

BOHOL CLIMATE EMERGENCY RESPONSE ROADMAP

TO SUPPORT SMALL ISLANDS AND COASTAL COMMUNITIES
VULNERABLE TO TIDAL FLOODS AND SEA LEVEL RISE

2021–2030



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BACKGROUND: WHY FOCUS ON SMALL ISLANDS?

Small island dwelling usually evokes idyllic scenes of everyday living. With the changing climate, however, living on a small island is fast becoming an issue of survival for the residents. For most of the year, inhabitants of small islands have to contend with strong winds, strong rains, and thunderstorms. However by 2100, the global mean sea level is predicted to rise by 0.28-0.98 meters under RCP 2.6 or a low emissions scenario (IPCC AR5, 2013). Between 1993 and 2015, the rate of sea level rise in the Philippines was observed to be approximately twice the global average (PAGASA, 2018). The challenge then is how island communities will adapt to these environmental changes.

Islands are highly exposed to climatic hazards, and are often home to the poorest sectors in society. These residents are heavily dependent on available natural resources for a living. Any change in the environment, particularly due to climate change, will have long-term impacts not just on population vulnerability but also on ecological health, biodiversity, ecosystem goods and services, and over-all island sustainability.

DECLARATION OF CLIMATE EMERGENCY IN THE SMALL ISLANDS OF BOHOL

The declaration of climate emergency is warranted in the islands of Bohol, particularly those located within the Danajon Bank, as these have already started to regularly experience tidal flooding. In the face of almost certain acceleration of sea level rise in the future and the increasing vulnerability of small islands to climate extremes, the communities in Danajon Bank have begun preventive measures. They have collectively discussed their realities and drawn up recommendations, with the help of their own barangay representatives and other stakeholders.

Rice Watch Action Network (R1) together with Greenpeace in partnership with Climate Change Commission, House Committee on Climate Change and the Congressional Office of Rep. Edgar Chatto and other partners have joined together to raise awareness on



the state of emergency of our island communities. Acting with a greater sense of urgency under a climate emergency, grassroots organizations and local governments on the islands can develop plans and actions to adapt to the potential impacts of climate change, while also addressing its underlying causes through the mitigation of carbon emissions.



CRAFTING OF THE CLIMATE EMERGENCY RESPONSE ROADMAP

To formulate the roadmap, a collaborative process was set in motion to generate concrete actions among affected communities, local governments, and experts from different fields that are most important to island ecosystems. These fields include coastal engineering, marine biology, waste management, conservation, fisheries, and sustainable livelihood. The goal of the collaboration was to ensure identification of appropriate adaptation options to address the climate crisis and avoid exacerbating already existing disaster risks.





OBJECTIVES OF THE ROADMAP DEVELOPMENT

This process aims to do the following:

- Assist stakeholders and LGUs in crafting the declaration of a climate emergency in the island of Bohol (including making known that people are aware how Big Polluters are accountable for climate change);
- Explore and learn how a declaration of climate emergency can strengthen convergence of climate change adaptation, mitigation initiatives, and climate justice;
- Determine how these small islands can enhance their resilience against the negative effects of climate change, particularly sea level rise and drought

METHODOLOGY/PROCESS

The roadmap development process started in 2019 and continued until 2021. All of the consultations with island and coastal communities were done on-site, with consultations at the municipal, provincial and national levels being held via virtual, face to face, or hybrid workshops. Below are municipalities and barangays included in the roadmap development process, with consultation dates and number of participants in each consultation session:



Areas and Number of Participants

Date	Municipality	Barangays/ Islands Consulted	Number of Participants
October 21, 2020	Talibon	Nocnocan	17
October 28, 2020	Bien Unido	Hingotanan East	26
		Hingotanan West	12
		Bilang-bilangan Diot	16
		Bilang-bilangan Dako	8
October 29, 2020	Talibon	Calituban	14
November 10, 2020	President Carlos P. Garcia	Aguining	15
November 11, 2020		Sto. Rosario	43
November 12, 2020	Getafe	Banacon	34
November 13, 2020		Nasingin	25
November 19, 2020	Inabanga	Ondol	20
		Lawis	20
November 24, 2020	Clarín	Poblacion Norte	11
		Tangaran	15
		Bacani	11

Experts and National Government Agencies Consulted (Jan. 27, 2021)

Names	Profession	Organizational Affiliation
Liza Manzano	Senior geologist	DENR-EMB
Desiree Eve Maano	Supervising ecosystems management specialist	DENR-BMB
Rosalina De Guzman	Senior climate specialist	DOST-PAGASA
Ma. Isabel Abigania	Science senior research specialist	DOST-PHIVOLCS
Kimberly Go-Tian	Project development officer	DSWD
Benjamin Felipe S. Tabios, JR	Attorney V	DA-BFAR
Lea Guerrero	Country director	Greenpeace
Jocelyn S. Limkaichong	Hon. member	House of Representatives
John Christopher Bangsal	Consultant	Office of Cong. Jocelyn Limkaichong
Diocel Harold Aquino	Assistant professor	UP Institute of Engineering/Resilience Institute
Engr Maria Antonio Tanchuling	Director	UP Institute of Civil Engineering
Caroline Marie B. Jaraula	Assistant professor	The Marine Science Institute

Presentation and Validation with LGUs (March 11–12, 2021)

Date	Municipality	Number of Participants/ Male and Female

BOHOL CLIMATE EMERGENCY RESPONSE ROADMAP TO SUPPORT ITS SMALL ISLANDS/COASTAL AREAS' VULNERABLE POPULATION TO TIDAL FLOODS AND SEA LEVEL RISE

2021–2030

Profile of Bohol's Island/Coastal Communities

Although Bohol as a whole is vulnerable to the effects of climate change particularly sea level rise, its components islands are far more susceptible to climate hazards. For this particular risk assessment, the following municipalities were covered:

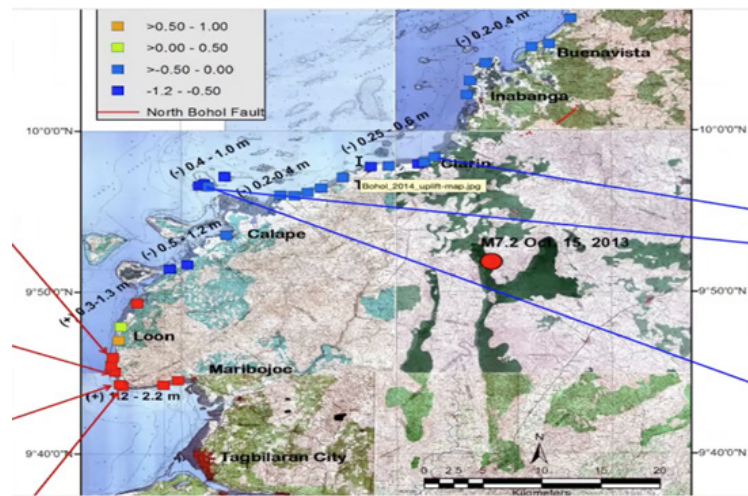
Municipality	Island Communities	Islands/Coastal Communities Consulted
Bien Unido	Hingotanan Bilang-bilangan	Hingotanan Bilang-bilangan
Calape	Mantatao	Mantatao
Clarin		Poblacion Norte (coastal barangay)—saltwater intrusion Tangaran (coastal)—saltwater intrusion Bacani—saltwater intrusion
President Carlos P. Garcia	Aguining Sto. Rosario 4 islets	Aguining Sto. Rosario
Inabanga		Ondol Lawis
Getafe	Jandayan (Handayan) Banacon Mahanay Nasingin Pandanon	Banacon Nasingin
Talibon	Nocnocan, Calituban Guindacpan	Nocnocan Calituban
Tubigon	Bagong Banwa Pangapasan Ubay Bilang-bilangan	Pangapasan Ubay Bilang-bilangan

Due to time constraints and ongoing travel restrictions dictated by COVID 19, we were not able to cover all island communities. Instead, we relied heavily on the areas proposed by the LGUs. However, it is possible that many of the proposals are applicable to non-participating island communities, as well.

The risk assessment process focused heavily on islands that sank as a result of the 2013 earthquake. A PHIVOLCS study revealed that the 2013 earthquake produced “associated ground rupture, liquefaction, earthquake-induced landslide and the appearance and formation of many sinkholes. The ground rupture of the North Bohol Fault (NBF) was mapped continuously for 6 kilometers in the northern extent but plotted aftershocks that [extend] from 60 to 80 kilometers southwest; that probably indicates how long the rupture could be. Rupture of the NBF resulted in the uplift and subsidence of approximately [a] 73-kilometer stretch of the west to northern coastline of the main island and the many smaller islands north of Bohol.”

NOTE: Blue areas experienced subsidence while red areas experienced uplift

According to PHIVOLCS in the public forum for this project, the subsidence seems permanent. But evidence says there is “elastic rebound” although the return will take time. While PHIVOLCS cannot predict the next earthquake, they say that if another earthquake occurs, these areas might sink again and the other zones will rise again.



Quick Facts:

- The subsidence ranges from 0.2 to 1.3 meters (refer to the map).
- The subsidence is quite permanent.
- A slow “elastic rebound” can take place, but it will happen extremely slowly. However, this will not return the area to the same level before the earthquake. That is the effect of subsidence.
- Communities are now experiencing tidal flooding.
- We cannot predict the next earthquake—it could take at least another 500 years.
- In the event of another earthquake, it is possible that there will be another subsidence in these areas and rising on the other side.

The lowering of the land surface is due to sinkhole collapse or is the result of a strong earthquake. Subsidence caused by sinkhole collapse in karst is one of the most dangerous geohazards because of its extreme unpredictability.

Karst is a comprehensive term applied to limestone areas that possess a topography peculiar to, and dependent upon, underground water solution and diversion of surface waters to underground routes.

As a result of lowered land surfaces, Bohol’s northern islands have become more exposed to regular tidal flooding. The communities are annually exposed to gales and other strong winds, making transportation particularly difficult. Food and fresh water have to be brought in from the mainland in dire situations. Access to social services is difficult and limited, with access to water, a universal right, being threatened, including intermittent electricity. Another difficulty is limited food supply, which consequently spikes food prices. Additionally, limited infrastructures make access to basic services even more inconvenient.

Livelihoods are limited because of inadequate land. If there is land available, it is affected by salt intrusion. Fishing becomes the main means of sustainability, which by itself depends on the state of resources of the larger area that embraces the island. Because island dwellers depend much on the open-access natural resources for their livelihoods, island communities have little to no options for survival. So they stay despite the danger.

MUNICIPAL AND ISLAND PROFILES

1. BIEN UNIDO

Bien Unido is a coastal municipality in the island province of Bohol. The 4th-class municipality has a land area of 27.39 square kilometers or 10.58 square miles. This constitutes 0.57 percent of Bohol's total area.

Its population in 2015, as determined by the 2015 Census, was 27,115. At that time, this represented 2.06 percent of the total population of Bohol province or .37 percent of the overall population of the Central Visayas region. Based on these figures, the population density was computed at 990 inhabitants per square kilometer or 2,563 inhabitants per square mile.

LOCATION: The municipal center of Bien Unido is situated at approximately 10°8' North, 124° 23' East in the island of Bohol. Elevation at these coordinates is estimated at 7.1 meters or 23.4 feet above mean sea level.

DISTANCE: Based on the great-circle distance (the shortest distance between two points over the surface of the Earth), the cities closest to Bien Unido are Lapu-Lapu, Maasin, Mandaue, Cebu City, Danao, and Talisay. The nearest municipalities are Talibon—6.05 kilometers from Bien Unido, Trinidad—7.73 kilometers, Ubay—13.47 kilometers, San Miguel—17.32 kilometers, President Carlos P. Garcia—19.25 kilometers, and Dagohoy—23.24 kilometers. Bien Unido's distance from the national capital is 615.81 kilometers (382.64 miles).

Bien Unido is the youngest municipality in Bohol, having been founded in 1981 after it was carved out and separated from the municipalities of Trinidad and Talibon.

Among its industries are rice farming, livestock raising, algaculture, fishing, mat weaving, and seaweed farming; the last has earned the town its nickname, Seaweeds Capital of the Visayas. Meanwhile, the Bien Unido Double Barrier Reef Marine Park is the first underwater pilgrimage spot in Asia, established in 2012. It is situated along the Danajon Bank.

Bien Unido is comprised of 15 barangays including the island barangays. Of these, only Bilang-bilangan, Diot, and Hingotanan East are classified as rural; the rest are urban barangays.



