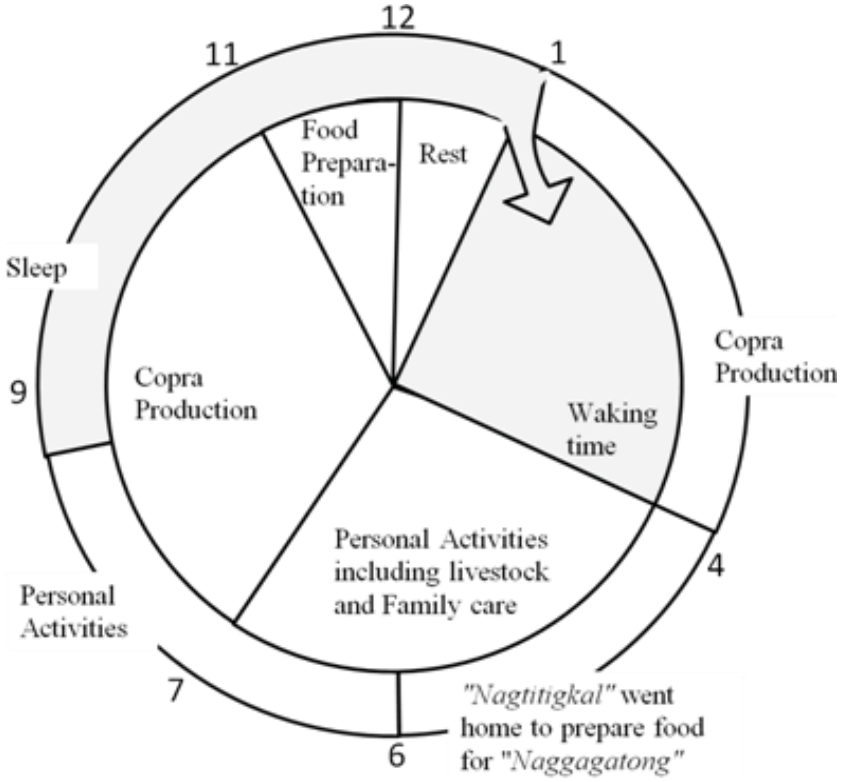
LEGEND: **Male** **Female**

5. Gender Clock

MALE



FEMALE



6. Problem Tree

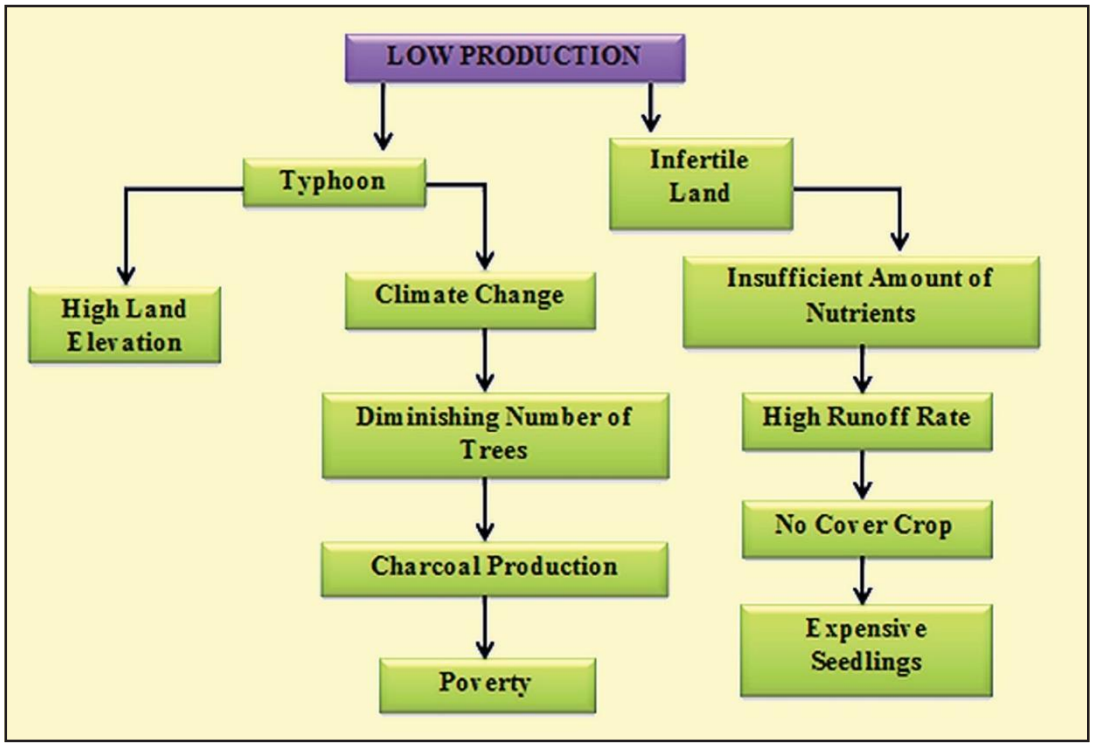


Figure 4. Problem tree of barangay Ermita with concern about its coconut farming system

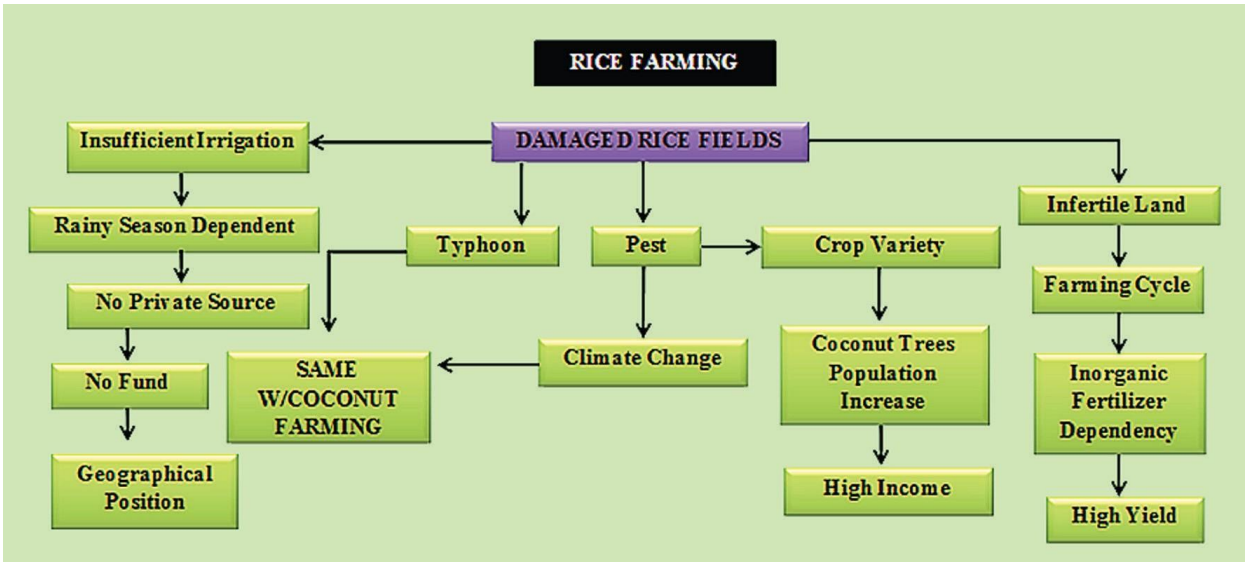


Figure 5. Problem tree of barangay Ermita with concern about its rice farming system

7. Community Mapping

Himbubulo Weste

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and updates on development interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

- Establish with the community the livelihood conditions in the village using the 5 capitals;
- Determine community's perception on changes in climate, its impacts on their livelihood and other factors/drivers;
- Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
- Establish an in-depth analysis of the climate change related risks faced by farmers, existing coping mechanisms, possible adaptation measures and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment (PVA) study was conducted at the Himbubulo Weste barangay hall last October 2014 with 25 participants (20 men and 5 women), representing the barangay council members, headed by the Barangay Chairman and coconut and vegetable farmers. This was the 4th barangay where PVA was conducted. Focused group discussion (FGD) was done using different participatory rural appraisal (PRA) tools: seasonal calendar, timeline, livelihood assets matrix, 24-hour clock and problem tree. Description of these tools is in Annex A.

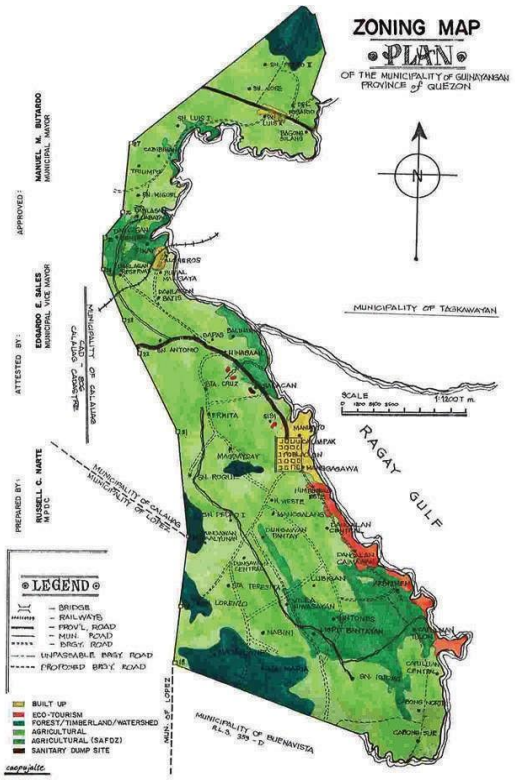
Additional data and information for this report were also gathered through key informant interview (KII) to Barangay Officials. Secondary data were further gathered at the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information.

The study was limited to agriculture as livelihoods of the community. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Himbubulo Weste is an upland agricultural community located 5 kilometers from the municipal town proper. It is accessible by all types of vehicles due to an all-weather road that connects it with the rest of the municipality. Himbubulo Weste covers a portion of the Maulawin Spring Protected Landscape (MSPL), one of Guinayangan's watershed. A total area of 105 hectares of the barangay is within the MSPL buffer zones involving 40 farmers covered buffer zone of Maulawin Spring Protected Landscape (MSPL). The MSPL has an area of 183.15 hectares declared protected area per Republic Act No. 11038.



Basic Information

Topography: Upland
Elevation: 209.5 meters above sea level
CP Signal: Partial
Location: 5 km northeast of municipal town center
Area: 650 ha.
Road condition: Dirt 10%, Gravel 35%, Cement 55%
Boundaries: Magsaysay (N), Calimpac (E), Hinabaan (S), Ermita (W)
Population (2018 data): 532 individuals (271 female, 261 male), 134 Households 100% in farming
Community infrastructures: 1 elementary school, 1 secondary school, 1 health center, Barangay hall, Multi-purpose hall, evacuation center, electricity
Community-based Organizations: Himbubulo Farmers Association (HFA) 30 male members, Stewardship Tenured Migrants of Maulawin Protected Area (STMMPA) 40 members (20 male, 20 female), **4K** 45 members (all female), **KALIPI** 60 female members, **4Ps** 70 beneficiaries (52 female 18 male) as of Feb 2021.

Most men of this community involve themselves with the cock fighting activity that is actively present from January to April, yet they celebrate Valentine's Day on the 14th of February with their loved ones. Next highlights of the year happen in the months of May, November and December in which San Isidro feast, All Soul's Day, and Christmas events are respectively celebrated.

4.2. Village History

In 1930s, Barangay Himbubulo Weste was divided into three (3) separate communities: Himbubulo Weste, Himbubulo Este and Magalang. The division resulted to better community administration and management.

Barangay Himbubulo Weste's milestone was characterized by major disturbances and the onset of infrastructure and development works that resulted to major socio-economic changes in the community.

In 1973, a 7.2 magnitude earthquake struck the community. Many barangay infrastructures such as roads and agricultural lands were damaged. Some trees were uprooted and the supply of water dried up as groundwater flow pattern was disturbed. This caused diseases to people and animals. Drought like conditions and typhoons were the two (2) major climate-related milestones experienced in the village.

In 1940s forest trees were replaced with planting of coconut trees which offered better income for the community. Corn used to be the main livelihood and staple food in the community in 1950s until 1970s.

In 1980-1984, the community experienced extreme violence under the Marcos administration, where many innocent people died because of the government's order for the complete elimination of the armed rebel group New People's Army (NPA), whose presence was then very concentrated in Guinayangan, Quezon. The residents were accused of being involved with the activities of the NPA and thus were not exempted from the mass killings under the martial law. Hunger immediately spread all over the community because of the security issues that restricted them from working in the farms. Some people were sneaking down to the main town of Guinayangan to secure their lives. They went out at night and then returned back home every morning to secretly work on their farms to at least survive starvation that spread throughout the barangay.

Among the major socio-economic developments the participants remember are the establishment and construction of barangay road, health centers and barangay hall and rural electrification. The construction of barangay road in 1994 provided access to and from barangay resulting to better commerce and transportation system. It also contributed restoring peace and order in the community. The establishment of health center and barangay hall improved delivery of basic services and governance. Likewise, the installation of electricity in 1999 provided comfort and convenience.

4.3. Land Use and Tenurial Arrangements

Out of the barangay's 650 hectares, 89.97% of which is allocated to coconut farms while the remaining 10.03% is planted to vegetable farming. Majority of the residents in the community are tenants. There are some who owned their land as well. The barangay hosts part of the Maulawin Spring Protected Landscape. There are 51 farmers living within the 50 hectares multiple use zone of the watershed. They are covered with the Protected Area Community-Based Resource Management Agreement (PACBRMA) for 25 years that allows them to live and utilize the land in the multiple use zone in exchange of helping the government maintain and protect the watershed.

5. Livelihood Profile

Barangay Himbubulo Weste is an agricultural community. Majority of the residents are engaged in coconut farming particularly *paglulukad* or copra production. Other sources of livelihoods are corn, root crops such as cassava, taro and sweet potato. Vegetables and legumes, i.e., *kalabasa* (squash), eggplant, chili, sitao (string beans) and tomato, are also planted in the community.

The traditional process of coconut production is generally termed as *pagkokopra* or *paglulukad* with copra (desiccated coconut) as the main product sold by the farmers to a casa in the town proper. Mature coconut is normally harvested every 45 days. Production of coconut is at lowest during the months of April and May due to high temperature while production is at highest during the month of August. The farm gate price of coconut during its peak is at Php 35 per kilo while Php 18 is the normal or average price of coconut.

Corn is the second main livelihood in the community. It is grown from March to July. Legumes such as peanuts, root crops, banana and vegetable are also grown throughout the year.

Majority of the landowners employ laborers to deliver the services required of producing copra. This is mainly because the household cannot do it alone. Most of the labors though are also from neighboring households. As such, while most farmers in Himbubulo Weste are tenants, they are also laborers themselves who work in other coconut farms.

Aside from farmers, key important actors to the copra value chain supply are the land owners and casa who provides capital for the land owners. Majority of men and women in Barangay Himbubulo Weste relies on copra production as their main source of livelihood. The participants identified 15 activities that are done in copra production. The participants said that most of the work is performed by men because women have other household roles to complete daily. For *pagkakakawit*, *lulutiin*, and initial *pag-iimbasi*, the males perform all the required tasks. For *pag-iipon* at *tabas*, *pagpapatas* and *pagkakamada*, *paghahango*, and *pagtitigkal*, both genders have even labor contribution. While for *paghahakot*, *pagbubunot*, second *pag-iimbasi* and *pagsasako* the males do most of the job; for

pagbabaak, only the females perform the labor requirement; for *pagtutusta*, the males perform 75% of the workforce; and for *pagsusulit* only the owner is authorized to handle it.

The daily routine of a typical female farmer in barangay Himbubulo Weste begins at 4:00 am. She spends nine (9) hours for household activities including tending her children, personal activities and tending their farm animals; six (6) hours on the farm/field activities, and nine (9) hours of rest and sleep. Meanwhile, a typical male farmer spends seven (7) hours for personal activities and tending farm animals, seven (7) hours on the field and 10 hours of rest and sleep including eating meals. Unlike the woman farmer, male farmer has more time to rest, for family time and for himself. Woman does the household chores and duties. Annex 4 show the 24-hour clock activities of male and female farmer engaged in copra production.

Pest such as *kadang-kadang* which starts to thrive during dry months appear in small numbers during January until February and becomes more visible during March and April. *Kadang-kadang* is a disease that also attacks and damages coconut production. Furthermore, *Bayuko* (local snail), *Uod* (worm) and *Atangya* are observed during the rainy season. *Atangya* or black bug is a sap-feeding insect that attacks rice plants at almost stages of its growth.

Eliminating poverty in the barangay is the biggest challenge for the community. According to the participants, the growing population of the Himbubulo Weste community demands more from the resources available in community.

According to the participants, drought and typhoons caused poor quality of copra commands cheaper and lower market price. The changes in climate pattern also affect the overall productivity of different crops while it also directly hits the livelihood of many residents. As a result, many trees are cut down for charcoal production that would provide additional profit to the residents.

6. Climate Change Perceptions and Coping Mechanism

6.1. Perceived Climate Patterns

The dry season is in the months of March and April as they felt an extremely hot days and nights. Most recent climate patterns (2012~2014) showed that moderate climate conditions were experienced twice a year compared to only once a year (from January to February) in the past decades.

During the dry months, however, the community experiences very little or no rainfall at all. The sources of community water for drinking and domestic use are prone to drought. The absence of rain has a great impact to their water availability.

Water supply normalizes during the months of January to March and May to August, large volumes of water arrive during September to December as the wet season officially begins.

Unpredictable climate pattern, i.e., longer hot days with no rain then followed by excessive rains in one or two days affected health and activities in the community. Some members of the community could not work efficiently and conveniently. This is affecting services and activities in the community. Women farmers spent less time on the field to avoid too much heat exposure. The participants observed that cases of hypertension increased due to severe hot temperature. Furthermore, children are at risks with unpredictable climate conditions. They easily catch common diseases like cough, colds, and fever. Summer is hotter and more prolonged as recently experienced.

6.2. Impacts

Typhoon and droughts are the major climate-related events that affected the livelihood in the community of Himbubulo Weste.

The community recorded two (2) droughts in 1975 and 1986 that dried up their source of water, damaged crops and coconut, caused death to many farm animals and community disease such as measles. Crops were damaged while coconut produced immature nuts. Coconut farming had even experienced poor production of coconut due to immature growth of nuts triggered by extreme heat condition, but in one

positive aspect, drying became easier because the process became easier as the ambient temperature rapidly brought the coconut meat into its required moisture condition.

However, participants noted that mango production increased that helped some community members recover from other crops losses.

Furthermore, many forest trees dried and eventually died due to inefficient amount of water coming from different water banks. Some animals also died as their environment became very unsuitable for growth and development. Prolonged absence of rains dried up springs and dug wells.

Furthermore, children in the community catch common diseases like skin rashes, cough, colds, and fever because of the prolonged absence of rain and high temperature.

In 1995 and 2014, Typhoons Rosing and Glenda brought large-scale damage to their livelihood. Strong winds and heavy downpour caused by Typhoon Rosing caused a six-foot high flood when the Hiwasayan River overflowed. This submerged most farm lands and drowned many farms and domestic animals. Because of the loss of these valuable assets related to food production, famine arose.

Meanwhile, Typhoon Glenda affected coconut production resulting to reduction in copra production and loss of livelihood. The drying facility of some residents received minor damages that decelerated the production of coconut meat, but the residents easily recovered by repairing and strengthening the facility. Many temporary roads also instantly became impassable because of the poor capability in withstanding flashfloods and road blocks; therefore, they suggested that concrete roads with shoulder canals should be constructed immediately to avoid similar inconvenient situation in the future. Phone signals and power supply were also interrupted due to extreme winds of the typhoons that knocked down several utility posts.

In late 2020, the Philippines was battered by three very significant weather disturbance rapid succession displacing over three (3) million people and leaving more than 100 deaths, lots were injured and many are still missing as reported by the national government authorities. Southern Luzon, particularly Guinayangan municipality (and Himbubulo therein) in Quezon province was among the places devastated by these consecutive storms in span of 17 days:

1. October 26, 2020 - Typhoon Quinta (International Name: Molavi). Maximum sustained winds: 205 kph (125 mph). Guinayangan was placed under Typhoon Signal No.: 3 with winds of 121 kph (to 170 kph (105 mph).
2. November 1, 2020 – Super Typhoon Rolly (International Name: Goni) an extremely powerful tropical cyclone that made landfall as a Category 5–equivalent super typhoon. Maximum sustained winds: 315 kph (195 mph). Guinayangan was placed under Typhoon Signal No.: 4 a ferocious wind of 171 kph (106 mph) to 220 kph (136 mph) with gustiness up to 310 kph (192 mph) was experienced by the local residents for several hours.
3. November 10-11, 2020 – Typhoon Ulysses (International Name: Vamco) a powerful Category 4-equivalent typhoon with strong winds reaching 205 kph (127 mph) near the center. Guinayangan reached up to Typhoon Signal No.: 3 with winds 121kph (75 mph) to 170 kph (105 mph).

These storms brought strong winds, torrential rains and flying typhoon debris, caused flooding, landslides and destruction to houses, government and private communications and powerlines structures and facilities and incurring serious economic losses. Storm surge on coastal areas destroyed banca, fish cages and most fishing equipment. The agricultural livelihoods sources of the local residents both on crops, fisheries and livestock suffered devastation posting an equivalent damaged of PHP1.9 billion (US$40.6 million) as reported by the local OMA in Guinayangan. A total of 2,964 families equivalent to 17,784 individuals were evacuated either at the town center buildings, Barangay Halls and School buildings or temporarily stayed at others houses considered to be sturdy, 23 houses (initial report, still assessing) were totally damaged and 498 houses partially damaged. There were four (4) houses totally buried by landslide at Sitio Prenza, Barangay Calimpak. Initial report from the municipal disaster risk reduction and management office (MDRRMO) estimated over 150 million pesos cost of damage to government buildings and road infrastructures. Road clearings and assessments still going on and damages is expected to go up in the final report.

On the other hand, typhoons also resulted positive effects on the community's water supply. Excessive rains replenished groundwater supply and watershed.

6.3. Who are most affected?

People at risk are those who cannot afford to reach basic education, differently abled persons and widows.

6.4. Coping mechanism

The community adjusted their planting pattern and planted other crops such as peanuts and root crops to cope with the effects of El Nino. Others engaged in trading coco lumber and broom stick and charcoal making. They looked for other sources of water such as digging well. The participants stated that installation of pumps and new diversion canals could prevent extreme water scarcity.

7. Summary and Findings

Droughts and typhoons that badly hit the community adversely affected the production of coconut. As a result, the decrease in copra production resulted to loss of livelihood for men and women farmers.

Climate plays an important role for the farm schedule of a farmer as current agricultural systems are still highly dependent on the seasons for proper sunlight and rainfall conditions. Increases in temperature, however, slight could cause detrimental effects to some crops. Mono cropping and dependency to one source of livelihood puts farmers at risk. Diversification of sources of livelihood would provide support especially if the livelihoods are susceptible to changing climate patterns.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS, DA AMIA and IDRC provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options have been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Himbubulo Weste explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

These interventions are aimed to enhanced the livelihood options of the farmers at the MSPL buffer zones and those within through agroforestry and organic farming while educating them on the importance of enhancing intra species biodiversity in the upland coconut ecosystem. This is expected to reduce their current dependence on the forest product, enhance ecosystems services (e.g., pollinators) and enhance carbon sequestration through regenerative agriculture. The intervention is expected to influence the other barangays in the municipality on the importance of restoring biodiversity to the current predominant coconut-based systems.

These interventions also hope to address the challenges associated with the coconut mono-cropping pattern for copra production as revolutionized through the planting of different forest tree, coffee and cacao, and fruit trees species and shade trees and other understory food crops such as camote, taro, ube, banana, legumes and indigenous vegetables with added raising of native pigs and native chickens thereby increasing tree, crop and livestock biodiversity and sustained ecosystem development.

Farmers implemented agroforestry as a means to increase biodiversity in the upland coconut ecosystem. Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Livestock has been included in the system as appropriate. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increase soil capacity for water and moisture retention. Trees not only help mitigate climate change (by absorbing carbon dioxide an important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro-climate and help reduce the desiccating action of wind. Trees store carbon in their biomass. Fruit trees, coffee, cacao, banana, and root crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits that can generate additional income for the farmers while ushering for the biodiversity enhancement in this coconut upland ecosystem.

The interventions brought both increase in economic activity in terms of family food security and nutrition and income as compared to the usual coconut dependence alone and positive impact to the environment brought about by the multiple plant and animal species including honey bees raised in the area.

The increased in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens and honey that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development.

Following are some of the interventions by the collaborative partnerships of different actors at Barangay Himbubulo Weste:

- Participatory action research (PAR) on Agroforestry: 3 farmer-cooperators participated
- Participatory action research (PAR) on Goat Raising: 3 farmer-cooperators participated
- Farmers adoption of climate smart agriculture options:
  - ✓ 13 farmers on native pig raising (LEIPP) (male 3, Female 10)
  - ✓ 30 farmers on agroforestry (Male 5, Female 15)
- Farmers trained on the different CSA technologies:
  - ✓ 13 farmers on native pig raising (LEIPP) (male 3, Female 10)
  - ✓ 30 farmers on agroforestry (Male 15, Female 15)
- Enriching landscapes through fruit tree-based intensification: 45 farmers received the following seedlings:

2,684 coffee	40 mango Guimaras	250 calamansi
317 rambutan	15 mango carabao	6 langka (jackfruit)
80 guyabano	6 durian	3 santol bangkok
225 black pepper	200 cacao	600 coffee seedlings

In addition, some farmers also received the following:

380 black pepper for 7 farmers (Male 5, Female 2)
6 colonies stingless bees for 3 farmers (Male 1, Female 2)
20 banana suckers lakatan 2 farmers (Male 2)
4 native pigs 4 farmers (Male 2, Female 2)
1,336 coffee seedlings 5 farmers (Male 5)
2,500 cacao seedlings 14 farmers (Male 5, Female 9)
50 kgs ube 5 farmers (Male 5)
13 native pigs 13 farmers (Male 3, Female 10)

- Established on-site native pig holding facility: concrete building with water, electricity and, intensive feed garden for small livestock.

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

Community mapping identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.

Historical timeline outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.

Seasonal calendar shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago). Matrix of livelihood activities lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.

24-hour clock determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether they are changes and adjustment in time, allocation and roles if there are climate hazard or extreme events.

Problem tree identifies the three (3) major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.

Matrix of livelihood assets lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.

