

# Participatory climate risk mapping: Building local adaptation capacities

A case from Ivisan, Capiz, Philippines



RESEARCH PROGRAM ON  
Climate Change,  
Agriculture and  
Food Security



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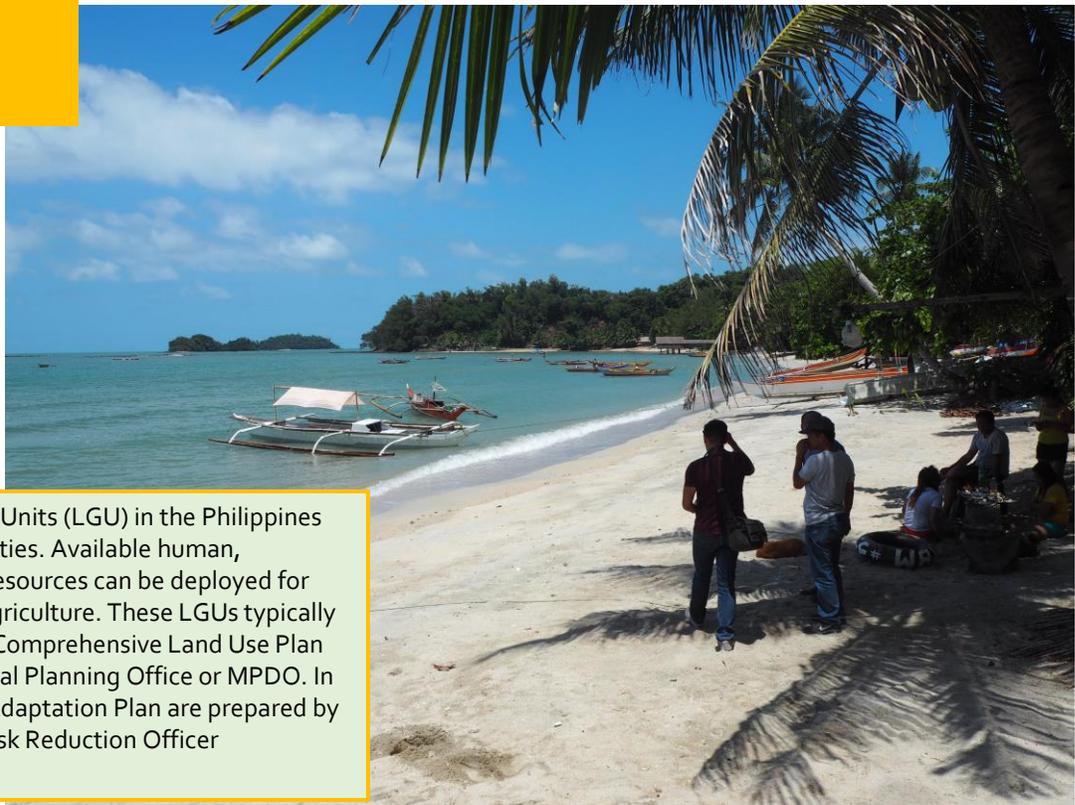
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# PROGRAMME SUMMARY

<b>Project Title</b>	<b>CRP 7 ON Climate Change, Agriculture and Food Security (CAAFS): "Climate smart mapping and planning for Ivisan Municipality, Capiz province, the Philippines</b>
<b>PLA ID</b>	C-2018-61
<b>Agreement ID (DRPC Ref. No.)</b>	A-2016-70 (DRPC2016-69) BUS: 22-200-14663
<b>Donor</b>	CGIAR Research Program on Climate Change, Agriculture and Food Security (CAAFS)
<b>Reporting period</b>	April 2018 to May 2018
<b>Total Project Budget</b>	
<b>Outcomes/ Planned Results</b>	<p>To produce climate-related risk maps and adaptation plans for agriculture (Climate-Smart MAP/CS-MAP) for the 15 villages of Ivisan.</p> <ul style="list-style-type: none"> <li>▪ Maps of normal year risk</li> <li>▪ Maps of severe years</li> <li>▪ Validated maps (using QGIS or ArcGIS software)</li> <li>▪ Workshop reports and presentation</li> </ul>
<b>Geographic Focus</b>	Municipality of Ivisan, Province of Capiz, Philippines
<b>Focus Population</b>	15 villages, 29,055 in 2015
<b>Partners</b>	<ul style="list-style-type: none"> <li>▪ Local Government Unit of Ivisan, Province of Capiz</li> <li>▪ Municipal Planning and Development Office</li> <li>▪ Municipal Agriculture Office</li> <li>▪ Association of Barangay Captains – Ivisan</li> </ul>
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# ACRONYMS AND ABBREVIATIONS

ABC	Association of Barangay (Village) Captains
AMIA	Adaptation and Mitigation Initiatives in Agriculture
BFAR	Bureau of Fisheries and Aquatic Resources
BRIDGE	Bridging Relief and Recovery towards Resilience building in disaster affected areas in Panay Island
CASCOFAMCO	Capiz Small Coconut Farmers' Cooperative
CFLC	Community Fish Land Center
CMDRR	Community Managed Disaster Risk Reduction
CRH	Carbonized Rice Hulls
CSV	Climate-Smart Village
DA	Department of Agriculture
DA-BAR	DA - Bureau of Agricultural Research
DRRM	Disaster Risk Reduction and Management
GIS	Geographic Information System
HVC	High-Value Crops
IIRR	International Institution of Rural Reconstruction
JDC	The American Jewish Joint Distribution Committee
LGU	Local Government Unit
MAO	Municipal Agriculture Office
MPA	Marine Protected Areas
MPDO	Municipal Planning and Development Office
PCIC	Philippine Crop Insurance Corporation
QGIS	Quantum GIS
RTC	Root and Tuber Crops
SFR	Small Farm Reservoir



Many Local Government Units (LGU) in the Philippines have risk mapping capacities. Available human, hardware and software resources can be deployed for adaptation planning in agriculture. These LGUs typically are tasked to undertake Comprehensive Land Use Plan (prepared by the Municipal Planning Office or MPDO). In addition, Local Climate Adaptation Plan are prepared by the Municipal Disaster Risk Reduction Officer (MDRRMO).

## INTRODUCTION

### Background and rationale

Located at the typhoon-belt and Pacific Ring of Fire in Asia, the Philippines is a hotspot of disaster risks. The Philippines is exposed to high incidents of hazards such as typhoons, floods, storm surges, floods, tsunamis, earthquakes, volcanic eruptions, landslides, and droughts. The country experiences an average of 20 earthquakes per day and, hosts 300 volcanoes, 22 of which are active while five (5) are considered most active.

The country is also vulnerable to extreme events. Ninety-nine (99) typhoons entered the Philippine Area of Responsibility (PAR) from 2006 to 2016 with 64 typhoons able to make landfall.

From the latter, 10 were Category 1 typhoons (119-153 km/h), 18 were category 2 typhoons (154-177 km/h), 14 were category 3 typhoons (178-208 km/h), 37 were category 4 typhoons (209-251 km/h) and 20 were category 5 typhoons (more than 252 km/h).<sup>1</sup>

In a span of five years, three of the strongest typhoons hit the Philippines, which are Typhoon Haiyan (Yolanda), Typhoon Bopha (Pablo), and Typhoon Megi (Juan). These typhoons accounted for total damages and losses equivalent to USD 3.315 million. In a year, there is an average of 10 destructive typhoons, 250,000 damaged houses, 1.18 people affected by natural disasters, and PHP26 billion worth of damages.

<sup>1</sup> Access to benefits and claims after disaster (ABCD), volume 2, IDEALS, HLA

In the province of Capiz, the most recent typhoon that generally resulted to devastation of livelihoods, shelter and infrastructure is Typhoon Haiyan (Yolanda) in November 28, 2013. According to Multi-Sector/Cluster Initial Rapid Assessment (MIRA) report commissioned by UN-OCHA, an estimated 2.4 million people required food assistance in Eastern Visayas, Northern Cebu, and Northern Panay Island. A total of 515,179 houses were totally destroyed and 551,546 were partially destroyed, livelihoods, 60% of the standing crops such as rice, corn and vegetables were affected, 50% of the plantation crops such as coconuts and banana. And, 45% of fishing equipment was damaged and lost in the affected areas in Eastern Visayas, Northern Cebu and Panay Island.