BASIC INFORMATION ABOUT ISLAND BARANGAYS OF BIEN UNIDO

	Hingotanan East	Hingotanan West	Bilang-Bilangan Dako	Bilang-bilangan Diot
Location	Situated at approximately 10.2400, 124.4876 in the island of Bohol	10.2410, 124.4838 in the island of Bohol.	10.2480, 124.4506 in the island of Bohol	10.2463, 124.4551 in the island of Bohol
Elevation	21.7 ft above mean sea level	21.7 ft above mean sea level	7.5 ft above mean sea level	14.8 ft above mean sea level
Total Land Area	32.7 has			89.9259
Total Population	2,143	1,986	1,960	818
Total Households			166 HH	170 HH
Total Purok	7	7	7	7
Main Economic Activities	Guso or seaweed farming, fishing, and gleaning	Guso or seaweed farming, fishing, and gleaning	Fishing and gleaning; with potential for ecotourism	Guso or seaweed farming, ishing, gleaning
Vulnerable Population	Aged 14 and below, make up an aggregate of 38.64% (828)	Aged 14 and below, make up an aggregate of 37.71% (749)	Aged 14 and below, make up an aggregate of 35.77% (701)	Aged 14 and below, make up an aggregate of 34.72% (284)

HINGOTANAN ISLAND

Hingotanan is one of the coral islands dotting the north-eastern coastline of Bohol in Central Visayas. It is among the bigger islands of Bohol, and is the most densely populated.

In the late 1970s, its population went over 5,000 with about 700 households. Because of this, there was a move to split the barangay into two. The proposal was initiated by the late Mr. Apronianao Paden, who was then a sitting municipal councilor of Bien Unido, the island's mother town. The plan, of course, had to have the blessing and concurrence of the local council and the entire Hingotanan populace. It was painstaking to organize meetings and caucuses among the people to get a consensus to split the barangay. However, eventually, the sincere efforts of those who were behind the move paid off and a decision was reached. Hingotanan was officially divided in two separate barangays: Hingotanan East and Hingotanan West.

The total land area of the entire island is only 32.7 hectares or roughly 327,000 sq meters of pure sandy soil and coconut mangroves. The beachlines of its oval-shaped geography are majestically ringed by the sugar-like white sand that most world-renowned beaches are known for. Its location and terrain are naturally exposed to sea level rise, storm surge, and drought, amid other domestic (solid wastes) and livelihood issues.

Accessibility to the island is only by sea, using mechanized outriggers known by the locals as pump boats. These boats are the only means of transportation to go in and out of the island from its neighboring barangays and coastal towns of Bohol, Leyte, and Cebu. Business and commerce are mostly done and engaged in by the local entrepreneurs in the city of Cebu where big traders are usually based.

The island is composed of four sitios. Two of these form Hingotanan East: Lugating on the West and Tunga on the North. The other two belong to Hingotanan West: Lawis on the East and Luyo on the South.

The early 1980s were pivotal years for Hingotanan island's economy. This period was considered the dawn of a miraculous economic transformation among the residents, when seaweed, its naturally abundant marine product, was discovered to have several uses

. It was scientifically found to be an excellent stabilizer for toothpaste; thickener for fire-fighting foam, shampoo, and cosmetic creams; gel for shoe polish, ice cream, milk shakes, sweetened condensed milk and sauces, and many more. Seaweed has several varieties such as agar-agar, eucheuma, cottonii, and spinosum. When processed, the by-product Carrageenan is created.

There was unprecedented demand of this product from industrial countries, such as Japan, Europe, and the US. It eventually opened up the floodgates to a more promising and lucrative industry for the people of Hingotanan, who used to depend a lot on fishing as their means of livelihood. They used to have to depend only on the daily catch, which was not always enough to survive on. Before the seaweed industry was born, life in the community was a “hand to mouth” existence for most families.

The second largest producer of seaweed in the world after China is the Philippines. Here, the cultivated varieties are vastly produced in commercial quantities and account for 30 percent of the world supply. Hingotanan and Dawahon share about 35 percent of the country’s total production.

The most common variety being cultivated on these islands are cottonii and spinosum, which together make up about three quarters of the world production. These grow at sea level down to about 2 meters. Seaweed is normally grown on nylon lines strung between bamboo floats. It is harvested after three months or so when each plant weighs around 1 kilogram. The shallow waters along the Dawahon Reef was found to be perfectly suitable in the cultivation and farming of this marine plant commercially.

Recently, the seaweed farmers in Hingotanan have been fearing the possibility of their livelihood being affected by the rising sea temperature, making seaweed more prone to a disease locally called “ice-ice.”

Aside from hotter temperatures, seaweed production is also negatively affected by illegal fishing practices. These lead to high chlorine content of seawater around the island, greatly affecting the growth of seaweed. This may start the fall of the seaweed industry.

Another issue is sea level rise due to the changing climate. To seaweed farmers, this could destroy their properties and even lives. A valid concern is the possibility of stronger typhoons and extreme monsoons that could wipe out seaweed farms and even barangays.

Water supply is also a major concern on the island. Most of the residents have big jars (matabana) for the rainwater collection. There’s also a deep well on the island that supplies water for washing clothes and bathing.

Finally, there is the concern of waste disposal, especially since not all constituents have a water-sealed toilet in their households.

BILANG-BILANGAN ISLAND

The island of Bilang-bilangan is a long strip of flat land about a 10-minute boat ride from the neighboring island of Hingotanan. It is composed of two barangays: Bilang-bilangan Dako on the west side, and Bilangbilangan Diot on the east side.

The community in Bilang-bilangan has exactly the same problem as the residents of Hingotanan in terms of seaweed production as both islands share the same municipal waters in the area. The dwellers of the island give importance to the mangrove trees that they have planted on both sides of the island so that they will be protected from typhoons and strong monsoons.

The island has a coastline area that spans more than a kilometer. It is an advantage to residents in a way that the children and mothers can do gleaning activities, an alternative way of fishing during low-tide. On the other hand, the long coastline is disadvantageous because if there is an emergency, it is difficult for residents to rescue the patient since they need to first carry the boat to the seawater from the docking port before the patient can be transferred to the mainland. Also, it is difficult for the residents to dock their boats at low tide. In that instance, passengers need to transfer from the bigger boat to a flat boat, 10 people at a time.

Most of the households do not have water-sealed toilets; the dwellers dispose their waste in the coast. Solid waste disposal, both domestic and those that drift to the island after high tide and typhoons, is a major concern.

Water supply is another problem. The Island dwellers use matabana. The dwellers have to buy purified water for drinking from

sari-sari stores which is costly due to the additional costs of transportation and labor. During summer time, the dwellers will buy water from the deep well in the neighboring island of Hingotanan.

Seawater encroaches some households up to the pathways of the barangay, especially in Purok 1, in Barangay Diot, and in Purok 3, 5, 6, 7 in Barangay Dako. There is a high school in Bilang-bilangan situated very near the coastline.

The island is a good ecotourism site thanks the Grotto dive site and the Sto. Niño diving site.

2. MUNICIPALITY OF CALAPE, BOHOL

Municipal Profile

Calape is a third-class municipality situated along the western side of Bohol facing Cebu Strait. It is about 41 kilometers from the capital city of Tagbilaran. It has a total land area of 75.36 square kilometers which constitute 1.56 percent of Bohol’s total area. The municipality is composed of 33 barangays, of which 18 are coastal. The jurisdiction of Calape are the islands of Pangangan (with eight barangays) and Mantatao, with two uninhabited islets, Poom Island and Basihan Island.

Based on the 2015 census, the total population of the municipality is 30,863, which represents 2.35 percent of the total population of the province.

1. BARANGAY MANTATAO, CALAPE, BOHOL

Mantatao is an island barangay in the municipality of Calape, located at approximately 9.9434, 123.8551 in the province of Bohol. Elevation at these coordinates is estimated at 1.0 meters or 3.3 feet above mean sea level. It has a total land area of 51.888 hectares. The approximate travel time to reach the island is about 15–30 minutes travel by pump boat. As determined by the 2015 census, the barangay has a population of 849, which represents 2.75 percent of the total population of Calape.

Total Land Area	51.88 hectares
Population	1,028
Male	544
Female	484
Number of Households	217
Number of Families	256
Vulnerable Groups	PWD: 31 (2 elderly, 29 adults) Aged 14 & below make up an aggregate of 36.98% Senior citizens–3.89%
Main Economic Activity	Fishing & gleaning Mariculture – bangus production Seaweed farming With MPA – 38 hectares Mangrove Forest – 70 hectares
Power Source	Electricity (3 pm–11 pm) for almost all HH





Characterizing Current and Possible Hazards

	Description	Impact	
Hotter temperature	More intense heat	Water supply is affected Incidence of fish kill and destruction of marine resources (i.e. shellfish, donsol)	
Storm surge	Not yet experienced, although has high risk	Bad weather affecting sea turbulence	
Tidal Floods			

2. CLARIN

Clarín is a coastal municipality in the island of Bohol. The municipality has a land area of 52.12 square kilometers or 20.12 square miles which constitutes 1.08 percent of Bohol's total area. Its population as of 2015, as determined by the 2015 census, was 20,301. This represented 1.55 percent of the total population of Bohol province, or .027 percent of the overall population of the Central Visayas region. Based on these figures, the population density is computed at 390 inhabitants per square kilometer or 1,009 inhabitants per square mile.

LOCATION: The municipal center of Clarín is situated at approximately 9° 58' North, 124° 1' East, in the island of Bohol. Elevation at these coordinates is estimated at 5.0 meters or 16.3 feet above mean sea level.

	Tangaran	Bacani	Poblacion Norte
Location	9.9689, 124.0333	approximately 9.9631, 124.0429	9.9651, 124.0250
Elevation	13.1 ft above mean sea level	121.7 ft above mean sea level	10.8 ft above mean sea level
Total Land Area			
Total Population	776	1,185	831
Total Households	230 HH		
Total Purok			
Economic Activities/ Abundant Resources	Fishing and farming	Fishing	Fishing
Vulnerable Population	Aged 14 and below, make up an aggregate of 33.38% (259)	Aged 14 and below, make up an aggregate of 32.74% (388)	Aged 14 and below, make up an aggregate of 30.32% (252)

DISTANCES: Based on the great-circle distance, the cities closest to Clarín are Talisay, Lapu-Lapu, Tagbilaran, Naga, Cebu City, and Mandaue. The nearest municipalities are Tubigon–6.97 kilometers, Inabanga–8.97 kilometers, Sagbayan–9.32 kilometers, Catigbian–12.65 kilometers, San Isidro–13.67 kilometers, and Buenavista–16.31 kilometers. Clarín's distance from the national capital is 609.71 kilometers (378.86 miles).

There are 24 barangays in Clarin.

The Bohol Environmental Management Office (BEMO) highly recommends that the town of Clarin to be included in its advocacy. After all, it was the office of the municipal mayor that identified the coastal barangays of Bacani, Tangaran, and Poblacion Norte as areas affected by saltwater intrusion after a 7.2 magnitude earthquake hit Bohol in 2013.

BACANI

The livelihoods of the community, such as farming, are greatly affected by seawater encroaching over the ricefields, affecting rice production. Barangay Bacani lies along a major river. Therefore, it experiences siltations that cause the river to become too shallow, and also to produce flash floods whenever there is heavy rain.

TANGARAN

It is the same scenario in barangay Tangaran. In fact, the rice fields cannot be cultivated anymore, leading the farmers to plan to convert their agricultural lands into fishponds. However, they don't have the heavy equipment to use and sufficient funds to do the conversion.

POBLACION NORTE

On the other hand, the seawater will encroach over some resident houses in Purok 1, 2, 3 and 4 in Poblacion Norte. This disturbs the residents' sleeping time, and always make them uncomfortable. There are many makeshift houses in Poblacion Norte along the coastline that are in danger during typhoons. Also, there are flooding incidents in some areas of Poblacion Norte due to the lack of a drainage system.

These coastal barangays are identified by the Municipal Disaster Risk Reduction Management Council as storm-surge areas.

3. PRESIDENT CARLOS P. GARCIA



The municipality of President Carlos P. Garcia (CPG), formerly known as Pitogo, is an island municipality just meters away from the mainland off the port of Tapal in Ubay.