Perceptions on vulnerability define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard. Mapping of vulnerable sectors identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

Livelihood Matrix

LIVELIHOOD ASSETS	EFFECTS	COPING MECHANISMS	ADAPTATION
PHYSICAL			
Drying Facility	Fast drying Damaged	Repaired and constructed temporary facility	
Road	Dusty, unpaved roads which caused faster breakdown of tires Ruptured road	Utilized face mask and bought new tires	Construction of concrete road and canal
Power Supply	Blackout, power shortage, and additional expenditure Blackout	e-embankment of roads	
Phone Signal	Delayed signal		
NATURAL			
Spring Dug Well/ Groundwater	Scarce water supply High water supply	Re-excavated the source and harnessed water at nearby areas	Construct diversion canals, install water pump, and search for other water-rich aquifers
Coconut Farm	Unproductive trees, and performed natural coco meat drying	Domesticated farm animals and cultured new crops	Broomstick and charcoal production, carpentry, and alternative livelihood
Forest	Wilted trees and plants and dried irrigation reservoir Damaged forest and landslide	Reforestation	Regulate logging of trees
Earth/Land	Ruptured lands and dried feedlot Landslide	Manually fed the animals through *kompay* Planted trees	Plant trees
SOCIAL			
Senior Citizens Organization	Very weak immune system	Brought umbrella	
Kalipi	Pay-out burden		
4 P's			
HUMAN			
Adults			
Children	Common diseases and Sunburn Fear, phobia, and class absences	Brought to health center	To continue working on the copra farm, community brough umbrella, jacket, bring medicine and water
Maglulukad (Female)	Adjusted time for *Paglulukad*, hypertension, and shorter working hours	Seek for a shed	
Maglulukad (Male)	Hypertension	Brought umbrella	
FINANCIAL			
MFI (Card, TSPI)	Incapable to pay loan Rare public transportation (motorbike)	Mobile collector	Advance payment

Livelihood and Gender Role

Comparison of the activities being performed by both genders under coconut farming

COCONUT FARMING

ACTIVITY	PIE CHART
Pagkakawit	
Pag-iipon at Tabas	
Paghahakot	
Pagbubunot/Tapas	
Pagbabaak	
Pag-iimbasi/Hila	
Pagpapatas/Pagkakamada	
Lulutiin	
Hango	
Tigkal	
Tusta	
Paghahango	
Pag-iimbasi/Hila	
Pagsasako	
Pagsusulit	OWNER

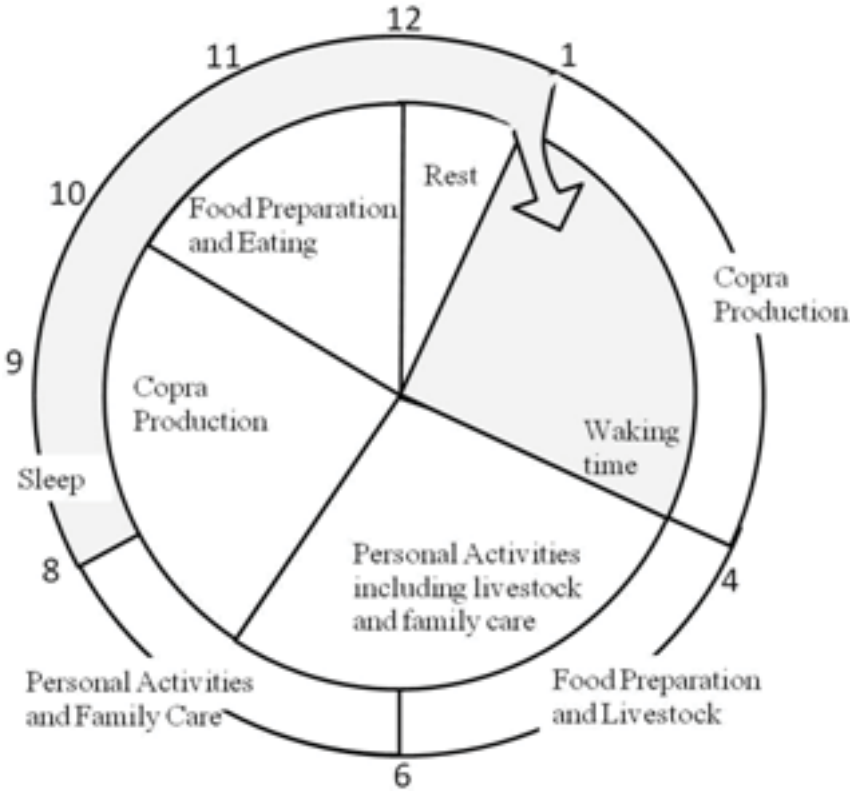
SIGNIFICANT PERSONS
Owner / Tenants / Laborer / Kasa (Buyer)

LEGEND:

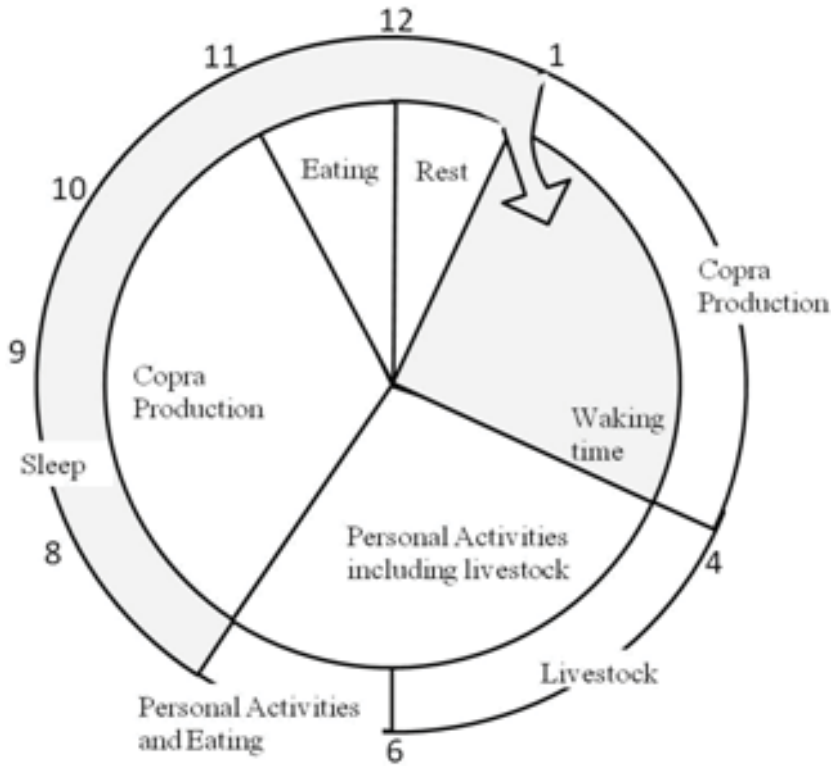
Male  Female 

Gender Clock

MALE



FEMALE



Barangay Ligpit Bantayan

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and update of interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

1. Establish with the community the livelihood conditions in the village using the 5 capitals;
2. Determine community's perception on changes inclimate, its impacts on their livelihood and other factors/drivers;
3. Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
4. Establish an in-depth analysis of the climate-change related risks faced by farmers, existing coping mechanisms, possible adaptation measures and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment (PVA) study was conducted at the Barangay Ligpit Bantayan Multi-purpose Hall last November 7, 2014. This was the last (11th) barangay where PVA was conducted. Twenty-three (23) participants (14 men and 9 women), representing the barangay council members and coconut, rice and vegetable farmers attended. Focused group discussion (FGD) was done using the following participatory appraisal (PRA) tools such as community mapping, seasonal calendar, timeline and livelihood assets matrix. Description of these tools is in Annex A.

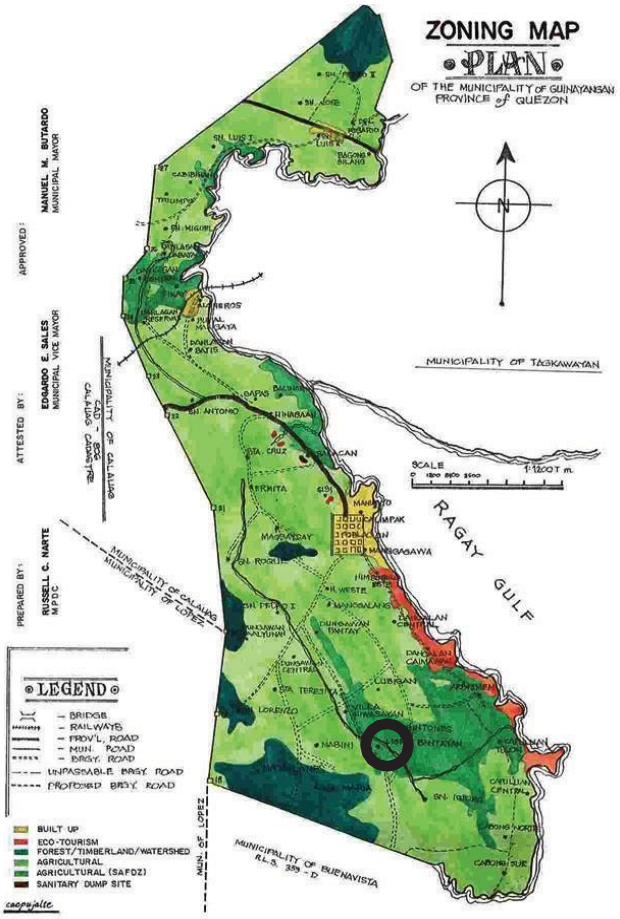
Additional data and information for this report was also gathered through key informant interview (KII) to Barangay Officials. Secondary data were further gathered from the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA) and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information.

The study was limited to agriculture as main source of livelihood of the community. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, Guinayangan Local Climate Change Adaptation Plan 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Ligpit Bantayan is a lowland and hilly village located at 17 kilometers southern part of Guinayangan's municipal town proper. It is accessible by all types of vehicles due to an all-weather road that connects it with the rest of the municipality. The village is divided into two (2) sitios, Ligpit and Bantayan. Sitio Ligpit is lowland community with a small river that supplies irrigation water for rice paddies and vegetable farms. Sitio Bantayan in the northern part of the village has scattered hills planted with coconut.



Basic Information

Topography: Lowland and hilly.
Elevation: 93.8 meters above sea level
Cellphone signal: None,
Road condition: 37% dirt, 62% gravel, 1% cement.
Location: 17Km northeast of municipal towncenter
Area: 1,091 ha
Boundaries: Brgy. Sintones (N), Capuluan Tulon (E), Sta. Maria (S), Villa Hiwasayan (W)
Population (2018 data): 1,118 individuals (539 female, 579 male), 275 Households
Community infrastructures: 1 multi-purpose court, 1 health center, 1 day care center, 5 barangay health workers
Community-based Organizations: 4H (youth),RIC (women), KALIPI (120 women), and Farmer's Association (mixed male & female), **Senior citizen**: 36 male, 45 female.

4.2. Village History

Milestone in the village's history is characterized by major disturbances and the onset of development works that resulted to major socio-economic changes in the community. One major earthquake in 1975 struck the village that according to the participants resulted to damaged coconut trees causing nuts to fall.

The declaration of Martial Law in 1972 and the ensuing years before it was lifted in 1982 left a significant memory to most of the residents due to break down of peace and order situation in the village. During those years, the presence of New People's Army (NPA) in the village became significant and fears of clashes between them and the Philippine military prevents them from working in their farms. As a result, majority of the residents moved to the town proper for safety and security. The migration stopped farming and economic activities in the community. The establishment of military camp in the community helped in restoring peace and order situation in the community.

In 1970-1980s the Coconut Farmers Federation or COCOFED was established in the village. During the Marcos administration, coconut levy was imposed. For every kilo of copra sold, coconut farmers are obliged to pay 50 centavos as tax. Children of coconut farmers who are members of COCOFED were given educational scholarship. Drought like conditions and occurrence of strong typhoons are the two (2) major climate-related events experienced in the village (discussed in separate section). Among the major socio-economic development the participants remember are the construction of barangay road, electrification in the village and agricultural mechanization.

The development of barangay road from 1973 to 1990s improved the community's access to and from other barangays by land, provided easier market access for agricultural products and reduced the number of travelling hours.

The installation of electricity in 1997 provided some resident additional income from selling ice and ice candy and encouraged the residents to buy basic appliances that provided comfort and convenience. Farm mechanization, hand tractors and rice mill helped farmers improved their farm practices and reduced the man labor requirement in the field. It was also in the same year that copra price went down to Php 2.00 per kilo resulting to huge losses of income.

It was only during the time of President Arroyo that copra price started to increase up to Php 39.00 per kilo. This encouraged coconut farmers to double their yield to meet the high market demand and price of copra.

Only Feast in April and Christmas events in December are the major cultural events for this community. Their expenses, however, are related to farming and education.

High expenditure is present throughout the year except in May. In contrast, the first two months of the year have low cash inflows while the succeeding months are noted as the period of high monetary receivables. Income begins to decline by October unto December. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that this barangay is exposed to flooding and salt water intrusion.

4.3. Land Use and Tenurial Arrangements

The barangay has a total land area of 877 hectares. 70% are devoted to coconut, 20% to rice and 10% to vegetables.

Corn used to be the main crop until the introduction of coconut in 1985. Low production of corn due to pest and diseases shifted farmers' focus on coconut production that offers better market price with less labor requirements. Farmers used to plant corn varieties such as *Kinalamba* and Tagalog and produced better yield than high value varieties such as Cargill and SMC. Farmers also observed that corn yields are higher before because of healthier soil condition that time. As estimated, a bag of maize, decades ago, produced 18 kilograms of corn.

5. Livelihood Profile

5.1. Coconut farming is the primary source of livelihood of majority of families in Ligpit-Bantayan. About 80% of the residents are engaged in coconut farming. Banana is intercropped with coconut. Next to coconut, rice and commercial vegetable farming are the other sources of livelihood in the village.

5.2. Coconut is the main crop produced in the village in terms of volume of production and income provided to farmers. The traditional process of coconut production is generally termed as *pagkokopra* or *paglulukad* with copra (desiccated coconut) as the main product sold by the farmers to a casa in the town proper.

5.3. Mature coconut is normally harvested every 45 days. Coconut production is low from January to July while production is high during the rainy months of August to November. However, during the month of December, whole nuts are sold because copra price is often sold at cheapest price of Php 2 per kilo.

5.4. Banana (*cardaba* variety) is intercropped with coconut. Banana production is low from January to August and high for the rest of the year. Banana is sold to market every week at Php 40.00 to Php 100per bundle or 100 pieces.

5.5. Rice is planted twice every year, from July to September and October to February. Rice varieties such as *Balibud*, *Tinunda* and *Tinalabuhan* were used to grow in the community before the domination of coconut plantations.

5.6. Commercial vegetable is another source of livelihood for other residents in Ligpit Bantayan. The commonly grown crops are string bean, bitter gourd, chili, eggplant, tomato, lady's finger and squash. There are two (2) cropping seasons for vegetables: the first is during the months of June to October and the other is from the months of March to May. Vegetable farmers are practicing multiple cropping and intercropping.

5.7. Aside from crops, some residents are also engaged in animal farming. Usually, large animals such as buffalo and cattle are utilized for different farming activities. Some residents are growing 10-24 heads of swine as additional source of income.

5.8. Majority of the landowners employ laborers to deliver the services required of producing copra. This is mainly because the household cannot do it alone. Most of the labors though are also from neighboring households. A such, while most farmers in San Roque are landowners, they are also laborers themselves who work in other coconut farms.

5.9. Aside from farmers, other important actors to the copra value chain supply are the owners of jeepneys. Copra products are transported to the casa using jeepneys.

5.10. Both men and women farmers are active in copra production. The participants have identified 13 activities involved in copra production. Four (4) activities such as nut picking, *pagtatapas* or dehusking, sacking of copra and *pa-iimbasi* or when copra is being pulled by the carabao to the road, are hard and laborious tasks that are manually done my men farmers only. The rest are light activities that are equally done by men and women farmers. These are nuts collecting, piling, counting/inventory, mechanical shelling, *pagkakamada*, fueling, *paghahango*, *pagtatagkal* and *pagsusulit* or marketing.

5.11. A typical woman farmer in Ligpit Bantayan spends seven (7) hours on the farm/field activities, two (2) hours tending farm animal, seven (7) hours for household activities, family needs and time for herself and eight (8) hours of rest and sleep. Meanwhile, a typical male farmer spends majority of time on the farm/field activity including tending the farm. Unlike the woman farmer, he has more time to rest, for family time and for himself.

5.12. *Tercio system* is the common practice in the community where 1/3 of the profit goes to tenant while the rest goes to the owner. Other sharing system practiced in the barangay is 70/30 system where 70% goes to the landowner while the 30 % goes to the tenants.

5.13. Farmers observed that yellowing of banana leaves and at early stage decomposition of the banana trunks, and worms are happening and damaging the production during the dry months of February until August.

5.14. Other than that, animal diseases like colds, cough and fever are occurring in September to December. Water-borne diseases caused by some viruses are, on the other hand, affecting humans particularly children from the period of October to December.

5.15. The community identified landslides, floods, drought and pest infestation among the hazards they have experienced. Warnings signs were installed near the river for the community's safety.

5.16. The participants identified that the key problem in coconut production is often attributed to low market cost and low production quantity. Production is affected by the increasing competition along with the soybean product. Soybean has healthier benefits particularly its oil yet it is cheaper compared to coconut products.

5.17. Weather events have also a significant impact on production. Typhoons largely damage many trees while droughts or hot weather conditions affect the water requirement of the trees. Another problem is the infertility of farms because of the lack of resources of farmers to buy inputs.

5.18. Generally, all of the agricultural commodities have been rated low in their value. This situation occurs because of the unpaved farm to market road system. Poor quality farm to market roads and long distance to market made their agricultural produce low quality and low market value. The residents are proposing for a *bagsakan* or market day in Guinayangan town proper to save on time and transportation cost. They also added that seminars on agriculture production will also help the farmers improve their farm management skills.

6. Climate Change Perceptions and Coping Mechanism

6.1. The participants observed that climate pattern have started to change and become too unpredictable several years ago. Five years ago, they observed that dry season is now observed from February to August while wet season happens from September to January. Before, occasional rains were observed from January to May, while months of June to December were the rainy season. They also observed that dry season is now hotter and longer than expected causing damage to several crops.

6.2. The changes affected the cropping seasons of various crops. There were cases when farm yields were very low as a result of damaging typhoon, drought and heavy rainfall.

6.3. In 2014, the participants said that excessive rainfall was experienced in the village during the Northeast Monsoon. This resulted to flooding in low lying areas in the village. Water in the river and irrigation canal overflowed situation took place due to high runoff rate that was further intensified by their overflowing irrigation canal.

6.4. From 1964 to 2014, five (5) typhoons badly hit the village. These were Typhoons Dading, Sisang, Rosing, Milenyo and Glenda. Typhoons damaged the houses, farms and killed farm animals. It took the community two (2) years to recover from the effects of the typhoons.

6.5. Moreover, three (3) drought like conditions were experienced by the community from 1970 to 2014. The prolonged drought and absence of rain according to the participants resulted to no harvest of coconuts, rice and other crops for years. Lack of rain and extreme heat wilted and dried up crops, soil and grasslands resulting to hunger and death of farm animals. Extreme heat and lack of water left farmer lands idle as well.

6.6. The participants defined vulnerability as, "the incapability of an individual to easily recover and respond with disaster". The participants defined vulnerable groups with the following criteria:

- Those with a large number of family members
- Those who do not own their houses, most of whom live in houses made of light materials
- Incapacitated people
- Widows or single parents
- Those with only one source of income (like copra production)

6.7 To cope with the damages and losses brought by typhoon and droughts farmers planted rice and corn for their subsistence. They repaired their damaged houses. Others engaged in charcoal-making while others borrowed and loaned money to support their daily needs.

7. Summary and Findings

7.1. Factors that encouraged farmers to shift from other agricultural crop as main source of livelihood are market viability and price, farming labor requirements, resistance to pest and diseases and climate events.

7.2. The availability of water for farming provided diversity of crops and livelihoods for farmers in Barangay Ligpit Bantayan.

7.3. Coconut and banana are the main crops and livelihood of farmers. However, both crops are susceptible to strong winds brought by typhoon. Excessive rains may badly affect banana while may be good for coconut trees. Climate variabilities, i.e., hotter dry season, wetter wet season and frequency of strong typhoons may adversely affect the production of coconut and banana in the near future. Thus, livelihoods of coconut farmer dependent on these crops are at risks.

7.4. Vegetable farmers were oriented on market viability of high value vegetables and taught to depend on external inputs in producing vegetables. This limited their resources and capacities to maximize and diversify their vegetable produce and conserve and protect their farmlands.

7.5. Development of farm to market roads and provisions of post-harvest facilities helped in farm labor and provided better market value for their agricultural products.

7.6. Crop and livelihood diversification and coconut value adding may help coconut farmers' livelihood to be resilient against future climate hazards.

7.7. In 2019, the Guinayangan Municipal Disaster Risks Reduction and Management Council identified that Ligpit Bantayan is exposed to flooding and salt water intrusion, exposed to liquefaction and ground rapture, flooding is also observed.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options have been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Ligpit Bantayan explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

Farmers' adoption of climate smart agriculture options:

- 4 farmer beneficiaries trained and adopted the native pig production
- 1 farmer trained on agroforestry

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes, good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustments in time, allocation and roles if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

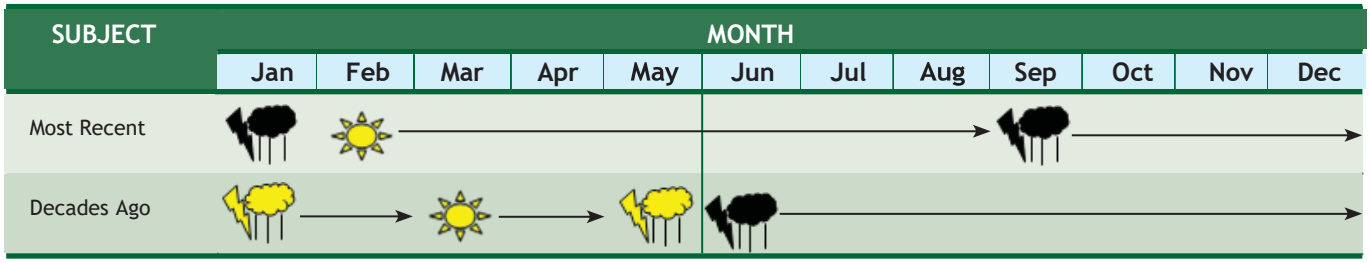
1. Timeline

Year	Events	Impacts	Coping Mechanism
1964	Typhoon Dading (Category 3)	Typhoon damaged the houses, farms and killed farm animals.	Farmers planted rice and corn for their subsistence. They repaired their damaged houses. Others engaged in charcoal-making while others borrowed and loaned money to support their daily needs.
1970s	El Niño/Drought months)	The community experienced no harvest of coconuts and other crops for years. Drought dried up the soil and grasslands resulting to hunger and death for their farm animals. Extreme heat and lack of water left farmer lands idle.	The community engaged in broomstick and charcoal production as alternative livelihood. They also collected water from the river to sustain their water requirements.
1970s-80s	Formation of Coconut Federation (COCOFED)	Coconut levy tax collected from the farmers are additional expense for them. Their membership to COCOFED provided scholarship for their children.	
1975	Earthquake	The earthquake damaged coconut trees causing nuts to fall.	
1975-1993	Earth Road	The road provided access to and from barangay and convenience in travelling to and from the town proper by land.	Some residents bought jeepneys and motorcycles for easier travel.
1978	NPA and military conflict & insurgency	The conflict resulted to fear among residents. 70% of the residents moved to the town proper for safety and security. The migration stopped farming and economic activities in the community.	Residents temporarily moved to safer places. The establishment of military camp in the community helped in restoring peace and order situation in the community.
1985-1987	Poor corn production	Corn pest and diseases reduced corn production.	Farmers shifted their livelihood to coconut which required less labor requirement.
1987	Typhoon Sisang	Typhoon damaged the houses, farms and killed farm animals.	Farmers planted rice and corn for their subsistence. They repaired their damaged houses. Others engaged in charcoal-making while others borrowed and loaned money to support their daily needs.
1990	Agricultural Mechanization	Farmers bought hand tractors that made their farm activities lighter and easier.	
1992	Drought	The absence of rain wilted and dried up crops. Rice farmers have no harvest.	
1995	Typhoon Rosing	Typhoon damaged the houses, farms and killed farm animals. It took the community two (2) years to recover from the effect of Typhoon Rosing.	Farmers planted rice and corn for their subsistence. They repaired their damaged houses. Others engaged in charcoal-making while others borrowed and loaned money to support their daily needs.
1996	Increased rice production	The community noted the increase in rice production that resulted to higher income.	
2000	Drought	The community started to experience hotter dry season and unpredictable climate pattern. They also experienced heavier rainfall that affected their agricultural produce.	They adjusted and diversified their cropping pattern.
2006	Typhoon Milenyo	The community experienced similar impacts of previous typhoons.	
2014	Typhoon Glenda	The community experienced similar impacts of previous typhoons. It would take two (2) years for the coconut to recover.	