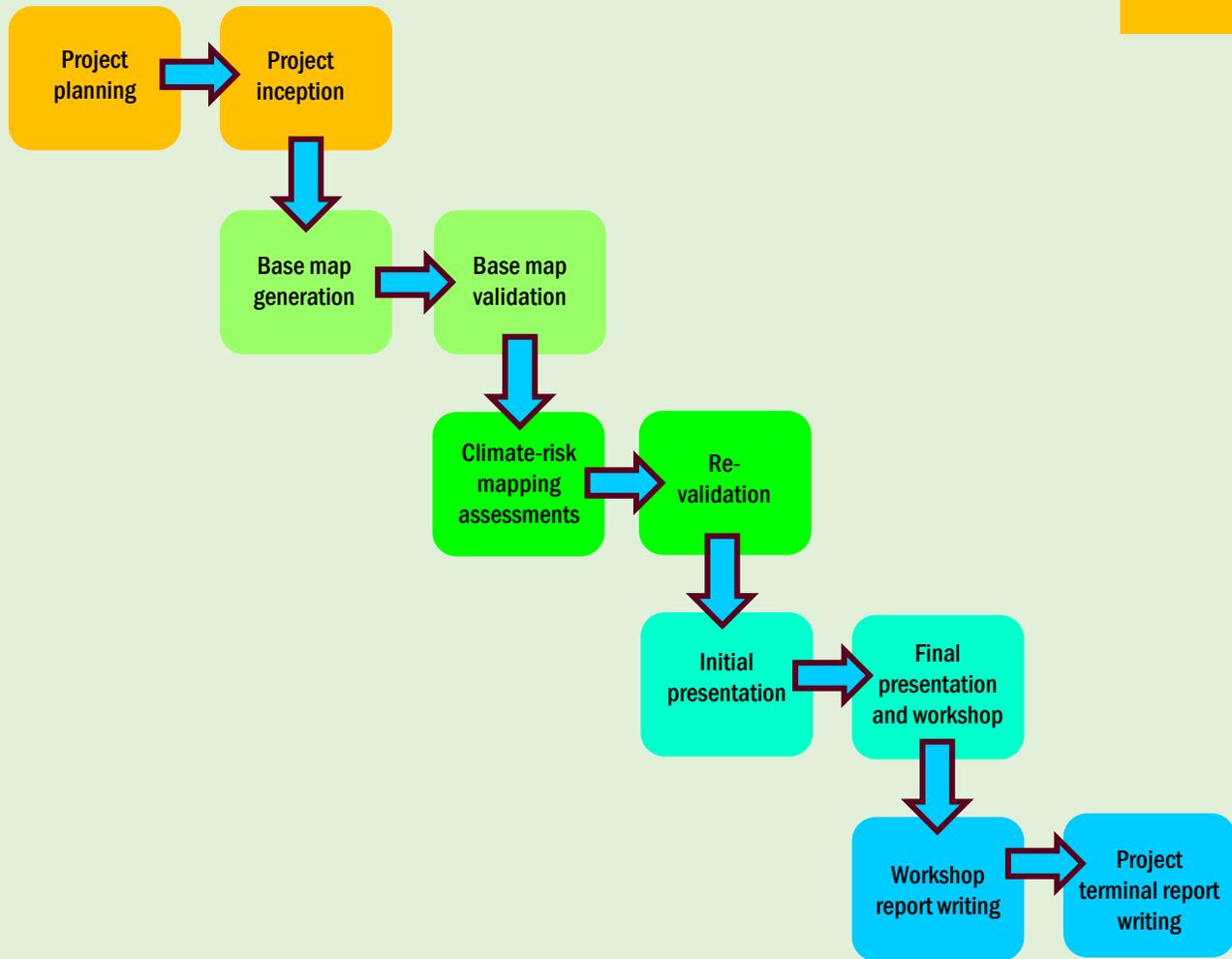
## Objectives of the study

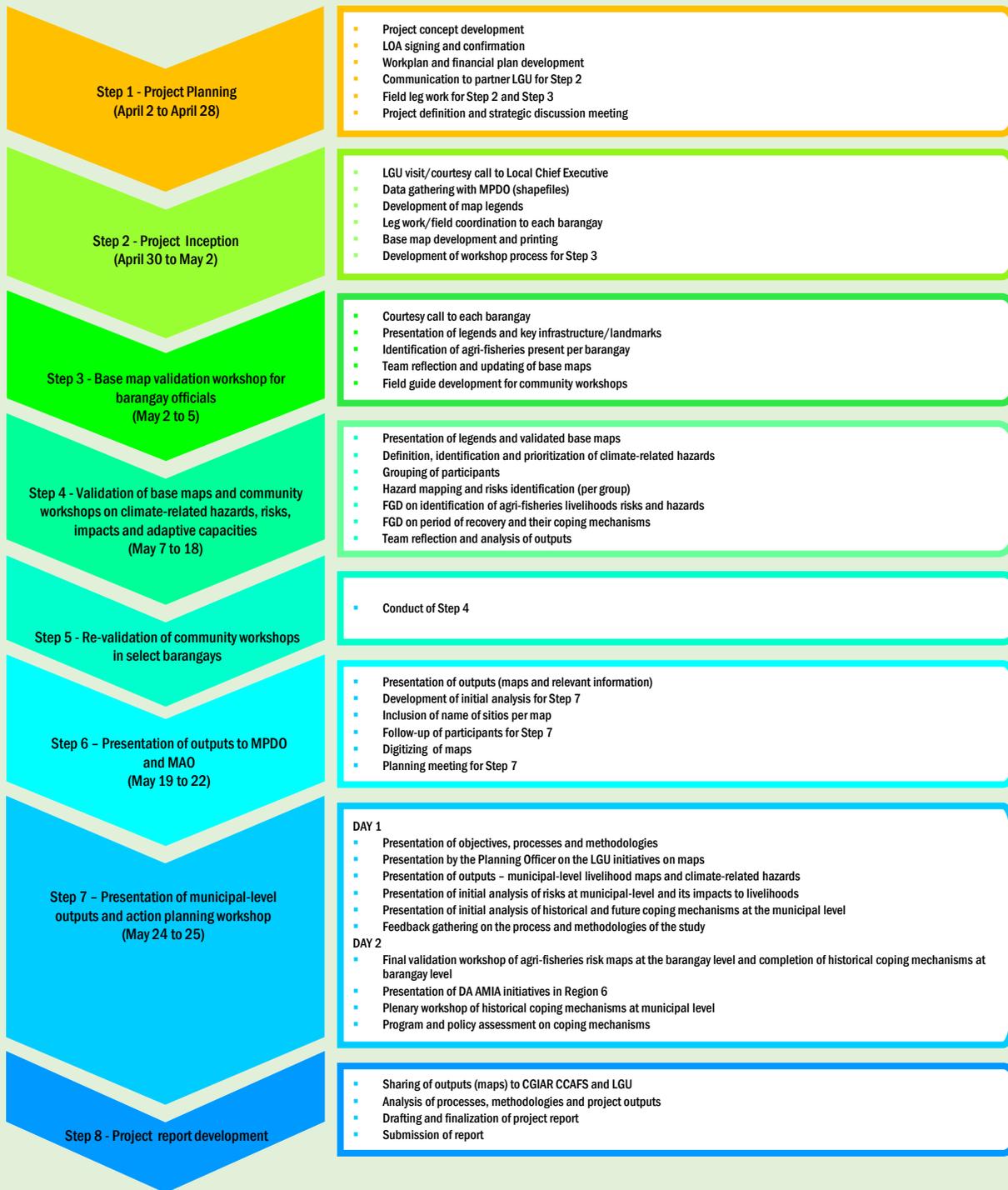
The main objective was to understand how the local government unit in Ivisan municipality, Capiz, Philippines coped with, mitigated, and prepared for climate-related risks in the livelihood and agri-fisheries sector. The goal of this research was to produce Climate-Related Risk Maps and Adaptation Plans in agriculture (Climate-Smart MAP/CS-MAP) for the 15 villages of Ivisan. The maps will assist in decision making and planning for risks, in normal and severe years, on a long-term basis.

These maps have two purposes: (i) to identify the climate risks and livelihood vulnerability (high, medium, and low), depending on the areas, for each climate-related hazard event (drought, flood, salinity, storm, surge, etc.); (ii) to provide tools for the Local Government Unit (LGU) of Ivisan to guide their operations in anticipating and preparing for climate risk events, and thus ease stress, after each event.

## Process and methodologies

The process involved ten (10) key activities. At the start, the management team “leveled-off” on the proposed objectives and, deliverables of the project. The initial project workplan was also developed and communicated to the partner LGU. During the inception stage, a courtesy call was made, the presentation of planned project outputs and gathering of information and shapefiles from the LGU was undertaken. The draft workplan was updated and strategies were improved based on the feedback. The third step involved the development of base maps (from the shape files gathered). Administrative and logistical activities were also conducted and finalized in this stage. The activity was followed by meetings with barangays officials and key community leaders in 15 of the targeted barangays. Here is where the base maps were validated, improved and updated. During this stage, field guide questions were developed alongside with the updating of base maps. The fifth step involved the conduct of the climate risk mapping assessment in each of the 15 barangays: here base maps were presented, hazards were identified, defined and prioritized, livelihoods were mapped according to the impacts of hazards, and, past coping mechanisms were identified and documented. The development of climate risk maps and an initial analysis of livelihood risks were also pursued concurrently with the field team’s conduct of the village-level climate risk mapping. A re-validation of climate risk mapping assessment outputs was undertaken in a few select barangays, where previously there not enough participants during the earlier workshop. The seventh step involved the initial presentation of outputs, maps and analysis to the offices of the Municipal Agriculture and Municipal Planning and Development. This step undertaken prior to the presentation in plenary was strategic as it helped secure early inputs from local government officials. The eighth step was the final presentation of outputs, initial analysis and action planning workshop, to a wider group of officials from the LGU and targeted barangay officials. The ninth and last step was the preparation of a workshop report, finalization of livelihood vulnerability and hazard maps, and, an analysis of outputs from both the community and municipal-level workshops. A simple presentation of the steps is shown on the next page. The succeeding portion presents the detailed activities of the project.





# RESULTS FROM COMMUNITY RISK MAPPING

## Description of agri-fisheries profiles (municipal level)

The municipality of Ivisan is a fourth class LGU with a total land area of about 5,420 hectares which is the smallest in the Province of Capiz. The Municipal Agriculture Office (MAO) Ivisan, reports that the major crops grown in the municipality are coconut and rice (irrigated and mostly rain-fed). A total of 2,294.5 has were planted with coconut with 3,217 farmers and 650.4 has of rice were grown by 709 farmers. Other crops grown includes corn, vegetables, industrial fruit trees, mango, banana and dragon fruit.

For the livestock, a total of 587 farmers/fisherfolks raised carabao, cattle, goats, swine and native pigs while for the poultry, native and upgraded chicken, broiler, layer, ducks and turkeys were raised by approximately 951 farmers and fisherfolks majority in the backyards (households).

For the fisheries sector, 10 villages were considered as coastal barangays with 3,474 households (7,976 persons) were 1,927 registered fisherfolks. Fishpond area consists of 702.97 has, while oyster and mussel area subsequently have 45,000 has and 10,600 has. Fish sanctuary and reserve area accumulates to 1,628.4 has while the mangrove area summed up to 99 has. There were three CFLCs and one fish port present in the municipality

Based on the outputs of community validation workshops conducted in this study, there were six agriculture-related livelihood commodities occurred and seven fisheries-related livelihood commodities present in the municipality. Below are the outputs of the community validation workshops conducted in 15 barangays were the agriculture-fisheries livelihood maps were presented at the municipal level.

Presented below are the key agriculture and fisheries information of the municipality of Ivisan.

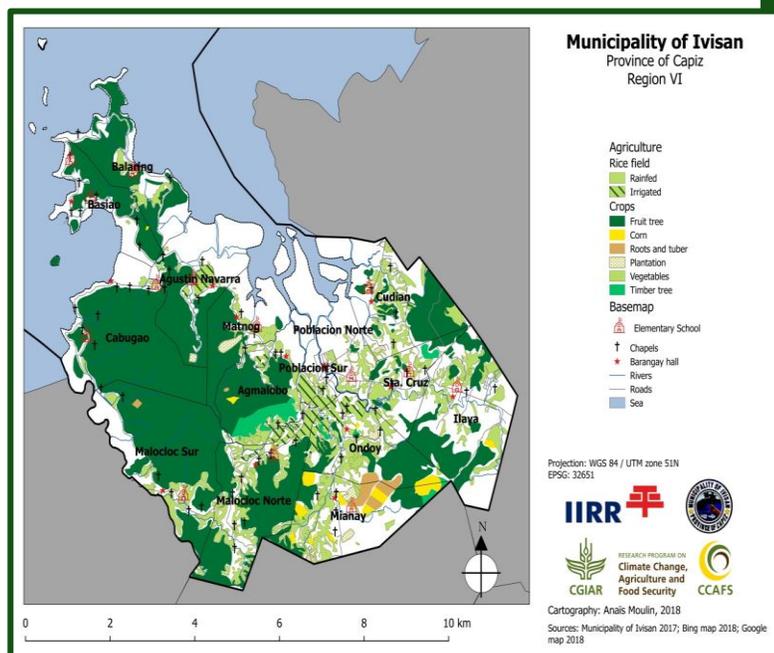


Figure 1: Agricultural crops map of the municipality of Ivisan. Fruit trees defined in this study can be a combination/inter-cropping of coconut, fruit bearing trees, banana, bamboo trees, papaya, timber and mango trees. Plantation is defined as a single livelihood that is monocrop such as mango and dragon fruit.

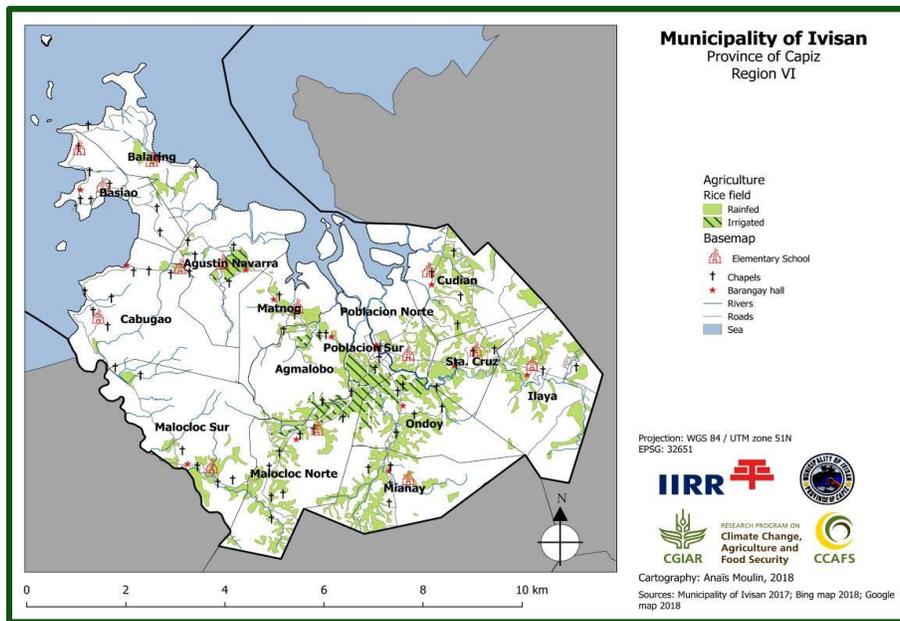


Figure 2: Agricultural rice field map of the municipality of Ivisan where irrigated and non-irrigated (rain-fed) rice fields were illustrated. Irrigated fields are present in mostly in urban areas where irrigation canals were established while rain-fed rice fields were common in hilly to mountainous areas.