The policy and advocacy on solid waste management on this island is truly a good practice of the local government of CPG through incentives. People's awareness of the advocacy is high due to the good strategy applied by the local government. It helps that the local government unit of CPG has received an award as one of the cleanest coastal municipalities in the Philippines.

Another good practice of the LGU is ensuring budget allocation for the coastal law enforcement team to monitor their boundaries. They do this to prevent illegal fishers, particularly commercial fishing vessels, from invading their municipal waters. The island is known as the "Blue Crab

Capital" in the province of Bohol, which is very relevant in the rehabilitation, management, and conservation of the island's marine resources. Subsequently, the LGU will be able to sustain the community's marine resources so that the whole fishing community can enjoy it.

The town of CPG has two major ports, namely: Pitogo Seaport for the pump boats coming from Poblacion, Ubay; and Popoo Seaport for the pump boats and barges coming from Tapal, Ubay. There's another seaport for the Roll-on Roll-off (RoRo) ferries in barangay Aguinig, but it is under construction.

The municipality has a land area of 54.82 square kilometers or 21.17 square miles, which constitutes 1.14 percent of Bohol's total area. Its population as of 2015, as determined by the 2015 census, was 23,356. Based on this figure, the population density was computed at 426 inhabitants per square kilometer or 1,103 inhabitants per square mile.

The island of CPG has 23 barangays.

LOCATION: The municipal center of CPG is situated at approximately 10° 7' North, 124° 33' East, in the island of Lapinig. Elevation at these coordinates is estimated at 19.9 meters or 65.3 feet above mean sea level.

DISTANCES: Based on the great-circle distance, the cities closest to CPG are Maasin Leyte, Baybay Leyte, Lapu-Lapu-Cebu, Mandaue-Cebu, Danao-Cebu and Cebu City. The nearest municipalities are Ubay–11.34 kilometers, Bien Unido–19.25 kilometers, Trinidad–23.53 kilometers, Talibon–25.27 kilometers, Alicia–27.52 kilometers, and San Miguel–27.87 kilometers. Its distance from the national capital is 628.88 kilometers (390.77 miles)

BARANGAY AGUINING ISLAND

Barangay Aguinig is an islet connecting the mother island and CPG through a narrow wooden-steel bridge . It has 7 puroks and 4 sitios. These are 7 kilometers from the center of Pitogo. It has many mangrove trees in the area. However, some time ago, mangroves planted in private property were cut due to development. The dwellers in barangay Aguinig are into fishing, dried fish production, blue crabs, and many more.

It is a promising barangay because of the ongoing construction of the Seaport for RoRo ferries. A development plan includes the terminal site of buses near the covered court area, and the plan to construct a new barangay hall. In the meantime, the problem on transportation is a valid concern of the constituents because of few public transportation options available in the area. In most cases, habal-habal is the easiest option; but it is very expensive compared to tricycle fare. In connection to the development plan, road widening and concreting is ongoing. Moreover, there is a proposed development of ecotourism site in the area that would generate employment and other small business opportunities for the constituents. A resort is going to be constructed to accommodate guests and visitors coming to Aguinig, and tourists may engage in some water activities such as snorkeling, jet skiing, and the like.

One of the challenges of some dwellers in the barangay is the seawater encroachment on their dwellings, particularly from Purok 1 to Purok 5. The dwellers have newly discovered that the water level is getting higher, 1 meter and up during high tide, and reaching farther along the barangay road during monsoons, and especially if there is a typhoon. Coastal erosion has been observed by the dwellers.

Water supply is a major concern in the community, though there is available purified water in some stores, which is costly. There are deep wells in the area, and the dwellers also have containers for rainwater collection to supplement their needs of water for household use.

Another valid concern is the very limited access to signal communication. It is difficult to find a phone signal in the place. The youth are not deprived of their basic right: education. In barangay Aguinig, there is a high school.

STO. ROSARIO ISLAND

Barangay Sto. Rosario is one of the vulnerable barangays of CPG that was identified by the Municipal Disaster Risk Reduction Management Council; it is prone to storm surge. It has an area of 10,299 square meters with a population of 570, with 143 households and 7 Puroks. The barangay is almost surrounded by water; a peninsula.

The main livelihoods of the community are fishing, farming, and Romblon mat weaving. However, there are challenges for the dwellers regarding their livelihood. In fishing, there are some fisherfolk who still practice illegal means of fishing, particularly tiro, and some fishermen invade the marine sanctuary. These illegal means of fishing subsequently affect the fish catch of the fishermen.

The farmers in barangay Sto. Rosario have been affected due to the increase of temperature. The rice field in the area is dependent on rain. They cannot cultivate their land if there is a long drought. This particular barangay of Sto. Rosario in CPG is known to be the source of Romblon fibers and the mat weaving industry. They have vast of Romblon plants in the area which is a very good business opportunity for the whole community. However, the said industry is vanishing because the youth prefers to migrate for work. There is a need to organize these mat weavers and help them in marketing their products.

The barangay is very laidback about the facts that it has a very poor communication signal, very narrow and rough roads, small barangay hall, and no other infrastructure aside from the covered court, which is under construction. The lack of transportation means is a major concern in the place; this makes residents feel isolated from the mother town.

Water supply is a problem for the dwellers, though they have deep wells for bathing and washing, and containers for rainwater collection.

The major concern of the youth is the dilapidated high school building. Falling debris is very dangerous. The parents proposed to build another structure for the high school students.

The dwellers especially observed the sea level rise in the shoreline, from knee level to hip level. This scenario made the dwellers fill the shore with gravel, particularly in Purok 1–3, so that their households would be protected against seawater encroachment.

	Aguinig	Sto. Rosario
Location	10.0912, 124.5924 in the island of Lapinig	10.1080, 124.593 in the island of Lapinig
Elevation	33.5 ft above mean sea level	60.7 ft above mean sea level
Total Land Area		10,299 square meters
Total Population	2,175	322
Total Households	300 HH	142 HH
Total Purok	5	7
Main Economic Activities/ Most Abundant Resources	Fishing; blue crabs, fish, shells, etc.	Fishing, mat weaving
Vulnerable population		

4. INABANGA

Inabanga is a coastal municipality in the island province of Bohol. The municipality has a land area of 125.63 square kilometers or 48.51 square miles, which constitutes 2.61 percent of Bohol's total area. Its population in 2015, as determined by the 2015 Census, was 45,880. This represented 3.49 percent of the total population of Bohol province, or .62 percent of the overall population of the Central Visayas region. Based on these figures, the population density is computed at 3,654 inhabitants per square kilometer or 946 inhabitants per square mile. There are 50 barangays in the municipality of Inabanga.

LOCATION: The municipal center of Inabanga is situated at approximately 10° 2' North, 124° 4' East, in the island of Bohol. Elevation at these coordinates is estimated at 4.21 meters or 13.9 feet above mean sea level.

DISTANCES: Based on the great-circle distance, the cities closest to Inabanga are Lapu-Lapu-Cebu–33.39 kilometers, Talisay–33.59 kilometers, Mandaue–35.05 kilometers, Cebu City–36.03 kilometers, Naga-Cebu–39.19 kilometers and Carcar–47.34 kilometers. The nearest municipalities are Buenavista–7.43 kilometers, Clarin–8.97 kilometers, Sagbayan–13.50 kilometers, Tubigon–14.53 kilometers, Getafe–16.11 kilometers and Danao–19.61 kilometers. Its distance from the national capital is 605.76 kilometers (376.40 miles).

The office of the municipal mayor identified the two coastal barangays of Ondol and Lawis as part of this project due to the

vulnerability of the residents living in the place. As per Hon. Mayor Roygie Jumamoy, these barangays are located on a peninsula. It is connected to the mainland through a steel bridge. On one side of this peninsula is the Inabanga-Wahig River, known to be the widest river in Bohol; on the other side is the shoreline.

	Ondol	Lawis
Location	10.0527, 124.0649	10.0656, 124.0656
Elevation	7.5 ft above mean sea level	
Total Land Area	131.5 hectares	121.0407 hectares
Total Population	1,107	1,297
Total Households	266 HH	419 HH
Total Purok	7	7
Economic Activities/ Most Abundant Resources	Fishing	Fishing, basket weaving, food processing, and gleaning
Vulnerable Population	Aged 14 and below, make up an aggregate of 39.30% (435)	Aged 14 and below, make up an aggregate of 31.30% (406)

These barangays are classified as hazard zones susceptible to onslaught of typhoon, flooding, landslides, and other hydrometeorological hazards. Hence, the DENR declared the barangays of Ondol and Lawis as no-build-zone areas.

Despite this, the community insisted on staying and adapting than migrating because most of the families are dependent on the marine resources found there.

Undoubtedly, the two barangays have been affected by seawater encroachment, causing the death of the coconut tree plantation in the area. Sea level rise is inevitable in the areas where almost all structures are encroached during high tide. More so during typhoons, and when there are strong monsoon waves.

The people in the community constantly worry when the rainy season comes. They are afraid of flashfloods in the area since they are situated at the estuary of the Inabanga-Wahig River. There are times that residents cannot cross the mainland due to the flood and strong current of the water.

These two barangays are identified as storm-surge areas by the municipal Disaster Risk Reduction Management Office. It is mandatory for all residents to evacuate when typhoons come. This is because storm surges are highly likely to happen then, damaging and surpassing the residents' mini dikes/seawalls.

The area is abundant with mangrove trees. However, several trees have died. The barangay coordinated with DENR to check the reason for this. Currently, the community is doing mangrove reforestation.

5. GETAFE



Getafe is a coastal third-class municipality in the island of Bohol. The municipality has a land area of 120.50 square kilometers or 46.53 square miles, which constitute 2.50 percent of Bohol's total area. Its population as of 2015, as determined by the 2015 Census, was 30,955. There are 24 barangays in Getafe.

LOCATION: The municipal center of Getafe is situated at approximately 10° 9' north, 124° 9' east, in the island of Bohol. Elevation at these coordinates is estimated at 5.1 meters or 16.6 feet above mean sea level.

Based on the great-circle distance, the cities closest to Getafe are Lapu-lapu—28.60 kilometers to the northwest, Mandaue—30.11 kilometers to the northwest, Cebu City—33.54 kilometers, Talisay—35.15 kilometers, Danao, Cebu—

43.30 kilometers, and Naga, Cebu—43.97 kilometers to the west. The nearest municipalities are Buenavista—8.78 kilometers to the south-southwest, Inabanga—16.11 kilometers to the southwest, Talibon—18.78 kilometers to the east, Trinidad—22.31 kilometers to the east-southeast, Danao—2,387 kilometers to the south-southeast, and Bien Unido—24.74 kilometers to the east. Its distance from the national capital is 600.34 kilometers (373.03 miles).

The town of Getafe has island barangays such as Jandayan (Handayan), Banacon, and the western part of [Mahanay](#). The small islands of Nasingin and Pandanon are considered to be two of the most [densely populated islands in the world](#). These island barangays in Getafe are visibly populated in contrast to their area. Despite this, Nasingin and Banacon are popular eco-tourism sites.

BANACON ISLAND

Banacon island is known for its vast mangrove population, initiated by the local community. In fact, Banacon is considered to have the largest mangrove plantation in Southeast Asia. Its eco-tourism enterprise centers around the boardwalk in the Banacon Mangrove Area, which is managed by the Banacon Fisherfolks and Mangrove Planters Association. The island also has seaweed growers who are managed by the Banacon Growers Seaweeds & Mangrove Association (BAGSAMA).

The island of Banacon has an existing mini water desalination facility that is fully operational. As per the barangay council, the facility can only produce a pitcher of potable water daily, which is insufficient for the demand of the island community. Another water desalination facility exists on the island, funded by a Japanese organization. However, it is damaged and needs a considerable amount for repairs. Potable water remains the primary concern in the island.

Many houses were built along the shoreline; most of these are made of light to semi-concrete materials, adding to their vulnerability and high exposure to hazards. Moreover, there are many wooden stilt houses built along the mangrove areas and shoreline. This adds danger for the constituents, amid many other environmental concerns.

Banacon has problems brought on by sea level rise. As per the community, the water can reach up to an adult's hip—about a meter-and-half deep—in Purok 2, 3, 4, 5, and 7 at high tide. During typhoons, the water can reach as far inland as the elementary school and the barangay hall.