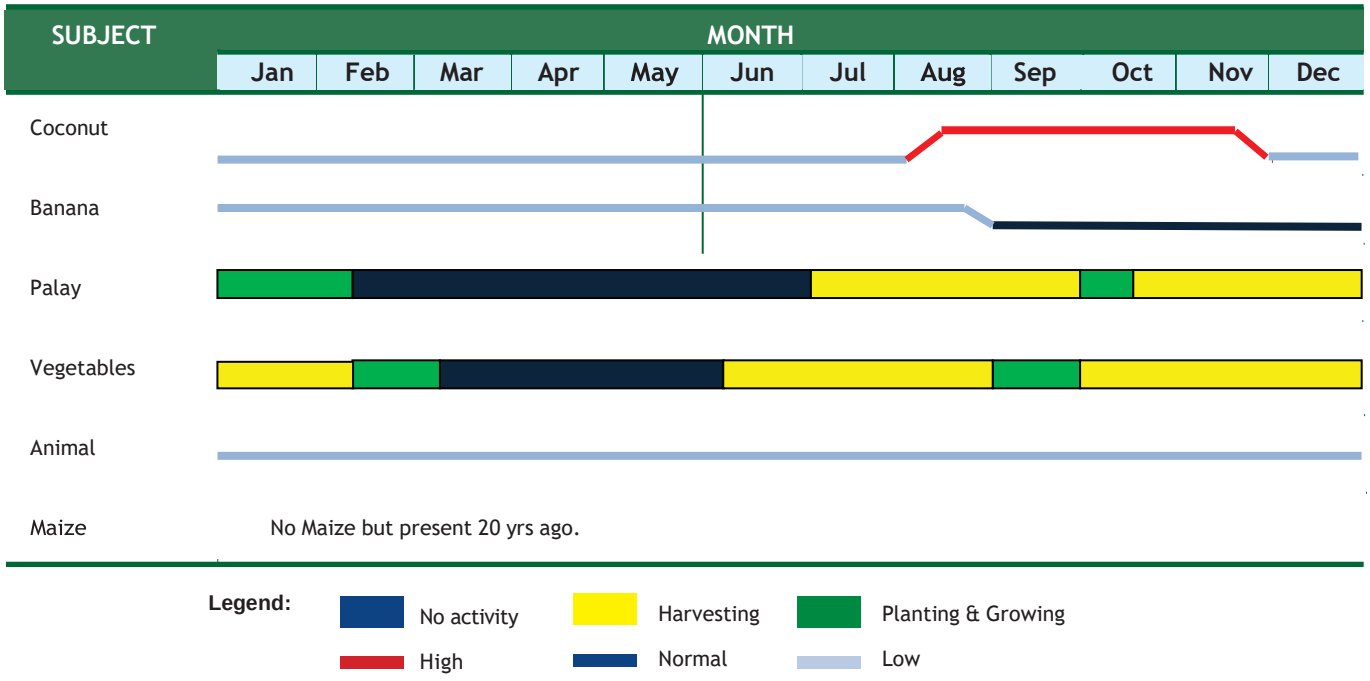
2014 (AUG)	Intense Northeast Monsoon	Excessive rainfall damaged the open canal and too much water run off.	
2018	Prolonged drought	Many of the rice farmers did not harvest their crops. Same with the vegetable growers.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.
2019	Typhoon Tisoy	Destroyed coconut, vegetables, banana farms and fruit trees. Destroyed fishing boats, houses, communication facilities and government infrastructures.	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making. After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief operations and cash for work programs.
2020	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.

2. Seasonal Calendar

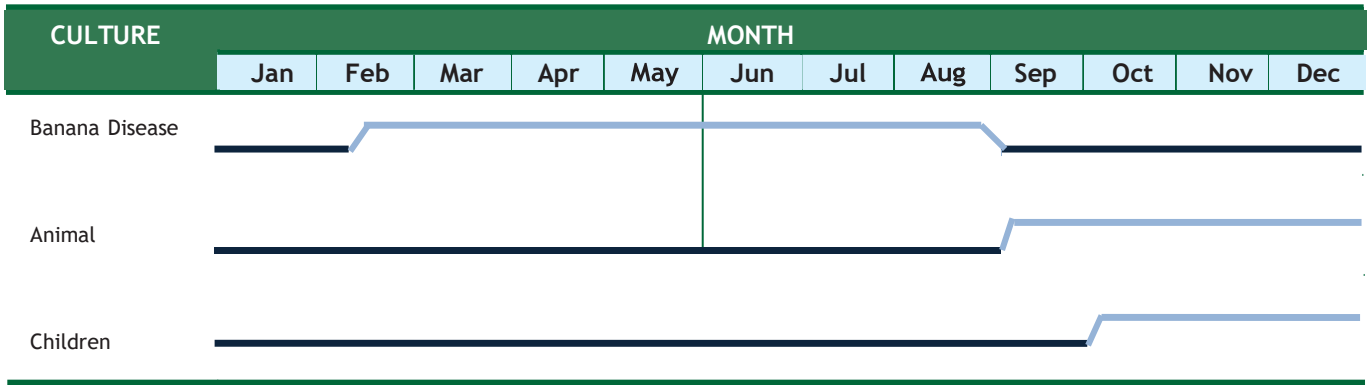
CLIMATE



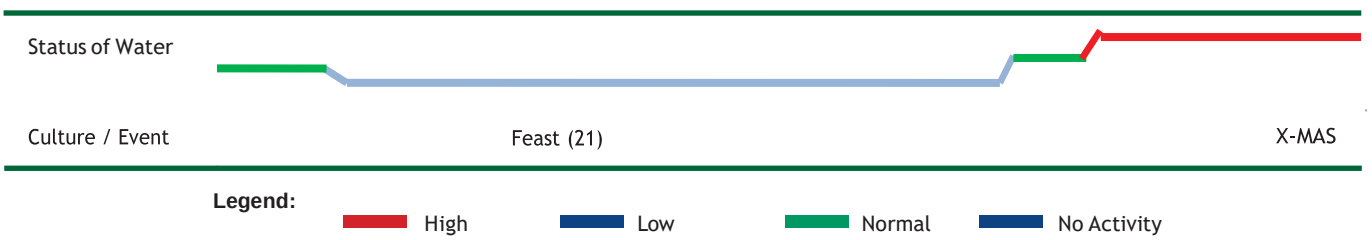
LIVELIHOOD ASSETS (PRODUCTION QUANTITY)



CROPS PEST AND ANIMAL AND HUMAN HEALTH ISSUES



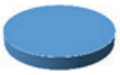
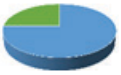
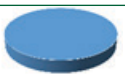
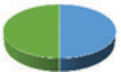
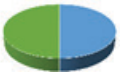
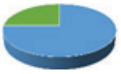
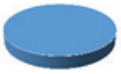
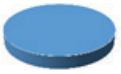
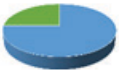
WATER AVAILABILITY (LWUA, RIVER, SPRING AND JETMATIC WELL)



3. Gender and Livelihood Analysis

Comparison of the activities being performed by both genders as linked to coconut farming

COCONUT FARMING

ACTIVITY	PIE CHART
1. Nuts Poling/Picking (Kawit)	
2. Nuts Collecting	
3.Piling (Parada)	
4. Pagtatapas	
5. Inventorying (Bilang)	
6. Mechanical Shelling	
7. Pagkakamada	
8. Fueling (Gatong)	
9. Mixing (Hango)	
10. Pagtitigkal	
11. Product Packing (Sack)	
12. Pa-iimbasi	
13. Sulit	

SIGNIFICANT PERSONS

Buyer/Kasa

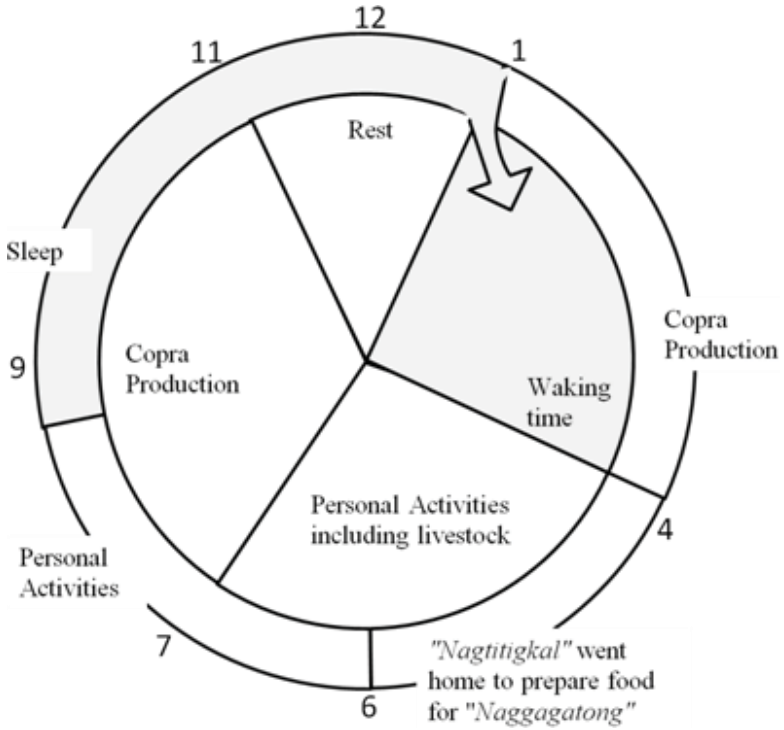
Laborer

Owner

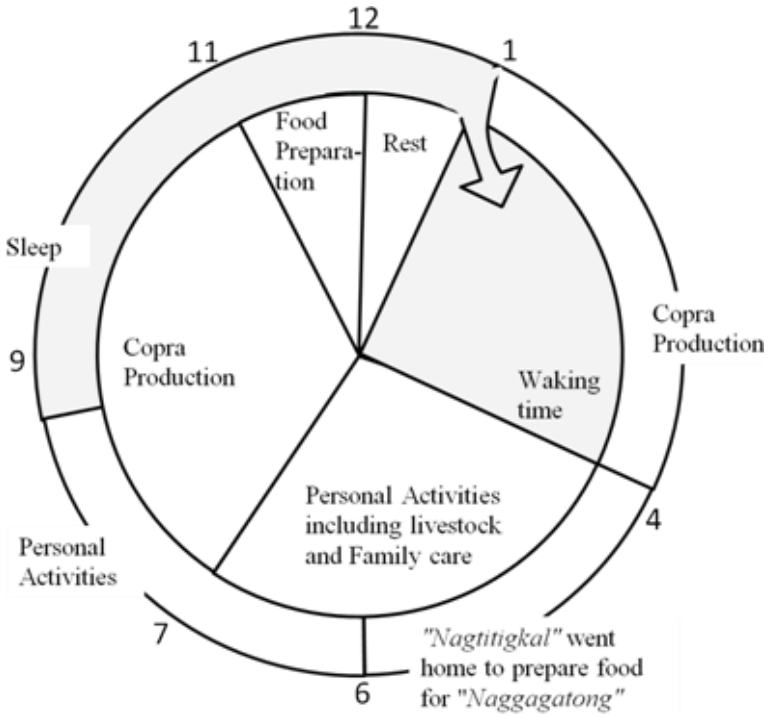
LEGEND: **Male** **Female**

Figure 1 shows the clock of activities of the Ligpit Bantayan farmers inrelation to coconut farming

MALE



FEMALE



4. Livelihood Matrix

LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS
PHYSICAL and NATURAL		
Community Infrastructures	Typhoons damaged houses, barangay hall, road networks and electric poles, electricity and communication services.	Repaired damages through *bayanihan*. Some residents bought gas lamps and solar-powered lights.
Barangay road (Earth road)	Debris blocked the roads causing difficulty in accessing the barangay	The residents conducted *bayanihan* in cleaning up the debris.
Coconut farms	Typhoons uprooted some coconut trees and damaged the nuts. Drought, lack of rain and extreme hot temperature produced smaller nuts.	The community sold felled to have income.
Vegetable Farms	Typhoons largely damaged their vegetable crops. Droughts dried up their soil and land resulting to non-farm activities.	The residents saved and tended crops that survived the typhoon.
Electricity Poles	Typhoons broke electric poles causing power shut down. Drought caused residents to consume more electricity.	The community bought generator, gas, battery, and solar device.
Deep Well, Spring and river	Typhoons overflew their spring and river and caused water turbid. Drought dried up their deep wells.	The community saved on water consumption and searched for other water sources.
LWUA	Typhoons made water supply turbid while drought caused poor or non supply of water in the community.	
HUMAN		
Male Farmer	Typhoons brought more workloads such as damage repairs and land clearing.	
Female Farmer	Typhoons brought more household chores household loads while extreme hot temperature caused hypertension.	
Children/Youth	Typhoons shocked the children while extreme dry and hot weather caused common colds and flu among children and youth.	The parents helped and counseled their children. Medications were administered.
FINANCIAL		
Microfinance Institutions (TSPI, CARD)	Farmers cannot pay for their debts/loans.	Asked assistance from relatives for payment.

Barangay Magsaysay

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and updates on development interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

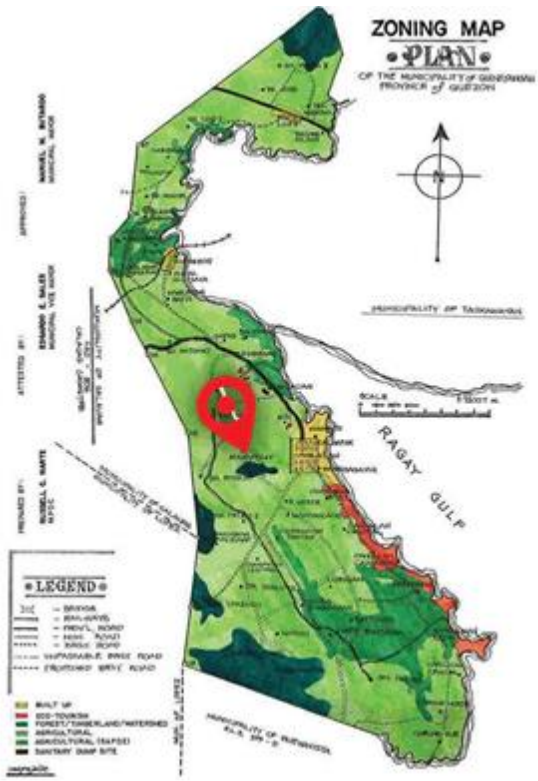
This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, the International Institute of Rural Reconstruction (IIRR) partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS under its small grants program ina project that enables farmers to increase productivity using regenerative approaches. The project tests the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers (IIRR).

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts.

Thus, the PVAs facilitated by the IIRR-LGU partnership were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. PVAs emphasize the importance of understanding the issues that surround vulnerabilities, especially those of the poor and including their gender dimensions. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community-based adaptation strategies and to facilitate the multi-stakeholder, decision-making processes.



Basic Information

Topography: Upland
Elevation: 243.1 meters above sea level
CP signal: None.
Road condition: 2% dirt, 90% gravel, 8% cement
Location: 7.5 km south east of municipal town center
Area: 333 ha.
Boundaries: Sta. Cruz (W), Himbubulo Weste (E), San Roque (N), Sisi (S)
Population (2018): 328 individuals (206 female, 122 male) 75 HHs,
No. of families: 77 (100% are in farming)
Community infrastructures: 1 health center, 1 day care center, basketball court, multipurpose hall, water system, electricity, Barangay outpost
Community-based Organizations: 4H (youth), RIC (35 women), KALIPI (women), Farmers' Association 22 members (17 male, 5 female), 4Ps beneficiaries: 23 (18 female, 5 male as of Feb 2021)
Unique infrastructure/features: The portion of the barangay covers Maulawin Spring Protected Landscape

2. PVA Study

The PVA study was conducted in the 11 barangays of Guinayangan to help the community achieve a better understanding of the conditions and factors that affect their vulnerability to climate change impacts. Once the community receives this information, it will be in a better position to increase its resilience and react to disasters.

Specifically, the PVA has the following objectives:

1. In collaboration with the community, establish the livelihood conditions in the village using the 5 capitals.
2. Determine the community's perception on changes in climate, its impacts on their livelihoods and other factors/drivers.
3. Determine and establish the level of exposure of smallholder farmers to climate risks in the 11 villages where IIRR works.
4. Establish an in-depth analysis of the climate-change-related risks faced by farmers, existing coping mechanisms, possible adaptation measures, and perceived interventions for increasing their adaptive capacities.

3. Methodology

The PVA study was conducted at the barangay hall on November 3, 2014. The meeting was attended by a total of 14 participants (10 men, 4 women), representing the barangay council members and some coconut farmers. A focused group discussion (FGD) was held using participatory appraisal (PRA) tools such as community mapping, seasonal calendar, timeline, and livelihood assets matrix.

Additional data and information for this report was also gathered through a key informant interview (KII) to barangay officials. Secondary data were further gathered from the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, documentation of a stand-up meeting, and project reports augmented needed data and information.

The study was limited to agriculture as main source of livelihood of the community. This updating in April 2021 was done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay Magsaysay is an upland community that can be accessed through an all-weather road and 7.5 kilometers from the town proper.

4.2. Village History

Magsaysay used to be part and an upland sitio of Barangay Sisi. It became a new barangay in the early 70's. In 1972, a destructive earthquake hit Guinayangan and caused land fissures in many of the farm lands. Water table was also affected as there was an observed change in the springs' flow.

In 1979, an earth road was opened that made the barangay accessible. Electricity was installed in 1985 and other infrastructure such as school, barangay hall and day care center were all built in the early 1990s.

The timeline recorded more typhoons starting in the 1990s until the present. Rosing and Glenda were considered to be the most destructive. Typhoon Rosing was the strongest in terms of precipitation rate, while typhoon Glenda became the most fatal in terms of wind speed and gust. However, both typhoons severely affected coconut production.

Though drought was experienced by the community, which occurred in 1992 and 2012, and affected rice farms that no farming activities was done due to extreme heat and some wells dried up, the community said that they were able to cope easily compared to typhoon. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that the whole barangay with its 100% populace engaged in farming is exposed to landslide and strong winds.

4.3. Land Use and Tenurial Arrangements

The barangay has a total land area of 290.8 hectares, 2% of which is dedicated to rice production, the rest is for coconut production. The main source of income in the barangay is copra production (75%). Only 15% rely on rice production and very few are engaged in vegetable production. Majority own their land with an average landownership of 3-4 hectares. Barangay Magsaysay is a homogenous community. Most of the people are related and came from a single family line thus there are few tenants. Except for the 40 hectares owned by nonresidents and managed by tenants, mostly lands are owned and passed on to children.

Barangay Magsaysay covers a portion of the Maulawin Spring Protected Landscape (MSPL), one of Guinayangan's watershed. A total area of 78 hectares of the barangay is within the MSPL buffer zones involving 22 farmers. The MSPL has an area of 183.15 hectares declared protected area per Republic Act No. 11038.

5. Livelihood Profile

Copra production is the main source of livelihood in the barangay. Production is year-round. Production in the months of June and July is usually average and by August to October highest production is achieved while lowest is in November to January. Labor is usually performed by family. If there is a need for additional labor, neighbors are tapped and sharing system is practiced where 40% goes to those who provided labor. Activities in copra production are usually dominated by men. Women only provide a full share of the labor during mechanical shelling and during marketing. More physical and risky (removing from shell and poling) activities are usually handled by men. Other remaining activities are shared by both though mostly men dominate the labor requirement. A number of households are engaged in subsistence rainfed rice farming. Planting is in the last quarter of the month as precipitation is at highest during those months. They harvest by February to March and consider high harvest if they get at least 500 kilos and average harvest at 300 kilos. Traditional rice breeds such as Camoros, Balibud and C1 were planted 20 years ago. Today most are using hybrid variety.

Rice lands are fallowed after the next season. In terms of labor, men are engaged in land preparation and in fertilizing. Women share labor during sowing of seeds, weeding and harvesting.

Vegetable production is another source of income for some residents. Since it is a rainfed system, planting is done usually in July to September. Farmers are able to adjust according to season. They plant eggplant and other crops that thrive during rainy season and plant crops squash, tomatoes, bell peepers, beans at the onset of summer season. Mungbean and corn are also grown. Men provides majority of the labor during land preparation, spraying and trellis preparation for crops that need one. Women meanwhile dominate labor during harvesting and marketing.

Many are engaged in commercial livestock production. Swine raising using commercial input had been seen as an alternative livelihood for the residents. They consider high commercial input requirement as a challenge in continuing this livelihood option which is considered to a lifeline in times of emergency. Men and women equally share labor in most activities except for preparation of housing and during marketing, men are more involved. Off farm work is considered an alternative during lean months especially during times when copra production is low. Many are engaged in labor either within the municipality or outside of Guinayangan.

The participants determined the key issues in farm production as decreased in farm yield due to insufficient technical knowledge and political support that will assist them in battling climate-related calamities. Many also are not practicing intercropping. They attribute this to low soil fertility. They do not want their coconuts to compete nutrients; this is the reason why they are not practicing intercropping. On the other hand, vegetable production is affected by the absence of accessible market.

There was also a significant increase in pest infestations which they associate with changes in weather. Rainfall pattern also changed through time that affected vegetable and rice production.

Water supply for farming increases during the rainy season (September to February). Water is sourced mostly from deep well and spring and accessed using mechanical pumps during dry months.

Meanwhile, events in the barangay affect the way people spend their money throughout the year. The locals indicated that they use much of their money by months of March until June at the time when verse reading feast day, and beginning of classes are consecutively approaching on.

6. Climate Change Perceptions and Coping Mechanism

6.1. Perceived Climate Patterns

Climatic pattern 10 years ago and 20-30 years ago showed similarity. Rainy season usually starts in June and last until December, dry season meanwhile is from March to May. Currently, a change in the season has been observed for the past 5 years. Shorter rainy season is experienced. Usually, rains come in July then by August, more often than not, there is an absence of rain. Rainfall again begins in September until December that may sometimes last until February but with very little rainfall. Dry season now is from March to June.

Meanwhile, though occurrence of typhoon is not often, usually a devastating typhoon visits the municipality every 3-5 years. They observed that its wind and rain has intensified. Coconut trees are completely destroyed, some even uprooted by the 2014 and 2006 typhoons.

The seasonal calendar clearly shows the change overtime of agricultural crops and source of livelihoods of the community. However, during the FGD, these changes were dictated by economy and not by any cataclysmic natural event. The community shifted from rice farming to coconut as the latter provides them a more stable income. Summer is hotter and more prolonged as recently experienced.

6.2. Who are most affected?

The participants identified the following conditions of vulnerable individual or household in the community:

- Households with large family size
- Farmers that are tenants and do not own land
- Persons with disability
- Household headed by single parent or widowed
- Senior citizen
- With only one source of income

6.3. Coping Mechanism

Devastating typhoon is considered to be the hazard that mostly affects their livelihoods. Copra production is their main source of income. Strong typhoons usually blow away nuts and leaves. Sometimes trees are uprooted due to strong winds. During these events, farmers are able to utilize and sell the nuts that fell for only 2 months after the typhoon. After that coconut trees need 1 to 2 years to recover before they can achieve production level again. As a result, some temporarily migrate to find jobs outside of the barangay and even out of Guinayangan. Many said they engaged in charcoal production, using trees felled during the typhoon. Broom making also becomes an alternative source as felled leaves of coconuts are used for this cottage industry. However, with positive attitude many usually start re-planting given that this is their main livelihood.

Meanwhile, extended dry season has been felt. The community has started to observe the lack of available rain for their farming activities. Even with 6 springs and wells available in the community, only domestic use can be supported while irrigation for farms has to be sacrificed. As mentioned earlier, farmers already adjusting the types of crops they are planting according to weather and climate patterns.

7. Summary and Findings

7.1. Participants agree that typhoon poses more threat to their main livelihood compared to drought. They can easily cope with drought as water sources are available near the village. Barangay Magsaysay covers a part of the Maulawin Watershed.

7.2. The homogenous character of the community is an important factor during disaster events as "*bayanihan*" or the spirit of communal unity and cooperation is easily tapped.

7.3. Livelihood sources of the community are already diverse. Improving their farming systems towards low external input, maximization of available lands to drought resilient crops and enhancing their knowledge on some available technologies are seen to be the initiatives to be pursued.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnership with Guinayangan LGU, CCAFS, DA AMIA and IDRC provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options has been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Magsaysay explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

These interventions are aimed to enhance the livelihood options of the farmers at the MSPL buffer zones and those within through agroforestry and organic farming while educating them on the importance of enhancing intra species biodiversity in the upland coconut ecosystem. This is expected to reduce their current dependence on the forest product, enhance ecosystems services (e.g., pollinators) and enhance carbon sequestration through regenerative agriculture. The intervention is expected to influence the other barangays in the municipality on the importance of restoring biodiversity to the current predominant coconut-based systems.

These interventions also hope to address the challenges associated with the coconut mono-cropping pattern for copra production as revolutionized through the planting of different forest trees, coffee and cacao, and fruit trees species and shade trees and other understory food crops such as camote, taro, ube, banana, legumes and indigenous vegetables with added raising of native pigs and native chickens thereby increasing tree, crop and livestock biodiversity and sustained ecosystem development.

Farmers implemented agroforestry as a means to increase biodiversity in the upland coconut ecosystem. Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Livestock has been included in the system as appropriate. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increase soil capacity for water and moisture retention. Trees not only help mitigate climate change (by absorbing carbon dioxide an

important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro-climate and help reduce the desiccating action of wind. Trees store carbon in their biomass. Fruit trees, coffee, cacao, banana, and root crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits that can generate additional income for the farmers while ushering for the biodiversity enhancement in this coconut upland ecosystem.

The interventions bring both increase in economic activity in terms of family food security and nutrition and income as compared to the usual coconut dependence alone and positive impact to the environment brought about by the multiple plant and animal species including honey bees raised in the area.

The increase in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens and honey that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development.

The following are some of the interventions by the collaborative partnerships of different actors at Barangay Magsaysay:

- Farmers' adoption of Climate smart agriculture options:
  - ✓ 50 farmers adopted agroforestry (Male 30, Female 20)
  - ✓ 50 farmers adopted native pig raising (Male 30, Female 20)
  - ✓ 1 farmer adopted improved goat raising (Male 1)

- Farmers trained on the different CSA technologies:
  - ✓ 26 farmers (Male 10, Female 16) on native pig raising plus 1 native goats (Male 1)
  - ✓ 50 farmers trained on agroforestry (Male 30, Female 20)

- Enriching landscapes through fruit tree-based intensification: 30 farmers received the following seedlings:

2,650 coffee	30 guyabano	4 langka (jackfruit)
390 rambutan	10 mango Guimaras	2 santol Bangkok
4 durian	180 calamansi	380 black pepper

In addition, some farmers also received the following:

945 black pepper for 9 farmers (Male 5, Female 4)
4 colonies of singles bees to 2 farmers (Male 2)
100 suckers of banana lakatan to 10 farmers (Male 10)
4 native pigs to 4 farmers (Male 4)
2,300 coffee seedlings to 3 farmers (Male 3)
2,000 cacao seedlings to 9 farmers (Male 5, Female 4)
50 kgs ube to 5 farmers (Female 5)

Barangay San Pedro 1

Guinayangan, Quezon

A village level assessment of climate related risks vulnerabilities and updates on development interventions

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in the rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS under its small grants program in a project that enables farmers to increase productivity using regenerative approaches. The project tests the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. Thus, the PVAs facilitated by the IIRR-LGU partnership were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. PVAs emphasize the importance of understanding the issues that surround vulnerabilities, especially those of the poor and including their gender dimensions. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community-based adaptation strategies and to facilitate the multi-stakeholder, decision-making processes.

2. PVA Study

The PVA study was conducted in the 11 barangays of Guinayangan to help the community achieve a better understanding of the conditions and factors that affect their vulnerability to climate change impacts. Once the community receives this information, it will be in a betterposition to increase its resilience and react to disasters.