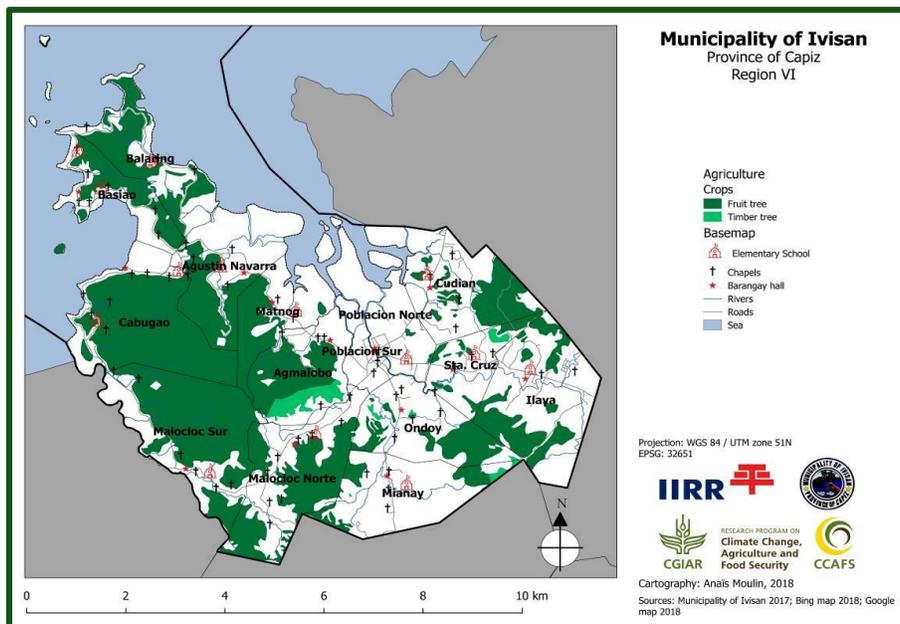


Figure 3: Fruit and timber trees map of the municipality of Ivisan. Timber tree areas defined in this study uses mono-crop system where timber trees alone were planted.

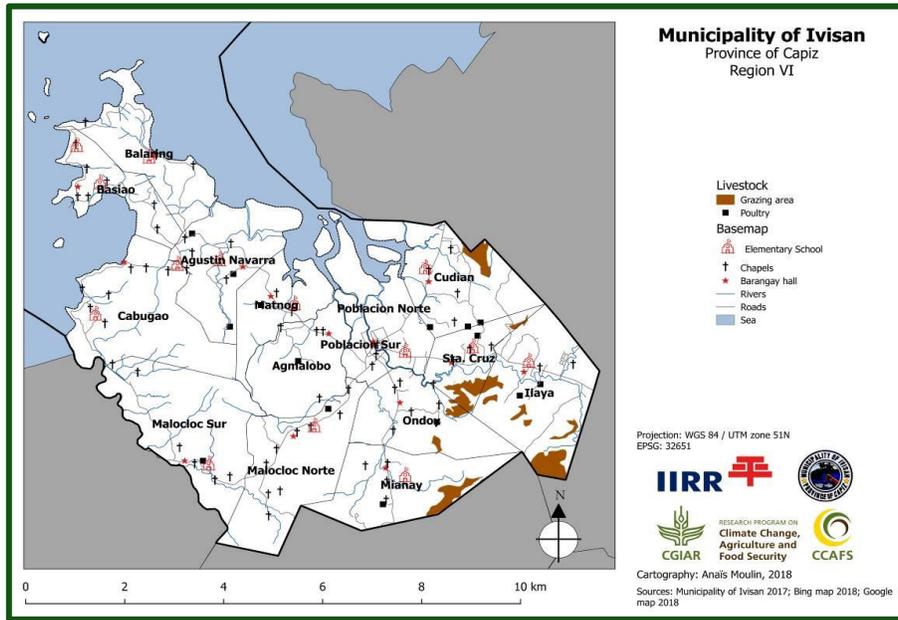


Figure 4: Livestock, poultry and grazing area map of the municipality of Ivisan. Poultry as defined in this study is a livelihood that is either breeding or layering.

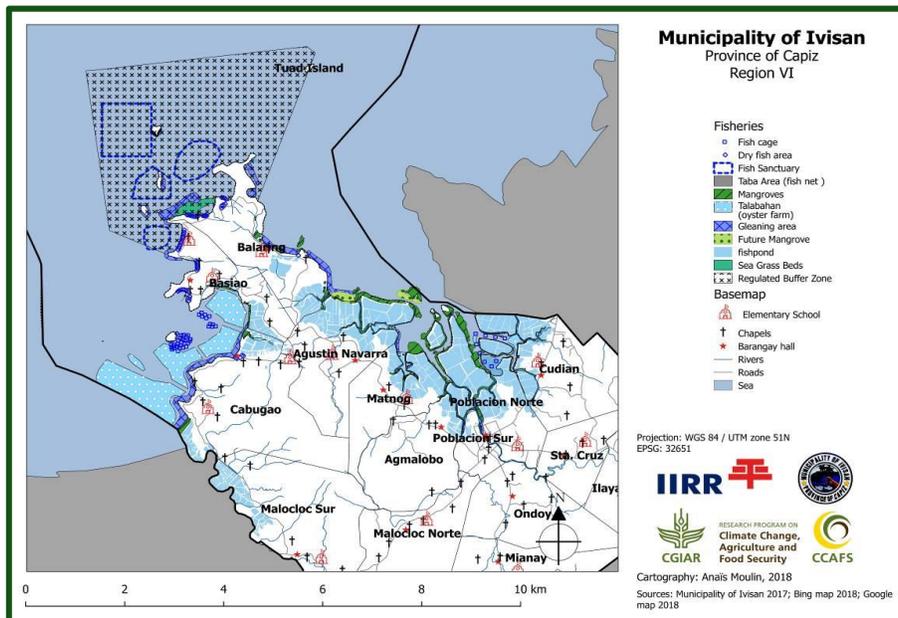


Figure 5: Fisheries map of the municipality of Ivisan. Note: The municipal waters were not shown.

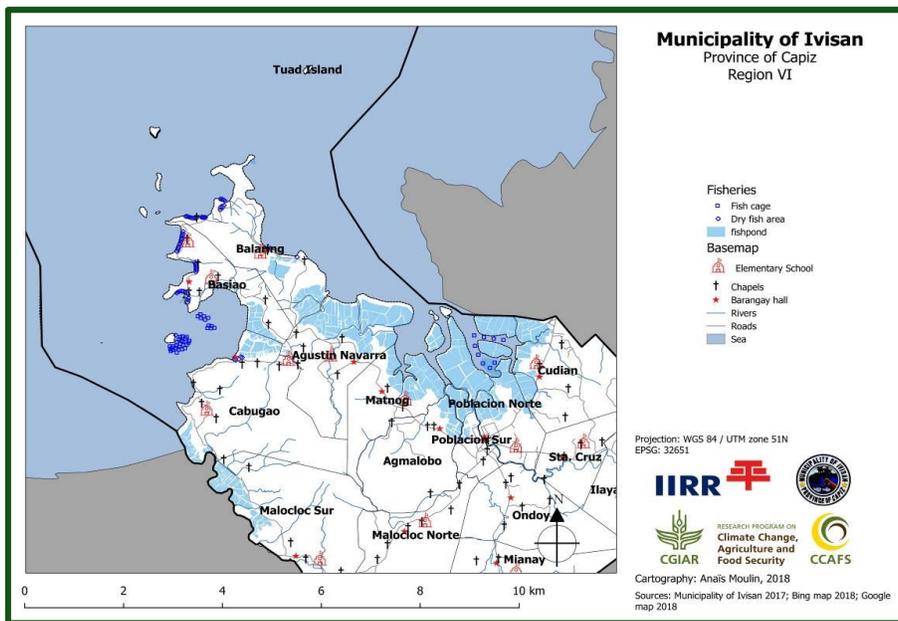


Figure 6: Fish cages, dry fish areas and fish ponds map of the municipality of Ivisan.

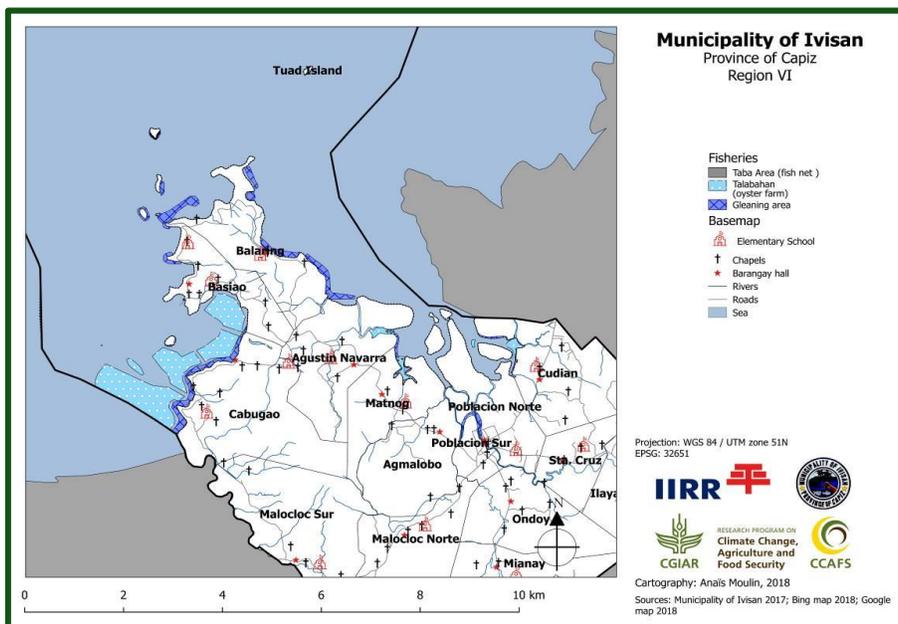


Figure 7: Fish net areas, oyster and green mussel farms and gleaning areas map of the municipality of Ivisan.

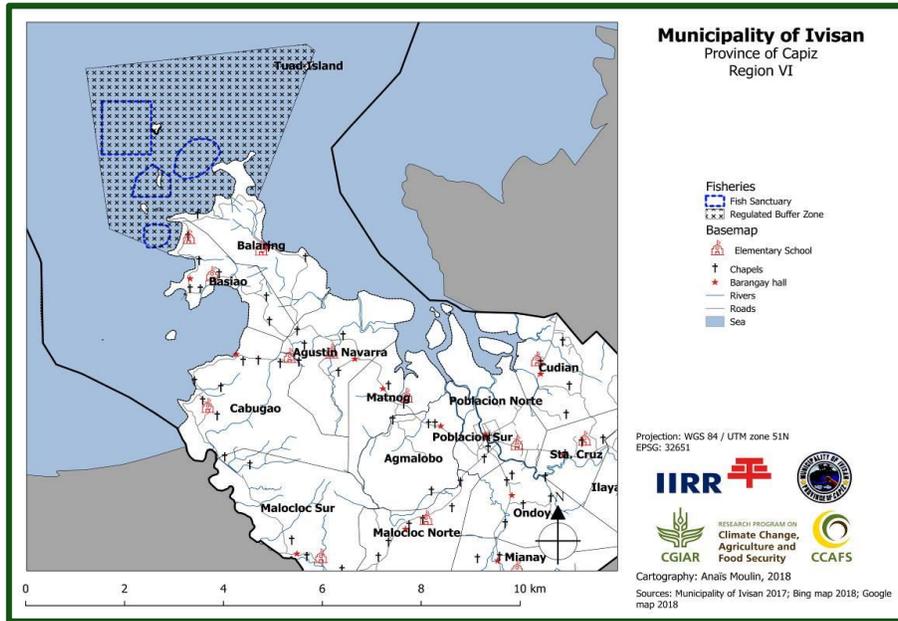


Figure 8: Fish sanctuary (core zones) and regulated buffer zone map of the municipality of Ivisan.