The solid waste being dumped at the back of the elementary school adds more problems to the health of the community, affecting the vulnerable sectors, specifically children and the elderly. Solid waste disposal being transported to the mainland is an option due to limited space in the island. However, because of a limited budget, it is difficult to implement. Aside from being a health hazard, solid waste on the shoreline is also an eyesore for visitors arriving at the port. Shoreline trash is made up of domestic waste, garbage brought over by typhoons, and trash that drift over from other coastlines gather on the island's shoreline. As well, many residents dispose their waste in the area due to a lack of communal water sealed toilets.

Livelihood options in the community are varied as they have an abundance of marine resources—from fish to crustaceans and shellfish. There is a need to protect all these resources because there are many fisherfolks who still practice illegal fishing. Additionally, there are many fishermen coming from neighboring provinces, such as Cebu and Leyte, who intrude Banacon's fishing territory.

NASINGIN ISLAND

The island of Nasingin is small with a very dense—and continuously increasing—population with a vast mangrove plantation in the area, which is in line with the community's greening project. The barangay's close proximity between households poses a high risk of disease transmission and the spread of fire. With the houses built right next to each other, there is nowhere to go but to the sea in case there is fire. Additionally, the inflated population causes inevitable domestic and foreign waste build-up, which is a major concern in the island.

The whole community is dependent on marine resources. They are into fishing, gleaning, dried boneless danggit production, and seaweed or guso farming. However, most of the seaweed farmers have currently stopped their business because they are experiencing a big loss on their investment due to the problem of the seaweed production.

Seawater encroaches households and other infrastructures such as the elementary school and the covered court area when the sea level rises. Moreover, in past typhoons, big waves damaged some fish drying facilities and footbridges. The whole island is identified as a storm surge area by the Disaster Risk Reduction and Management Council. Even the evacuation center in the small island is not safe against a storm surge.

Like other island barangays, potable water is a major concern in Nasingin. The residents have to buy potable water from the mainland. Most of the households have big jars for rainwater collection.

The major concern of the youth on the island is difficult access to high school education. There is no high school on the island, creating a hundred out-of-school youth. It is an everyday struggle for the island's high school students to travel to the neighboring island just for school. Once, a boat some students were on capsized, causing damage to life and property. When there is bad weather, students get stranded in school and have to wait out the weather before going home.

	Banacon	Nasingin
Location	10.2013, 124.1788	10.1833, 124.1331
Elevation	3.9 ft above mean sea level	
Total Land Area	11 hectares	424 hectares
Total Population	1,298	2,045
Total Households	442 HH	448 HH
Total Purok	7	7
Main Economic Activities / Most Abundant Resources	Fishing, gleaning, and trading	Fishing, gleaning, guso or seaweed farming, and dried boneless danggit production
Vulnerable Population	Aged 14 and below, make up an aggregate of 35.75% (464)	aged 14 and below, make up an aggregate of 37.51% (767)

6. TALIBON



Talibon is a first-class coastal municipality in the province of Bohol. It has a land area of 140.46 square kilometers or 54.23 square miles, which constitutes 2.91 percent of Bohol's total area. There are 25 barangays in Talibon. The municipality has a seaport for ferries bound for Cebu.

LOCATION: The municipal center of Talibon is situated at approximately 10° 9' north, 124° 19' east on the island of Bohol. Elevation at these coordinates is estimated at 11.9 meters or 39.0 feet above mean sea level.

DISTANCE: Based on the great-circle distance, the cities closest to Talibon are Lapu-Lapu City–44.85 kilometers to the west-northwest, Mandaue City–46.13 kilometers to the west-northwest, Cebu City–50.51 kilometers to the west-northwest, Danao, Cebu–52.45 kilometers to the northwest, Talisay, Cebu–53.38 kilometers to the west-northwest, and Maasin, Southern Leyte –57.15 kilometers to the east. The nearest municipalities are Bien Unido–6.05 kilometers to the east-southeast, Trinidad–8.20 kilometers to the south-southeast, San Miguel–18.07 kilometers to the south, Getafe–18.78 kilometers to the west, Ubay–18.99 kilometers to the east-southeast and Dagoohoy–23.56 kilometers to the south. Its distance from the national capital is 611.28 kilometers (379.83 miles). Islands in Talibon, including Nocnocan, Calituban, and Guindacpan are considered to be among the most [densely populated islands](#) in the world.

NOCNOCAN ISLAND

In most islands, water supply is a major concern. However, in the island of Nocnocan, they have developed a very good water

system despite having no other source of water aside from rain; Nocnocan has no river or stream. The only way to resolve the problem is to build a rainwater reservoir.

Since the island is heavily populated, there is no other space to construct a rainwater reservoir but the barangay's covered court area. The barangay council decided to build three tanks under the floor of the covered court; even the space under the stage floor was turned into a big rainwater reservoir. The barangay's 1-horsepower water pump extracts the water. The department of Social Welfare and Development (DSWD) sent a representative from the national office to check the feasibility of the project. And the technical working group agreed to build the structure to finally address the major concern of the constituents on the island, which is water. This success story is worth being shared to be replicated in other islands.

The dwellings of the people are close to each other, exposing them to different risks of health, safety, and most especially natural hazards. There is electricity on the island, run by a generator set from the barangay; the generator has a power of 70 kVA (kilo Volt Ampere). Residents pay the barangay for their electricity consumption—power runs for four (4) hours, from 5 p.m. to 9 p.m. Those who cannot afford electricity use candles or the traditional lampara, which are fire hazards.

The constituents in the island, particularly in Purok 1, have been experiencing seawater encroachment inside their dwellings at high tide. The water can reach waist level, or one meter high. Unfortunately, the houses in this purok are made of light materials.

Solid waste is another major concern in the island. More than 50 percent of the households do not have water sealed toilets. There are public communal toilets but these need regular maintenance.

The major concern of the youth is education. There is no available high school in Nocnocan. This explains the rising number of out-of-school youth on the island. The students have to travel to the neighboring island of Cataban for school. Many times, the students are stranded in Barangay Cataban because of bad weather. Apart from this being a major risk for students, their additional travel allowance puts a strain on parent's budgets.

Despite having an early warning device that uses the one-line communication system for all puroks for broadcasting during emergency cases, the island of Nocnocan is still not safe when a storm surge happens because it is a small and flat island.

CALITUBAN ISLAND

The island of Calituban is quite progressive. They have a vast swamp of mangrove trees as part of their greening program. (Though records say that there are some residents who cut some mangrove trees to build their home.)

Most of the dwellings are made of semi-concrete and concrete materials. Some residents have installed solar panels as their power source; others use generators. The quality of life on this island is better compared to the others.

Inevitably, the island dwellers are into fishing and fish vending. Fishermen observe that in recent years, they have had decreased fish catch. One possible reason for this is illegal fishing, specifically dynamite fishing or tiro. Unfortunately, there is no budget to pay the bantay-dagat or patrol; besides, the patrol boat is not operational. Another reason of the decrease of catch is overfishing. Even fishermen coming from Cebu and Leyte provinces fish in the municipal waters of Talibon. Lastly, there is little catch because the beautiful coral reefs of Calituban have been damaged by fishermen, needing rehabilitation.

The primary concern of the island dwellers is water supply, which is a basic necessity. They do not have a big structure for their rainwater reservoir, though most of the residents can afford to buy gallons of purified water for drinking. However, they still need water for cleaning and bathing.

Another concern in the island is solid waste management. The barangay council is planning to build a compost pit or dumpsite surrounded by a concrete fence. However, the health of the populace is at stake.

Communications is another concern of the dwellers on the island. It is difficult to find a cell signal in the area.

Some of the dwellers in Calituban have experienced seawater encroachment on their dwellings, particularly in Purok 2, 3, 5, 6, and 7.

Inspite of the concrete materials of their dwellings, the residents still worry when typhoons come simply because they live in a flat and small island that is prone to storm surges.

	Nocnocan	Calituban
Location	10.2462, 124.4039	10.2484, 124.2938
Elevation	9.8 ft above mean sea level	3.3 ft above mean sea level
Total Land Area	2.7 hectares	5,265 hectares
Total Population	1,913	4,145
Total Households	More than 300 HH, with 400 families	1,050 HH
Total Purok	7	7
Main Economic Activities/Most Abundant Resources	Fishing, vinegar production	Fishing, gleaning
Vulnerable Population	Aged 14 and below, make up an aggregate of 43.96% (841)	Aged 14 and below, make up an aggregate of 37.83% (1,568)

7. TUBIGON, BOHOL

Tubigon is a coastal municipality in the island province of Bohol. It has a land area of 81.87 square kilometers or 31.61 square miles, which constitutes 1.70 percent of Bohol's total area. Its population in 2015, as determined by the 2015 Census, was 45,893. This represented 3.49 percent of the total population of Bohol province, or .62 percent of the over-all population in the Central Visayas region. Based on these figures, the population density is computed at 561 inhabitants per square kilometer or 1,452 inhabitants per square mile. Tubigon has 34 barangays.

LOCATION: The municipal center of Tubigon is situated at approximately 9° 57' north, 123° 58' east, in the island of Bohol. Elevation at these coordinates is estimated at 3.7 meters or 12.0 feet above mean sea level.

DISTANCES: Based on the great-circle distance, the cities closest to Tubigon are Talisay, Cebu–34.76 kilometers, Tagbilaran, Bohol–36.29 kilometers, Naga, Cebu–36.31 kilometers, Carcar, Cebu–39.02 kilometers, Lapu-Lapu, Cebu–39.8 kilometers, and Cebu City–40.26 kilometers. The nearest municipalities are Clarin–6.97 kilometers, San Isidro–10.24 kilometers, Catigbian–11.90 kilometers, Calape–11.96 kilometers, Inabanga–14.53 kilometers, and Sagbayan–15.02 kilometers. Tubigon's distance from the national capital is 607.08 kilometers.

(June 24–26, 2019, ABC Hall, Tubigon, Bohol)

Tubigon is faced with multiple hazards. As an island municipality, which is part of the bigger island province of Bohol, it is naturally exposed to sea-level rise, including storm surges and earthquake-induced tsunamis.

Tubigon has a slight-to-high susceptibility to erosion, low-to-high susceptibility to rain-induced landslides, and a propensity for intensity 7 to intensity 8 earthquakes especially for the coastal and island barangays. Because of the risks to ground-shaking hazards and the physical contours of Tubigon, the municipality also faces possible earthquake-induced landslides especially in the upland areas. The 2013 earthquake was traumatic not just for the people of Tubigon but for those in the entire Bohol province.



Tubigon Port offers 45-minute fast craft services to Cebu City

Tubigon has a total land area of about 8,186.96 hectares, representing about 1.99 percent of Bohol province's total land area. It has 34 barangays with a population of 45,863 in 2014.

The municipality is divided into different ecosystems—urban, upland, lowland and coastal/island barangays.

The municipality's Type IV climate has no pronounced wet or dry season and is characterized by maximum rain periods and relatively short dry periods. Total average annual rainfall from January to December is about 1,400 mm rainfall while the average during El Niño years was recorded at 1,072.7 mm and 1,736 mm during La Niña.

Focus group discussions in Bagong Banwa, Pangapasan, Ubay and Bilang-bilangan, which fairly represent island barangays, were done to determine the residents' common problems.

The common hazard they experience in the island community is tidal flooding. At high tide, sea water floods these entire barangays. Floods became worse due to the submergence effect of the last earthquake in 2013. Residents experience this kind of tidal flooding at least six days per month wherein most of their livelihood and routines are affected.

Fishing is the major source of income in the communities. Some residents have their own sari-sari store. For them, the inability of the community to fish results in minimal sales. Worse, there is an increase in incidences of debt that may lead to bankruptcy to some.

Even under normal weather conditions, residents cannot grow vegetables due to saltwater intrusion in their community. They also have limited or no available land area for crop production. Additionally, vegetables are not adaptable to their areas, even with the use of container gardening, due to lack of fresh water supply.

Lack of household and potable water is another major problem. Some of the residents have their rain-water harvester, but this is not enough for their everyday use. Additional expenses on water is also part of this effect and aggravate their condition.

There are also more incidences of skin disease, cough and cold, diarrhea, and fever.