Specifically, the PVA has the following objectives:

1. In collaboration with the community, establish the livelihood conditions in the village using the 5 capitals.
2. Determine the community's perception on changes in climate, its impacts on their livelihoods and other factors/drivers.
3. Determine and establish the level of exposure of smallholder farmers to climate risks in the 11 villagers where IIRR works.
4. Establish an in-depth analysis of the climate-change-related risks faced by farmers, existing coping mechanisms, possible adaptation measures, and perceived interventions for increasing their adaptive capacities.

3. Methodology

Barangay San Pedro 1 was the first village where the PVA was conducted. There were 28 participants -- 15 male and 13 female. As part of profiling the participants, a game was conducted to obtain the following information: age range of participants, types of livelihood in the village, average household size and number of years participants lived in the village. Following the first PVA design process, the team started with community mapping through plenarysession. Working from an existing map (Child Fund has initially conducted a PDRA and a community hazard map was produced), the participants identified existing resources in the area. Community mapping last for 48 minutes (10:00am – 10:48am).

The facilitator then divided the participants into 4 groups according to the major livelihood they belong to. These were: coconut or copra production, charcoal production, livestock and vegetable planting. The following tools were facilitated in each group: livelihood matrix using the 5 capitals, timeline and

seasonal calendar to capture changes through time and important events that have an impact to their livelihoods. Each group also identified the most important assets in the resource map.

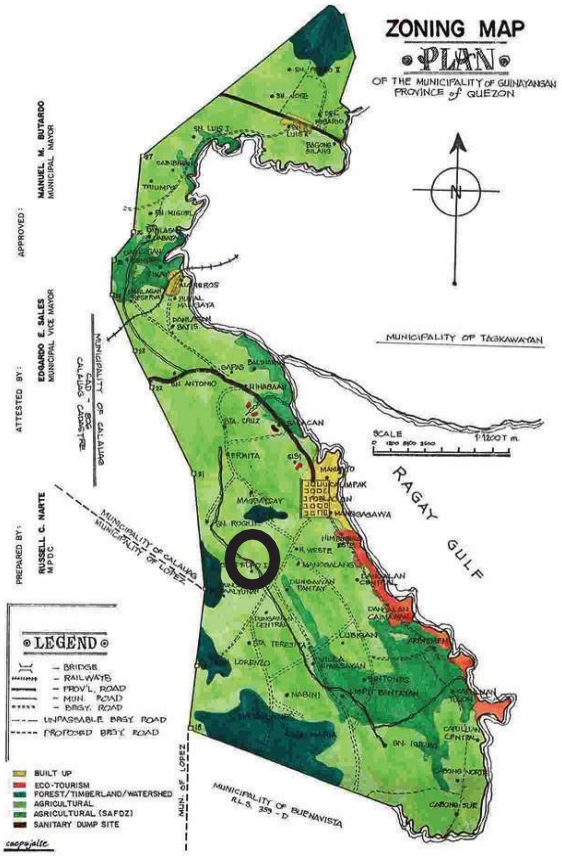
Additional data and information for this report was also gathered through a key informant interview (KII) to barangay officials. Secondary data were further gathered from the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA) and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, documentation of a stand-up meeting and project reports augmented needed data and information. This updating in April 2021 done through field observations and interview with some villagers, barangay officials and adopting data from Guinayangan Comprehensive Development Plan 2017-2022, LCCAP 2016-2020 and DSWD data sheets.

4. Introduction

4.1. Barangay Profile

Barangay San Pedro is an upland village located 6 Km northwest of Guinayangan's municipal town center. It is accessible by all types of vehicles by an all-weather road that connects it with the rest of the municipality.

There are six important annual events: school graduation in March; barangay fiesta in May; feast day of San Isidro, the patron saint of farmers, on 15 May; All Souls' Day in November, and Christmas in December.



Basic Information

Topography: Upland
Elevation: 180.01 meters above sea level
Cellphone Signal: Partial
Road condition: Dirt 50%, Gravel 30%, Cement 20%
Location: 6 km northeast of municipal town center
Area: 424 hectares
Boundaries: Barangays San Roque (N), Himbubuo Weste (S), Dancalan Paalyunan (W), Magsaysay (E)
Population (2018): 559 individuals (280 female 279 male), 127 households(137 Families),
Community infrastructure: 1 barangay hall, 1 multi-purpose hall, 1 health center, evacuation center, Day Care center, water system, credit facility, electricity
Community-based organizations: 4H (youth), RIC (women), KALIPI (190 women), Farmers' Association (15 male, 20 female), 4K 150 members (women); **4Ps** beneficiaries: 46 (39 female, 7 male as of Feb 2021)
Unique Infrastructure/features: Hiwasayan River traverses the village, various spring sources are available. The water district's source of water tappedone of the springs in the village. Some 25 hectares of the barangay is within the buffer zone of Maulawin Spring Protected Landscape (MSPL). The MSPL has an area of 183.15 hectares declared protected area per Republic Act No. 11038.

4.2. Village History

The presence of armed troops of the New People's Army (NPA) from 1979 to 1989 caused widespread fear in the barangay which resulted to the migration of many residents to the main town. Farm lands remained untouched and farm animals were quickly sold to earn money. Economic activity for the residents who migrated shifted from agricultural to non-farming forms of livelihood. Many engaged in labor. When peace returned to Barangay San Pedro, people decided to return to their farms and but shifted from growing traditional crops to planting coconut trees to increase their income.

Roadways became more passable in 1998 which improved trading. By 2000, electricity became accessible to the residents of Barangay San Pedro 1, providing bright lights to their dark evenings.

In 1972, a strong earthquake caused many coconut trees to collapse, farm lands cracked open, and water supply from the spring seem to have decreased. Viable parts of the coconut were collected and sold to reduce the impact of the earthquake, however, short-term.

By November 1995, typhoon Rosing was destructive that it damaged most of the coconut trees in the barangay as it uprooted a number of trees and totally destroyed leaves and nuts fell due to the strong winds. Even other crops were destroyed. After the storm, farmers took advantage of the available water and planted rice.

Crops were again destroyed with the onset of the 1998 El Nino. The shortage in water availability for irrigation caused stunted growth of many fruits trees and even produce from coconuts were observed to be smaller. Farmers started to fetch water from springs around the barangay to augment their supply. They also grew other crops like sweet potato, cassava, banana and taro as source of food for the family during this longer dry season. Then in 1999, La Niña occurred and killed off many farm animals. Again, farmers resorted to rice farming because of the continuous rains.

Strong typhoons again hit the Province of Quezon, including Barangay San Pedro I in Guinayangan in 2006 and 2014, while El Niño and La Niña again occurred in 2010 - the impact of each increasing in scope and magnitude. Typhoon Tisoy in 2019 destroyed coconut, vegetables, banana farms and fruit trees. It also destroyed houses, communications facilities and government infrastructures. Typhoons Quinta and Ulysses and Super typhoon Rolly in late 2020 destroyed the still recovering crops and some livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality, and barangay San Pedro 1 is included in that. The Guinayangan 2016-2020 Local Climate Change Adaptation Plan (LCCAP) indicates that the whole barangay with its 100% engaged in farming is exposed to landslide and strong winds.

4.3. Land Use and Tenurial Arrangements

Of the total 424 hectares land area 70% is dedicated to coconut, 15% to rice, 10% to vegetables and the rest banana. Copra production is their main source of livelihood, providing employment for 75% of adult residents. Other income sources include labor (farm-related or other general non-farm, unskilled labor), rice production, gardening, charcoal production, and animal farming.

Water for both agriculture and household purposes come from Hiwasayan River and several springs that the barangay is endowed with.

Despite being an upland village, San Pedro has a considerable area planted to paddy rice, mostly rain-fed but with a few portions irrigated by locally constructed small irrigation systems. It has Hiwasayan River that supplies irrigation water for agriculture for most months of the year. There are several springs and wells in the village, which together supply most of the water for household needs. Some of the springs also supply irrigation water to rice paddies but these run dry during the dry season (March to May).

4.4. Related Issues

The MSPL is very important to the people of Guinayangan. River waters which emanate directly from MSPL is the Maulawin River with its headwaters located within the strictly protected zone (SPZ) while the Hiwasayan River traverses within the multiple use zone (MUZ). MSPL cradles almost eight (8) lagoons of different sizes potential for ecotourism and small group activities. Two (2) major springs supplies the

water needs of Poblacion, Guinayangan and another two (2) were recently tapped to supply the water needs of BLISS subdivision and Barangay Sisi. Maulawin falls, Frenza and Sisi falls are within the MSPL. MSPL is a home of 32 rare to critically endangered flora species: 6 critically endangered, 5 endangered, 1 rare and 20 vulnerable.

Barangay San Pedro 1 covers a portion of the Maulawin Spring Protected Landscape (MSPL), one of Guinayangan's watershed. A total area of 25 hectares of the barangay is within the MSPL buffer zones involving 35 farmers. The MSPL has an area of 183.15 hectares declared protected area per Republic Act No. 11038.

The dominant threats to biodiversity and ecosystem and biological and natural resources of the site are the still dominant coconut monocropping system of many farmers and extraction of forest products. There is a great need to further enhance the biodiversity by including intensive agroforestry reliant on diverse species (multistoried cropping systems)

5. Livelihood Profile

5.1. Six major livelihood activities were identified: coconut farming, vegetable farming, charcoal-making, livestock raising, rice farming and service workers. Majority of the households are involved in coconut farming and also engaged in livestock raising. A significant portion are (estimated at half of households) engaged in charcoal-making. Only a small percentage of households are engaged in commercial vegetable production and paddy rice production. Road networks and springs connected to water systems are the 2 most important community resources in terms of livelihood support.

5.2. During the historical timelines, participants said that before, they were very reliant on corn as their primary food. Many farm lands also produced upland rice varieties such as *Camoros*, *Ininkanto* and *Balibud* which are known to be tolerant to dry conditions. A shift to coconut farming as the crop has a higher demand and were deemed to be more profitable, less importance has been given to rice farming in the coming years. Thus, currently coconut farming is the most dominant livelihood in this barangay. The crop's production is stable. Only the visit of typhoons disrupts production. Low production is usually observed from February to May while high yield is attained from August to November. Normal production occurs around December to January and from June to July. Market prices for copra peak around January, and again around March well until August with a mean price of 22 pesos per kilo.

5.3. For those engaged in vegetable production (bitter gourd, eggplant, pumpkin and bell pepper), production is normal throughout the year. Market prices for pumpkin are usually high around February to May, while eggplant prices peak only in May.

5.4. Subsistence livestock production provides the buffer income for many of the households. In cases of crop failure or decline in production, livestock serves as an alternative source of food and income. In 1995, commercial breeds of pigs started to enter in this barangay bringing reasonable profit to the farmers. However, the farmers later observed high increases in expenses because the hybrid animals had poor immunity to diseases. Production of farm animals is usually normal throughout the year, except for swine whose market price is always high.

5.5. Low production has been identified as the main problem for coconut and vegetable farming. Pest infestation affects vegetables. These pests are more visibly observed when the relative humidity of the environment is too high. *Atangya* is present from January until March because this is the period that *palay* starts its flowering stage thus, intensive care is required. Aphids, Lady Bugs, and *Brontispa* occur in April to June, while flies are visible during the months of July until December. Large numbers of *bagongbong* and rats were observed between 10 and 30 years ago. Other than that, new crop breeds have been very weak in resisting pests as compared to the traditional ones. However, because of the proven high economic value of newer breeds, many farmers have almost abandoned traditional crops to be able to pay their debts.

5.6. For animal farming, the usual problems are related to marketing and growing of animals, and availability of loan for capital. The farmers also discovered that hybrid animals are more sensitive to health issues and weak in dealing with the unusual climate pattern. However, people doubt

trying organic feeding because the animals could not achieve their desired market weight as fast compared to the current technique of using commercial feeds.

5.7. Lastly, small-scale charcoal production is performed occasionally by some residents especially when calamities affected their sources of income. The problem in production occurs when supply of raw materials is limited because of the excessive tree logging activities for coco lumber. The market price of charcoal is affected every time its trading process gets constrained by the weather disturbances.

6. Climate Change Perceptions

6.1. Perceived Climate Patterns

6.1.1. Climate pattern in Barangay San Pedro has little changes compared to current and during the past decades (10 years ago, 20-30 years ago). The early onset of typhoon month 20-30 years ago was changed to rainy season starting 2000.

6.1.2. In November 1995, a destructive typhoon named Rosing greatly again damaged many farm lands, uprooted many trees and completely wiped out all the growing crops. The farmers then decided to grow *palay* when rain became continuous due to the storm. The farmers also decided to start an emergency fund to mitigate the economic damage by future calamities. Strong typhoons again hit the Province of Quezon, including Barangay San Pedro I in Guinayangan in 2006 and 2014, while El Niño and La Niña again occurred in 2010 - the impact of each increasing in scope and magnitude in more recent years.

6.1.3. Notably in the weather pattern ten years ago (2000) noted August as having sunny and hot weather. This was mentioned by some of the participants and other farmers in other barangays. They said that they have observed a "little summer" (*munting tag-init* as they termed) during August. Many crops were again destroyed with the onset of the 1998 El Nino phenomenon. The deficiency of water for irrigation caused stunted growth of fruits (e.g., banana, coconut, jackfruit) making these undesirable for marketing. Using a cart pulled by carabao (i.e., *Paragos* is the local term) farmers harnessed water from nearby areas. They also grew other crops like sweet potato, cassava, banana and taro to secure their family from the threat of food shortage. By 1999, La Niña occurred and killed off many farm animals. Again, farmers resorted to farming *palay* because of the continuous rains brought by the phenomenon.

6.1.4. Supply of water in the barangay was more abundant between 10 and 30 years ago compared to that during the 2000s. This situation is seen to be affected by the growing number of users as well as changes in the weather as it was observed that there is an increased in the frequency of longer dry season. Though previous droughts did not have much impact on the livelihoods of the community as several water resources are available and just enough for the current population. According to the residents, September until December is the "recharge period" of the ground and surface waters due to the rainy season. Summer is hotter and more prolonged as recently experienced.

6.2. Impacts

6.2.1. Previous typhoons that arrived in barangay San Pedro I had caused several damages that affected the livelihoods of many residents. Coconut is most affected during typhoons as nuts are blown away by the strong winds which can even uproot the tree itself. Coconut trees take at least 2-3 years to recover its productive capacity.

6.2.2. Typhoon also impacts different infrastructures such as houses, roadways and electric utility poles which were either smashed down or scoured because of the powerful storm winds. High precipitation causes landslide or soil erosion as soil is loosen.

6.1.3. During typhoons, schools are usually used for evacuation area. As a result, children are unable to attend their classes. Meanwhile male farmers consumed longer hours working on

their farms because of the debris left by the typhoon whereas female farmers received more loads of household chores.

6.1.4. During long dry season, people observed increased in pests infestation. New pests (e.g., *cocolisap*) have also been observed not only to crops but to animals as well. Animals are affected during dry season as sources of forage dry up. Rice farmers and vegetable farmers are most affected during drought.

6.1.5. Long dry spell has affected their working hours in the farm. Farmers wake up earlier to work as heat is unbearable starting at 10am to 2pm. Before, they can still work continuously until lunch and take a one-hour break.

In late 2020, the Philippines was battered by three very significant weather disturbance rapid succession displacing over three (3) million people and leaving more than 100 deaths, lots were injured and many are still missing as reported by the national government authorities. Southern Luzon, particularly Guinayangan municipality (and barangay San Pedro 1 therein) in Quezon province was among the places devastated by these consecutive storms in span of 17 days:

1. October 26, 2020 - Typhoon Quinta (International Name: Molavi). Maximum sustained winds: 205 kph (125 mph). Guinayangan was placed under Typhoon Signal No.: 3 with winds of 121 kph (to 170 kph (105 mph).
2. November 1, 2020 – Super Typhoon Rolly (International Name: Goni) an extremely powerful tropical cyclone that made landfall as a Category 5–equivalent super typhoon. Maximum sustained winds: 315 kph (195 mph). Guinayangan was placed under Typhoon Signal No.: 4 a ferocious wind of 171 kph (106 mph) to 220 kph (136 mph) with gustiness up to 310 kph (192 mph) was experienced by the local residents for several hours.
3. November 10-11, 2020 – Typhoon Ulysses (International Name: Vamco) a powerful Category 4-equivalent typhoon with strong winds reaching 205 kph (127 mph) near the center. Guinayangan reached up to Typhoon Signal No.: 3 with winds 121kph (75 mph) to 170 kph (105 mph).

These storms brought strong winds, torrential rains and flying typhoon debris, caused flooding, landslides and destruction to houses, government and private communications and powerlines structures and facilities and incurring serious economic losses. Storm surge on coastal areas destroyed banca, fish cages and most fishing equipment. The agricultural livelihoods sources of the local residents both on crops, fisheries and livestock suffered devastation posting an equivalent damaged of PHP1.9 billion (US$40.6 million) as reported by the local OMA in Guinayangan. A total of 2,964 families equivalent to 17,784 individuals were evacuated either at the town center buildings, Barangay Halls and School buildings or temporarily stayed at others houses considered to be sturdy, 23 houses (initial report, still assessing) were totally damaged and 498 houses partially damaged. There were four (4) houses totally buried by landslide at Sitio Prenza, Barangay Calimpak. Initial report from the municipal disaster risk reduction and management office (MDRRMO) estimated over 150 million pesos cost of damage to government buildings and road infrastructures. Road clearings and assessments still going on and damages is expected to go up in the final report.

On the other hand, typhoons also resulted positive effects on the community's water supply. Excessive rains replenished groundwater supply and watershed.

6.2. Who are most affected?

Participants gave the following conditions of vulnerable households:

- ✓ Farmers dependent to copra production for livelihood
- ✓ Farming households with people with disability
- ✓ Farmers with no land but are just dependent in providing labor for copra production (*maglulukad*)

6.3. Coping mechanisms

"B*ayanihan*" or community spirit is alive in the village after typhoons. People provide labor in clearing up debris and landslides to open access to their village. Local folks were able to recover or mitigate the result of damages by maximizing their remaining resources. Many also grow alternative crops, most of the time root and tuber crops. Meanwhile, others opt for temporary migration and work outside of the

community to look for a stable job after a devastating typhoon. They tend to stay in that work longer and more often affects copra production as available labor in the village is limited. Different community organizations extended their efforts by providing assistance to those extremely affected residents; while the microfinance groups offered a calamity loan for those people who were severely affected by the storm.

7. Summary and Findings

7.1. The 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. Four typhoons had hit them in the past 2 decades. Long dry season does not affect them as hard as typhoon does as they have several sources of water. Irrigating their crops is not a challenge. What prolonged dry season affected was the number of working hours spent in the farm. With the intense heat, farmers have adjusted their time in doing their work in the farms.

7.2. Prolonged dry seasons in the community have lesser impacts to San Pedro relative to other barangays. This is due to the presence of at least 6 major springs in the village, most of which do not dry up even in the summer. Thus, water for household consumption is more available in the village than in other barangays. Prolonged dry seasons though have a big impact to coconut farming as production of nuts is lowered and quality (size) is also diminished.

7.3. While strong typhoons largely result to massive destruction of crops leading to adverse impacts to livelihoods, timing of its occurrence, however, contributes largely to the resilience of the community. Strong typhoons occurring within the months of October to December do not have as much impact as those occurring in earlier months. This is because farmers often resort to upland rice farming and vegetable farming to cope with the losses from their coconut farms. Typhoons occurring earlier (such as Rammasun in July) are more destructive to livelihoods as farming is not possible due to the absence of continuous rains.

7.4. Farmers believe that strong and destructive typhoons that pass the province occur in a span of 10 years such as the case of typhoons in 1995 (Angela) and 2006 (Xangsane in September and Durian in November). This is, however, not the case of the recent typhoon Rammasun which occurred only 8 years after Durian. More importantly, the typhoon hit in the month of July.

7.5. The farmers are well-informed of El Niño and La Niña phenomena resulting from its occurrence in 1998-999 and again in 2010-2011. During these periods, some of the springs in the village went dry and farmers had to use draft animals to fetch waters elsewhere.

7.6. Among the identified crops grown in the village during drought (El Niño) conditions are sweet potato, cassava, taro and banana. La Niña conditions on the other hand, allow farmers to open up areas for paddy rice production. Vegetables farming on the other hand, is more difficult during La Niña as crops get rotten faster and pests and diseases are more prevalent.

Nature-based solution

Communities and LGUs have to be empowered to uptake more the natured based adaptation for the sustainable management and use of nature for tackling socio-environmental challenges and issues such as climate change, water security, water pollution, food security, human health, biodiversity loss and disaster risk management.

The practice of nature-based solutions is supported by nature, and this approach are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into communities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions further emphasizes the benefits for having biodiversity and support the delivery of a range of ecosystem services.

The nature-based solutions initiative are actions that work with and enhance nature so as to help people adapt to change and disasters. With this practice, healthy, resilient and diverse ecosystems (whether natural, managed or newly created) can provide solutions for the benefit of societies and overall biodiversity.

Interventions

For the past years after this PVA study has been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options have been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as San Pedro 1 explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

These interventions are aimed to enhanced the livelihood options of the farmers at the MSPL buffer zones and those within through agroforestry and organic farming while educating them on the importance of enhancing intra species biodiversity in the upland coconut ecosystem. This is expected to reduce their current dependence on the forest product, enhance ecosystems services (e.g., pollinators) and enhance carbon sequestration through regenerative agriculture. The intervention is expected to influence the other barangays in the municipality on the importance of restoring biodiversity to the current predominant coconut-based systems.

These interventions also hope to address the challenges associated with the coconut mono-cropping pattern for copra production as revolutionized through the planting of different forest tree, coffee and cacao, and fruit trees species and shade trees and other understory food crops such as camote, taro, *ube*, banana, legumes and indigenous vegetables with added raising of native pigs and native chickens thereby increasing tree, crop and livestock biodiversity and sustained ecosystem development.

Farmers implemented agroforestry as a means to increase biodiversity in the upland coconut ecosystem. Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Livestock is ncluded in the system as appropriate. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increase soil capacity for water and moisture retention. Trees not only help mitigate climate change (by absorbing carbon dioxide an important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro-climate and help reduce the desiccating action of wind. Trees store carbon in their biomass. Fruit trees, coffee, cacao, banana, and root crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits that can generate additional income for the farmers while ushering for the biodiversity enhancement in this coconut upland ecosystem.

The interventions brought both increase in economic activity in terms of family food security and nutrition and income as compared to the usual coconut dependence alone and positive impact to the environment brought about by the multiple plant and animal species raised in the area.

The increased in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens and honey that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development.

The following are some of the interventions by the collaborative partnerships of different actors at Barangay San Pedro 1:

- Participatory action research (PAR) on Goat Raising: 3 farmer-cooperators participated
- Participatory action research (PAR) on Goat Raising: 3 farmer-cooperators participated
- Farmers' adoption of Climate smart agriculture options:
  - ✓ 8 farmer beneficiaries adopted the low external inputs on pig production (LEIPP).
  - ✓ 8 farmer beneficiaries adopted the improved goat raising
  - ✓ 58 farmers beneficiaries adopted agroforestry
- Farmers trained on the different CSA technologies:
  - ✓ 58 farmers trained on native pig raising (LEIPP)
  - ✓ 58 farmers trained on agroforestry
- Enriching landscapes through fruit tree-based intensification: 45 farmers received the following seedlings:

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

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes, good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pests and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles and if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where they are located.

Barangay San Roque

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

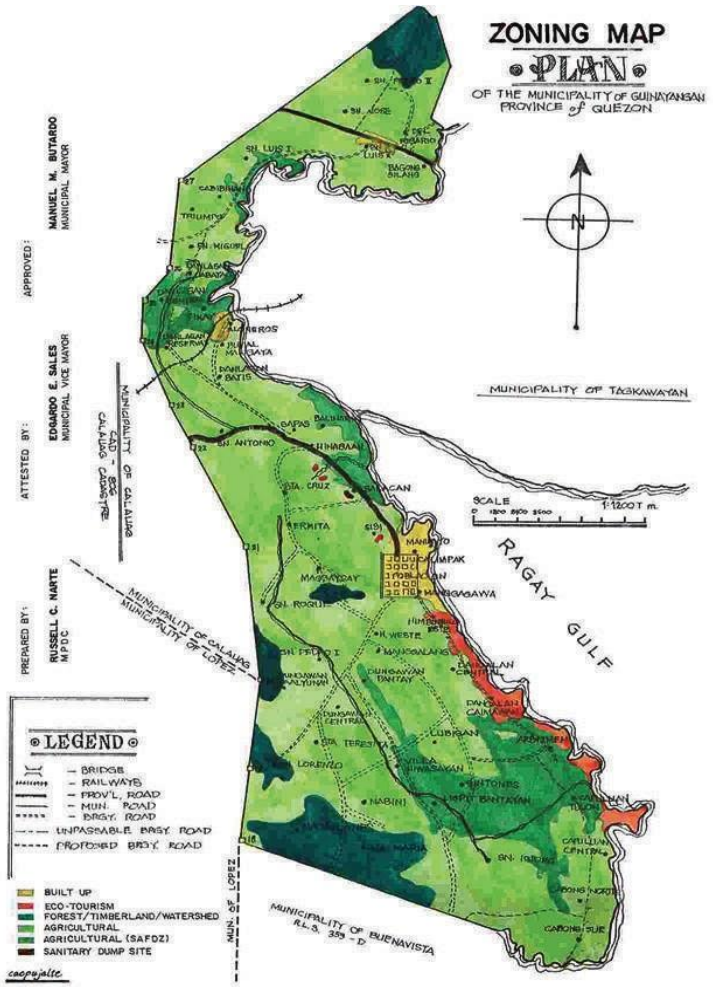
- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, the International Institute of Rural Reconstruction (IIRR) partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.



Basic Information

Topography: Upland
Elevation: 291.3 meters above sea level
Cellphone signal: Partial.
Road condition: 75% gravel, 25% cement
Location: 11Km northeast of municipal town center
Area: 456 ha
Boundaries: (N), Santa Cruz (E), San Pedro 1 (S), Municipality of Lopez (W)
Population (2018): 689 individuals (317 female, 372 male); 169 Households, 182 Families (100% farming)
Community infrastructures: elementary school, barangay hall, day care center, health center, multi-purpose hall. Evacuation center. It has three (3) barangay health workers (BHW). Credit facility, Barangay Tanod, Water system.
Community-based Organizations: Rural Improvement Club (RIC) and KALIPI; Farmers Association, Pantawid Pamilyang Pilipino Program 51 beneficiaries (48 female, 3 male)
Unique infrastructures/features: The communityhost one of the watersheds of Guinayangan whichis geographically shared with the Municipality of Lopez. As such the village is blessed with several springs.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

- Establish with the community the livelihood conditions in the village using the 5 capitals;
- Determine community's perception on changes in climate, its impacts on their livelihood and other factors/drivers;
- Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
- Establish an in-depth analysis of the climate-change related risks faced by farmers, existing coping mechanisms, possible adaptation measures; and perceived interventions for increasing their adaptive capacities.