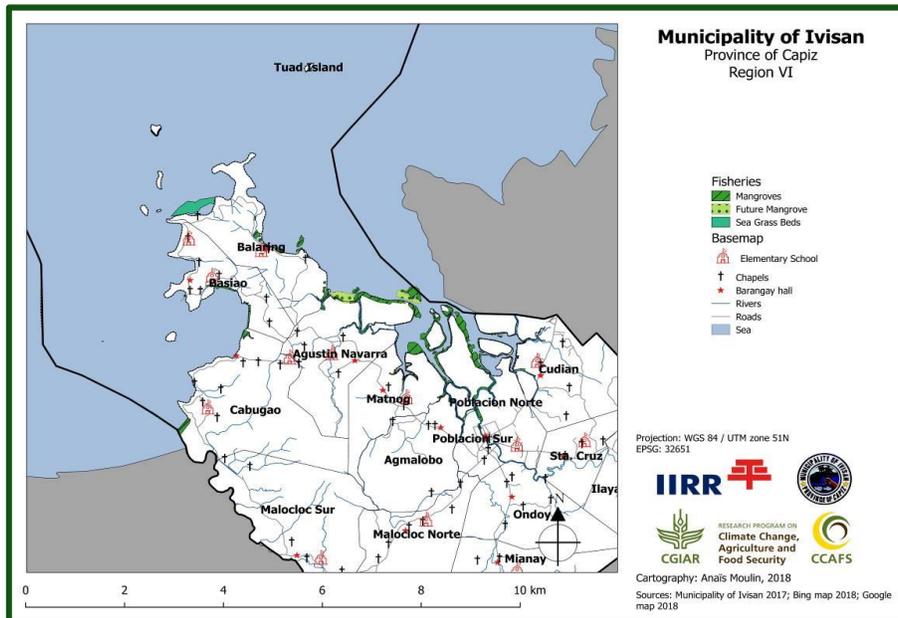


Figure 9: Mangroves and sea grass area beds map of the municipality of Ivisan.

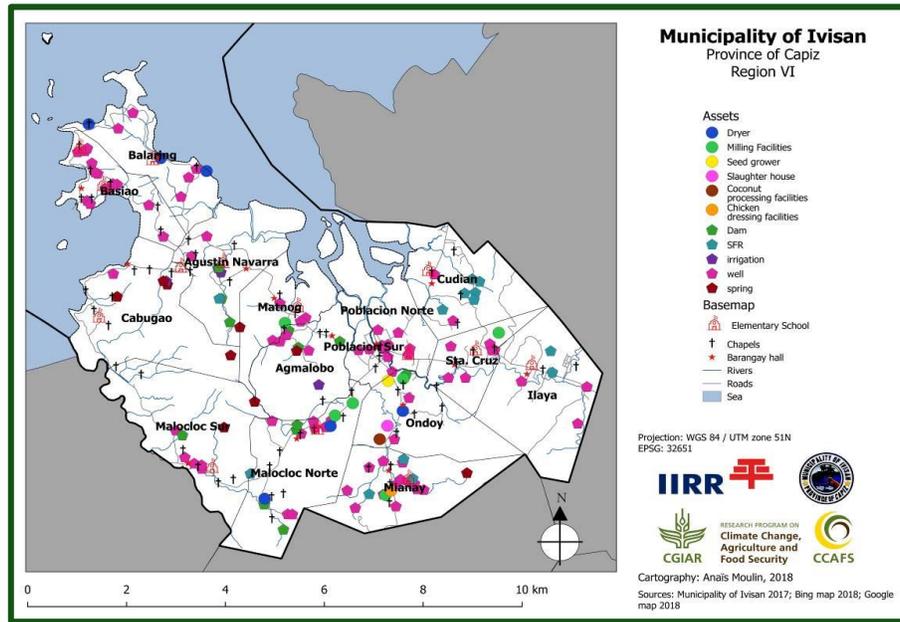


Figure 10: Agricultural and fisheries livelihood assets map.

## Vulnerability maps based on historical risks

There were ten hydro-meteorological and climate-related hazards that were identified during the community workshops that the inhabitants of Ivisan experienced and may possibly experience in the future. The hazards were as follows: flood, landslide, storm surge, drought, saline intrusion, red tide, flash flood, typhoon, strong winds and pest and diseases. Among the ten hazards, storm surge were not experienced but could happen in the future.

During the process, identical hazards were defined first in order to provide clarity and differentiation. Among them were floods that occurred between flash flood and typhoons between strong winds.

Floods can happen when heavy rain *and* high tide occurs simultaneously. On the other hand, if there is a heavy rain but its low tide, floods will not occur. Also, rainwater will stay in specific area and can subside within one to two hours. Flash flood only happens in upland areas where, beside rain water, other debris such as gravel, tree trunks and mud were included. Typhoon was defined in this study when the Philippine weather bureau (PAGASA) raises an alarm or signal due to Inter Tropical Convergence Zone (ITCZ) that brought rains combined with winds. Strong winds articulated happens even without public warning signal due to ITCZ but can bring strong winds due to North-West monsoon or "Amihan".

The climate-risk maps presented below have direct impacts to livelihoods on agriculture and fisheries in the municipality of Ivisan.

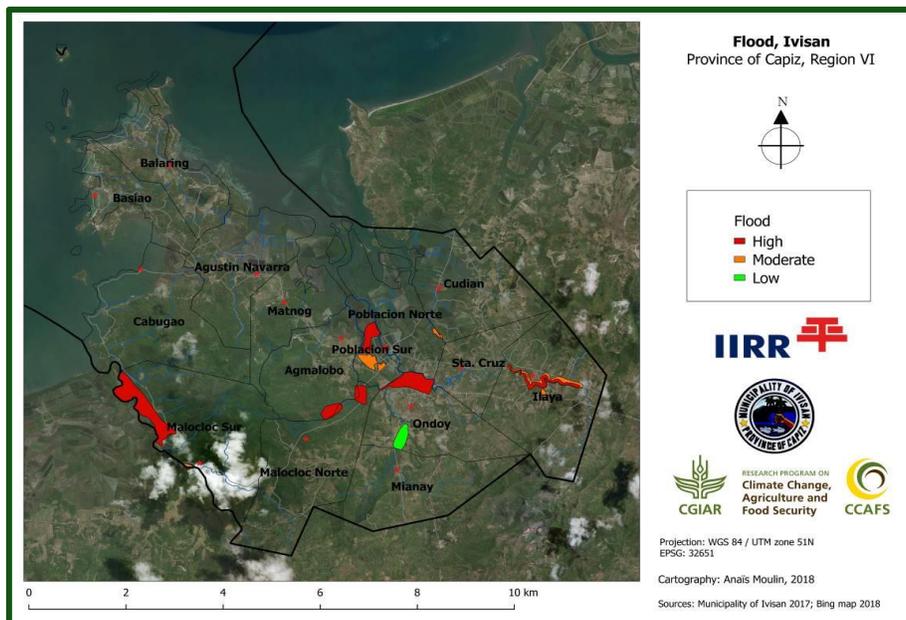


Figure 11: Livelihood vulnerability map on flood in the municipality of Ivisan. Vulnerable areas include Ilaya Ivisan, Sta. Cruz, Poblacion Sur, Agustin Navarra, Ondoy and Malocloc Sur where livelihoods on high risks were rice especially during the vegetative and milking stages. Selected fish ponds were moderately at-risk while backyard vegetable farming and livestock raising were slightly at-risk.

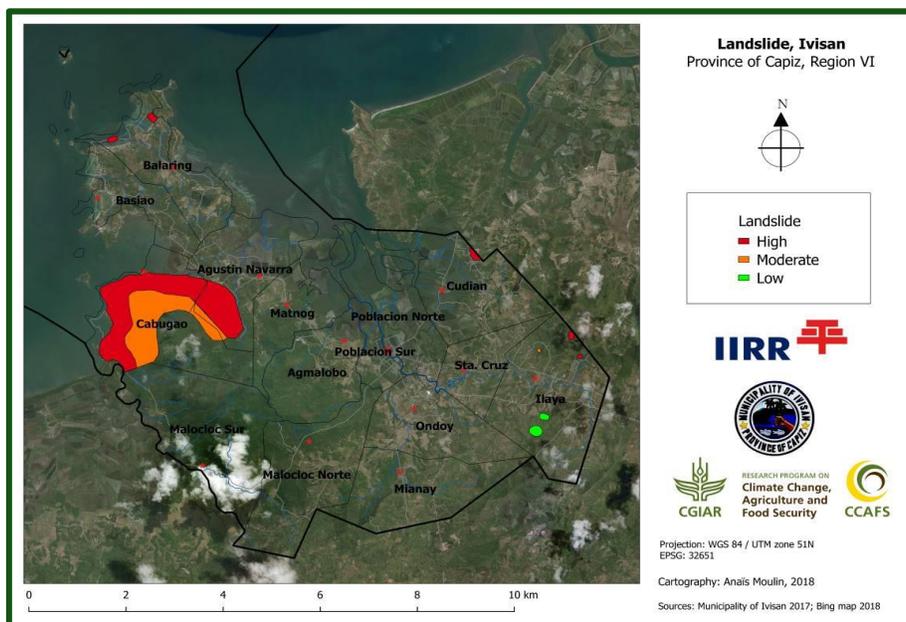


Figure 12: Livelihood vulnerability map on landslide in the municipality of Ivisan. Moderate and high-risks livelihoods include fruit trees, coconut and bamboo trees and buyers and sellers of fish products.

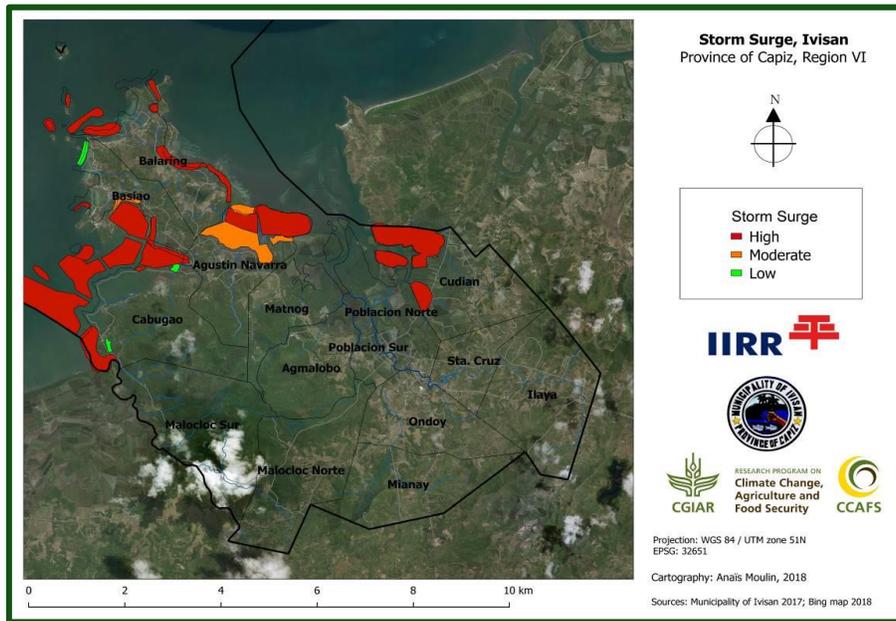


Figure 13: Livelihood vulnerability map on Storm surge in the municipality of Ivisan. Livelihoods on high-risks include fish ponds, mangroves, oyster and green mussel farms while other fisheries assets at-risks includes fish nets, dry fish area and boats. Selected rice fields were at low risk.