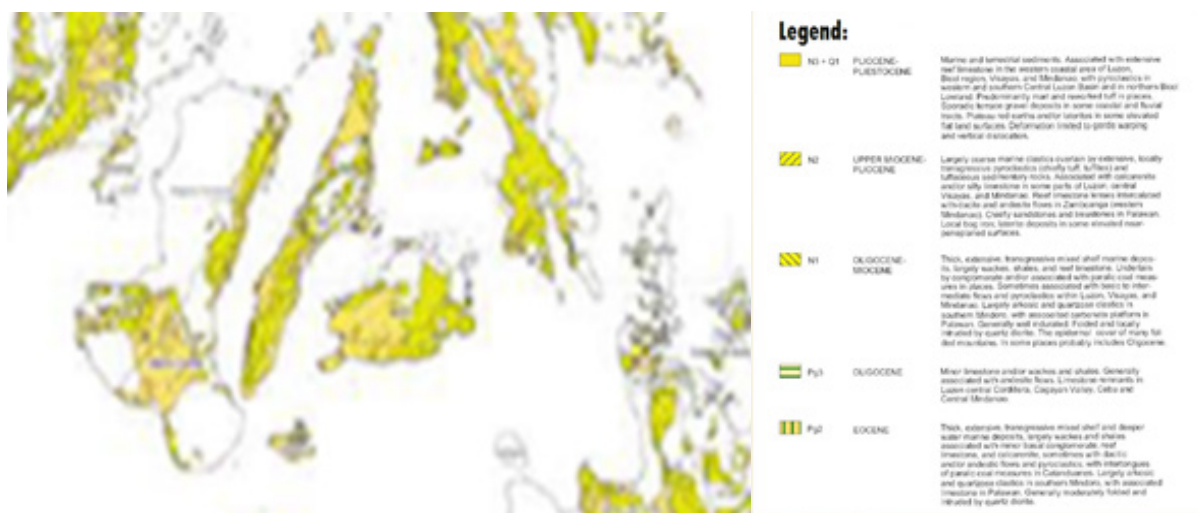
Due to lack of income, especially during the habagat season, students cannot go to school. They don't have enough money for their food and transportation. During this season of strong winds, isolation is rampant and there is limited access to social services.

HAZARDS BOHOL FACE

KARST AREA

Bohol sits on 75 percent karst topography. This kind of topography develops in areas that are underlain by carbonate rocks; they are characterized by caves and cavities underneath. All karst areas are no-build zones; therefore, almost all of Bohol should be a no-build zone.

Karst Map. With Bohol (inset)



The occurrence of the numerous underground caverns in Bohol could be attributed to the absence of rivers and natural water channel ways in the area. The action of the surface water infiltrating the normal fissures and joints of the substrate produced the enlargement and widening of cavities, which ultimately formed the caverns.

TIDAL FLOODS

With the subsidence, some of Bohol's northern areas and small islands are regularly inundated by tidal floods. Below is the description of the tidal flood experiences, its impacts and the usual at-risk population and/or affected ecosystems within the island.

	Island/Coastal Community	Description	At risk
Tidal Floods	Matatao	Flooding of up to 1 meter deep 1–2 flooding incidents every week during rainy months lasting 1–2 hours	Classes are affected and suspended Entire barangay is flooded. Including all houses and public infrastructures
Clarin	Tangaran	Flood brings in heaps of garbage	77 HH
	Bacani	Flooding of houses Saltwater intrusion in rice areas	Almost all puroks All farm areas
	Poblacion Norte	Entry of seawater in houses—3 ft high in Purok 3 & 4; 2 ft high in Purok 1 & 2	All puroks affected
CPG	Rosario	Flooding of houses up to knee level of seawater Lots of residential/public infrastructures (basketball court, etc.) near the sea	HH in Purok 1, 2, and 3 near the shore line (45%)
	Barangay Aguining Pitogo	Tidal flooding up to knee level affecting residences, business establishments	Purok 1–5 affected Roads, houses, stores, bakery, barangay court, evacuation center, barangay hall, clubhouse
Bien Unido	Hingotanan East and West	Flooding of up to knee level in some puroks	Damaged appliances Once water reaches the road, 80 HH from Purok 1–7 are affected
	Bilang-bilangan Dako Bilang-Bilangan Diot	Garbage, flooding of homes, during high tide of 2 meters Seawater reaches homes and floods some parts of the pathways in Purok 1, 3, 4, 5 Flooding in some areas, specially in Puntod or Purok 1 where seawater inside homes reaches knee level	Puroks 1, 3, 4, 5 Residents living near the shoreline Estimated 20 HH

Getafe	Banacon islands	Increased flooding up to 3.5 meters high (within 2 to 3 hours)	All 266 HH and 1,408 residents in all puroks (1–7 puroks) are affected (100%) Purok 1, 47 HH; Purok 2, 38 HH; Purok 3, 31 HH; Purok 4, 34 HH; Purok 5, 40 HH; Purok 6, 30 HH; Purok 7, 46 HH Insfrastructures like steel bridge, basketball court, barangay hall, elementary school are invaded by seawater Daycare and classes for pre-schoolers are cancelled; Classes for elementary pupils will push through (pupils will take off their sacks and shoes, and class will end early Agricultural lands are damaged, particularly the coconut trees (3–4 has)																															
Talibon	Calitoban	Flooding of 1.8–1.9 meters																																
	Nocnocan	Seawater in Purok 1 goes over the seawall	Lots of residential houses near the shoreline (Puroks 1–3) are affected during high tide																															
		During high tide, flooding of up to 2 meters. But on usual days, flooding is 1 meter																																
Tubigon	P a g a s p a s a n / Bilang-bilangan Batasan Ubay	<table border="1"> <thead> <tr> <th>Island</th><th>Flood Height (median)</th><th>Flooded Days In 2016</th><th>Flood Durat</th><th>Flooded Area</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td><td></td><td>100%</td></tr> <tr> <td>Pangapsan</td><td>20.5cm</td><td>44days</td><td>2.6hrs</td><td>91%</td></tr> <tr> <td>Bilangbilangan</td><td>24.5cm</td><td>44days</td><td>2.6hrs</td><td>100%</td></tr> <tr> <td>Batasan</td><td>36cm</td><td>135days</td><td>3.9hrs</td><td>100%</td></tr> <tr> <td>Ubay</td><td>43cm</td><td>135days</td><td>3.9hrs</td><td></td></tr> </tbody> </table> *True land subsidence is likely greater than flood height	Island	Flood Height (median)	Flooded Days In 2016	Flood Durat	Flooded Area					100%	Pangapsan	20.5cm	44days	2.6hrs	91%	Bilangbilangan	24.5cm	44days	2.6hrs	100%	Batasan	36cm	135days	3.9hrs	100%	Ubay	43cm	135days	3.9hrs			
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CLIMATE OF BOHOL (BASED FROM DATA OF TAGBILARAN STATION)

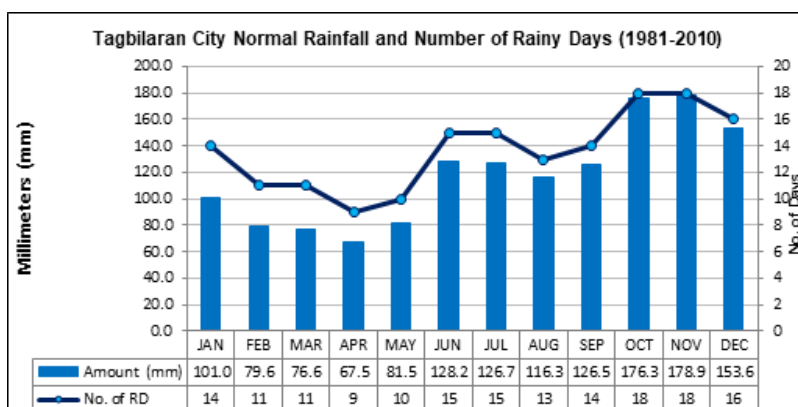
Bohol's climate is characterized as type IV based on the Modified Coronas Classification. Rainfall in this area is more or less evenly distributed throughout the year. This type resembles type II since it has no dry season.

Rainfall is expected every month. It is at maximum level during October and November and at minimum from February to May. The mean annual temperature is 28°C. January is the coolest month while May is the hottest.

Rainfall distribution is influenced by the complex interactions of the various factors such as geography and topography, principal airstreams, and weather systems that affect the country at different times of the year.

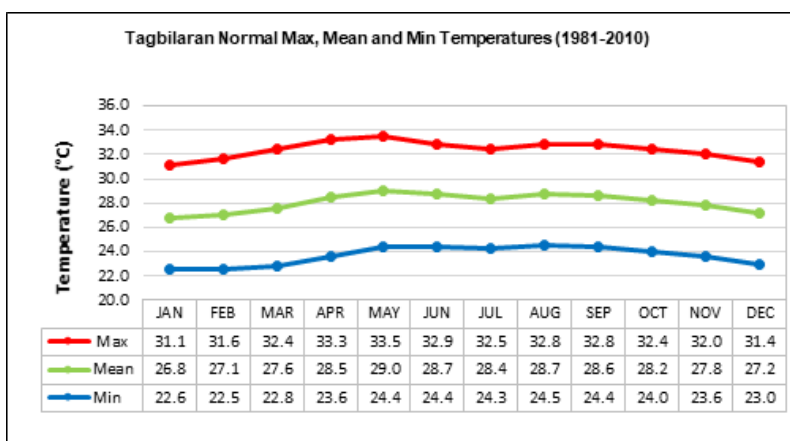


Tagbilaran receives an average annual rainfall of 1,412 mm. The months of October and November have the most amount of rainfall with 176.3 mm and 178.9 mm respectively, while the month of April has the least with a monthly average of 67.5 mm. Rain is observed for an average of 164 days in a year, which is more or less evenly distributed throughout. As of 2019, the greatest one-day rainfall observed is 229.1 mm, recorded on December 29, 2014.



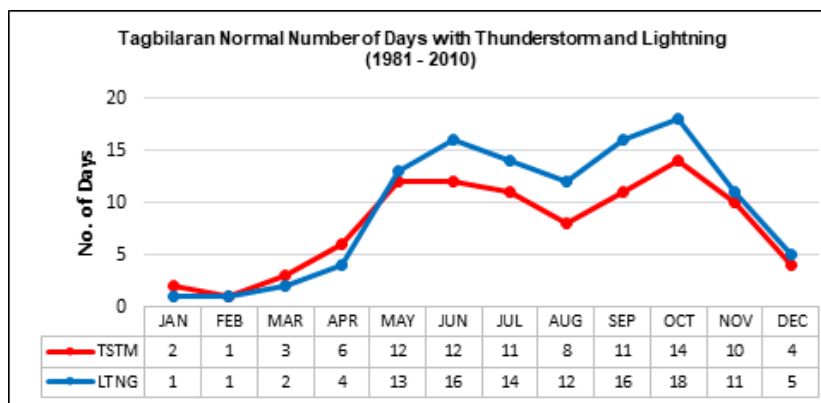
Based on the 1981–2010 climatological normals of Tagbilaran Synoptic Station, Tagbilaran's annual mean temperature is 28°C. January is the coolest month with an annual mean temperature of 26.8°C while the warmest month is May with an annual mean temperature of 29°C. Minimum temperature is observed on the month of February at 22.5 °C on the average, while the maximum temperature is observed on the month of May at 33.5°C on the average.

As of 2019, the highest temperature recorded in the city was 37.2°C on September 04, 1992, while the lowest temperature recorded was 16.2°C on February 24, 1973.



Thunderstorms form when there is enough instability (unstable air) and moisture in the atmosphere. Lightning is formed when the positive and negative charges in the clouds grow large enough for a giant spark to occur between the two charges within the cloud or between the cloud and the ground.

The months of May to November have the most number of days with thunderstorms and lightning. This is because both moisture and instability are high during these months. These parameters are low during the cold months, from December to February. Annually, the city experiences an average of 94 thunderstorms and 113 days with lightning.



Since the Philippines is located in the tropics, the weather and climate prevailing in any particular place in the country are dictated by the area's geographical location and the different wind systems that prevail in the locality during the different times of the year. On the average, the prevailing wind in the Philippines from October to February is northeasterly (amihan), easterly from March to May due to the Pacific trade winds, and southwesterly (habagat) from June to September.

Weather patterns in the Philippines are dictated by the prevailing winds—the habagat (southwest monsoon) and the amihan (northeast monsoon). The northeast monsoon brings colder temperatures and rains to areas with Type IV climate, such as Tagbilaran city, from October to May. As of 2019, the strongest wind speed recorded in Tagbilaran was 36 m/s on a south-southeasterly direction during the passage of Typhoon Reming on November 19, 1968.

TROPICAL CYCLONES

From 1948 to 2019, a total of 32 tropical cyclones crossed the Province of Bohol. Eleven of these TCs reached typhoon category, 14 were tropical storms while 7 were tropical depressions. Tropical cyclone occurrence in the province is most expected every November. This partly explains the rains during this period. These weather systems spare the city, however, during the months of June, July, and September.