3. Methodology

The participatory vulnerability assessment (PVA) study was conducted at the San Roque Multi-purpose Hall last September 26, 2014 with 18 participants (11 men and 7 women), representing the barangay council members, rice, coconut and vegetable farmers. This was the 7th barangay where the PVA was conducted. Focused group discussion (FGD) was the method used using different PRA tools such as seasonal calendar, timeline, and livelihood assets matrix and problem tree. (See Annex 1 for the description of the tools).

Additional data and information for this report were also gathered through key informant interview (KII) to Barangay Officials. Secondary data were further gathered at the Municipal Planning and Development Office (MPDO), Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information.

The study was limited to agriculture as livelihood of the community.

4. Introduction

4.1. Barangay Profile

Barangay San Roque is an upland village located 11 kilometers from Guinayangan's municipal town proper. It is accessible by all types of vehicles due to an all-weather road that connects it with the rest of the municipality.

Despite being an upland village, San Roque has a watershed that makes water available year-round in the village. There are also several number of springs and wells in the village that supply most of the water for household needs of families and for irrigation water to rice paddies.

4.2. Village History

San Roque was established in 1968 after being separated from barangay Sta. Cruz. In 1960's, the area covered by Barangay San Roque used to be grassland. There were abundant forest areas with little agricultural activities. Before 1980s, coffee and banana were the main sources of livelihood in the village. Banana production started to decline in the late 1980s after it was hit by pests. In 1979, hybrid coconut was introduced in the village which offered better income for farmers. Coconut replaced banana and coffee as main crop in 1980s providing more stable income for farmers as farmers can harvest every 45 days with minimal maintenance requirement compared. The shift from coffee to coconut coincided with the decline in the market price of coffee at the global market.

Milestones in the village's history are characterized by major disturbances and the onset of development works that resulted to major socio-economic changes in the community. Droughts and four (4) typhoons are the two (2) major climate-related milestones experienced in the village (discussed in separate section).

The establishment of San Roque as well as the construction of community infrastructures such as barangay hall and elementary school played a major role in the development, governance and administration of the community. These improved services for the community and provided access to primary education.

In 1979, the construction of farm to market road improved market accessibility and made transportation easier. In 1999, electricity became available in the village which provided comfort and convenience to the residents. Farm practices have also improved when new technologies such as hand tractor and rice mill arrived in the community, reducing the man hour labor requirement.

From 1984-1987 the presence of National People's Army (NPA) in the upland villages affected the safety and security of the residents. The resident migrated to town proper for safety. Many civilian volunteers were recruited by military.

4.3. Land Use and Tenurial Arrangements

With a total land area of 456 hectares, 84 hectares are devoted to rice land and the rest are coconut plantation. A part of San Roque is within the Lopez Tibyang Watershed. This is currently occupied by upland dwellers from the barangay without a tenurial instrument. Rice is subsistence farming but surplus is sold within the barangay. About 80% percent are small-owner cultivators.

5. Livelihood Profile

Coconut is the main crop produced in the village in terms of volume of production and income provided to farmers. Coconut farming is the primary source of livelihood of majority of families in San Roque. Ginger and peanuts are intercrop with coconut. This is followed by rice farming.

The traditional process of coconut production is generally termed as *pagkokopra* or *paglulukad* with copra (desiccated coconut) as the main product sold by the farmers to a casa in the town proper.

Mature coconut is normally harvested every 45 days. The highest production of coconut is in the months of August to December during the wet season, while the lowest is on the months of March to May during the dry season. Farmers said that high temperature affects the production of coconuts. Average or normal production is observed during January to February and June and July.

Rice is grown in two cropping seasons. First season (wet season) is in June and second (dry season) is in November. Peanuts is also grown twice a year, the first cropping in May and then in October. Ginger is grown once a year.

Recently, a private company introduced and oriented some coconut farmers on organic coconut and copra production that offers premium market price. Some farmers signified their interest to produce organic copra.

Majority of the landowners employ laborers to deliver the services required of producing copra. This is mainly because the household cannot do it alone. Most of the labors though are also from neighboring households. As such, while most farmers in San Roque are landowners, they are also laborers themselves who work in other coconut farms.

Aside from farmers, other important actors to the copra value chain supply are the owners of jeepneys. Copra products are transported to the casa using jeepneys.

The participants identified 11 activities in copra production which men and women are both involved. These are nuts picking or *kawit*, weeding or *tabas*, *tapas*, mechanical shelling, pan loading or *hakot*,

kamada, fueling or *gatong*, *hango*, *tigkal*, sacking and *pagsusulit* or marketing. Four (4) tasks that are light and easy are equally done by men and women farmers. These are weeding, hango, tigkal and pagsusulit or marketing. The rest are hard and laborious tasks that are dominantly done my men farmers.

The daily routine of a typical female in barangay San Roque begins at 4:00 in the morning. She spends nine (9) hours for household activities including tending her children, personal activities and tending their farm animals; six (6) hours on the farm/field activities, and nine (9) hours of rest and sleep. Meanwhile, a typical male farmer spends five (5) hours for personal activities, two (2) hours tending farm animals, seven (7) hours on the field and 10 hours of rest and sleep. Unlike the woman farmer, male farmers have more time to rest, for family time and for himself.

Talok-ani system is widely practiced whereas 40 percent of the harvest goes to the laborer while 60 percent goes to the farm owner.

Brontispa or coconut leaf beetle feeds on young leaves and damages young seedlings and mature coconut palms. It occurs during the month of January to June with peak infestation during the rainy months of July to December. Other pests such as weevils, aphids and rats occur throughout the year.

The participants identified that low productivity of coconut trees is the key issue in the community. Coconut production is largely affected by higher incidences of losses due to typhoons and droughts. However, there are occasions when production is affected by tight market competition as a result of excessive coconut supply. In addition, market competition is also further affected with the entry of soybean. Some experts claimed that soya bean is healthier and extract more oil than coconut. Soybean meal has also become a significant input in livestock feed formulation thus, making soybean oil a better product.

6. Climate Change Perceptions and Coping Mechanisms

6.1. Perceived Climate Patterns

The participants observed that now a days, they are experiencing hotter days and nights and heavier rainfall. Wet season starts in the month of May and lasts until February; with occasional storm/typhoon season during September to December. Dry season start in February and ends in May.

From 1968 to 2014, the village experienced four (4) strong typhoons that badly hit the community. These are Typhoons Dading, Sisang, Rosing, and Glenda. According to the participants, among these cyclones, Typhoon Rosing was the strongest, damaging the community forest, coconut farms and houses and killed many farm animals. According to the community, it was able to flip down the large aluminum cooking pan (*talyasi*) when it happened. Many farmers dependent to copra production were displaced. Meanwhile, Typhoon Glenda destroyed their coconut farms, damaged their houses and killed their farm animals and toppled down electric poles and destroyed communication lines. According to the participants, it would take two years for the coconut trees to recover from the effects of Typhoon Glenda.

From 1997 to 2014, the community twice experienced prolonged drought that damaged coconut production and caused death of fish in streams and farm animals such as carabao. It also dried up water sources, farmlands, grasslands and roads. Intense heat disrupted farming and household activities as well. Intense heat caused children suffer from fever, prickly heat rash, chicken pox, sore eyes, and measles while adults suffer from high blood pressure and become irritable.

To cope with the effects of typhoon and drought, the community planted corn and rice for their subsistence. Other farmers plant mungbean and ginger to provide alternative livelihood. Women sought jobs outside in nearby towns as house helpers while men worked as laborers in construction and coco lumber production. Both men and women engaged in charcoal production to support their families. The community practice *bayanihan* in repairing and rehabilitating damaged community infrastructure such as roads and school. Summer is hotter and more prolonged as recently experienced.

6.2. Who are most affected?

The participants defined vulnerability as, "the incapability of an individual to easily recover and respond to the disaster." The participants defined vulnerable groups with the following criteria:

- Households with large family size
- Farmers that are tenants and do not own land
- Persons with disability
- Household headed by single parent or widowed
- Senior citizen
- With only one source of income

7. Summary and Findings

Both men and women dependent to copra production as main source of livelihoods are at risk to strong typhoons and drought that were experienced in Barangay San Roque. Majority of the residents in San Roque are small owner cultivators that have greater opportunity to diversify their crop and livelihood sources. Crops that are resistant to typhoon, drought and excessive rains should be planted or intercropped with coconut to provide buffer against these climate hazards.

Meanwhile, tenants and landless coconut workers are on higher risks as they lack access and control over land resources to maximize its potentials against climate hazards. Land tenure and security is an important factor in making farmers' livelihood resilient.

Community forest provides several springs steady supply of water throughout the year. The presence of water sources also provides opportunity for farmers to plant rice as subsistence crop.

Nature-based Solution

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The increase in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens and honey that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development

The following are some of the interventions by the collaborative partnerships of different actors at Barangay San Roque:

- Farmers' adoption of Climate smart agriculture options:
  - ✓ 4 farmer beneficiaries adopted the low external inputs on pig production (LEIPP)
  - ✓ 5 farmer beneficiaries adopted the improved goat raising
  - ✓ 28 farmers beneficiaries adopted agroforestry

- Farmers trained on the different CSA technologies:
  - ✓ 4 farmers trained on native pig raising (LEIPP)
  - ✓ 28 farmers trained on agroforestry
  - ✓ 5 farmers trained on goat raising
  - ✓ 2 farmers trained on systems of rice intensification
- Enriching landscapes through fruit tree-based intensification: 21 farmers received the following seedlings:

292 rambutan	410 coffee

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

Community mapping identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.

Historical timeline outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.

Seasonal calendar shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool is also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).

Matrix of livelihood activities lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.

24-hour clock determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles and if there are climate hazard or extreme events.

Problem tree identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.

Matrix of livelihood assets lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.

Perceptions on vulnerability define the trait, characteristics or criteria of people who are considered
vulnerable to climate hazard.

Mapping of vulnerable sectors identifies and lists who are the vulnerable families, individuals and where are they located.

Annex B: Outputs of Community Workshops

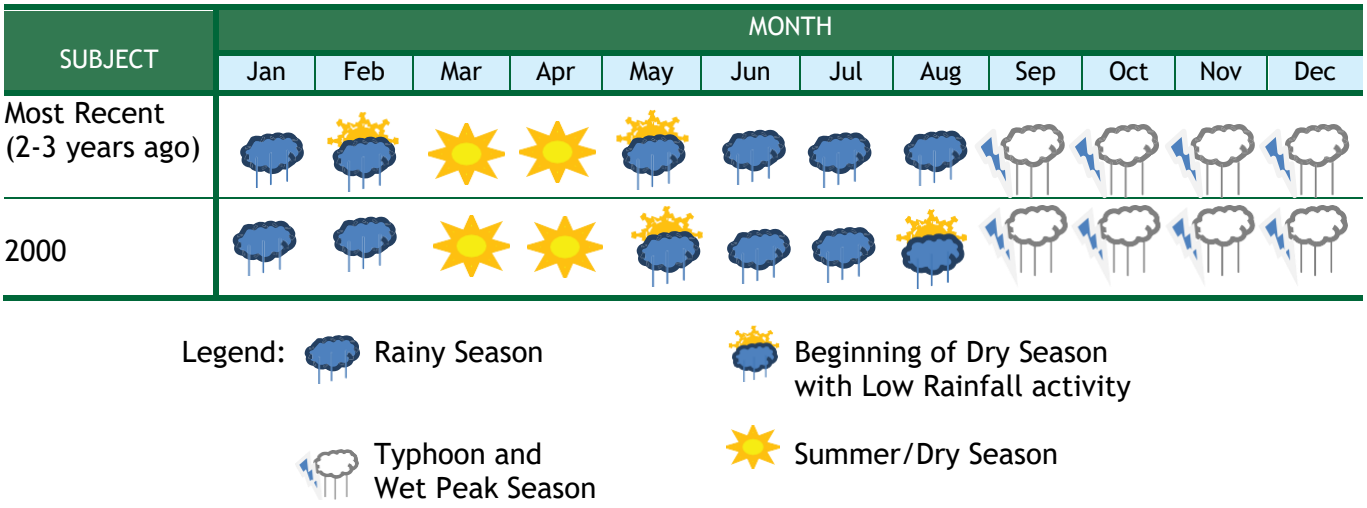
Timeline

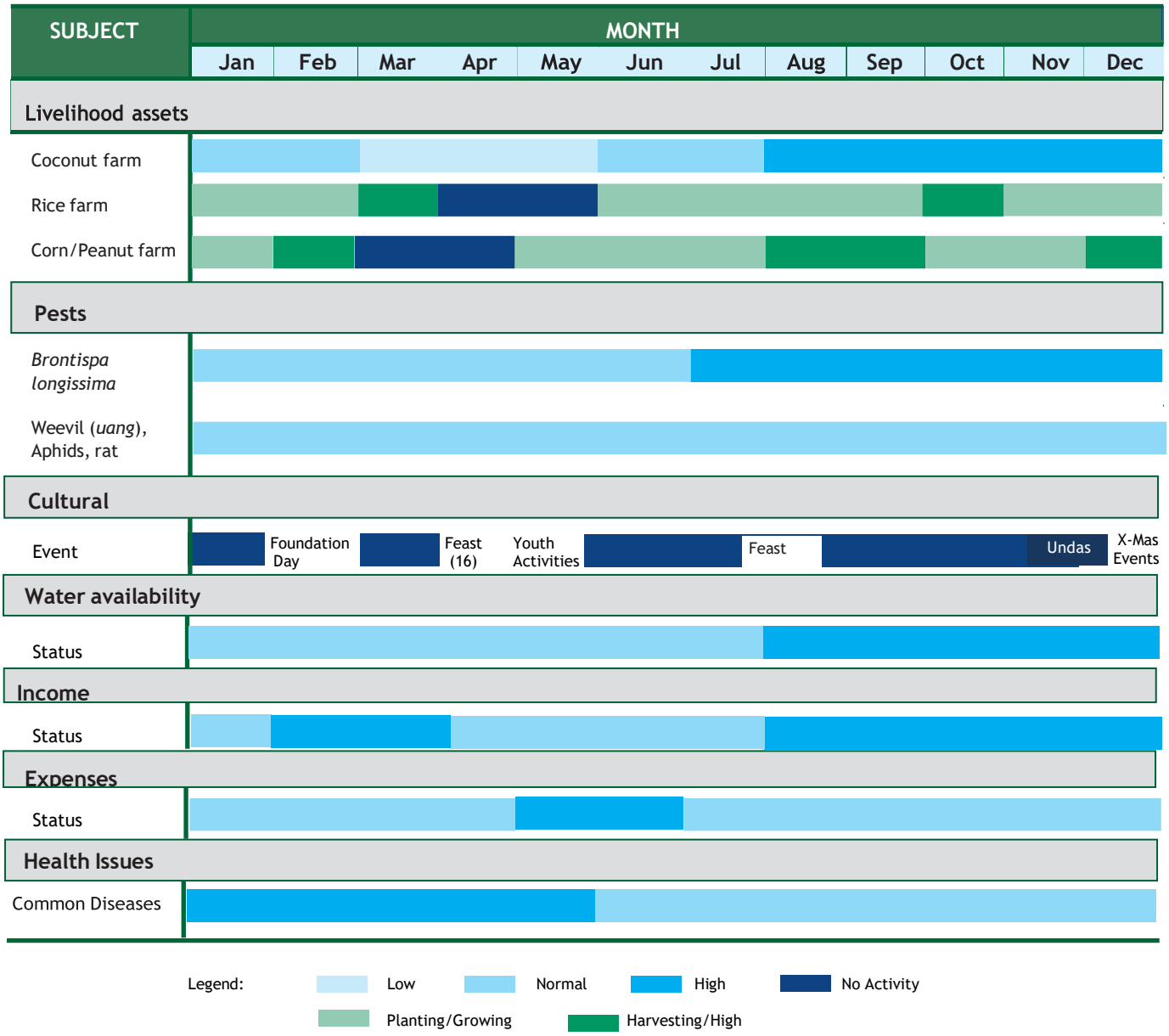
Year	Events	Impacts	Coping Mechanism
CLIMATE-RELATED EVENTS			
1964	Typhoon Dading (Category 3 typhoon)	The typhoon caused minor damaged on houses and farms.	Similar with the 1995 event
1987	Typhoon Sisang	The typhoon caused major damages to houses and farms.	The community planted rice and corn for their subsistence.
1995	Typhoon Rosing	Typhoon Rosing destroyed their farms, forest and damaged their houses. Many farm animals also died.	Some residents borrowed money from financiers to support their families. Other worked in other place as house helpers while other planted corn and rice for subsistence.
1997	El Nino (7 months drought)	Drought damaged coconut production and caused death of fish in streams and farm animals such as carabao. It also dried up water sources, farmlands, grasslands and roads. Intense heat disrupted farming and household activities as well.	To cope, some community members planted mungbean that thrives in limited water while others sought jobs in Manila.
2014	Typhoon Glenda	Typhoon Glenda destroyed their coconut farms, damaged their houses and killed their farm animals. Power lines were also destroyed.	The residents planted rice and corn for subsistence while other sought jobs from other places.
	Drought for 4 months	Decrease in coconut production	
2018	Prolonged drought	Many of the rice farmers did not harvest their crops. Same with the vegetable growers.	Some farmers converted their rice fields into corn. Others plant vegetables in just small areas/backyard that they can water.
2019	Typhoon Tisoy	Destroyed coconut, vegetables, banana farms and fruit trees. Destroyed fishing boats, houses communications facilities and government infrastructures.	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making. After the storm, families opted to do gardening for quick source of food and income if surplus is available. Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief operations and cash for works programs.
2020 (Oct-Nov)	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.

COMMUNITY DEVELOPMENT			
1968	Barangay San Roque was established	The barangay formed its own council and had its own fund.	
1968-69	Construction of barangay hall & elementary school	Improved services for the community and provided access to primary education	
1979	Construction of barangay road	Provided access to and from other communities	
1968	Militarization	Residents migrated to town proper for safety. Civilian volunteers were recruited by military.	
1994	Formation of Sangguniang Kabataan	Youth are involved in local politics. The basketball court was also constructed using the SK fund.	
1999	Electrification	Provided comfort and convenience to communities. Population also decreased.	
LIVELIHOOD			
1979	Hybrid coconut was introduced	Provided easier income for the coconut farmers	
1980	Peak of coconut production	Coconut replaced coffee as main livelihood in the community	

Seasonal Calendar

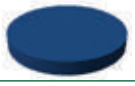
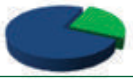
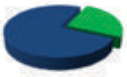
WEATHER AND CLIMATE





Livelihood and Gender Analysis

Table 1. Comparison of the activities being performed by both genders under coconut farming

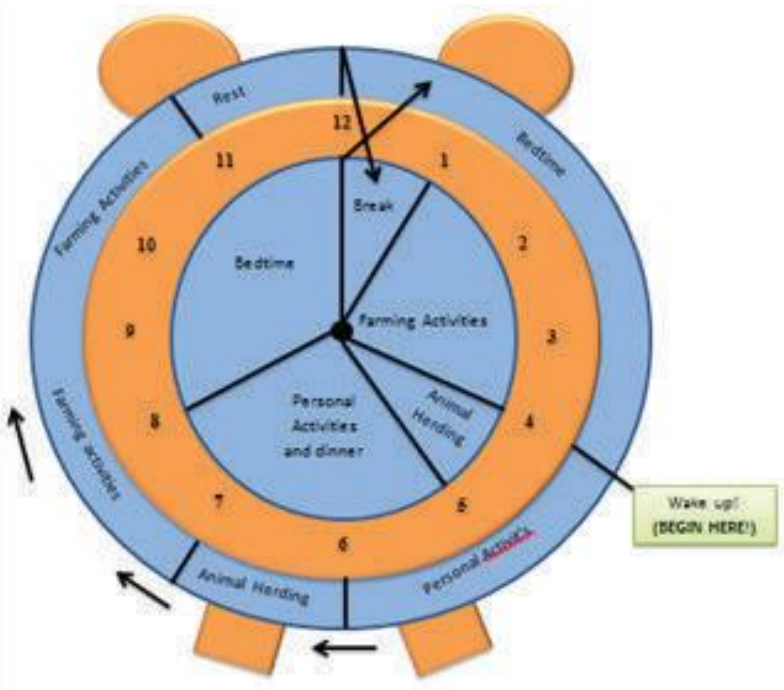
COCONUT FARMING	
ACTIVITY	PIE CHART
Nut poling/picking (*kawit*)	
Weeding (*Tabas*)	
Tapas	
Mechanical shelling	
Pan Loading (*Hakot*)	
Kamada	
Fueling (*Gatong*)	
Initial Mixing (*Hango*)	
Tigkal	
Product packing (Sack)	
Pagsusulit (marketing)	

SIGNIFICANT PERSONS
Owner (land) and owner (transportation vessel)
Tenants
Laborer Kasa (buyer)

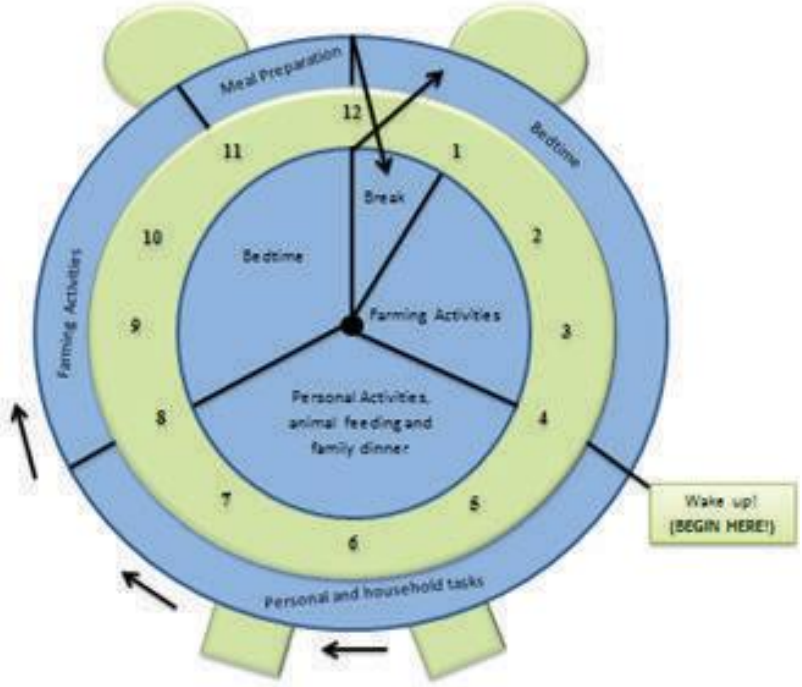
LEGEND: Male Female

Gender Clock

MALE



FEMALE



Community Mapping

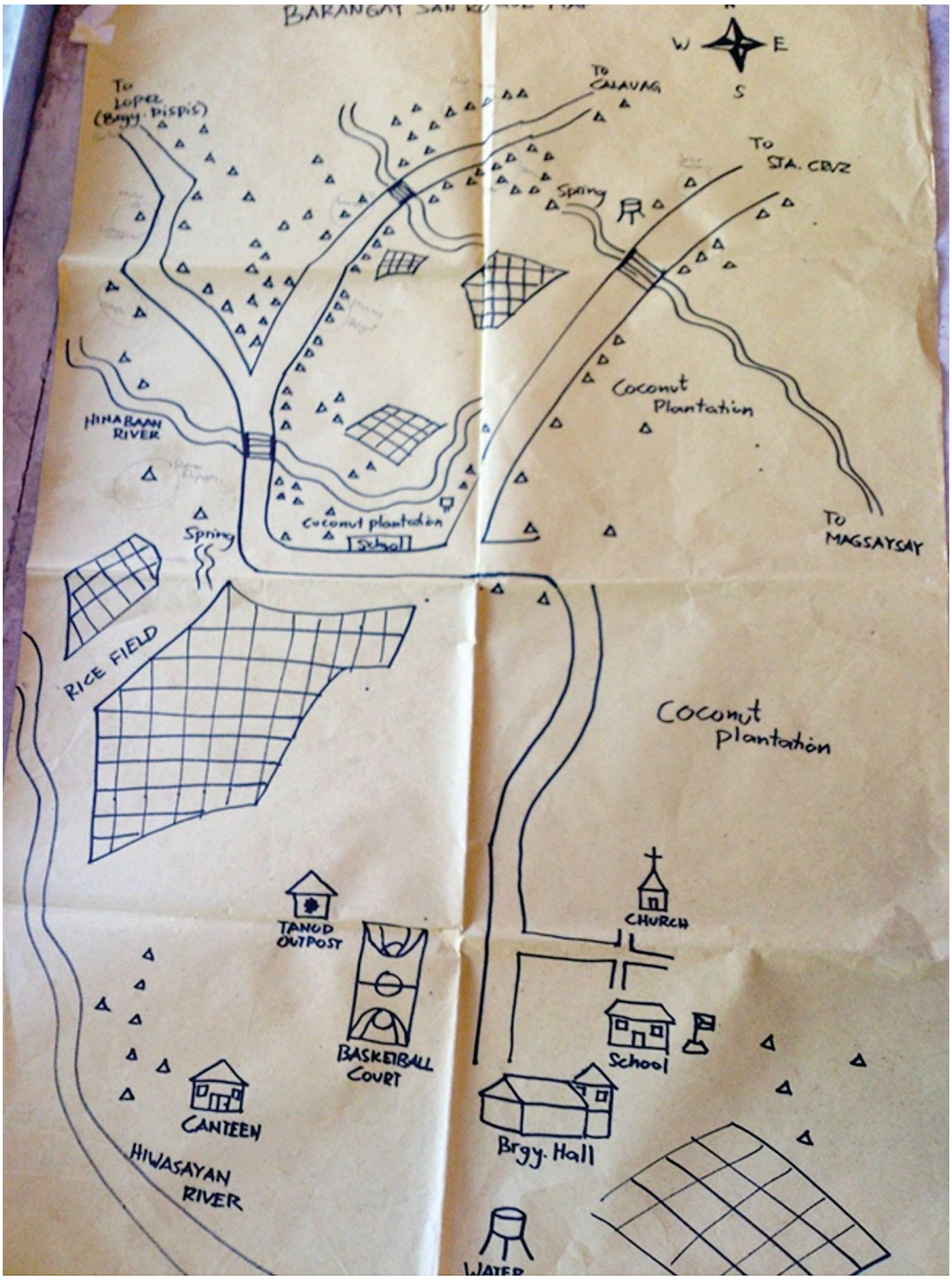


Figure 1. Community-generated map of Barangay San Roque, Guinayangan, Quezon

Barangay Sintones

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities and interventions update

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS in a project that is expected to enable farmers to increase productivity using environmentally friendly regenerative approaches. The project explores the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers.