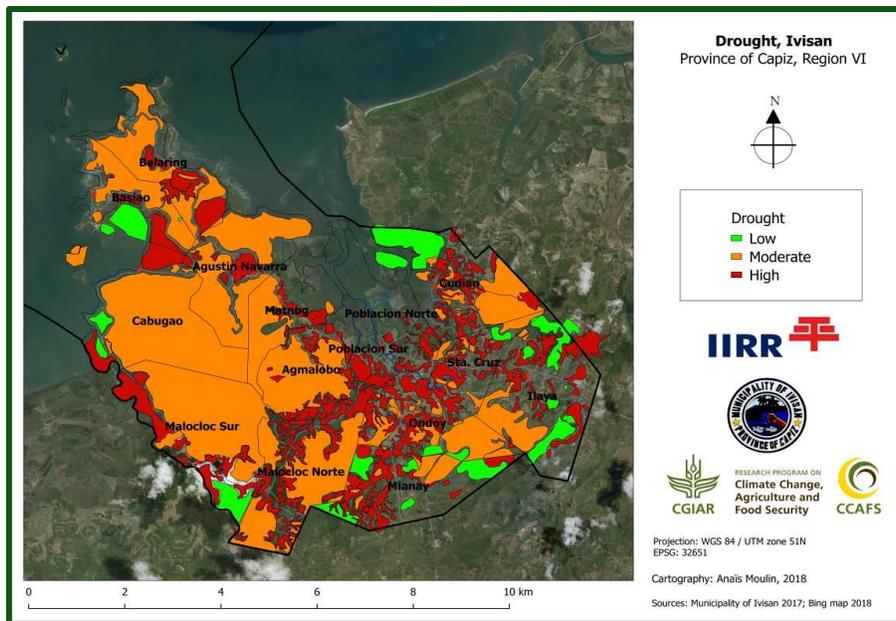


Figure 14: Livelihood vulnerability map on drought of the municipality of Ivisan. Livelihoods at high risks includes majority of the rice fields and vegetable farms while majority of the fishpond areas were moderately to high risk. Livelihoods that were moderately at-risk include Root and Tuber Crops, backyard swine and poultry raising, fruit trees and forest areas.

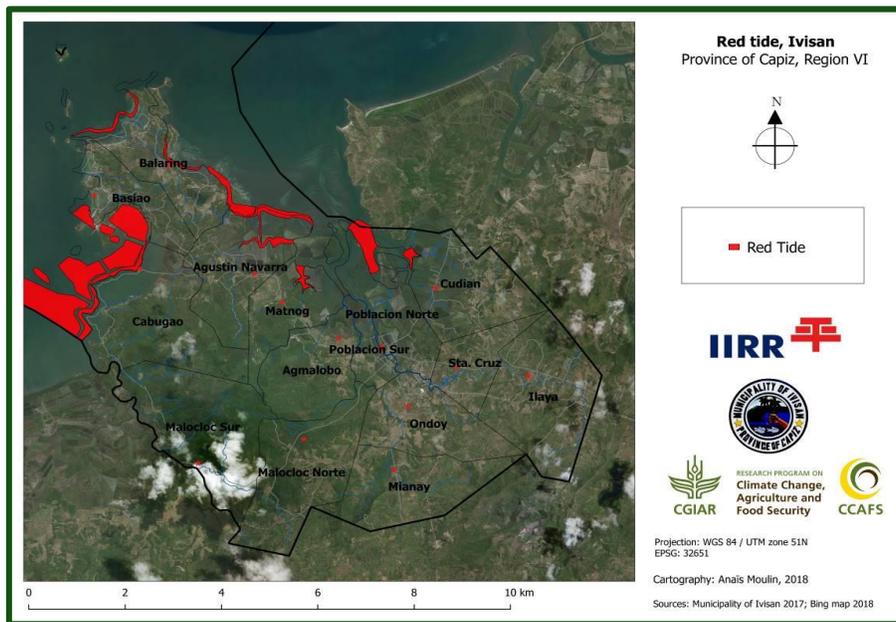


Figure 15: Livelihood vulnerability map on red tide of the municipality of Ivisan. Livelihoods at high risk were mostly shell-based activities such as gleaning, oyster and green mussel farming. Majority of the coastal areas affected where these livelihoods were present includes Cabugao, Basiao, Balarang, Agustin Navarra, Matnog and Cudian. Market vendors, sea shell buyers and vendors were moderately affected.

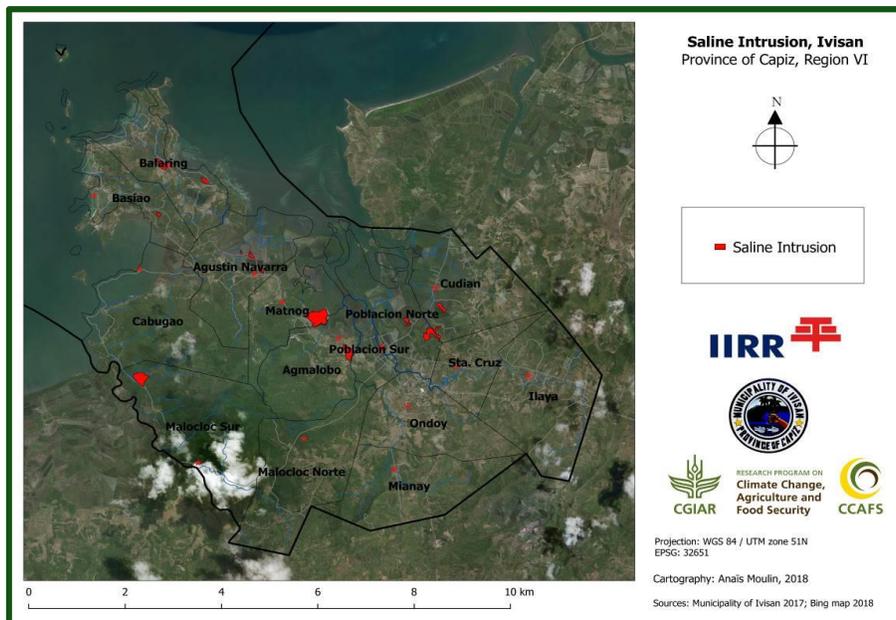


Figure 16: Livelihood vulnerability map on Saline Intrusion of the municipality of Ivisan. Livelihood at high-risk were selected rice fields near the fish ponds and mouth of the rivers. Vulnerable areas include Malocloc Sur, Cudian, Basiao, Balarang, Poblacion Norte, Matnog and Agmalobo. The level of risk matters when a high tide reaches between 2 to 2.2 meters combined with heavy rainfall.

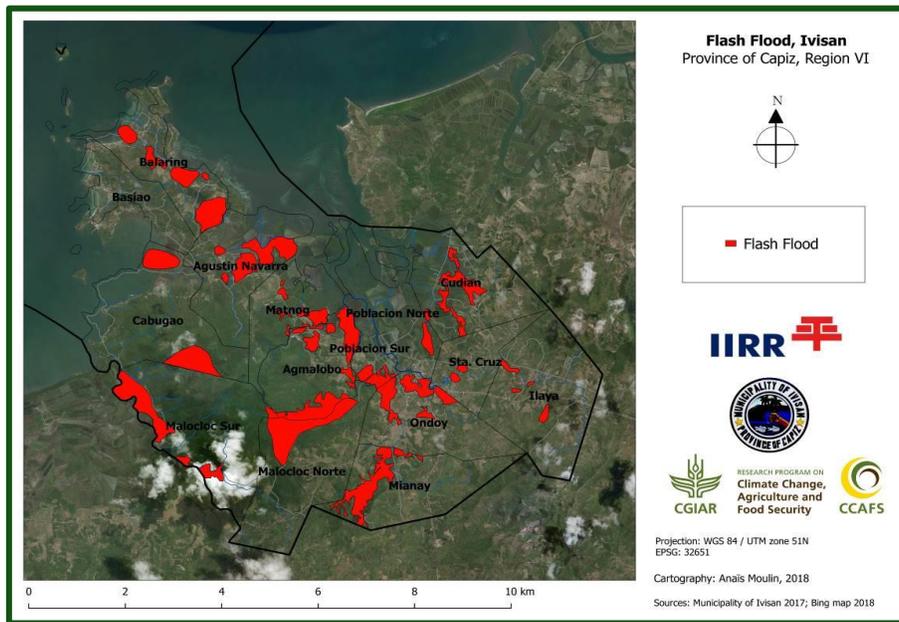


Figure 17: Livelihood vulnerability map on Flash flood of the municipality of Ivisan. Livelihoods at high risk were select rice fields in almost all the barangay especially during booting, milking and ripening stage. Moderate livelihoods at risk were selected fish ponds in the municipality while the oyster and green mussel were at low risk.

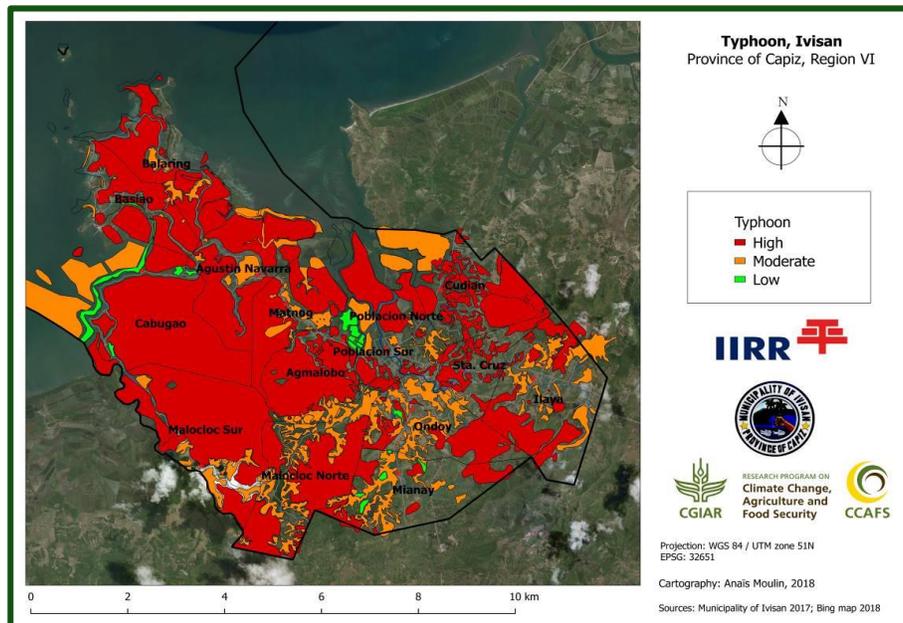


Figure 18: Livelihood vulnerability map on typhoon of the municipality of Ivisan. Majority of the livelihoods were considerably at high risk. These include fruit, timber and coconut trees, banana, bamboos, fish ponds and rice fields near the coastal areas. Moderately at-risk livelihoods include oyster and green mussel farms, vegetable farms and other fishing assets and materials. However, Root and Tuber Crops, backyard swine and poultry raising were analysed as low-risk livelihoods.