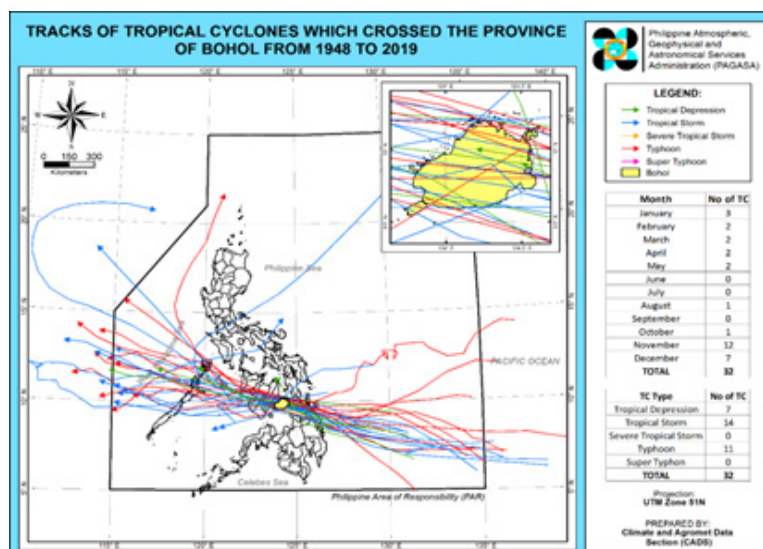


Table 1. LIST OF TROPICAL CYCLONES THAT CROSSED THE PROVINCE OF BOHOL FROM 1948 TO 2019

YEAR	MONTH	TYPE	TC NAME	PAR BEG	PAR END	MSW
1948	Nov	TD	TD4816	11/28/1948	11/30/1948	
1949	Nov	TS	TS4918	11/4/1949	11/8/1949	
1949	Nov	TS	RENA	11/10/1949	11/13/1949	
1949	Dec	TS	BETTY	12/2/1949	12/7/1949	
1950	Nov	TS	DELILAH	11/18/1950	11/22/1950	
1954	May	TY	ELSIE	5/4/1954	5/9/1954	
1954	Dec	TS	TS5418	12/23/1954	12/29/1954	
1960	Apr	TY	KAREN	4/19/1960	4/26/1960	139
1962	Nov	TY	LUCY	11/25/1962	11/28/1962	139
1965	Jan	TD	ATRING	1/16/1965	1/16/1965	55
1967	Mar	TY	BEBENG	3/1/1967	3/5/1967	185
1967	Nov	TS	YAYANG	11/6/1967	11/8/1967	140
1968	Nov	TY	REMING	11/13/1968	11/21/1968	160
1971	Oct	TY	GOYING	10/19/1971	10/22/1971	130
1972	Dec	TY	UNDANG	12/1/1972	12/8/1972	110
1975	Jan	TY	AURING	1/22/1975	1/25/1975	130
1976	Dec	TD	KAYANG	12/29/1976	12/30/1976	55
1979	May	TS	KARING	5/10/1979	5/16/1979	65
1980	Feb	TD	ASIANG	2/12/1980	2/13/1980	55
1984	Aug	TY	NITANG	8/31/1984	9/4/1984	222
1986	Dec	TY	ANING	12/20/1986	12/24/1986	165
1988	Nov	TS	WELPRING	11/1/1988	11/5/1988	85
1991	Apr	TS	BEBENG	4/23/1991	4/26/1991	55
1993	Dec	TY	PURING	12/24/1993	12/29/1993	120
1998	Nov	TS	MIDING	11/22/1998	11/24/1998	75
2002	Mar	TD	CALOY	3/20/2002	3/23/2002	55
2007	Nov	TS	LANDO	11/19/2007	11/27/2007	130
2008	Nov	TD	ROLLY	11/7/2008	11/9/2008	55
2014	Nov	TD	QUEENIE	11/25/2014	11/28/2014	65
2014	Dec	TS	SENIANG	12/27/2014	12/31/2014	65
2018	Jan	TS	AGATON	1/1/2018	1/3/2018	65
2018	Feb	TS	BASYANG	2/11/2018	2/14/2018	65

NOTE :

PAR BEG means date when the tropical cyclone entered the PAR

PAR END means date when the tropical cyclone exited the PAR

MSW means estimated Maximum Sustained Winds in km/h

** means Tropical Cyclones with multiple entry in PAR

TROPICAL CYCLONE CLASSIFICATION

*From May 2015 to Present

TD - Tropical Depression - 61 km/h or less

**

TS - Tropical Storm	- 62–88 km/h
STS - Severe Tropical Storm	- 89–117 km/h
TY - Typhoon	- 118–220 km/h
STY - Super Typhoon	- more than 220 km/h
*Before May 2015	
TD - Tropical Depression	- 63 km/h or less
TS - Tropical Storm	- 64–118 km/h
TY - Typhoon	- more than 118 km/h

TROPICAL CYCLONES AND OTHER RELATED EVENTS—STRONG WINDS AND STORM SURGES

Below is the characterization of tropical cyclone events, its impacts, and the at-risk population. About 44 percent of the TCs that passed thru Bohol were tropical storms and about 34 percent were typhoons.

	Island/Coastal Community	Description	At risk
Bien Unido	Hingotanan East and West	Typhoon Quinta flooded homes by 2 ft Seaweed farms wash out, classes automatically suspended, residents cannot go to the coastline to glean, pick up seashells Damage to properties (boats and houses)	All are affected: fishers, gleaners and seaweed farmers
	Bilang-bilangan Dako and Diot	Damage to properties (boats and houses) Corresponding storm surge of 3 meters	100 HH situated by the road
Calape	Matatao	Turbulent seas/strong winds for 3–4 days (Typhoons Nitang and Reming were TCs that brought huge damage)	Fishers: no fishing activity/no income Damage to houses, especially those made of light materials
		Intense rainfall from December to February	More incidences of higher flooding levels Residents still able to collect water Suspension of classes

Clarin	Tangaran	Storm surge affects many houses built in locations identified as danger zones	Purok 1–49 HH, Purok 2–28 HH, Purok 3–96, Purok 4–29, Purok 5–28
	Bacani	Strong winds with storm surge damage shelters	HH along the coast
	Poblacion Norte	Makeshift houses are damaged due to strong typhoons Flooding in the area due to lack of a drainage system	Purok 1–4
CPG	Rosario	Difficulty of cooking in HH; residents have to settle for only one meal daily Damage to crops, houses, infrastructures (electric poles, roads, churches, etc.) Flooding of 1.5 m; if tropical cyclones coincide with high tide, flooding reaches an additional 1 ft Low repayment of loans Class suspensions Storm surge	90% of HH 25% of farmers Fishers Children HH on the shoreline (Purok 1–3)
	Barangay Aguning Pitogo	A 1-ft increase in water level with TCs coinciding with high tide of 1.9 m Erosion in the coastal areas Coral destruction (debris of trees and garbage by the shore) Storm surge that can affect coastal areas in Purok 1–5	HH from Purok 1–5 are affected by storm surge There is also infrastructure damage Corals of __has

Getafe	Nasingin	Whole barangay is prone to flash-floods because the location is a peninsula Also, situated nearby the mouth of the Inabanga-Wahig River, the widest river in Bohol	All residents living in the barangay are mandated to do forced evacuation to Nabuwad High School building, day/s prior to the landfall of typhoon regardless of signal number No fishing activity/ no income 150 women (owners of sari-sari stores and food processing businesses) have no income Suspension of classes up to high school level 28 PWDs have no income All evacuees need relief food packs, etc.
	Banacon Islands	Waist-level seawater flooding during tropical cyclones Soil erosion	Fisherfolk 442 HH covering all puroks Residents living in coastal areas in houses made of light materials
Inabanga	Lawis	Barangay roads are slippery due to mud Increased flooding caused by river level rise over 2 ft high within 24 hours	All barangay roads in barangay Lawis All household and residents in Purok 1, 2, 3, 4 Around 50 high school students are affected. During flooding and strong current, students are unable to cross the bridge in Ondol. Students need to ride a pumpboat bound for Barangay Tungod for them to go to school in Saint Paul or in Nabuwad High School. In the afternoon, they will walk home barefoot. 540 children are affected by their health due to some diseases like dengue (2 casualties), fever, cough, headache, etc.
		Whole barangay is identified as a storm-surge area.	Storm surges affect the entire barangay, causing damage to properties and lives.

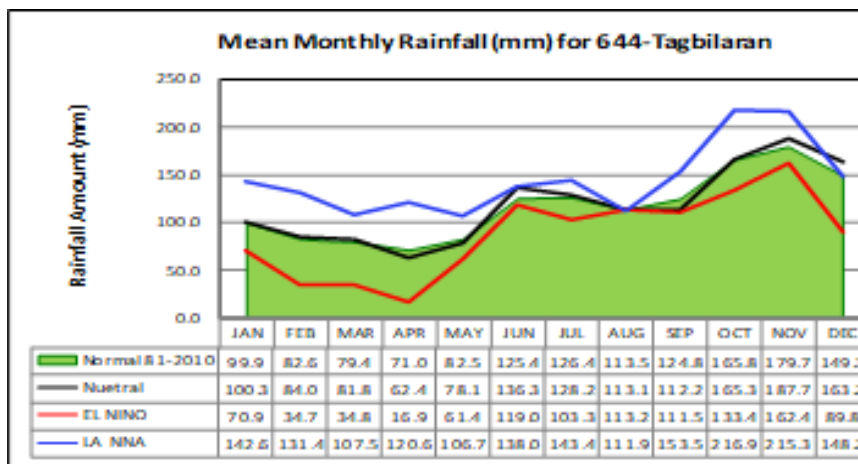
	Ondol	Whole barangay is prone to flashfloods because the location is a peninsula. Also, because it's situated near the mouth of the Inabanga-Wahig River, considered the widest river in Bohol.	All residents living in the barangay are mandated to do forced evacuation to Nabuwad High School building day/s prior to the landfall of typhoon regardless of SIGNAL #. Damaged crops/ banana trees and coconut trees (100% of farmers are affected) Fishers: no fishing/no income Women lose their income Suspension of classes up to high school level PWDs have no income, either (all evacuees need relief food packs, etc.)
		Whole barangay is identified as a storm -surge area	In case of storm surges, the entire barangay will greatly affected, causing damage to properties and lives.
Talibon	Calitoban	Flash floods, storm surges, water rising by 2 ft Garbage waste enter houses during flooding/storm surges	No income for fishing households Purok 2, 3, 5, 6, 7 affected
	Nocnocan	Residents living in the coastal area are mandated to evacuate in the elementary school/covered court. Typhoons enhance flooding and bring floodwaters to waist level Low repayment of credit Waste is increased Soil erosion Damage to fishing boats	Houses made of light materials are damaged Fishers have no income Natural resources are adversely affected Students: classes are suspended

Analysis of the annual temperature in Tagbilaran indicates an increasing trend based on the difference of the actual data from 1961 to 2019 and the average of the 1981 to 2010 temperatures. A temperature increase of 1.003°C was observed during the last 59 years. It is also worth noting that the station was transferred from Tagbilaran to Dauis in 2013. Hence, when temperature readings were combined, there was a noticeable decrease in temperature. Until the data is homogenized, the temperature analysis that should be considered should only be from 1961–2013.

Changes in rainfall pattern are associated with changes to tropical cyclone activity in the western equatorial Pacific, the strength of monsoons, changes in the onset and/or termination of monsoon rains and the ENSO (El Niño-Southern Oscillation) phenomenon. Analysis of the annual rainfall in Tagbilaran shows an increasing trend based on the difference of the actual data and the average of rainfall values from 1981 to 2010. Lower rainfall levels are very evident during El Niño years (i.e., 1968–1969, 1991–1992, 1997–1998, etc.) while increase in rainfall is obvious during La Niña years (i.e., 1973–1975, 1995–1996, 1999–2001, etc.).

IMPACT OF ENSO ON RAINFALL IN TAGBILARAN

The extreme phases of the ENSO phenomenon have a strong modulating effect on seasonal rainfall in the Philippines. Mature ENSO warm events (El Niño) are often associated with drought and stresses on water resources and agriculture. On the other hand, cold events (La Niña) often result in excessive rainfall (Jose 2002; Lyon et al. 2006). There are also impacts on the onset and length of the rainy season and, more importantly, the number of tropical cyclones.