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understandingof the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts. The PVAs were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community level discussions that result in community-based adaptation strategies.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

2. PVA Study

The PVA study was conducted in the 11 barangays of Guinayangan to help the community achieve a better understanding of the conditions and factors that affect their vulnerability to climate change impacts. Once the community receives this information, it will be in a better position to increase its resilience and react to disasters.

Specifically, the PVA has the following objectives:

1. In collaboration with the community, establish the livelihood conditions in the village using the 5 capitals.
2. Determine the community's perception on changes in climate, its impacts on their livelihoods and other factors/drivers.
3. Determine and establish the level of exposure of smallholder farmers to climate risks in the 11 villages where IIRR works.
4. Establish an in-depth analysis of the climate-change-related risks faced by farmers, existing coping mechanisms, possible adaptation measures, and perceived interventions for increasing their adaptive capacities.

3. Methodology

The PVA study was conducted at the barangay multi- purpose hall on 7 November 2014. The meeting was attended by a total of 23 participants (14 men, 9 women), representing the barangay council members as well as the coconut, rice, and vegetable farmers.

A focused group discussion (FGD) was held using participatory rural appraisal (PRA) tools such as community mapping, seasonal calendar, timeline and livelihood assets matrix. These tools are described in Annex 1.

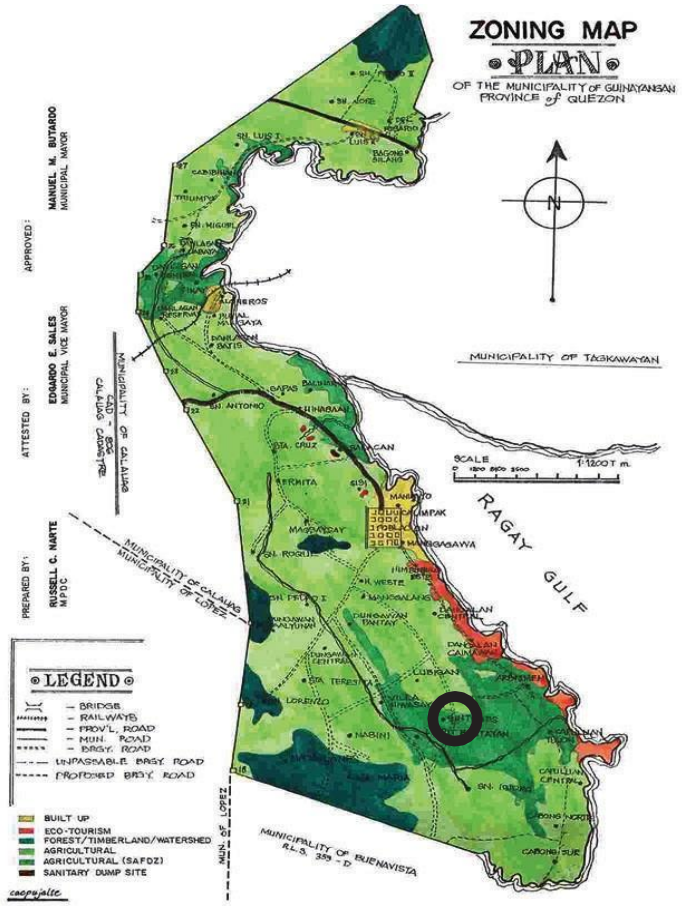
Additional data and information for this report was also gathered through a key informant interview (KII) to barangay officials. Secondary data were further gathered from the Municipal Planning and Development Office (MPDO), the Office of the Municipal Agriculture (OMA), and the Department of Social Welfare and Development (DSWD). Information from activity reports of monitoring visits, documentation of a stand-up meeting, and project reports augmented needed data and information.

The study was limited to agriculture as main source of livelihood of the community.

4. Introduction

4.1. Barangay profile

Barangay Sintones is an upland village located in the southern part of Guinayangan. It is accessible by all types of vehicles due by an all-weather road that connects it with the rest of the municipality.



Basic Information

Topography: Upland,
Elevation: 66.8 meters above sea level
Cellphone signal: Partial
Road condition: 5% dirt, 35 gravel 60% cement
Location: 10km northeast of municipal town center
Area: 313 hectares
Boundaries: Lubigan (N), Capuloan Tulon (E), Ligpit Bantayan (S), Villa Hiwasayan (W)
Population (2018): 755 individuals (350 female, 405 male) 175 households, No. of families: 185.
Community infrastructure: 1 elementary school, barangay hall, 1 health center, 1 day care center, basketball court, multipurpose hall, solar dryer, covered court, irrigation system, palay thresher, potable water supply, Sindacar bridge spillway, 5 barangay health workers
Community-based organizations: 4H (youth), RIC (women), KALIPI (60 women), Irrigators' Association and and Farmers' Association (mixed male & female), 4Ps 63 as of Feb 2021 (58 female, 5 male)
Unique infrastructure/features: Philippine Volcanology (PHILVOCS) discovered that a fault line in Guinayangan passes through Barangay Sintones.

Despite being an upland village, Sintones has multiple water sources, including both springs and rivers. The community has had an irrigation system since the 1990s that provides sufficient water for growing various crops. It has also a spillway for flood control. The river is used for both irrigation and laundry.

4.2. Village History

Barangay Sintones was established in 1926 after being separated from Barangay Dancalan. The elementary school of Sintones was constructed in the 19th century, and since then has been providing education not only to barangay residents but also to students from the nearby communities of Capuluan, Arbismen, Ligpit-Bantayan, San Isidro, Dancalan Central, and Villa Hiwasayan.

In 1960, a buffalo disease outbreak spread throughout the community, killing more than half of the population of the ruminants.

In 1984, a drying facility became accessible that made drying of *palay* efficient.

In 1985, the clash between the New People's Army (NPA) the Philippine military caused fear among many residents and resulted in high rates of migration to safer places. Some residents who refused to leave their homes served as civilian volunteers to resist the rebels.

In the 1990s, because of the Comprehensive Agrarian Reform Program (CARP), several landless farmers were given an opportunity to own their own land.

During the 1990s, LWUA and NIA became functional, providing the entire water requirement for the cultivation of various crops. Two decades later, the Catholic Church was established that improved the ethical and spiritual behavior of its believers.

Electricity services became available in 1990, providing access to current news through television and radio. Reduction of *buri* (palm) was also observed at this period as coconut farming became the priority of production.

In 1995, the ARCOP Spillway was constructed, reducing the flooding situation in the barangay. Water levels became easier to regulate.

4.3. Land use and tenurial arrangements

Barangay Sintones has a total land area of 502 hectares, of which 288 are devoted to agricultural land (22 hectares for rice cultivation and 266 for coconut production). The remaining land area is dedicated to residential areas.

Most coconut lands are owned by residents, although a number of tenant farmers live in the village. The 60/40 sharing arrangement is practiced. 15% of the area is planted to rice and 80% of this area is owned by residents. In coconut farming, the sharing agreement of 60/40 is practiced where 40 goes to the farmer/laborer. In rice farming, the tercio system is practiced where one third of the yield goes to the tenant. Another payment scheme is done through the 40/60 system where the highest percentage of the harvest goes to the land owner. Usually, land rent for farming amounts to PHP 500/ha, planting labor amounts to PHP 2,500/ha, and grass mowing (*gapas*) is paid through the 2/13 system per harvest. A farmer usually earns 200 PHP/sack of rice (50kg).

5. Livelihood Profile

5.1. Coconut is the main crop produced in the village in terms of volume of production and income provided to farmers. Coconut farming is the primary source of livelihood of the majority of families in Sintones. Coconut is followed by rice, corn, banana, broomstick and vegetable.

5.2. The traditional process of coconut production is generally termed as *pagkokopra* or *paglulukad*. Copra, the main product, is sold by the farmers to a casa in the town proper. Copra is the dried coconut used to extract coconut oil.

5.3. Coconut is grown year-round. Mature coconut is normally harvested every 45 days. When the price of copra is very low, the whole nut sells for PHP 10. Peak harvest per hectare usually reaches 2,000 nuts/ha, whereas the lowest yield is 500 nuts/ha.

5.4. Rice is grown twice a year. The wet season starts in June and the second in November. Rice cultivars grown today are Triple 2, Sampaguita 174, and RC18. The traditional rice varieties grown in this barangay are *Balibud, Camoros, Binerto, and Iningkanto*. Maize is also produced twice a year (May and November). Banana is grown year-round as well as broomstick production.

5.5. Vegetable farming is also performed on a small-scale basis, where crops such as eggplant, string bean, bottle gourd and pumpkin are commonly grown. This barangay is also covered by the Animal Dispersal Program (which covers pigs, goats and buffaloes) of the Department of Agriculture in Guinayangan.

5.6. The key livelihood activity in this community is coconut production. The locals identified 10 major activities performed for this farming system. Two of them, nut picking and *tapas*, are only done by men. Three – nut collecting, mechanical shelling, and marketing – are largely performed by women. Four others, parade or *piling*, cooking, toasting, and sacking are performed mostly by men. The tenth activity, *tigkal*, is done equally by both genders. The first two mentioned above are done by men because the nature of work is very laborious. The key actors are landowners, jeepney owners, tenants, laborers, and *kasa* operators (buyers).

5.7. For rice farming, the participants identified 17 activities that require both male and female labor. Male activities are land soaking, primary tillage operation, seed soaking, secondary tillage operation, spraying of herbicide, application of fertilizers, manual threshing, drying and marketing. Seed preparation and sack tying

are performed mostly by women. Both sexes are responsible for planting, weeding, farm securing and harvesting.

5.8. A typical female in Barangay Sintones usually begins her day at 0400. She spends 7 hours in the field, 4 hours preparing meals for the family and tending the farm animals, 6 hours for personal activities and chores, and 7 hours for rest and sleep. Meanwhile, a typical male farmer also starts his day at 0400. He spends 8 hours on the field, 7 hours of rest and sleep, 2 hours tending their animal farm, and 7 hours for his personal activities and family time.

5.9. Stem borer infestation is usually low from March to August, then increases until February of the next year. Stem borer usually thrives in wet conditions and when the crops are in the vegetative stage. Another major pest encountered by farmers is worms. Worm population is low during the first 6 months of the year, then increases over the last 6 months when wet conditions prevail.

5.10. The key problem with coconut farming is low production. This occurs when yield is poor, often because the environmental threats brought on by climate change. Some farmers, in anticipation of the inevitability of climate change, are preparing for their worse threshold yields ever. Also, infertile soils often generate poor fruits.

5.11. The environment, as per reports from the participants, is consistently degrading due to the abusive activities of humans. But because they are poor, many people practice illegal activities such as tree logging and the *kaingin* system just to have an additional income for their families.

6. Climate Change Perceptionsand Coping Mechanisms

6.1. Perceived Climate Patterns

6.1.1. Climate patterns in Barangay Sintones have been changing. Weather events have been very destructive – rainfall is becoming more intense while surrounding temperatures are becoming intolerable.

6.1.2. The dry season starts in March and ends in May with the month of April as the peak period. The wet season, punctuated with occasional typhoons, starts in June and ends in January (the following year) with June to September as the initial rainy months. October to December are the peak rainy months. But aberrations are common. In 2014, for example, several farmers observed that rainfall only arrived when a low pressure area surrounded the country.

6.1.3. The community identified the hazards affecting their livelihoods. These were flooding in areas near the river, drought, and pests in ricefields.

6.1.4. In past years, typhoon occurrence was not a new phenomenon but a common event. From 1960 to 2014, the community recorded 6 typhoons in Sintones: Dading, Sisang, Rosing, Milenyo, Reming and Glenda. The typhoons destroyed coconut trees and caused excessive flooding of the Hiwasayan River that drowned many farm animals. Strong winds and excessive rainfall brought by typhoons have washed out soil nutrients and damaged vegetable and rice crops, houses, roads, irrigation canals and electric poles, shutting down power and communication services.

6.1.5. Typhoon Rosing was the strongest in terms of precipitation rate, while typhoon Glenda became the most fatal in terms of wind speed and gust. However, both typhoons killed numerous trees, affecting the production and income of many farmers.

6.1.6. Similarly, drought also adversely impacts their livelihoods. Prolonged drought and absence of rainfall in 1970 and 2014 dried up the soil, crops, and water sources. Extremely hot temperatures limited farming activities. People preferred staying indoors, causing higher electric consumption. Summer is hotter and more prolonged as recently experienced.

6.1.7. Typhoons Tisoy in 2019 and Quinta, Ulysses and Super typhoon Rolly in 2020 brought so much destructions to livelihood sources, houses and government infrastructures.

6.2. Who are most affected?

The participants defined vulnerability as, "the incapability of an individual to easily recover and respond to disaster." The participants defined vulnerable groups with the following criteria:

- Those with a large number of family members
- Those who do not own their houses, most of whom live in houses made of light materials
- Incapacitated people
- Widows or single parents
- Those with only one source of income (like copra production)

6.3. Coping Mechanisms

6.3.1. Communal work or *bayanihan* is one way of coping and participating in recovery activities such as repair of damaged infrastructure.

6.3.2. Young and felled coconuts are collected and immediately sold while other damaged crops are fed to farm animals.

6.3.3. The community plants new seedlings and saved crops that were partly damaged.

6.3.4. Others engage in charcoal production.

6.3.5. Community members collect water from other sources while women washed clothes in the river.

7. Summary and Findings

7.1. Coconut, the main livelihood in Barangay Sintones, is susceptible to high temperatures, prolonged drought, and strong winds brought by typhoons. Between the 1960s and 2014, the community recorded 6 typhoons that brought massive damage to the infrastructure and livelihoods of the barangay. Typhoon Rosing was the strongest in terms of wind and rainfall, while typhoon Glenda was the most deadly in terms of wind speed and gust. However, both typhoons damaged coconut trees, affecting the production and income of many farmers. Furthermore, the prolonged absence of rain resulting in drought also affected the production of coconut and rice. Sole dependency on coconut as livelihood puts majority of the community at higher risk.

7.2. Rice production is also affected with increases in temperature, lack of water, strong winds and excessive rain. However, use of varieties resistant to varying climate conditions as well as new farming methodologies and technologies may help reduce its exposure to climate hazards.

7.3. Hotter dry seasons, wetter wet seasons, and frequency of strong typhoons will likely put production of coconut and rice at higher risk.

7.4. Diversification and intercropping coconut with crops such as ginger, vegetables, coffee or cacao may provide alternative sources of livelihood for coconut farmers. Diversification and value adding of coconut products will also help to make their livelihoods resilient. Livestock raising and production of fruit trees will also provide buffers in times of calamities.

7.5. Smallholder cultivators are less at risk to typhoons and droughts since they have control and access to make their lands productive. Tenants or landless coconut workers are more sensitive to climate stresses that affect coconut production. Reduction in yield affects reduction in copra activities. Some coconut farmers and workers, especially men, regularly seek non-farm jobs outside the community.

7.6. Availability and access of the community to different water sources and facilities for agricultural cultivating rice and vegetables provided them with diverse sources of food, nutrition and livelihood.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options has been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Sintones explored diverse cropping and links with small livestock. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

Farmers' adoption of Climate smart agriculture options:

- ✓ 49 farmer beneficiaries trained on low external inputs rice production (LEIRP)
- ✓ 49 farmer beneficiaries adopted the LEIRP

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

1. **Community mapping** identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.
2. **Historical timeline** outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes; good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.
3. **Seasonal calendar** shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).
4. **Matrix of livelihood activities** lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.
5. **24-hour clock** determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles if there are climate hazard or extreme events.
6. **Problem tree** identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsen by climate hazards and changes in climate patterns.
7. **Matrix of livelihood assets** lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.
8. **Perceptions on vulnerability** define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.
9. **Mapping of vulnerable sectors** identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

1. Seasonal Calendar

CLIMATE / WEATHER

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Condition (Current)												

AGRICULTURE

Livelihood Assets (Production Quantity)

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Coconut												
Palay												
Maize												
Banana												
Broomstick												

Legend: No activity, Harvesting, Planting & Growing, High, Normal, Low

CROP PESTS

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Stemborer												
Worm												

HUMAN HEALTH ISSUES

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Colds, fever, cough and diarrhea												

Legend: High, Normal, Low

WATER AVAILABILITY (LWUA)

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Status of water												

CULTURE

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Events					San Isidro Feast	Town Feast						X-Mas

INCOME

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Status												

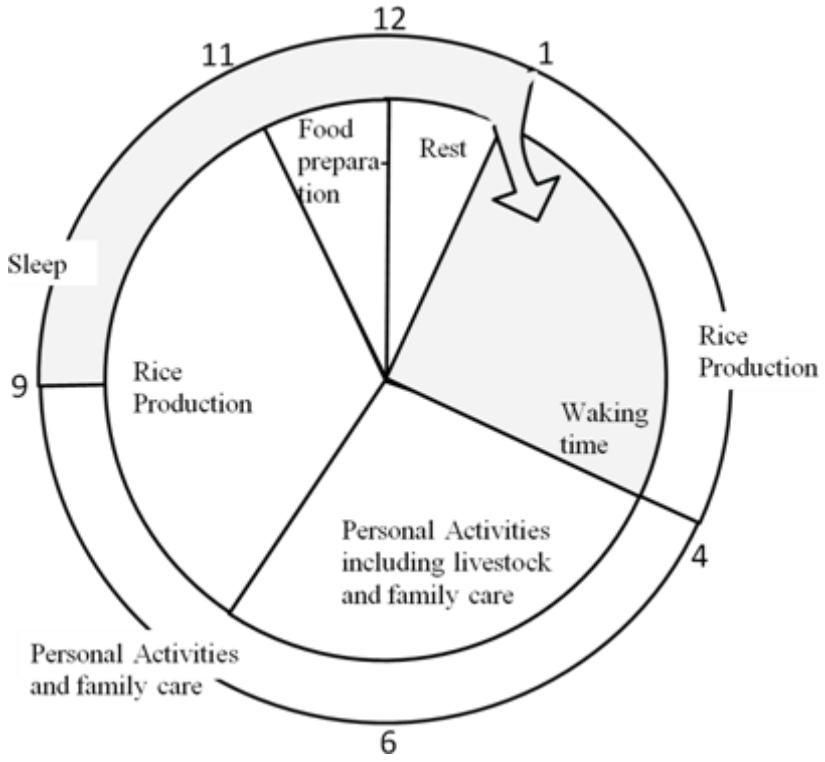
EXPENSES

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Status												

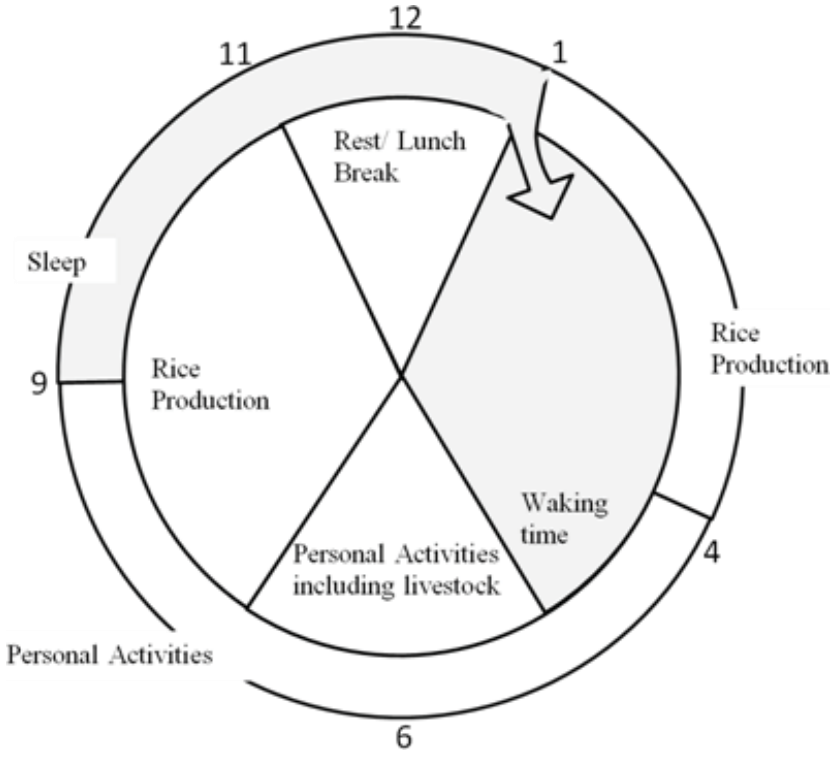
Legend: High Normal Low

2. Gender Clock

MALE



FEMALE



3. Livelihood Matrix

LIVELIHOOD ASSETS	IMPACTS	COPING MECHANISMS
NATURAL		
LWUA	Typhoon caused water turbidity while drought dried up water sources.	Community boiled and filtered water for drinking.
River	Excessive rains caused river to overflow while drought reduced water flow in river.	Opening of dam/spillway to prevent flooding. Sourced water from deep wells for domestic consumption.
Livestock	Farm animals were drowned and died.	
PHYSICAL		
Rice Farm	Typhoon damaged rice fields, irrigation canals and coconut farms while drought dried up the farmlands and limit farming activities.	*Bayanihan* in repairing damages and collected and sold crops that were partly damaged by typhoon. Some farmers planted mungbean that thrives in lesser rain and dry soil.
Coconut Farm	Coconuts and trees felled during strong typhoon while prolonged drought caused immature nuts and lower production.	Collected and sold crops and nuts that were partly damaged while other were fed on swine.
Infrastructures (House, Road, Electric and Power Utility)	Typhoons blocked road networks, damaged houses and electricity. After the typhoons, demand for drying facility was high. Prolonged drought caused higher electric consumption and power interruptions.	*Bayanihan* in repairing damages, use power generator, gas lamp and solar devices.
HUMAN		
Children	Typhoons lower school expenses due to postponement of classes Low school expenses	Assisted parents in doing household chores
Male Farmer	Occurrence of typhoon resulted to lesser farming hours	-
Female Farmer	More household activities for women during typhoons	Women went to nearby areas to wash clothes.
FINANCIAL		
MFI, CARD, and lending organizations	Provided calamity loan	

4. Community Mapping

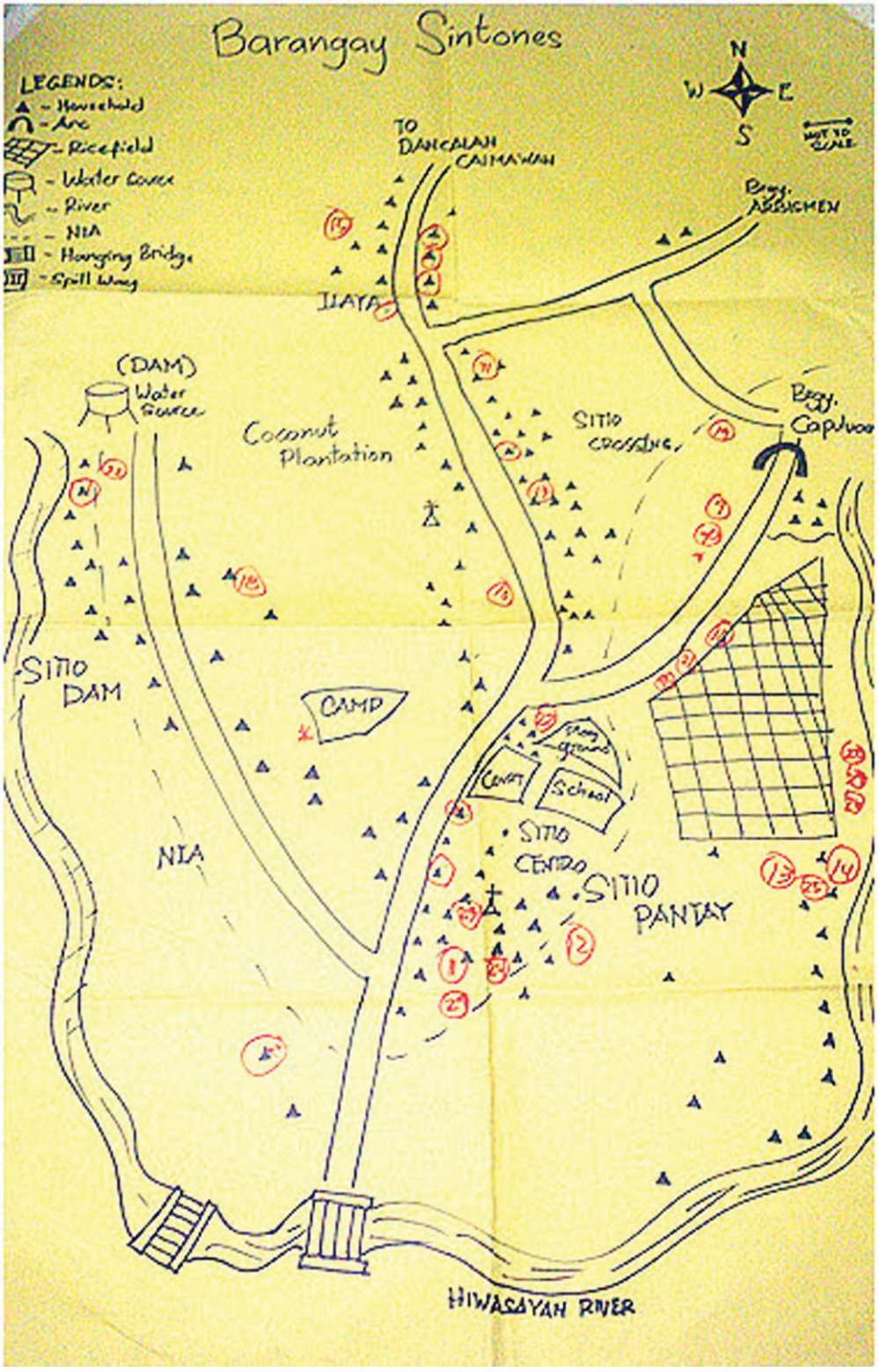


Figure 1. Community-generated Map of Barangay Sintones, Guinayangan, Quezon

Barangay Sta. Cruz

Guinayangan, Quezon

A village level assessment of climate related risks and vulnerabilities

1. Background

Climate Change Adaptation and Food Security (CCAFS)

Climate-smart agriculture (CSA) is an integrated approach that addresses the interlinked challenges of food security and climate change. Facilitating sustainable agricultural intensification in the rural Philippines requires local investments in strategies that employ a three-fold approach that:

- increases productivity,
- protects the environment, and
- targets the poorest and most vulnerable members of the community.