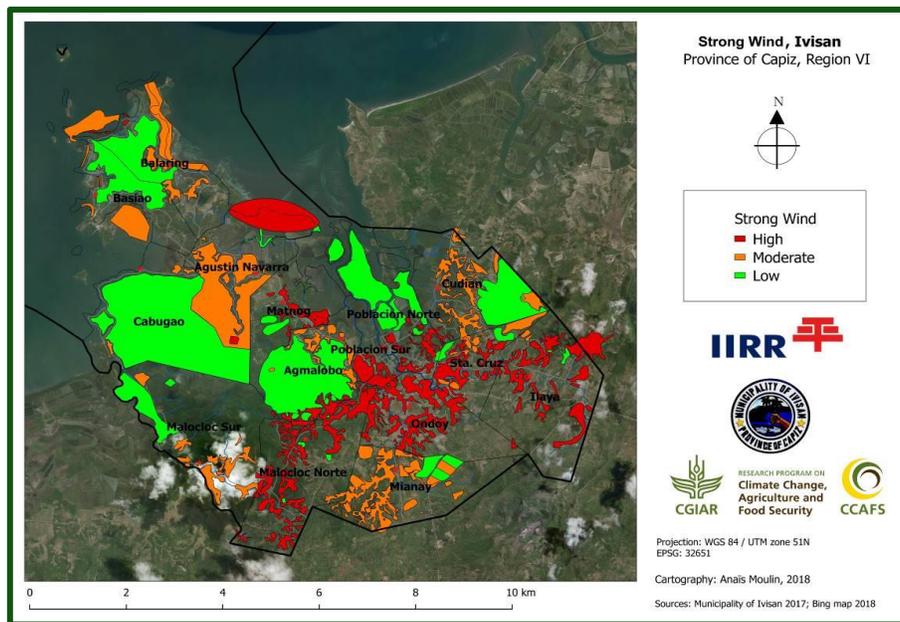


Figure 19: Livelihood vulnerability map on strong winds of the municipality of Ivisan. Standing crop specifically rice farms were at high-risk especially on booting and milking stage. Corn production and fruit trees can somehow bear the strong winds and analysed as moderately at-risk while mangrove areas as an assets, Root and Tuber Crops and vegetable farms were analysed at low-risk.

## CONSOLIDATED COMMODITY-BASED (HISTORICAL COPING MECHANISMS)

The coping mechanisms were facilitated at the community workshops that will provide how each community (villages) adapt and bounce back from the climate-related hazards.

The raw coping mechanisms were broken down/categorized into three areas which include Before, During and After (the hazard event) as the workshop outputs were provided in general condition.

The subsequent pages are the analyzed results from the consolidated historical coping mechanisms of the municipality of Ivisan.

## LIVELIHOOD COMMODITY: RICE

STAGES OF COPING MECHANISMS	FLOOD	DROUGHT	SALINE INTRUSION	FLASH FLOOD	TYPHOON	STRONG WINDS	PEST AND DISEASES
Before	<p>Clearing of river and creeks at least once a year</p> <p>Construction of canal drainage in the rice field</p> <p>Tried different varieties like RC10, RC216, RC222, Sampaguita, RC152, RC308 – that are quite tolerant</p> <p>Exchanged/ selling of seeds from other farmers</p> <p>Planted vegetables on upland areas as alternative source of food and income</p>	<p>Used tolerant varieties like RC10, RC14</p> <p>Broadcasted mung bean in rice fields after harvest</p> <p>Ratooning method</p> <p>Constructed SFR to store/catch rainwater that also diversifies livelihood (raising of poultry, swine and aquaculture)</p>	<p>Constructed dikes that controls the sea water to enter in the rice field</p> <p>Used of carbonized rice hulls as soil enhancer/ conditioner</p>	<p>Planted <i>kakawate</i> to protect the dikes</p> <p>Planted bamboos near the rivers</p> <p>Cleaning of rivers regularly</p> <p>Practiced transplanting method</p> <p>Saving of capital for next cropping</p>	<p>Practiced transplanting and organic method</p> <p>Seed banking for the next cropping season</p> <p>Secured/avail crop insurance</p>	<p>Planting of <i>kakawate</i> and <i>malunggay</i> trees</p> <p>Practiced transplanting method</p> <p>Planted rice varieties that can withstand to strong winds like Sampaguita, RC222, RC10</p> <p>Used early maturing varieties</p> <p>Practiced early harvest</p>	<p>Conducted pest monitoring in the rice field</p> <p>Planted insect repellent plants around or near the rice paddies like cosmos, lemongrass, etc.</p> <p>Reverted to traditional practice</p> <p>Changed of variety every cropping season</p> <p>Practiced natural farming – organic sprays like vermi-tea</p>
During							
After	<p>Repair of damaged and obstructed canals</p>	<p>Availed loans and credit</p> <p>Labor service to others</p>	<p>Re-planting of rice</p>	<p>Repair of dikes regularly after harvest</p>	<p>Re-planting on damaged rice fields</p>		

## LIVELIHOOD COMMODITY: AGROFORESTRY

STAGES OF COPING MECHANISMS	LANDSLIDE	DROUGHT	TYPHOON	STRONG WINDS	PEST AND DISEASES
Before	<p>Tree planting and re-planting of lost trees</p> <p>Planted banana or coconut in other upland areas</p>	<p>Used tolerant varieties like RC10, RC14</p> <p>Constructed SFR to store/catch rainwater that also diversifies livelihood (raising of poultry, swine and aquaculture)</p>	<p>Planting of <i>kakawate</i> trees</p> <p>Planted various roots and tuber crops, banana, papaya</p>	<p>Planting of alternative crop</p> <p>Cutting of unwanted leaves and branches of bananas, papayas and also put bamboo poles to support the tree</p>	
During	<p>Alternative livelihoods like gleaning, cash for work</p>				<p>Spray chemical pesticides in affected leaves</p>
After	<p>Repair of damaged and obstructed canals</p>	<p>Broadcasted mung bean in rice fields after harvest</p> <p>Ratooning method</p> <p>Labor service to others</p>	<p>Re-planting of uprooted crops (by PCA)</p>		<p>Introduced Parasitoid for cocolisap</p> <p>Cutting of affected area, use of spray (natural/chemical)</p>

### LIVELIHOOD COMMODITY: VEGETABLE

STAGES OF COPING MECHANISMS	FLOOD	LANDSLIDE	TYPHOON
Before	<p>Construction of canal</p> <p>Planting of <i>kakawate</i> as trellis and source of fertilizers to their gardens</p> <p>Planting of corn and doing multiple cropping</p>	Planting of <i>kakawate</i> for soil erosion	Planting of short-term crops and do inter-cropping
During			
After			

### LIVELIHOOD COMMODITY: ROOT AND TUBER CROPS

STAGES OF COPING MECHANISMS	FLOOD	LANDSLIDE	TYPHOON	STRONG WINDS	DROUGHT
Before	<p>Planted drought-resistant RTCs like cassava, camote, peanut and ube</p> <p>Planting in upland areas</p>	Intercropping method	Planting of short duration crops	Planting camote, peanut and cassava crops	Planted drought-resistant RTCs like cassava, camote, peanut and ube
During					
After					

## LIVELIHOOD COMMODITY: LIVESTOCK AND POULTRY

STAGES OF COPING MECHANISMS	FLOOD	DROUGHT	TYPHOON	STRONG WINDS	PEST AND DISEASES
Before	Keeping animals in fences	Raised goat, cattle and turkey  Establishment of intensive feed gardens	Increased number of chicken raised for additional income  Early harvest and monitoring of weather forecast  Transfer to more stable and resilient facility  Livestock insurance	Applied for livestock insurance (PCIC)  Evacuate to safe place	Practice vaccination and immunization  Do other work such as gleaning and planting of vegetable
During					
After		Transition to raising of goat and native swine			Buy new stocks of chicken

## LIVELIHOOD COMMODITY: FISH PONDS

STAGES OF COPING MECHANISMS	FLOOD	STORM SURGE	RED TIDE	TYPHOON
Before	Cleaning of creeks and rivers  Repair of dikes  Planted mangroves near the dikes  Re-constructed and widened/deepened the river  Rented fishponds in other areas not prone to flood	Planting of <i>kakawate</i> and mangroves near the dikes  Emergency harvest	Emergency harvest	Planting of mangroves beside the dikes to protect the ponds  Early harvest of fingerlings
During				
After	Repair of dikes	Repair of fishponds if needed	Repair of fishponds if needed	

## LIVELIHOOD COMMODITY: FISH CAGES

STAGES OF COPING MECHANISMS	STORM SURGE	RED TIDE	TYPHOON	STRONG WINDS
Before	Built barriers from bamboo  Emergency harvest or early harvest		Early harvest and monitoring	
During				
After	Continued fishing after the disaster and repair damaged cages  Change in livelihood like construction workers for men	Alternative livelihoods (establish gardens, kaingin [charcoal making and selling])  Planted RTCs, copra selling, banana, raising of swine and poultry		Worked as laborer (farm or household)

## LIVELIHOOD COMMODITY: FISH NET, FISH DRYING, OYSTER AND MUSSEL FARMING AND GLEANING

STAGES OF COPING MECHANISMS	STORM SURGE	RED TIDE	TYPHOON
Before	Built barriers from bamboo  Emergency harvest or early harvest		
During			
After	Continued fishing after the disaster and repair damaged cages  Change in livelihood like construction workers for men  Do alternative income like labor and charcoal making  Farm/household laborer  Repaired damaged oyster farms and continue fishing	Massive clearing operations in coastal and river banks  Alternative livelihoods (establish gardens, kaingin [charcoal making and selling])  Planted RTCs, copra selling, banana, raising of swine and poultry  Rice farming, copra making, charcoal making, loans and credit	Produced salted fish  Transition to raft method  Re-cultured oyster and green mussels

# ANALYSIS OF HAZARD-SPECIFIC CLIMATE-RISKS

The matrix below presents the analysis of outputs (at the municipal level) that focus on the summary of degree of climate-risk per hazard in each of the 15 barangays.