This graph shows the mean monthly rainfall during Neutral, El Niño, and La Niña years. It is shown that Tagbilaran receives above normal rainfall from September to November and January to July during La Niña, while there is below normal rainfall during El Niño the whole year. Generally the impact of ENSO manifests usually on the last quarter and first quarter of the year.

DROUGHT

Bohol is a water-stressed province. The island communities are particularly vulnerable to drought and the lack of rainfall. Below are the usual characterizations of this phenomenon, including the at-risk populations and ecosystem element of the island communities

Island/Coastal Community		Description	At risk
Calape	Matatao	More intense heat/less rainfall	The entire population
		Water supply affected	
		Incidence of fish kill and destruction of marine resources—reduced fish catch	
Clarín	Tangaran	Drying -up of deep wells	77 HH
		Rain-fed ricelands cannot be cultivated	
		Several houses situated in Purok Tinago and Centro experience flooding due to overflowing of water from river	
	Bacani	Decreased fish catch; Increased crop failures	Fishing families/ consumers with increased fish prices/ fish supply
	Poblacion Norte	Decreased harvest Decreased fish catch	Number of farmers and fishers of Poblacion Norte

CPG	Rosario	Faster consumption of reserve water	100% of households affected
		Water inavailability	
	Barangay Aguing Pitogo	Increased mortality of corals, particularly in the shallow areas especially those that are exposed during low tide Decreased fish catch	Increased mortality of corals 300 HH
B i e n Unido	Hingotanan East and West	Coastal resources are affected specially shorelines Price of water spikes from P45 to P50 (EDIT: per liter?) Deepwells dry up Seaweed farming is affected	Shell-gleaners or 10% of population All residents Seaweed farmers
	Bilang-bilangan East and West	Capacity of water tanks is good only for 1–2 months Due to decreasing fish catch, fishers need to go further out to sea	480 HH
Getafe	Banacon Islands	Rainwater in the reservoir is depleted; water from the deepwell will also be depleted Plants will die Decreased fishcatch, decreased seashells by up to 60% Discoloration of corals/coral bleaching	Purok 1 to Purok 7; 442 HH ___ has of corals
Talibon	Calitoban	2–3 months of low to no rainfall means no more water stock Increased expenses for water both for drinking and everyday use. Under normal days, residents need to pay P40–P45 per container of mineral water. During drought, water becomes P50 per container	998 HH 1,050 families affected
	Nocnocan	Since rainwater reserve is depleted, consumers will be forced to buy purified water from the mainland which is very costly during summer time Raises problems washing clothes; no rinse after swimming in the sea	All residents
Tubigon	Barangay Ubay, Pangapasan, Batasan Bilang-bilangan		

OTHER SMALL ISLAND ISSUES AND CHALLENGES

Despite the available resources, there are also many issues and challenges. Considering their geological nature, what is the carrying capacity of these islands? Should development even continue to happen in these small islands? To what level can these islands support infrastructure development, settlements and resource utilization towards sustainable island living?

The effect of climate change, particularly sea-level rise, takes on more ferocity and unprecedented impact year-on-year. Some of the measures being practiced now may prove to be environmentally unsustainable and disastrous even in the long run, such as the harvesting of hardened corals to serve as foundations for raised homes.

RELOCATING OR NOT

Inevitably, the dilemma of island dwellers—whether to stay or leave their increasingly precarious island living—should be recognized, first by the dwellers themselves, then by the government. Despite the potential dangers, some island dwellers, particularly those covered by this study, decided to stay because of the generally peaceful way of living and the availability of fish and other fresh marine resources accorded to them by the sea. They should, however, be more mindful and ready to embrace measures to conserve and protect this critical resource against misuse.

TEMPORARY EVACUATIONS

There were two schools of thought in terms of evacuation: evacuation in situ can serve both as hard and soft measures—people don't stay in the evacuation sites permanently as their very lives are with the sea, but they have a definite place to go (ex-situ) whenever there is typhoon or other natural calamities.

ISLAND BIODIVERSITY

Other critical island issues are environmental. Bohol is a paradise and home to a genetic reservoir of marine organisms. Bohol hosts Danajon Bank (Da-NA-haun) which spans 97 miles across the islands of Bohol, Cebu, Leyte, and Southern Leyte. It is one of just six double barrier reefs in the world. Not only is Danajon Bank a rare geologic formation; it is also considered one of the richest areas of marine biodiversity sites anywhere, the place from which almost all Pacific marine life evolved.

WATER AND WASTE MANAGEMENT ISSUES

A desalination facility can be the most potent solution to the problem of fresh water for small-island localities. Locals themselves should be trained to run it, while rainwater can be harvested for household chores. And since small-islands and islets have very limited land area, a waste management system should be developed that is responsive to island dwellers, such as trash being collected and processed sustainably in the nearby mainland. Teachers and health workers, as much as possible, should also be from the localities to minimize quick turn-over of personnel. If non-residents must be brought onboard, there could be additional remunerations for them or facilities built to ease their stay.

FOOD AND INCOME SECURITY

There are related issues that have far more potentially dire effects but are more strategic in nature, hence, not easily seen. One is the issue of food security. This is a main component about living in small islands. To achieve food security, residents have to get their food and water from the mainland. This arrangement can be an overpowering issue even for mainlanders during natural calamities. The country cannot afford to always import its food requirements, considering that one of the bedrock principles in climate adaptation is one's capacity to be self-sufficient, at least to a certain degree. During dire situations, imported food products have to be shipped, making it utterly inconvenient for emergencies. Super typhoon Yolanda taught us many things.

OTHER HUMAN SECURITY ISSUES

Some recommendations, such as provision of pump boats for emergency use, may well be within the province's local capabilities. But others, such as construction of bridges and seawalls, can be more economically challenging. That is where the national government and even private organizations can be tapped for assistance. Research and studies about other means of mitigation and adaptation should be encouraged and funded, as the Philippines is an archipelago.



SUMMARY OF ISLAND ISSUES

Islands	Accessibility	Food and Income Security	Human Security	Water Security	Environmental Integrity	Vulnerable groups
Matatao Calape	Not all have pump boats No regular public transport schedule Expensive fare—P40 for a seat; P300 to hire the entire boat Only 1 available sea ambulance—not enough to cover the whole barangay	Food is expensive No direct on-site bulk buyer of seaweeds Seasonal fish catch/ seasonal income Production cycle of seaweeds takes 2 months and, therefore, income is also earned every 2 months Fungal infestation of seaweeds resulting in reduced harvest	Flooded during high tide—as high as 1 meter deep No covered court; the board and flooring of the existing court needs repair No evacuation center Limited Internet connectivity Lack supply of medicines, medical equipment and supplies Only 4 toilets are functional; but all 4 need upgrading and maintenance Pathways not cemented Seawall not complete Only 4Ps beneficiaries can avail of the sustainable livelihood program of DSWD Associated, not accredited; and no alternative livelihoods	Water is expensive; rainwater is P5 per 5-gallon container Water reserve is not enough in times of dry spell	Illegal cutting of mangroves Illegal fishing; poachers in the sanctuary area	

Hingotanan	No sufficient budget for fuel for pump boat and pump boat maintenance No safety equipment Weak communication signal	No credit Inconsistent fish catch Man-made destruction of fish environment (use of chlorine and formalin), as well as natural phenomenon (high temperature can damage corals) Lack of livelihood programs (especially for PWDs) Cannot do gleaning due to bad weather No available loan facilities Lack of capital Decreasing fish catch; resources are deteriorating due to overfishing Old stock of goods/owners of sari-sari stores have only limited capital The high costs of transport brings up cost of goods sold in islands	Lack of medicines, medical equipment; existing ones can be defective Not all can buy electric generators/materials for connections No birthing facility in the island Lots of illegal fishing	No water purifier Higher price/cost of mineral water during extreme weather events Stock of water usually doesn't last during long drought	Lots of shells, crabs and other coastal resources Pickers/fishers can also cause damage to corals and seagrass No area for bigger dumpsite Illegal fishing in the marine sanctuary Cutting of mangroves Some residents do not segregate waste	
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Bilang-bilangan	Not all have their own pump boats and do not have life vests	Limited funds for water and food	No budget for medicines/medical equipment	Contaminated drinking water during rainy season	Existence of Santo niño, grotto/ m=Mama Mary diving sites in	
	Not all gasoline stores offer credit	No credit for food and water	No credit		m=Mama Mary diving sites in	
	Travel frequency is limited	Residents have to buy food from Bien Unido (mainland)	Not all HH have electricity and toilets	Lack of water during drought	Danajon Bank but the rich corals are now threatened by	
	During southwest monsoon and strong winds, it is dangerous to travel by sea especially if you have children with you	Illegal means of fishing (compressor)	Lack of teachers and school materials	Salty	discoloration	
		Own strategies	The high school and elementary schools are very near the shore, with no seawall, but are surrounded by mangroves. There are lots of waste and garbage near the schools			
		No credit				
	Boat operators need to transfer 10 passengers at a time so passengers will need to wait a long time before transport	Limited capital				
	The roads are very narrow and there are portions not yet paved.	Low repayment of loans, or none at all; residents have to borrow money for fuel/gasoline; there is barangay-level discussion on the mechanisms for repayment				

Centro Pitogo Rosario	Very limited number of habal-habal and tricycles in the areas; high cost of transportation fare going to Centro Pitogo (CPG)—P150 for a habal-habal or P60 for an entire tricycle Narrow roads Mobile signal is only available in the docking port; very difficult during emergencies	No fishing during typhoon, full moon, “aya-ay” or __in english, <i>habagat</i> and <i>amihan</i> Rainfed crops—cannot plant during drought or dry season Some residents don’t have loan access; they don’t have budget for fuel Not all have pump boats Low-income population especially during the COVID-19 pandemic Limited passengers due to high transportation fare Lack of capital Lack of raw materials (Romblon) Communities have to halt production of goods, therefore, no income Poor loan repayment	Lack of medicines and medical equipment (blood pressure apparatus, for example); sometimes, the donated medicines and vitamins are too close to expiry date Delayed assistance Narrow, unpaved, and damaged roads that become muddy during rainy season; no canals Still not safe for evacuation; evacuation center not yet finished Lack of support to expand and improve products Weak mobile signal No bleachers; no public restroom Damaged/broken building (walls and ceilings) Flooded houses during high tide (2 m)	Expensive at P25/gallon Salty water	with illegal mangrove cutting No patrol boat Inactive Weak implementation of waste management	
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Pitogo	Damaged bridge that gets slippery during rainy season	Rain-fed crops Lack of budget for fuel Not all have pump boats Residents have low income, especially during pandemic Limited passengers due to high transportation fare Lack of capital Lack of raw materials (Romblon) Production of goods is halted, therefore, no income Poor loan repayment	No early warning of bad weather Roads are small, narrow, and damaged. These unpaved roads get muddy during rainy season No bleachers; no public restroom Damaged/broken buildings (walls and ceilings) Flooded houses during high tide (2 m) Limited funds from the LGU \ No birthing facilities Development of a college is still at phase 1 because of limited funds Waiting for approval ICC from DENR Ro-ro port construction still ongoing Very limited mobile and Internet signal due to absence of telecom tower in the area	Water tank or additional water /rain collector Not all houses have water tank With well but water is salty	Mangrove cutting in private area did not follow the government plans/ policies	
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	Unleveled, uncemented roads become flooded during high tide	Rice paddies can't be cultivated due to seawater intrusion Not all sitios are covered by water supply	A multi-functional barangay hall as it is also utilized as barangay health center Exclusion of some indigent families and senior citizens from assistance provided by government	No water tank		
	Prone to storm surge Flooding of households High fare rates Siltation causes the river to become shallow	Intrusion of seawater in rice fields situated in Purok 2 River overflows and causes flooding, damaging the rice fields Some Purok FMR not yet set in concrete, including Purok 1, 3, and 4	Lack of medical equipment Old and dilapidated earthen road unleveled; needs repair	Not all households have water connection	Illegal cutting of mangroves Siltation of river Households not practicing waste segregation	