This can be done through development interventions that focus on increasing the adaptive capabilities of smallholder farmers through CSA. Because we know that greater adoption of CSA by smallholders happens when interventions are promoted and undertaken at municipality level, IIRR partners with the local government unit (LGU) of Guinayangan. The partnership is supported by CCAFS under its small grants program in a project that enables farmers to increase productivity using regenerative approaches. The project tests the effectiveness of municipality-level actions using an ecosystems-based and ridge-to-reef approach to facilitate greater adoption of climate-smart agricultural practices among smallholder farmers (IIRR).

Participatory vulnerability assessments (PVAs) were undertaken in 11 villages to achieve a local understanding of the climate-related risks and vulnerabilities that enable them to arrive at viable options for addressing impacts.

Thus, the PVAs facilitated by the IIRR-LGU partnership were designed to generate knowledge of these risks, its gender-differentiated impacts (especially as they affect livelihoods), the communities' current coping mechanisms, and their current knowledge of CSA.

The methodologies used and the lessons learned from this experience will be shared in a separate publication.

PVAs can be used to systematically generate knowledge on how development interventions in Guinayangan can facilitate community-based adaptation. Thus, they build on community perceptions and utilize participatory approaches for generating information. PVAs emphasize the importance of understanding the issues that surround vulnerabilities, especially those of the poor and including their gender dimensions. Although the results of the PVAs do not necessarily offer solutions to rural problems, they can be used as tools to generate community-based adaptation strategies and to facilitate the multi-stakeholder, decision-making processes.

2. PVA Study

The PVA study was conducted in the 11 barangays in Guinayangan to provide a better understanding of the community and inform the project of the conditions and factors that affects their vulnerability to climate change impacts. This in turn will inform appropriate programs and actions the community can carry out to prepare them cope with impacts and increase resiliency.

Specifically, the PVA has the following objectives:

- Establish with the community the livelihood conditions in the village using the 5 capitals;
- Determine community's perception on changes in climate, its impacts on their livelihood and other factors/drivers;
- Determine and establish small farmers' level of exposure to climate risks in the 11 villages where IIRR works; and
- Establish an in-depth analysis of the climate-change related risks faced by farmers, existing coping mechanisms, possible adaptation measures and perceived interventions for increasing their adaptive capacities.

3. Methodology

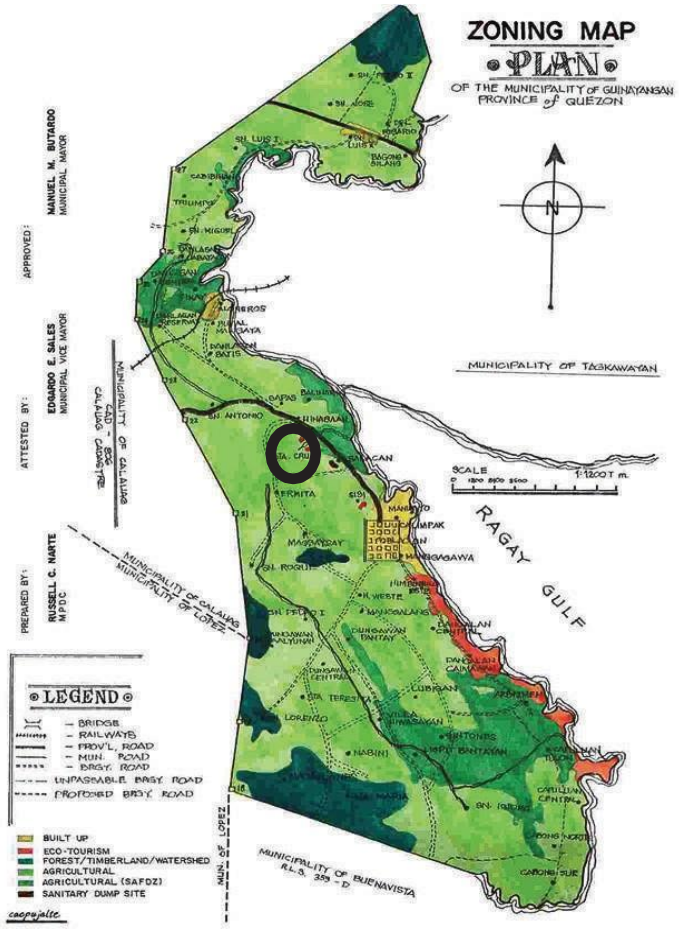
The PVA was conducted last September 18, 2014. This was the 3rd barangay where PVA was conducted. Thirty (30) participants attended with 14 male and 16 female. Focused group discussion (FGD) was done in two (2) separate groups to ensure geographical representation. The first group was composed of farmers from Sito Malituko, one of the farthest Sitio in the barangay. The second group were farmers near the center of the barangay and easily accessible. Sitio Malituko had 18 participants while the other group had 12. Updating of important data of this barangay PVA was done in May 2021. FGD was the method used using the following participatory appraisal tools: seasonal calendar, timeline, livelihood matrix and problem tree. Description of these tools is in Annex B. It was during this PVA when gender clock was first conducted.

Additional data and information for this report was also gathered through key informant interview to Barangay Officials. Secondary data were further gathered at the Municipal Planning Office, the Office of the Municipal Agriculture and the Department of Social Welfare and Development. Information from activity reports of monitoring visits, stand up meeting (journal) documentation and project reports also augmented needed data and information.

4. Introduction

4.1. Barangay profile

Barangay Santa Cruz is an upland village. It is accessible by all types of vehicles due to an all-weather road that connects it with the rest of the municipality.



Basic Information

Topography: Upland
Elevation: 244.3 meters above sea level
Cellphone signal: Partial
Road condition: 80% dirt, 20% cement.
Location: 7 Km from the municipal town center
Area: 608.30 ha
Boundaries: Magsaysay (N), Salacan (E), Hinabaan (S), Ermita (W)
Population (2018 data): 863 individuals (408 females, 455 male), 218 Households, 245 families (100% farmers)
Community infrastructures: 1 elementary school, 1 secondary school, 1 health center, barangay hall, tribal hall, water system, irrigation facility, pre/post-harvest facility, market place/bagsakan center
Community-based Organizations: 4H (youth), RIC (50 women), KALIPI (60 women), and Farmer's Association 23 male members

Despite being an upland village, Sta. Cruz has considerable area (40%) of paddy rice, mostly rainfed but with a few portions irrigated by locally constructed small irrigation systems. It has at least 1 small river that supplies irrigation water for agriculture for most months of the year (May-December). There are also several springs and wells in the village, which supplies most of the water for households needs of families. Some of the springs also supply irrigation water to rice paddies but dry out during the dry season (March to May). There are six annual events closest to the heart of most villagers. These are: school graduation during March, barangay Fiesta (feast day) in the month of May, feast day of San Isidro (St. Isidore), the patron saint of farmers on May 15th, All Souls' Day in November and the Christmas holiday in December. Diminished rainfall and prolonged dry season in 2018 until early 2021 dried the irrigation river and many of the rice areas were planted with corn, vegetables and some few root crops. Other land areas remain idle. Prolong drought is now among the perceived vulnerabilities of the barangay. Summer is hotter as perceived by locals.

4.2. Village History

During the 80's, the village was well-known from among Guinayangan's 54 barangays as the foremost vegetable producing area. This upsurge in vegetable production resulted from the proliferation of a contract-growing scheme between an individual trader and some of the farmers in Sta. Cruz. The arrangement, however, was not sustained and interest in vegetable production waned as well.

The area covered by barangay Sta. Cruz was once dominated by forests sometime during the 1960's when most residents are farmers whose primary means of livelihood is farming upland rice, vegetables, small livestock and poultry for household consumption. Upland rice production, however, has started to disappear along with the change in the general landscape of the area at the onset of the 1980's when farmers started planting coconuts as permanent perennial crop in their farms. In the early years during the introduction of coconuts, rice farming was still possible as farmers planted rice and vegetables in alleys between coconuts. As coconuts grew bigger in time, however, the alleys become shaded and thus rice farming was not possible anymore. Moreover, farmers found income from coconut to be more economically stable compared to vegetables. The former provides them a short cycle source of income as harvest is done every 45 days and it is also seen as less laborious.

Milestones in the village's history are characterized by major disturbances and the onset of development works that resulted to major socio-economic changes in the community. One major earthquake (in 1941) was experienced that according to residents resulted to damaged roads and even cracked farmlands.[1] Drought like conditions and the occurrence of strong typhoons are the 2 major climate-related milestones experienced in the village (discussed in separate section).

Among the major socio-economic development the villagers remember are the construction of roads, irrigation systems, community infrastructure (schools and health centers), and the electrification of the village.

Barangay roads were constructed in 1971 (again improved in 2000) that resulted to ease in transportation and trading (flow of goods) to and from the village to the town center.

The declaration of Martial Law in 1972 and the ensuing years before it was lifted in 1981 left a significant memory to most of the residents due to break down of the peace and order situation in the village. In those years, the presence of communist insurgents (NPA) became significant and fears of clashes between them and the Philippine military sometimes prevent them from working in their farms.

In 1984, electricity became available in most of the barangay but it was only in 2011 when it reached Sitio Malituko. Electrification benefitted students as it became easier for them to study at night, as well as for farmers, allowing them to do work until evening. In1989, there was an observed considerable increase in the community's population which resulted to growth in coconut production as labor became more available.

Community infrastructures such as an elementary school and the health center were constructed in the early 1990's, which greatly improved the delivery of social services to the village. In 1997, a secondary school was established which further reduced the cost of sending kids to school as they used to pay more for transportation in going to the nearest school.

A military base was established in 2009 as the government's response to reported presence of rebels. It has been there ever since and is perceived by the community to have contributed to the reduction of petty crimes in the village.

An irrigation system was constructed in 2012 that brought water to farms and reduced flooding in some areas along the main river.

[1] The earthquake led to the discovery that within Guinayangan is a fault line which makes the town a highly vulnerable area for earthquakes. A Philippine Volcanology and Seismology station has been built in the town center to monitor earthquakes and related activities in the fault line.

4.3. Land Use and Tenurial Arrangements

Most residents of Sta. Cruz are landowners, who inherited their properties from their parents. A few landowners are migrants who managed to buy land in the village.

There are also few landless families who reside in the village as tenant farmers.

5. Livelihood Profile

Coconut farming is the primary source of livelihood of majority of families in Sta. Cruz. This is followed by rice farming, backyard gardening and other non-farming jobs. Most farmers are practicing multi-cropping systems thus, most households have 2 or more sources of livelihood (e.g., coconut farmers maintaining small commercial vegetable gardens within their farm).

Coconut is the primary crop produced in the barangay in terms of volume of production and income provided to farmers. The production of coconut is high from August to December and low for the rest of the year, but only April and September often generate high market price.

Nowadays, instead of every 45 days, the harvesting time for coconut farming already takes almost two months. They attributed this to weather variability. The traditional process of coconut production is generally termed as "*pagkokopra*," with "copra" (desiccated coconut) as the main product sold by the farmers to a "*casa*" in the town center.

Mature coconut is usually harvested every 45 days. Production is highest in the months of August to December. However, it is during the months of April and September when farmer's good income as copra price is usually high.

Majority of land owners employ laborers to deliver the service required of these activities. This is mainly because the household usually cannot do it alone. Most of the labors though are also from neighboring households. As such, while most farmers in Sta. Cruz are landowners, they are also laborers themselves who work in other coconut farms. The dominant profit sharing system in Sta. Cruz is the 60-40 scheme wherein 60% of the net profit from selling to the casa goes to the land owner and 40% to the laborers/farmers.

During months of low production (May- July) and low market price, farmers are directly selling de-husked coconuts instead of producing copra as it entails lesser on-farm labor. There are also few farmers who harvest immature coconuts and sell it to "*buko*" traders.

Aside from the farmers, the other important actors to the copra value/supply chain are the middlemen who operate the casas where the farmers sell their produce (copra) and microfinance institutions, most notable of which is the CARD Bank, that offer loans to farmers especially on periods in between harvest months. There are several casas in Guinayangan.

Snail (*kuhol*) infestation started in the1970s. As it thrives in a wet environment, the local farmers indicated the months of September until December as its infestation period. Other pests mentioned are rats which are usual occurrence and just recently *cocolisap* was already observed in Sitio Malituko particularly during the hot and dry months.

Both genders have an active role for this sector although males execute more activities than females. For *pagkakawit*, *lulutiin*, and *pagsasako*, males perform all the labor requirement; for *pagiipon*, *pagpapatas*, pagtikal, and *paghango*, there is an even distribution of labor for both genders; for *pagbububunot* and *paghahakot*, the workforce is mostly composed of males; and marketing is done by the landowner.

Coconut Farming: A typical male of barangay Sta. Cruz usually wakes up at 4 am to finish all his personal activities and livestock feeding before finally going out at 7 am to do land farming activities that take an estimated duration of 4 hours. A male farmer usually takes his break between 11 am until 1 pm before going back to his unfinished farm work afterwards. Hours after 4 pm on the other hand, is apportioned for dinner preparation, while past 6 pm until a quarter before 9 pm is allotted for personal leisure that

involves watching TV. Finally, a male farmer would sleep for almost 8 hours and wakes up again by 4am to perform all the aforesaid activities.

Similarly, a typical female for this sector awakes at 4am and performs all the same activities as to male for the whole day. However, during 11 am until 1 pm the wife prepares food for the whole family that shortens her time to rest, nevertheless most males do heavier farm activities that would be fair enough to balance the labor division for both genders.

At times when the farm production is high, the activities of the workers could often reach until the evening. Also, throughout the day, the women do their personal, household, and farm obligations unlike the men who do not really involve much of their time with the household chores. Figures 1 and 2 illustrate the clock of activities for male and female, respectively.

Most farmers practice agroforestry as coffee and fruit trees are growing between coconut trees. Many are also engaged in backyard vegetable farming; some are into small scale commercial vegetable production.

Rice Farming: Male and female have a traditional division of labor depending on the nature of work that they would perform. Rice farming activities are divided into 12 different parts. For the seed selection and land preparation, 100 % of the job is done by males; for seed bed sprouting and transplanting, both genders have even distribution of labor; for fertilizing, most labor is performed by men; for weeding, women perform more of the job; for spraying, men perform most labor; for land securing against pest such as, rats and birds, female perform most of the job; for harvesting, even work distribution between male and female is performed; for automated/manual threshing, only men do the job; and for manual drying and milling, both genders have even work distribution.

Generally, in rice farming, men are seen a more significant role in doing heavy yet more dangerous activities while females work on the lighter ones. It was also noted that only few women could perform spraying because of its heavy weight that is accounted for its 16-liter solution capacity.

Furthermore, in rice farming, labor is not paid in cash but on share basis or the "*Talok-ani*" system wherein 20% of the production goes to the laborer and 80% to the land owner. The latter provides free food.

Rice Production: The daily routine of the usual male rice farmer begins at 5 am. He simultaneously performs livestock feeding and some of his personal activities within 2 hours after waking up before leaving for his rice fields for 4 hours. Lunch break and rest time of a male farmer begins at 11 am until 1 pm, after then, the farmer will continue with his farming activities until 7PM. Personal activities in the evening are then performed from 4 until 9 pm. The farmer sleeps for 8 hours after doing his evening activities.

Similarly, most women in this farming system are almost doing similar schedule with the males. They have fewer hours to take a rest but their nature of work is lighter than that of the men. Figures 3 and 4 illustrate the schedule of activities of male and female, respectively with respect to rice farming.

The usual activities of male and female in barangay Sta. Cruz were determined to understand the influence of gender on several farm activities. Figures were provided to easily visualize the set of activities being performed by the residents.

Low production is the key issue being encountered by the local farmers in barangay Sta. Cruz, Guinayangan, Quezon. Soil infertility begins to affect their yield because of the extreme rainfall that washed out the nutrient-rich topsoil of many farms. Measures to resolve this case remain unsuccessful as the free fertilizer supply from the Municipal Agriculture Office (MAO) still fails to reach the farmers.

Maturity of many coconut trees affects the overall supply of this commodity as long period shall be waited again before new generations of these trees would become productive again. The participants also said that occurrence of strong typhoons usually bring large damage to their farms that could adversely affect the production of coconuts.

Rice farming experiences production losses because of the scarce irrigation supply to the farm lands. The barangay is rainfed as the small irrigation system benefits only a few rice farms. This river dries up during

summer. The recent prolonged dry season took a toll to rice farmers as some were not able to harvest, crop failure was experienced by 80% of the rice farmers.

The central focus of the aforementioned issues still points out climate change to largely affect the daily farm activities in the barangay. Unpredictable rainfall patterns, long droughts and typhoons devastate the overall production system. These weather disturbances could account to large economic losses.

6. Climate Change Perceptions and Coping Mechanism

6.1. Perceived Climate Patterns

The 1970s up to the 1980s, Barangay Sta. Cruz experienced the dry cold season from January to February, summer from March to April and rainy season with occasional storms from May until December. However, since 2011 until the present time, the residents have been experiencing extremely hot weather conditions with occasional storm manifestations in random months.

In 2014, as stated by the participants, the dry hot season, was experienced from January until August, hence the farmers decided to control the irrigation supply to their farms to prevent their crops from reaching the permanent wilting point. The farmers also considered harnessing their irrigation supply from their domestic water source during times when supply reaches its critical amount to secure the water requirement of the crops during dry hot season.

Hottest recorded season of 2014 was experienced by the residents in April and May, while irrigation and domestic water supply reaches its peak level from September to December because of the expected monsoon rains and typhoon occurrences.

Barangay residents usually generate high income from coconut farming during the months of March, October, November, and December, whereas for the rice farming, high revenue is received in March and April. However, most expenses of the locals are occurring during May and September until December which are attributed to different events like Graduation, Feasts, All Soul's and All Saint's Day and Christmas events.

Records also showed that most health issues in the barangay are expected to increase during September to December in which wet season presently arrives. Children and adults usually catch colds, cough and fever while during April and May, the adults encounter hypertension due to extremely hot season.

Prolonged dry season starting in 2000 until the present has affected rice farmers severely. Just last year there was a crop failure as 80% of the rice farmers were not able to harvest. The seasonal calendar reveal that rainy/wet season is reduced to 4 months (Sept-December). With climate variability rice farmers are exposed to erratic weather changes just like what happened in 2013 and 2015. Farmers planted in November and December for second cropping knowing that there will be rain in January as this was the usual pattern. However, it did not rain starting December 2014 and lasted until early September 2014. This resulted to crop failure. Again, in order to regain their lost they still planted in October 2014 as their first cropping. A strong storm hit Guinayangan in January that affected their rice.

6.2. Impacts

Only two (of the many) typhoons made its mark in the village history due to its strength and the damage it wrought to the village, these are typhoons Rosing (1995) and Glenda (2014). The villagers also count the drought-like conditions as milestones in the village's history, which they observed to have occurred in 2 occasions – in the period of 2000 to 2006.[2]

[2] Based on records, El Niño events were observed in 2002–03, 2004–05, 2006–07 and 2009–10. The participants insisted that they shall start a poultry farm just in case such event would recur again.

Lastly, the most recent event which took place in 2014 was the typhoon Glenda that brought large-scale losses to the barangay as many coconut farms were destroyed/ruined by its strong winds. After the typhoon, farmers engaged in charcoal making to take advantage of the trees and logs that were washed away. The impacts were mitigated as farmers engaged themselves with their coal production business, whereas some of them worked at nearby provinces as factory and power saw workers.

Typhoon Rosing, which occurred in 1995, was the most devastating typhoon recorded in barangay Sta. Cruz's history. It took three years before the barangay totally recovered from the large-scale damage brought by the phenomenon to them. The supply of agricultural products to the local market was affected as many farms were flooded that restricted the farmers to manage their farms. Sitio Malituko suffered heavy flooding unlike the other Sitios. However, participants acknowledge the idea that farm lands became more fertile after the storm brought mud from the upland as flood washed away brought top-soil in the upland.

In 2000-2006, El Niño occurred twice that made every farm land unsuitable for growing crops like *palay*, maize, and vegetables, thus most of the famers handled the situation by giving more attention to their coconut fields as less damage was observed there. In 2013, El Niño again struck the barangay that made most farm lands unproductive. The residents decided to raise livestock to manage their economic losses, they even planted crop varieties with strong resistance to drought like monggo, and they also harnessed water from nearby areas to ease the extreme effect of the phenomenon.

6.3. Who are most affected?

The residents defined vulnerability as, "The incapability of an individual to easily recover and respond with disaster." Participants defined vulnerable groups with the following qualities:

- household headed by widowed women
- households with huge families

The residents also insisted that Sitio Malituko is the most sensitive within the vicinity of barangay Sta. Cruz because of its storm-sensitive geographical location.

7. Summary and Findings

Majority of the farmers in the barangay own their lands. Only a few are tenants. Because of this majority are practicing multi-crop farming system with coffee, fruit trees are growing between coconut trees. Many are also engaged in backyard vegetable farming; some are into small scale commercial vegetable production.

Sta. Cruz is both vulnerable to drought and typhoon. The barangay has limited source of water. Irrigation comes only from the river that dries up during long dry season. Springs and wells are available but domestic use is prioritized. In terms of its geographical position, the upland barangay (in particular Sitio Malituko) directly faces Ragay Gulf where more often than not, typhoons from the Bicol region pass.

Sitio Malituko has no other sources of income aside from their coconut farming business, unlike other Sitios that have other alternative sources of revenues related to vegetable farming. Nevertheless, drought does not necessarily affect the aforesaid Sitio because of the presence of natural water resources there like springs and streams that could sustain their water supply requirement.

Interventions

For the past years after this PVA study been conducted in 2015, IIRR in partnerships with Guinayangan LGU, CCAFS and DA AMIA provided interventions so farmers could cope. A wide portfolio of climate change mitigation and adaptation options has been initiated to address both climate risks and people's livelihoods needs. It is well known that if landscape approaches are used, local communities must have access to a range of options relevant to restoring landscapes.

Upland communities such as Sta. Cruz explored diverse cropping and links with small livestock such as native pigs. These complex systems hoped to address livelihood needs and enhance various dimensions of resilience. Diversified portfolios reduce the climate risks and vulnerabilities of local communities.

These interventions are aimed to enhance the livelihood options of the farmers through agroforestry and organic farming while educating them on the importance of enhancing intra species biodiversity in the upland coconut ecosystem. This is expected to reduce their current dependence on the forest product, enhance ecosystems services (e.g., pollinators) and enhance carbon sequestration through regenerative agriculture. The intervention is expected to influence the other barangays in the municipality on the importance of restoring biodiversity to the current predominant coconut-based systems.

These interventions also hope to address the challenges associated with the coconut mono-cropping pattern for copra production as revolutionized through the planting of different forest tree, coffee and cacao, and fruit trees species and shade trees and other understory food crops such as camote, taro, *ube*, banana, legumes and indigenous vegetables with added raising of native pigs and native chickens thereby increasing tree, crop and livestock biodiversity and sustained ecosystem development.

Farmers implemented agroforestry as a means to increase biodiversity in the upland coconut ecosystem. Agroforestry is an ecologically sustainable land use management system in which trees and food crops are grown in combination. Livestock is included in the system as appropriate. This deliberate combination of agriculture and forestry has varied benefits including increase in biodiversity, significantly reduced soil erosion, soil enrichment through leaf litter fall, increase soil capacity for water and moisture retention. Trees not only help mitigate climate change (by absorbing carbon dioxide an important greenhouse gas) but, they are an important climate change adaptation mechanism. Trees in various combinations play a phyto-remediation role, improving micro-climate and help reduce the desiccating action of wind. Trees store carbon in their biomass. Fruit trees, coffee, cacao, banana and root crops are examples of combining trees and shrubs of different canopy spread coverage. Trees bear fruits that can generate additional income for the farmers while ushering for the biodiversity enhancement in this coconut upland ecosystem.

The interventions brough both increase in economic activity in terms of family food security and nutrition and income as compared to the usual coconut dependence alone and positive impact to the environment brought about by the multiple plant and animal species raised in the area.

The increased in farm productivity also opened for biodiversity-friendly enterprises such as the selling of organic farm root crops, legumes, indigenous vegetables and meat of native pigs and native chickens that requires low external inputs and relies mainly on farm resources for the production.

The risk of low productivity of coconut farming especially after every strong typhoon can be addressed by the diversification of livelihood sources and increasing the biodiversity. Such approaches mutually reinforce production and ecosystem services for sustainable development.

Following are some of the interventions by the collaborative partnerships of different actors at Barangay Sta. Cruz:

- Participatory action research (PAR) on Upgraded Pig Raising: 3 farmer-cooperators participated
- Farmers' adoption of climate smart agriculture (CSA) options:
  - ✓ 5 farmers adopted the low external input rice production (LEIRP)
  - ✓ 30 farmers adopted the low external input pig production (LEIPP)
  - ✓ 30 farmers adopted the agroforestry
- Farmers trained on the different CSA technologies:
  - ✓ 5 farmers on systems of rice intensifications (SRI)
  - ✓ 30 farmers on native pig raising
  - ✓ 30 farmers on agroforestry
- Enriching landscapes through fruit tree-based intensification: 15 farmers received the following seedlings:

195 rambutan	30 calamansi	600 coffee seedlings
5 mango Guimaras	390 black pepper	
5 mango carabao	270 langka (jackfruit)	

Annex A: Participatory Rural Appraisal (PRA) Tools Used

Process and methods

The following PRA tools were used to generate the different information and data. Depending on sector and gender representation, sectoral and gender-disaggregated groupings were conducted in selected PRA tools.

Community mapping identifies the community's boundaries, road networks, river and springs, landmarks and infrastructure and houses.

Historical timeline outlines the significant events in the community such as major disaster, socio-economic, political and cultural events and development, changes on landscapes, good and negative impacts and coping capacities and mechanisms. It also shows the trends, frequency and intensity of events.

Seasonal calendar shows the seasonality of climate patterns annually, different livelihood activities in the community, water and food availability, pest and diseases on crops and livestock, health issues among children and adult, social and cultural activities, income and expenses. The tool also used to identify the changes in climate patterns overtime (10, 20 and 30 years ago).