In this analysis, vulnerability maps that includes the impact of hazard to the livelihoods were assessed along with the historical coping capacities, and, the prevention or mitigation strategies (of each barangay and at the municipal level). The degree of climate-risk was evaluated as high, moderate or low.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Flood	Ilaya Ivisan, Poblacion Sur, Agustin Navarra, Malocloc Sur and Ondoy	<p>Rice sector was the most affected livelihood. However, it will not be affected if it's on its first two weeks after transplanting. If it's on its vegetative stage, the development growth of rice will be disturbed thus it will moderately affected. If it's on its milking stage, it will be also be disturb thus it will not effectively produce more grains.</p> <p>Some vegetable crops were slightly affected in those affected areas specifically in backyard gardens. This includes High Value Crops such as radish, tomatoes, <i>pechay</i> and young papaya trees.</p> <p>Flashfloods can also affect fish ponds that can possibly overflow the water, thus, fish in cages will spill over.</p> <p>Livestock were slightly affected as they may get sick or get drowned.</p>	Low	The flooding affects very minimal livelihood areas in the municipality of Ivisan. Although rice is the most affected, there were number of rice farmers who advocates and promotes System of Rice Intensification. However, the technology should be further promoted by the LGU to promote a more climate-resilient agriculture. Recovery time for the affected livelihoods to bounce back is immediate.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Landslide	Ilaya Ivisan, Balaring, Cabugao, Cudian and Agustin Navarra in uplands area	<p>Mostly affects the fruit trees, coconut and bamboo as rocks can erode that may bring the trees to fall down.</p> <p>In Cabugao, the landslide caused road blocks that affected farmers and fisherfolks in transporting their products to the market.</p> <p>In Cudian, it affected the grazing area for the animals. It happened due to quarrying that covers the land with muddy soil.</p>	Low	Vulnerable areas are located in mountainous areas thus the affected livelihoods are limited. The municipality still has a still a valuable and healthy environment thus the degree of risk was reduced.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Storm surge	Cabugao, Basiao, Balaring, Agustin Navarra and Cudian	<p>The fish ponds were highly affected due to damaged dike.</p> <p>The mangrove areas were destroyed by the storm surge. Oyster and mussel farms were also affected and destroyed the sticks and the rafts. Other fishing assets such as the fish nets, dry fish area and even boats were affected/damaged.</p> <p>Some of the rice lands near the coasts were affected by saline intrusion.</p>	Moderate	Given that the municipality is considered as one coastal municipality and is one of the host of the sea products in the province of Capiz, storm surge generally affects all the coastal livelihoods. Although mangroves conservation is still at peak and is continuous to be protected, alternative livelihoods were very limited to affected population. Recovery time for the affected livelihoods to bounce back is about seven months.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Drought	All the 15 barangays	<p>In general, the drought affected mostly the rice fields and the vegetables areas.</p> <p>Root and tuber crops were moderately affected.</p> <p>Swine and poultry raisers were slightly to moderately affected. It brought diseases to the animals.</p> <p>In Basiao, Balaring, Malocloc Sur and Cabugao, the fish ponds were highly affected, and it will take 4-5 months to recover.</p> <p>For Cudian and Agustin Navarra, the fish ponds were moderately affected. And for the rest of the coastal barangays (Matnog, Agmalobo, Poblacion Norte and Poblacion Sur) the fish ponds were not affected by drought.</p> <p>In most of the barangays, the fruit trees/forests areas were slightly to moderately affected by drought.</p>	High	As majority of the agriculture and fisheries livelihoods were affected, only RTCs can tolerate the hazard. Even though there are CSA technologies being tested and livelihood options were established, the interventions must be out-scaled to other farmers with the support from the local government units.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Red Tide	Cabugao, Basiao, Balarig, Agustin Navarra, Matnog and Cudian	<p>Affects all the gleaning areas and oyster and mussels farms in Ivisan.</p> <p>On indirect impacts, it affects the market vendors in Poblacion Norte and Poblacion Sur.</p> <p>The recovery time wasp immediate acter a notice or clearance from the Bureau of Fisheries and Aquatic Resources.</p>	Moderate	<p>The disaster happened three times in 2014 that affected most of the fisher folk community for almost a year without livelihood that relied on shell-based commodities.</p> <p>Although there are interventions provided and technologies being promoted, the livelihood diversification has not yet scaled up. Backed up with environmental policies that can reduce the disaster risk, implementation, adoption of farmers and technologies and financing window to scale up is a bit challenging.</p>

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Saline intrusion	Malocloc Sur, Cudian, Basiao, Balarig, Poblacion Norte, Matnog, Agmalobo, and Cudian	<p>During high tide and heavy rain, especially the month of June when the tide water reaches between 2.0 to 2.2 meters high, rice fields near the fish ponds and mouth of the rivers are at a high risk resulting to lost of yield between 75% to 100%.</p> <p>It can take six months for them to recover.</p>	Low	<p>Minimal vulnerable areas and affected livelihoods. Mitigation activities can be done. Livelihood options are available as well as the inputs (seeds).</p>

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Flash flood	Flash flood Impacts all barangays except Ilaya and Basiao	<p>Rice fields were affected as most of the affected areas lean to the ground from cascading waters. Especially during booting, milking and ripening stages, the lost in harvest can reach up to 75%. But during seedling and vegetative stages, the rice can recover but still have from 20% to 30% of loss.</p> <p>It can also affect fish pond by water overflow that can damage the dikes and fish lost.</p> <p>Lower damages for the oyster farms in Agustin Navarra as some of the sticks use in oyster farming might take off.</p> <p>Fallen banana and coconut trees near the rivers occurred in Agustin Navarra, Malocloc Sur and Cabugao.</p>	Moderate	Majority of the barangays are vulnerable and affected major livelihood commodities in the municipality of Ivisan. Land development in other areas, used of unsustainable farming techniques, mono-cropping systems played major crucial roles in the increase on the degree of risks. Support on policy, promotion of sustainable agriculture and implementation can mitigate the impact of the hazard.

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Typhoon	All the 15 barangays	<p>The uplands areas were the most affected that includes fruit trees, coconut, banana, timber trees, and bamboos.</p> <p>Rice farming was also the most affected livelihoods especially those near the coastal area compare to lowland and upland areas. However, if the rice plant is at its younger stage, the rice can recover in one to two months time.</p> <p>The oyster and mussels farms were moderately affected by the ocean waves. It also destroys fishing materials and assets such as the fish nets, dry fish area, fish cages, and even boats.</p> <p>For the fish ponds, the dikes were destroyed by strong water current that go to 100% of the fish escaped. Some of the owners still have not recovered from Yolanda in 2013.</p> <p>Vegetables and plantations are destroyed.</p> <p>Root crops are slightly damage because they are protected under ground.</p> <p>Poultry are killed by the debris of the destroyed houses or fences. Almost a 100% in commercial poultry were lost.</p> <p>Livestock such as carabao, cattle and swine were slightly affected because farmers bring them to the safe upland areas.</p>	High	<p>The high likelihood of the hazard and its high impact to the majority of the livelihoods are predominantly the factors on its high degree of climate risks. Even though there are agriculture technologies that can reduce its impact especially on rice sector, crop and livestock insurance were promoted, increase in financial schemes and promotion of alternative livelihoods can reduce its impacts to affected farmers and fisherfolks.</p>

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Strong winds	All the 15 barangays	<p>The strong wind affect in particularly rice land.</p> <p>In the booting and milking stage, strong wind caused fallen/leans the rice plant and 50% to 70% of production lost.</p> <p>In seedlings to vegetative stage the risk of the rice will be low because the rice is growing and can recover after the event.</p> <p>Corn will fall down and break the stem and cause a lost of 50% of the yield.</p> <p>Fruit trees: fruit fall from the trees bananas and mango</p> <p>Fisherfolks can't dry their fish.</p> <p>Mangroves can be destroyed. (Agustin Navarra)</p> <p>Roots and tuber are slightly affected especially cassava which is a tall root crop.</p> <p>Vegetable are damaged especially the viny veggies, i.e: the trellis of the string beans, bitter gourds and even white squash.</p>	Moderate	<p>Although happened seasonally, standing crops for agriculture, some of the fishing activities affected as well as coastal resources and assets may be damaged. Change in farming system such as SRI be able to increase farmer's adaptive capacities to mitigate the winds. Although the hazard cannot be prevented nor mitigated, adaptive capacities of the farmers and fisherfolks were already increased.</p>

HAZARD	VULNERABLE BARANGAYS	LIVELIHOOD AND COMMODITIES AT RISK	DEGREE OF CLIMATE-RISK	SUMMARY OF FINDINGS
Pest and diseases	<p>Barangays affected by pest in rice:</p> <p>Sta. Cruz, Poblacion Norte, Malocloc Norte, Ondoy, Mianay and Agmalobo</p>	<p>Avian pest: New castle disease, Gomburo, coraiza, affected chicken especially backyard because in commercial poultry they have vaccination. A vaccine cannot be for 1000 heads, so farmers will not vaccinate for the small number of heads of backyard chicken they have.</p> <p>Green leaf hopper, it can cause viral diseases called tungro, that cause low harvest production.</p> <p>Brown leaf hopper, can cause hopper burn to rice especially in the milking stage.</p> <p>Snails/<i>kohol</i> will eat the young leaves of rice especially in the seedling and vegetative stage.</p> <p>Rice bugs attack the rice grains in the flowering and milking stage of the rice. It cause damage on the grains that triggers to loss of harvest production.</p>	Moderate	<p>Majority of the households have either native chicken in their backyard or do swine raising, most of them experienced to be affected by New castle disease. Even though affected including some of the rice farms, they be able to bounce back immediately after this hazard event.</p>

# ADAPTATION AND MITIGATION STRATEGIES AND POLICY AND PROGRAM IMPLICATIONS

HAZARD	ADAPTATION AND MITIGATION STRATEGIES
Flood	<ul style="list-style-type: none"> <li>▪ Canal and dike improvements/enhancements</li> <li>▪ River clean-up</li> <li>▪ Dike protection</li> <li>▪ Mangroves planting</li> <li>▪ Increase savings</li> <li>▪ Use high yielding varieties</li> <li>▪ Seed exchange during farmers field day</li> <li>▪ Use transplanting method</li> <li>▪ Cover insurance for crop, livestock and poultry</li> <li>▪ Keep animals away from vulnerable areas</li> <li>▪ Have an alternate fish pond not vulnerable to flooding</li> <li>▪ Dam control and water management in irrigation canals</li> </ul>
Landslide	<ul style="list-style-type: none"> <li>▪ Replanting on critical upland areas prone to landslide</li> <li>▪ Have an alternate source of livelihood</li> <li>▪ Clearing operations and repair of damaged canals</li> <li>▪ Establishment of canal and rain-water drainage in critical areas</li> <li>▪ Practice Sloping and Land Technology (SALT)</li> <li>▪ Establishment and construction of soil erosion projects</li> </ul>
Storm surge	<ul style="list-style-type: none"> <li>▪ Planting of beach forests that will serve as wind and tide breakers</li> <li>▪ Install control nets/for soil erosion</li> <li>▪ Avail loans in community or commercial entities</li> <li>▪ Rebuilding of damaged infrastructure and livelihoods</li> <li>▪ Diversification of livelihoods away from risk (vegetable farming, planting of RTCs, plant banana or coconut trees.</li> <li>▪ Build temporary (using bamboo) and permanent water break along the coast/shoreline</li> <li>▪ Improve access/window for livelihood capitalization</li> </ul>
Drought	<ul style="list-style-type: none"> <li>▪ Continue to practice alternative livelihoods (raising livestock and poultry tolerant to drought, plant RTCs, harvest firewoods in upland areas)</li> <li>▪ Increase individual savings</li> <li>▪ Avail loans and credit</li> <li>▪ Construct SFRs in strategic areas</li> <li>▪ Practice SRI, intercropping, seed banking and other water conservation techniques</li> <li>▪ Broadcast mungbean after rice harvest</li> <li>▪ Selection of rice varieties more tolerant to drought</li> </ul>

HAZARD	ADAPTATION AND MITIGATION STRATEGIES
Red tide	<ul style="list-style-type: none"> <li>▪ Increase savings and promote CoMSCA</li> <li>▪ Access community loans</li> <li>▪ Diversify livelihoods not relying in coastal resources</li> <li>▪ Adjust oyster and mussel farms spacing to increase water flow</li> <li>▪ Change and promote oyster farming system from stake to raft method</li> <li>▪ Removal of illegal structures in the coast and follow oyster and mussel farm area zoning</li> <li>▪ Regular river and coastal clean-up</li> <li>▪ Enforcement of solid waste management act</li> </ul>
Saline intrusion	<ul style="list-style-type: none"> <li>▪ Establish and improve pond area to minimize entry of salt water by planting Nipa</li> <li>▪ Do alternative livelihoods (gardening, livestock and poultry raising, handicraft making.</li> <li>▪ Access to insurance, loans and credit</li> <li>▪ Change rice varieties to more tolerant to saline</li> <li>▪ Construction of dikes to control salt water entry</li> </ul>
Flash flood	<ul style="list-style-type: none"> <li>▪ Increase savings to have capacity to buy inputs and for capital</li> <li>▪ Regular debris clearing on canals and rivers</li> <li>▪ Planting of bamboos near the river</li> <li>▪ Repair of damaged riprap and dikes</li> <li>▪ Access crop and livestock insurance</li> <li>▪ Plant <i>kakawate</i> near the river system to control soil erosion</li> <li>▪ Replanting of trees for damaged and affected areas.</li> </ul>
Typhoon	<ul style="list-style-type: none"> <li>▪ Planting of different short term agricultural crops (vegetables, RTCs)</li> <li>▪ Do alternative livelihoods during recovery time</li> <li>▪ Engage in livestock and poultry raising</li> <li>▪ Intercropping of different crops</li> <li>▪ Increase preparedness activities and weather monitoring</li> <li>▪ Pruning of branches on fruit trees and bananas</li> </ul>
Strong winds	<ul style="list-style-type: none"> <li>▪ Planting of crops such as cassava</li> <li>▪ Change of farming practice from broadcast to transplanting method</li> <li>▪ Planting of wind breakers such as <i>ipil-ipil</i>, <i>kakawate</i> and <i>malunggay</i></li> <li>▪ Practiced early harvest if necessary</li> <li>▪ Use short-term/early maturing rice varieties</li> <li>▪ Pruning of leaves for banana trees</li> <li>▪ Plant vegetable crops such as squash and native vegetables</li> <li>▪ Established IFGs for livestock and poultry</li> <li>▪ Increase family savings</li> <li>▪ Use and follow seasonal calendars</li> </ul>

HAZARD	ADAPTATION AND MITIGATION STRATEGIES
Pest and diseases	<ul style="list-style-type: none"> <li>▪ Practiced poultry vaccination and immunization of vitamins</li> <li>▪ Change native chicken breeds</li> <li>▪ Have an alternative livelihoods</li> <li>▪ Change in rice varieties per season</li> <li>▪ Establish seed bank tolerable on pest and diseases</li> <li>▪ Pest and diseases monitoring</li> <li>▪ Access crop and livestock insurance policy</li> </ul>

## General program and policy recommendations

During the municipal workshop, Engr. Lorna Bernales asked the participants to identify existing policies that are relevant to the discussion in terms of how the LGU and the community will increase its capacity to adapt and mitigate identified hazards during the community workshops and this study. Below is the output and the list of policies present in the municipality of Ivisan.

- No burning of rice straw (Mun. Ordinance#4 s. 1994)
- No dumping of garbage in rivers, creeks and public market
- Prohibiting of dumping of waste from travelling rice hulls
- Organic agriculture (Provincial)
- Closed – season on gleaning (A. Navarra)
- Waste segregation (Municipal and National)
- Closed season for fishery
- Local ordinance using electricity on fishing
- Designation of water ways in coastal areas
- Policy on dog vaccination
- Prohibiting animal grazing near the main roads
- Prohibiting drying of rice and agricultural product on the road
- Establishment of MPA
- Amendments of Fisheries Code: coastal zoning
- Establishment of Fisheries Code
- Prohibition of cutting of Mangroves and coconut trees (load)
- Trawl and illegal fishing
- Wildlife Act on Agroforestry (National)
- Regulation on use of fishing gears

During the discussion, the action planning resulted to the identification of the capacity needs, timeline and persons/ association/organization/department who will lead the activity. The agreed timeline and workplan of the LGU, community leaders, farmer and fisherfolk leaders and IIRR is shown on the next page.

ACTIVITY	TIMELINE	WHAT ARE THE CAPACITY NEEDS TA, MAT, Financial		PERSON/ASSN/OR G'N IN CHARGE (Lead & Co-Lead)
Concept development	June 2018	LGU	Organic materials seeds (climate resilient)	MAO, IIRR, MPDC, Federation(assn.-fisheries)  MPDC, MAO, , MAFC, MFARMC, Farmer Assn
Discussion with the Local Chief Executive	July 2018	DA RFO  IIRR	Farm tools  Farm lot co-operators  Soil analysis	MPDC, MAO, , MAFC, MFARMC, Farmer Assn
Lobbying to SB  - 1 <sup>st</sup> reading - 2 <sup>nd</sup> reading - 3 <sup>rd</sup> reading  Advocacy/IEC  Orientation	2018          3 <sup>RD</sup> QUARTER 2018	OPA  BS  LGU  BFAR	Water sources (development)  Funding for development & maintenance (labor)    Updating of the Municipal Fisheries circle  Coastal resource management plan	MFARMC, MAO, USPC  MPDO, LCE, SB, FARMC, IIRR, ALL LGU Officers

# MUNICIPAL WORKSHOP DOCUMENTATION

## A. Raw documentation file of outputs

### Consolidated historical and future coping mechanisms (municipal level)

	Flood	Land slide	Storm Surge	Drought	Saline Intrusion	Red Tide	Flash Flood	Typhoon	Strong Winds	Pest and Diseases	Current Policies
RICE	<p>Trying different varieties like RC10, RC216, RC222, Sampaguita, RC152, RC308 – that are quite tolerant</p> <p>Plant vegetables on upland areas as alternative source of food and income</p> <p>Cleaning of river or creeks at least once a year</p>			<p>Use tolerant varieties like RC10, RC14</p> <p>Broadcasted mung bean in rice fields after harvest</p> <p>Some practices ratooning</p> <p>Constructed SFR to store/catch rainwater that also diversifies livelihood – (raising of poultry, swine and aquaculture)</p>	<p>Constructed dikes that controls the sea water to enter in the rice field</p> <p>Used of Carbonized Rice Hulls as soil enhancer/conditioner</p>		<p>Planted <i>kakawate</i> to protect the dikes</p> <p>Repair of dikes regularly after harvest</p> <p>Saving of capital for next cropping</p> <p>Practiced transplanting method</p> <p>Planted bamboos near the rivers</p> <p>Cleaning of rivers regularly</p>	<p>Secured/avail crop insurance</p> <p>Stored palay seeds for the next planting season.</p> <p>Practiced transplanting method</p>	<p>Practiced transplanting method</p> <p>Practiced planting of trees like <i>ipil-ipil</i>, <i>kakawate</i> (madre de cacao), <i>malunggay</i> that served as wind breakers and fertilizer to the rice farms</p> <p>Planted rice varieties that can withstand to string winds like sampaguita, RC222, RC10</p> <p>Used early maturing varieties</p> <p>Practiced early harvest</p> <p>Seed distribution by LGU to replant and replaced affected rice farms</p>	<p>Changed variety every cropping season</p> <p>Used chemical spray one month before harvesting the rice</p> <p>Pest monitoring in the rice field</p> <p>Practice natural farming – organic sprays like vermi-tea</p> <p>Planted insect repellent plants around or near the rice paddies like cosmos, lemongrass, etc.</p>	<p>No burning of rice straw (Mun. Ordinance#4 s. 1994)</p> <p>No dumping of garbage in rivers, creeks and public market</p> <p>Prohibiting of dumping of waste from travelling rice hulls</p> <p>Organic Agriculture (Provincial)</p> <p>Closed – season on gleaning (A. Navarra)</p> <p>Waste segregation (Municipal and National)</p> <p>Closed season for fishery</p> <p>Local ordinance using electricity on fishing</p>

	Flood	Land-slide	Storm Surge	Drought	Saline Intrusion	Red Tide	Flash Flood	Typhoon	Strong Winds	Pest and Diseases	Current Policies
RICE											Designation of water ways in coastal areas
AGRO-FOREST-RY		Do alternative livelihoods like  Planted banana or coconut in other upland areas		Harvests fire woods from forests and upland areas and sell it  Swine and poultry raising  Planted drought-tolerant crops like bananas				Planting of various roots and tuber crops, banana, papaya that can have income and savings for the next disaster	Cutting of unwanted leaves and branches of bananas, papayas and also put bamboo poles to support the tree	(Cocolisap)  Introduced parasitoid  (Cutting of affected area, use of spray (natural/chemical))	Policy on dog vaccination  Prohibiting animal grazing near the main roads  Prohibiting drying of rice and agricultural product on the road
VEGETABLE				Planting of corn and doing multiple cropping				Planting of short-term crops and do inter-cropping	Planting of <i>kakawate</i> as trellis and source of fertilizers to their gardens		Establishment of MPA  Amendments of Fisheries code: coastal zoning
ROOT, TUBER, CROPS				Planted drought-resistant RTCs like cassava, camote, peanut and ube							Establishment of fisheries code  Prohibition of cutting of mangroves and coconut trees (load)
POULTRY								Increase number of chicken raised for additional income		Vaccination/immunization program for the prevention of New Castle disease	Trawl and illegal fishing
LIVE-STOCK				Establishment of intensive feed garden and plant vegetable crops as alternative feeds				Establishment of intensive feed garden and plant vegetable crops as alternative feeds	Applied for livestock insurance (PCIC)		Wildlife act on agroforestry (National)  Regulation on use of fishing gears

	Flood	Land-slide	Storm Surge	Drought	Saline Intrusion	Red Tide	Flash Flood	Typhoon	Strong Winds	Pest and Diseases	Current Policies
FISH PONDS	<p>Repair of dikes</p> <p>Planted mangroves near the dikes</p> <p>Rented fish ponds in other areas not prone to flood</p> <p>Reconstructed and widened/deepened the river</p>		<p>Emergency harvest</p> <p>Repair of fish ponds if needed</p>			<p>Emergency harvest</p> <p>Repair of fish ponds if needed</p>		<p>Early harvest of fingerlings</p>			
FISH CAGES			<p>Build barriers from bamboo.</p> <p>Change in livelihood like construction workers for men</p>			<p>Alternative Livelihoods (Established gardens, Kaingin (Charcoal making and Selling)</p> <p>Planted RTCs, copra selling, banana, raising of swine and poultry)</p>		<p>Early harvest and monitoring</p>	<p>Work as laborer (farm or household)</p>		

	Flood	Landslide	Storm Surge	Drought	Saline Intrusion	Red Tide	Flash Flood	Typhoon	Strong Winds	Pest and Diseases	Current Policies
FISH NET (Hila-Hila, Taba, Balaybay)			Emergency harvest or early harvest								
GLEANNING			Farm / house-hold laborer								
FISH DRYING						Alternative livelihoods (established gardens, kaingin (charcoal making and selling)  Planted RTCs, copra selling, banana, raising of swine and poultry)		Produced salted fish			
OYSTER AND MUSSEL								Early harvest  Re-cultured			

# PHOTODOCUMENTATION

Initial meeting was conducted to validate information on the maps with the Barangay officials. On this photo are the barangay officials of Brgy Mlanay.



Livelihood maps based on LGU information gets validated and corrected by Barangay officials of Matnog



Anais, French Planning and Development Specialist shares the objectives and methods of climate risk mapping workshop to farmers and fisherfolks of Barangay Augustin Navarra.



Discussion and identification of the different hazards experienced in the community was conducted by Jhun Servano, IIRR Panay Program Manager.



Farmers of barangay Sta. Cruz confirming the right location and number of structures seen on the map.



A group of farmers and fisherfolks shared their opinions on the impacts of hazards to their livelihoods during the community-risk mapping in Brgy. Malocloc Sur, Ivisan.

# PHOTODOCUMENTATION



With Miss Nelly Ambuan, Ivisan Agriculture Technician, keenly discussed how to map-out impacts of hazards in their livelihoods during the facilitation of the climate-risk mapping in the community.



Cudian Barangay Captain Ricky Remegio, seriously led his team in the identification of current and future coping mechanisms per livelihood and per hazard for their barangay.

Engr. Lorna Bernales, Ivisan Municipal Planning and Development Officer working out an action plan together with the barangay officials.



Two-day presentation of outputs and planning workshop was conducted to barangay officials, farmers' associations, partner cooperatives, partner stakeholders and the Local Government of Ivisan highlighting the hazard maps and its impact to livelihoods.



DA-RFO6 Representative Miss Giner shared the Dept. of Agriculture programs and services giving emphasis in the implementation of the AMIA Village (Adaptation Mitigation Initiatives in Agriculture).



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Engr. Lorna Bernales, MPDO  
Mrs. Susan Villar, OIC MAO  
Ms. Nelly Ambuan, Ivisan Fisheries Technician

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RESEARCH PROGRAM ON  
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Agriculture and  
Food Security**