Matrix of livelihood activities lists the various work performed and identifies whether each activity is dominantly done by men or women. It also shows who will be most likely affected if a climate hazard may impact the livelihood.

24-hour clock determines the time and allocation of productive and reproductive activities done by men and women over a course of a day. It also determines whether there are changes and adjustment in time, allocation and roles if there are climate hazard or extreme events.

Problem tree identifies the three major problems and challenges on livelihood and their different factors and reasons. Information and data gathered were rooted mainly on developmental issues and problems which are worsened by climate hazards and changes in climate patterns.

Matrix of livelihood assets lists the different assets and resources needed. It also identifies how climate change and climate hazards affects them; what are the needed solutions and capacities to enhance that will prevent or mitigate future impacts.

Perceptions on vulnerability define the trait, characteristics or criteria of people who are considered vulnerable to climate hazard.

Mapping of vulnerable sectors identifies and lists who are the vulnerable families, individuals and where they are located.

Annex B: Outputs of Community Workshops

1. Timeline

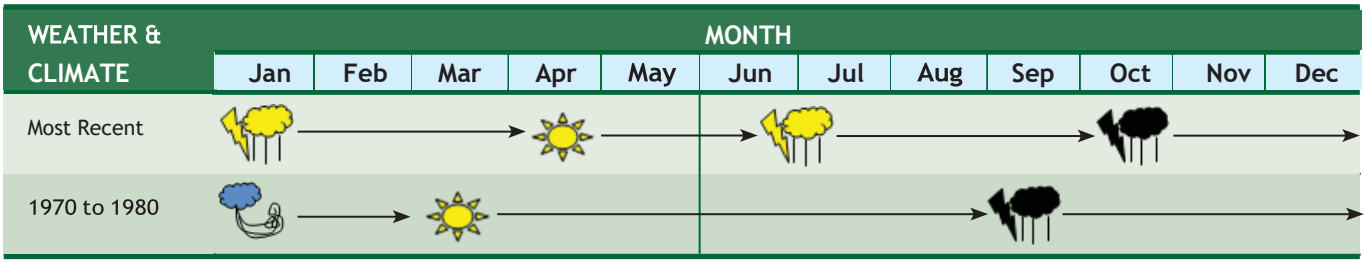
Year	Events	Impacts	Coping Mechanisms	Adaptations
1941	Strong earthquake	• Farms and roads cracked • Fear among the community residents • Pregnant animals were stressed that resulted to miscarriage	Moved outside homes to seek safe areas	• Hide beneath the table (?) • Go to the fields
1961	Road	• Wide and passable ways • Ease in trading		
1972	Martial Law	• Robust economy with low poverty rate • Fear • Significant presence of NPA • Losses on farming business • NPA threats that stopped the locals from working		
1989	Population growth of the community	• Strong neighborhood relationship • Increased number of coconut farmers		
1995	Typhoon Rosing	Coconut trees affected as nuts and leaves fell	Worked in coal production	Evacuation to safer and stronger shelter
2000-2006	El Niño *twice	Rice areas were severely affected		
2012	Irrigation supply	• Sufficient supply to farms • Reduced flooding		
2013	El Niño	Unproductive farm lands	• Animal domestication • Planted drought tolerant crops • Relied on water supply from nearby areas	Poultry farming
2014	Typhoon Glenda	• Reduction in coconut production • Damaged homes and farms	• Engaged in charcoal production • Several farmers worked at nearby provinces	• Evacuate to safer shelter • Cultivate sweet potato
2018	Prolonged drought	• Many of the rice farmers did not harvest their crops same with the vegetable growers.		Some farmers converted their rice fields into corn. Others plant vegetables in just small areas or backyard that they can water.
2019 (Dec)	Typhoon Tisoy	• Destroyed coconut, vegetables, banana farms and fruit trees • Destroyed fishing boats, houses communications facilities and government infrastructures.	Most of the men sought out work (labor) as construction workers outside of the Municipality. IIRR and the LGU provided food packs on its relief	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making after the storm,

Year	Events	Impacts	Coping Mechanisms	Adaptations
			operations and cash for works programs.	families opted to do gardening for quick source of food and income.
2020 (Oct-Nov)	Typhoons Quinta and Ulysses and Super typhoon Rolly	These 3 strong typhoons in less than 3 weeks rapid successions destroyed crops, fisheries and livestock. The Office of the Municipal Agriculturist reported an estimated consolidated damaged amounting to Php1.9B for agricultural commodities for the 54 barangays of the municipality.	Many of the farmers and fishermen relied on food pack relief and cash for work programs by the government. IIRR also provided nutrelief.	Many farmers resorted to craft making using coconut leaves for broomstick. As many trees fell, some resulted to charcoal making after the storm, families opted to do gardening for quick source of food and income.

2. Seasonal Calendar

CLIMATE and WATER AVAILABILITY

Weather and Climate



Water Utility

Domestic

Irrigation

Legend:

Summer

Hot season with minimal rainfall

Dry cold

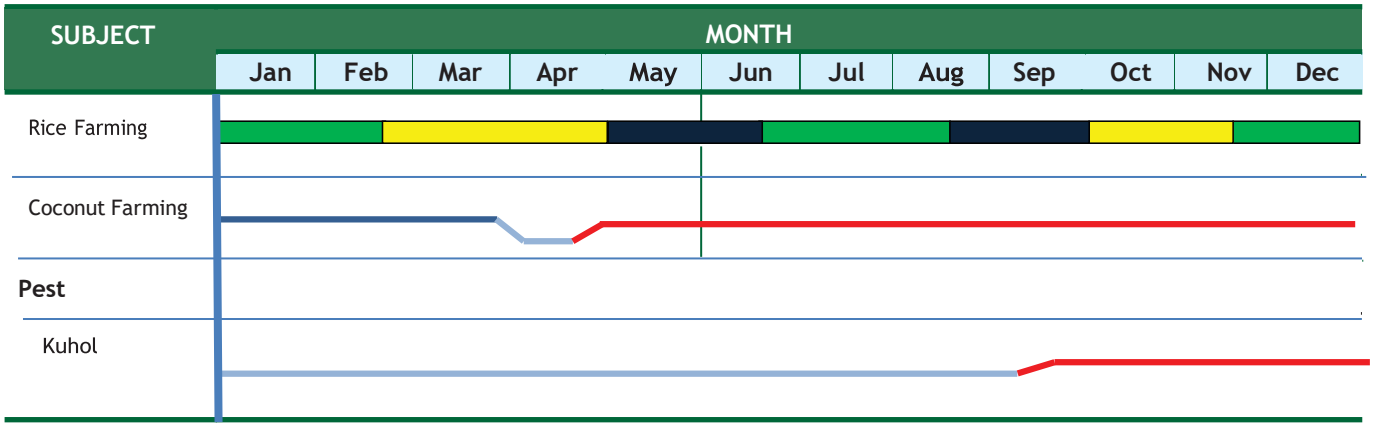
Wet season w/ occasional storms

Low

High

CROPPING SEASON

Land Cover



Legend: No activity | Harvesting | Planting & Growing | High | Normal | Low

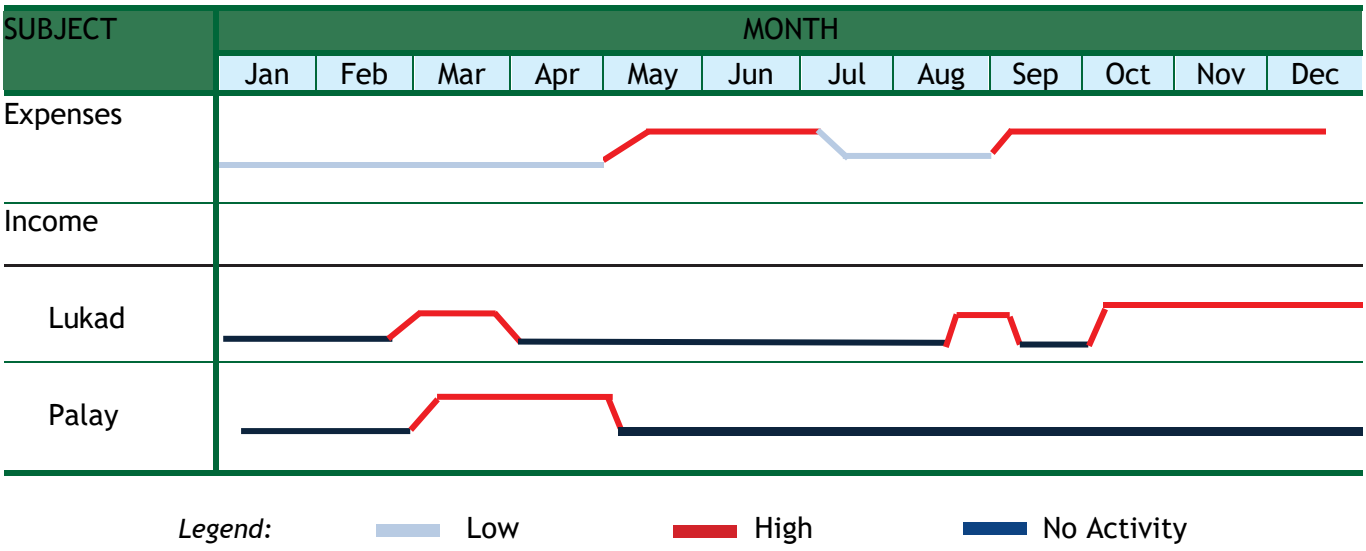
EVENTS AND DISEASES

Culture

SUBJECT	MONTH											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Events				Graduation		Fiesta		Nutrition Month			All Soul's Day	X-mas Events
Adults				Hypertension						Arthritis, Cough, Colds and Fever		
Children										Cough, Colds, Fever and Diarrhea		

* Note: Unshaded months means usual routine

INCOME AND EXPENSES



3. Livelihood Matrix

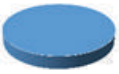
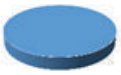
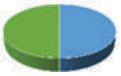
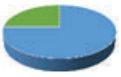
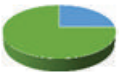
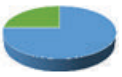
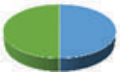
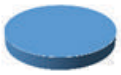
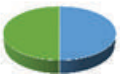
LIVELIHOOD ASSETS	EFFECTS	COPING MECHANISMS	ADAPTATION
NATURAL			
Forest	• During long dry season, fire is a constant hazard to forest areas. • Storms uproot old trees and branches are severed by strong winds.	• Reforested by coconut mahogany, and Gemilina • Used fallen tree branches for house reconstruction and worked in coal making business	• Maximize remaining economic trees • Replant
Land/Earth	• Dry season results to parched a, cracked soils • Storms causes landslides and washing away of top soil especially in sloping areas	• Anticipated for rainfall	
Spring/Dug Well/Groundwater	• With drought spring dries up easily as demand increases • Springs and wells are destroyed by flash floods caused by severe storms	• Searched for alternative source	
River/Surface water	• Low stream flow and dries up • Typhoons that bring a lot of rain usually washes away river banks	• Maximized the resource • Preserved sandy materials	
PHYSICAL			
Rice Farm	• Drought affects production of rice farms as water becomes scarce. There are instances of total crop failure. • Typhoon impacts rice farm on certain periods - during flowering and near harvest period.	• Many opted to plant mungbean as an alternative crop after the failure. • Early harvest as early forecast is utilized by farmers.	
Coconut Farm	Coconut is more vulnerable to typhoons than long dry season. Strong rains destroy leaves and nuts. Drought has minimal impact as ability to produce it not too affected by dry season.	• Engaged in coal Production	
School	• Extremely hot weather condition • Shattered facilities	• Used electric fan • Reconstructed the facilities	
Brgy. Infrastructure (Brgy. Hall, Health Center, and Day Care)	With typhoon destroying these facilities it has also affected the social services it provides such as the following: • Social events (basketball leagues) have strengthened social interaction in the community • With the health center, health issues are addressed specially for maternal and	• Revised class schedule	

	children's health (check-up 2x a month)		
House	Strong typhoons usually damage houses particularly those with thatched roofing, wood and bamboo materials; areas where landslide is prone affects houses near these prone areas	• Reconstructed houses	
Road and Bridge	• Dusty roads • Filthy ways	• Communal cleaning of roadways and bridge	
Power Supply	• Dry months results to higher demand on the use of electricity that results to higher bills • Electric posts are prone to strong winds.	• Constructed a swing outside the house and utilized e-fan at night only • Rebuilt posts and stored back the electric supply	
Phone Signal	Downed signal	Searched signal outside the barangay	
Youth & children	• Boils breakout • Caused large-scale fear and lost school supplies	• Treated • Rebought school supplies	
Male Farmer	• Hypertension • Strengthened community spiritual faith	Provided free check-up (self-medication of calci-bloc)	
Female Farmer	• Scarce water supply for domestic uses • Cluttered house	• Harnessed water from nearby areas/barangay • Group cleaning	
FINANCIAL			
MFI (Card, TSPI)	After drought or typhoon, farmers have difficulty paying off loans	Loaned payable amount only	

4. Livelihood and Gender Analysis

a. Livelihood and Gender Role for Rice Farming

RICE FARMING

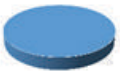
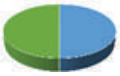
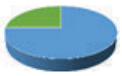
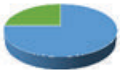
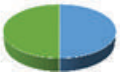
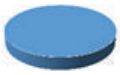
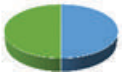
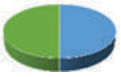
ACTIVITY	PIE CHART
1. Seed Selection	
2. Land Preparation	
3. Seed Bed Sprouting	
4. Transplanting	
5. Fertilizing	
6. Weeding	
7. Spraying	
8. Land Securing	
9. Harvesting	
10. Automated/ Manual Threshing	
11. Drying	
12. Manual Milling	

SIGNIFICANT PERSONS
Farmer/ Land Owner
Farm Laborer (Magtatalok)
Rice Mill Owner

LEGEND: Male Female

b. Livelihood and Gender Role for Coconut Farming

COCONUT FARMING

ACTIVITY	PIE CHART
1. Pagkakawit	
2. Pag-iipon	
3. Paghahakot	
4. Pagbubunot	
5. Pagbabaak	
6. Pagpapatas/ Pagkakamada	
7. Lulutiin	
8. Hango	
9. Tigkal	
10. Tusta	
11. Paghahango	
12. Pagsasako	
13. Marketing	OWNER

SIGNIFICANT PERSONS
Labor
Owner
Buyer

LEGEND: Male Female

5. Gender Clock

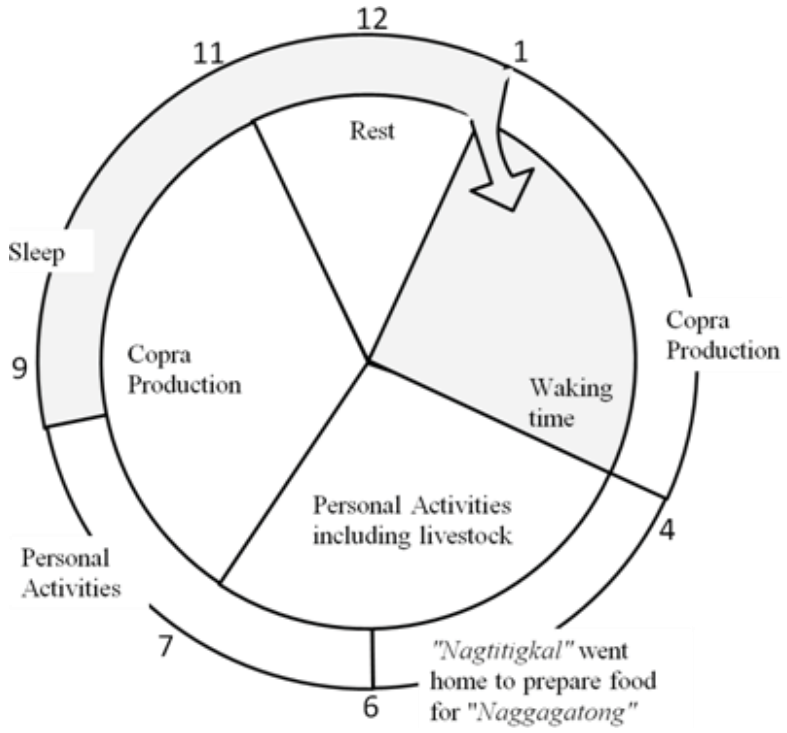


Figure 1. Coconut production 24-hr clock for male

(Note: Information Inside circle means happens in AM while information outside circle means it happens in PM.)

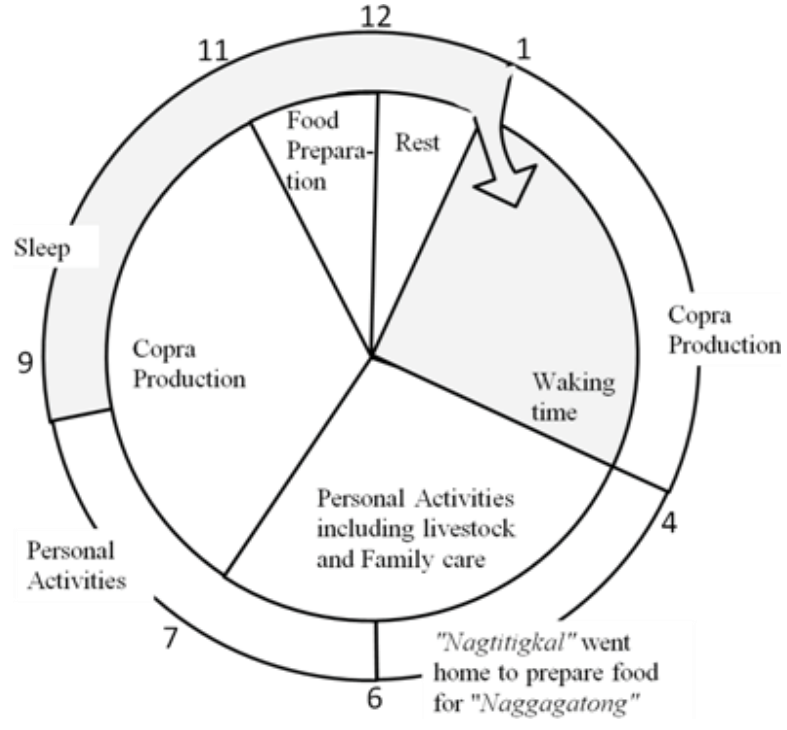


Figure 2. Coconut production 24-hr clock for female

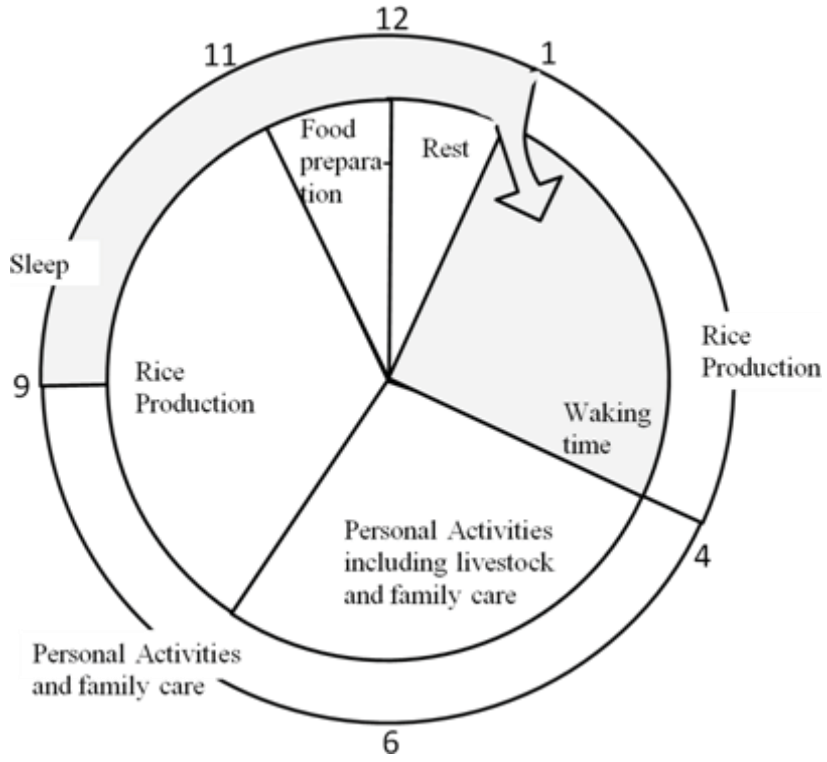


Figure 3. Rice production 24-hr clock for male

(*Note: Rice production in the morning ends at 10:00am if the weather is too hot.)

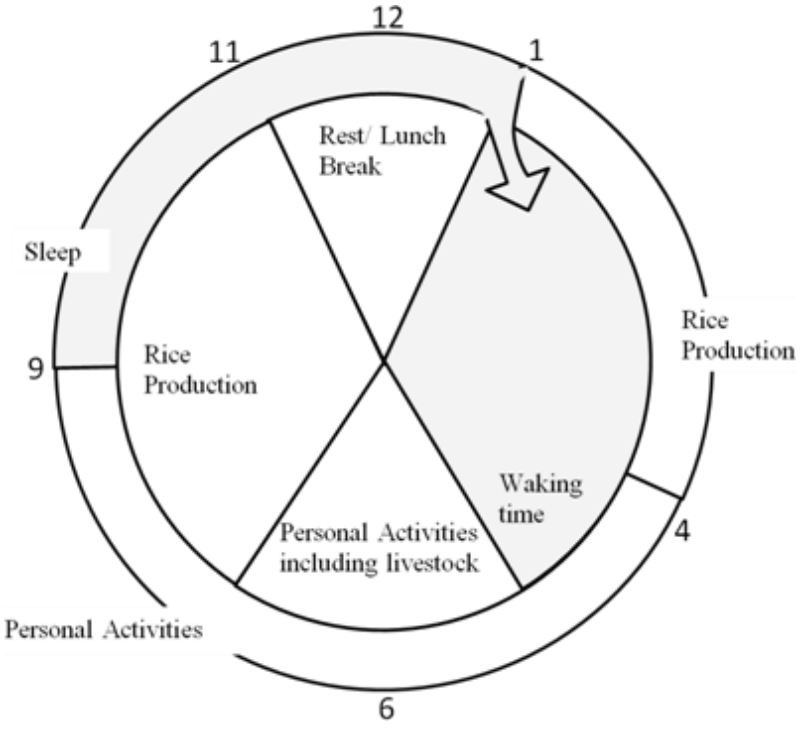


Figure 4. Rice production 24-hr clock for female

(*Note: Rice production in the morning ends at 10:00am if the weather is too hot.)

6. Problem Tree

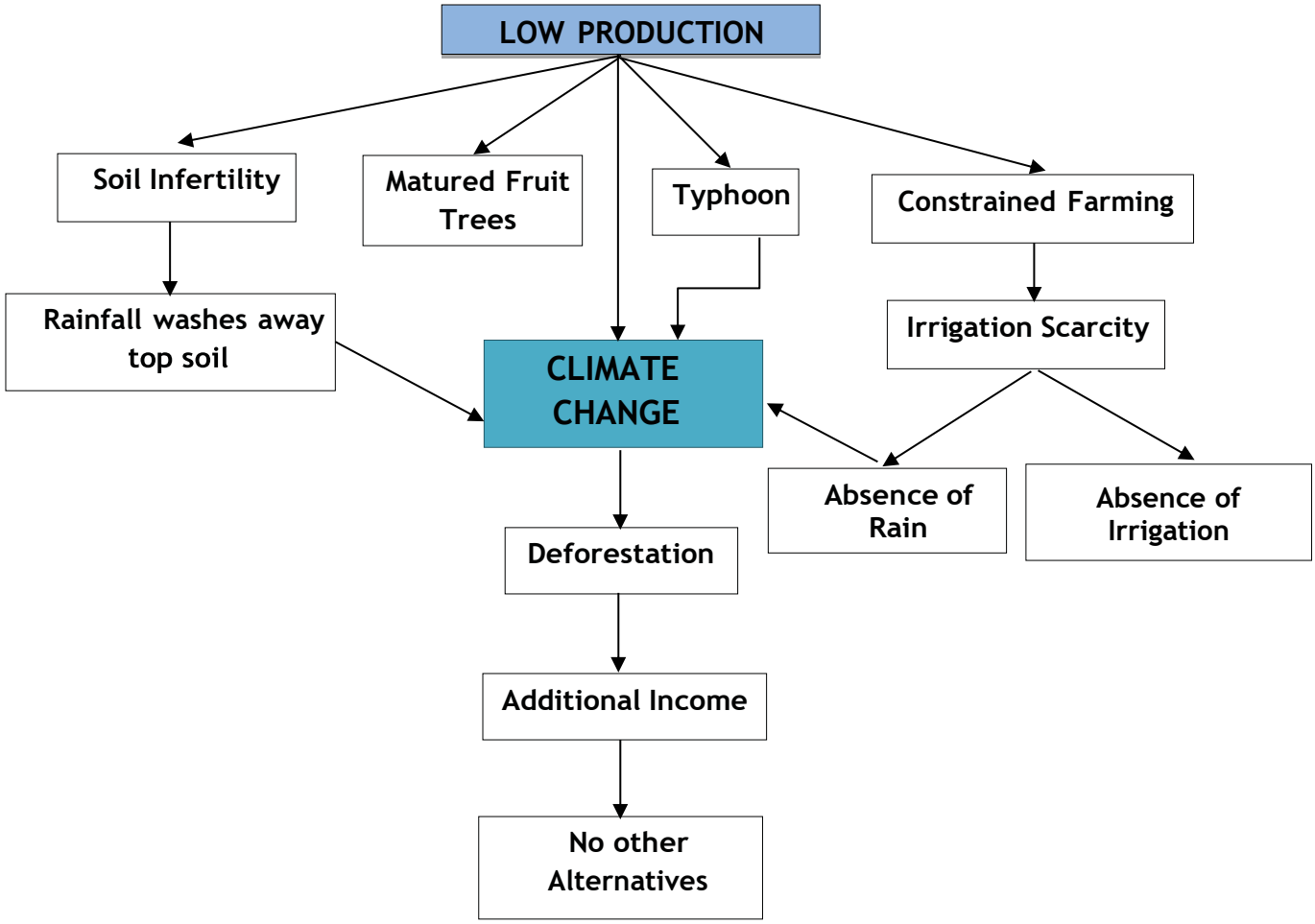


Figure 5. Problem tree of barangay Sta. Cruz, Guinayangan, Quezon