	Flooded with seawater especially during high tide Purok 1 access road is currently dilapidated High rates of fare (P15 minimum fare) Hang-out area used for dating and drinking is not lighted; needs repair	Absence of building and/or common service facilities for residents' livelihood operation No funds available to produce food No other livelihood Inactive beneficiaries/PO Decreasing fish catch	Lack of medicine supply and medical tools Some community members are inactive There are no accredited and registered socio-civic groups Toilets in Purok 3 are no longer functional FMRs can't be cemented and developed due to ownership issues Basketball court now serves as evacuation center, yet its construction isn't finished yet, particularly the roof; location is also prone to flooding			
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	Expensive fare (P30/ passenger, per trip) Emergency boat is no longer functional Seawater overflows during hightide up to 2–3 ft high/ knee level	No credit line for any customer Overfishing due to many consumers in the island, even residents from neighboring provinces Cebu and Leyte Drinking water is expensive in the island; supply is not sufficient for all the constituents especially during El Niño Many fishermen do not own fishing boats or fishing nets Seaweed farm was damaged due to unknown reason There's a strong competitor of production of Boneless Danggit from Daanbantayan in Cebu The drying facility can't cater or accommodate other members to dry in the area There's no livelihood activity for women The barangay council has no idea how to start and develop the place for eco-tourism Since not all houses are on stilts, seawater will intrude in low houses	Seawater reaches covered court, pathways, classrooms, and diapidated buildings at hightide Buildings are not maintained Lack of health center equipment and insufficient supply of medicines and vitamins from the RHU Lack of maintenance of communal toilets There are more than 100 out-of-school youth in the island probably because of the unavailability of high school in the area, plus the additional expense for boat fare to and from school. Also, travel is dangerous especially during southwest monsoons, trapping the students on the neighboring island where they go for school	Water tank is too small –collected water not enough to cover the needs of the sitio Damaged so non-functional Purified water expensive due to labor and transport costs drinking	Some residents cut mangrove trees Other fishermen will intrude on the MPA The bantay-dagat patrollers have no additional honorarium aside from being a bantay-tanod Dumpsites are overloaded, possibly causing air and water pollution	
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No internet cafe in the area

Getafe	Not all residents have pump boats; the lack of a regular boat schedule between the mainland and Banacon limits travel Some boat owners will not allow passengers to hitch a ride Banacon has no emergency boat available, and the port is difficult to contact	Many fishermen still practice illegal fishing such as dynamite fishing, compressor, use of formalin and other chemicals Over-fishing The existing eco-tourism enterprise (boardwalk in Banacon Mangrove Area managed by the Banacon Fisherfolks and Mangrove Planters Association) has a lack of maintenance and a lack of promotions and marketing. There are few tourists due to the distance and limited list of activities on the island. Seaweed farming is greatly affected; farmers have to temporarily stop business Not all residents are granted assistance because DSWD is prioritizing the 4Ps members as beneficiaries of their program No capital to start businesses; also, lack of skills training Difficult to transact money transfer since there is no Pera Padala Center in the area	Lack of medical equipment, medicines, and vitamins; medical personnel are on duty only three times monthly Homes are made of light materials Many Out of School Youth Students' fare to school is prohibitive to parents. This, and the dangerous travel conditions to another island just to go to school has increased the number of out-of-school youth in the barangay Docking port is damaged No other investors such as pawnshops or money transfer places There is Department of Social Welfare's KALAHI CIDDS program Port (or boat) needing maintenance, needs repair, no ladder Some puroks have no footbridge Seawater enters classrooms in the elementary school There is no gutter or water collector	Rainwater reserve is not sufficient to cater to the needs of even 1 purok Water tanks are dirty Expensive water	Violators are reprimanded or by the barangay council upon report by the PO members Barangay tanod will do volunteer work while waiting for additional honorarium from the barangay Barangay council is eyeing to implement a One-Use Plastic Policy Some residents cut the mangroves to clear space for them to build their houses Dumping site is overloaded with garbage, sitting very close to the residents' homes	
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Inabangga	The area under the bridge is already shallow caused by siltation. Hence, the seawater will overflow during high sea level rise Tricycles will not operate during high sea level rise due to flooding The area is identified as part of the danger zone or prone to flashfloods, and storm surge	Decrease of sales due to many competitors; and some stores will not allow credit Fishermen do not have sufficient fishing gear, and some do not even have pump boats No water supply in the past months, and purified drinking water is expensive Not all fishermen benefit from the government's program	No available medicines and vitamins The budget is very limited Feeding program is inconsistent Seawater floods basketball court, classrooms at high tide, causes classes to be suspended; dilapidated court needs maintenance Portions of the barangay road isn't paved yet, making roads slippery with mud when it rains.	Its been a long time with no water in faucets	Residents throw their garbage anywhere Some people cut the mangrove trees; there are areas that mangrove trees naturally die. some residents are still extracting sand in the area	Most of the youth are out-of-school, and they do nothing for a living PWD association is not registered and accredited.
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	Seawater goes over the bridge at high tide The bridge becomes slippery due to mud on rainy days Tricycles stop trips during sea-level rise due to flooding in the area	No credit available for customers because store proprietors lend additional capital from microfinance institutions Unlike before, there's a decrease of seashells, as per gleaners The fishermen can't afford boat maintenance and supply of fishing paraphernalia. So they have to stop fishing temporarily. Low sales in the basket weaving industry due to many supplier-competitors from other municipalities. Owners have to take out loans to survive. The organization is not able to meet demand due to lack of capital for the business operation. Also they do not have a common service facility for the production of processed foods	No available medicines at the barangay health center because these are not over-the-counter medicines. The patient has to go to the Rural Health center to get the medical transcription issued by the municipal health officer. Some of the clinical equipment are damaged Some children in the area are under-nourished There is no high school in the barangay. This is one of the reasons why there are many out-of-school youth (OSY) in the area. Cost of daily allowance is prohibitive for some parents. The unfinished dike reaches only up to Barangay Ondol. Seawall is damaged Damaged road goes through zero maintenance Lack of maintenance and equipment During sea-level rise, seawater will intrude in the area, including classrooms; during rainy days, the flooring of the covered court becomes slippery due to mud	No water supply in the last 3 months	Some residents cut mangrove trees There are still intruders to the MPA; and The bantagy-dagat patrollers have no honorarium aside from being barangay tanods	here's a PWD organization but The organization is not registered and accredited. Moreover, the organization has no available resources to support each member
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	Not all have pump boats going to mainland -Talibon Sea ambulance is still under repair Lots of fishermen coming from Cebu and other areas; some use illegal fishing techniques	Increase in population growth will also increase pressure on resources Difficulty in controlling the transient fishermen/intruders from other areas No budget for Bantay Dagat	No fish port Lack of medicines in their Botika sa barangay No covered court	Some of the residents / HH don't have water collecting systems Residents are unsure about the safety of their drinking water since this is not included in the government's desalination project	Inactive, no Barangay patrol – Bantay Dagat Illegal fishers No participation from barangay Damaged coral reefs Major problem is waste management/ disposal Lack of funds for dumpsite expansion	
	Gasoline in the island is expensive due to unavailability of gas station; Ferry boat going to and from Nocnocan to mainland is only available Tuesdays, Thursdays, Saturdays		Sea ambulance damaged The island barangay does not have a docking port structure Lack of medical equipment There are times midwife cant travel to the island due to big waves and strong current Botica ng Barangay was closed due to mismanagement	Not all households have a water source		

Tubigon	No regular schedule of transportation going to Centro/ mainland No passenger boats No safety dock for boats during extreme events Residents have no money to buy fuel/ gasoline Island submergence is worsened after the earthquake, especially in Barangays Ubay and Pangapasan	6 days every month of tidal flooding -No budget to buy food, water	Not enough cooperation between the community and local officials -No signal in the island -No electricity especially during extreme events Absence of life jackets in all service pump boats No health services for senior citizens and PWDs No housing in mainland High rate of boarding house rental Absence of life jackets in all service pump boats Poor law enforcement No investment/capital in lending facilities for fishery sector Extreme weather events No family planning Lack of budget for complete construction of pathways and covered courts Only temporary elevation of houses; this enhances island submergence	-No water collector or storage/container	-Poor law enforcement; low awareness among citizens on the impact of coral destruction, mangroves and sanctuaries Not enough budget for enforcement, awareness-building Illegal activities inside MPAs Lack of diplomacy/ management skills of those people assigned in their MPAs Illegal fishers from other barangays	-Limited livelihood programs for women
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CLIMATE PROJECTIONS FOR BOHOL AND IMPLICATIONS FOR ISLAND COMMUNITIES

Projected changes in average annual rainfall and temperature values indicate a wide range of possible futures for Bohol.

RAINFALL

Under the driest possible scenario (lower bound), climate projections show a decreasing trend in average seasonal rainfall across all the seasons for both medium (RCP4.5) and high (RCP8.5) emissions scenarios. During the September to November season, rainfall is expected to significantly decrease by as much as 21 percent under RCP4.5 and by 28 percent under RCP8.5. A reduction in rainfall will have serious implications for the water and agricultural sectors of the already water-stressed province.

On the other hand, under the wettest possible scenario (upper bound), average seasonal rainfall is projected to moderately increase across all seasons, although relatively significant changes are expected for the December to February period (up to 21 percent for RCP8.5, and 29 percent for RCP4.5).

Table 1: Projected Seasonal Rainfall in 2050 for RCP4.5 and RCP8.5 in 2050

Region	Provinces	Scenario	Range	Dec-Jan-Feb			Mar-Apr-May			Jun-Jul-Aug			Sep-Oct-Nov		
				Observed	Percent change	Projected value	Observed	Percent change	Projected value	Observed	Percent change	Projected value	Observed	Percent change	Projected value
Bohol	Moderate Emission (RCP4.5)	Lower Bound		376.1	-13.5	325.3	209.6	-2.4	204.5	412.9	-16.8	343.5	514.5	-21.2	405.7
		Median		376.1	3.0	387.5	209.6	3.9	217.7	412.9	-6.5	386.1	514.5	-12.2	451.9
		Upper Bound		376.1	29.7	487.8	209.6	11.9	234.5	412.9	13.8	470.1	514.5	4.8	539.1
	High Emission (RCP8.5)	Lower Bound		376.1	-17.1	311.9	209.6	-6.7	195.5	412.9	-22.1	321.7	514.5	-27.9	370.8
		Median		376.1	1.5	381.8	209.6	1.8	213.3	412.9	-2.3	403.3	514.5	-12.3	451.4
		Upper Bound		376.1	21.5	457.1	209.6	8.5	227.5	412.9	13.4	468.2	514.5	6.3	546.8

TEMPERATURE

Most models agree that the country's average seasonal temperature will increase in the future. In Bohol, temperature is projected to increase across all seasons, for both RCP4.5 AND RCP8.5. The increase in temperature values could range from 1°C to 2.2°C for the mid 21st century as shown in Table 2.

Table 2: Projected Seasonal Temperature in 2050 for RCP4.5 and RCP8.5 in 2050

Region	Provinces	Scenario	Range	Dec-Jan-Feb			Mar-Apr-May			Jun-Jul-Aug			Sep-Oct-Nov		
				Observed	Percent change	Projected value	Observed	Percent change	Projected value	Observed	Percent change	Projected value	Observed	Percent change	Projected value
Bohol	Moderate Emission (RCP4.5)	Lower Bound		26.6	1.0	27.6	28.0	1.0	29.0	28.2	1.0	29.2	27.8	1.0	28.8
		Median		26.6	1.2	27.8	28.0	1.2	29.2	28.2	1.2	29.4	27.8	1.2	29.0
		Upper Bound		26.6	1.7	28.3	28.0	1.7	29.7	28.2	1.7	29.9	27.8	1.8	29.6
	High Emission (RCP8.5)	Lower Bound		26.6	1.3	27.9	28.0	1.4	29.4	28.2	1.4	29.6	27.8	1.4	29.2
		Median		26.6	1.6	28.2	28.0	1.7	29.7	28.2	1.6	29.8	27.8	1.5	29.3
		Upper Bound		26.6	2.0	28.6	28.0	2.2	30.2	28.2	2.2	30.4	27.8	2.2	30.0

TROPICAL CYCLONES

The Global Climate Risk Index 2021 (long-term) ranked the Philippines as the 4th most affected country by climate change in the period of 2009 to 2019, mainly because the country has been recurrently affected by typhoons in the past two decades (e.g. Bopha 2012, Haiyan 2013, and Mangkhut 2018).

In the future, there is low-to-medium confidence that there will be fewer but more intense tropical cyclones. It is worth noting that Category 4 and 5 typhoons tend to pack more destructive winds, and are potentially more damaging

	Climate Model Simulations				
	1	2	3	4	5
Change in tropical cyclone frequency	↓	↓	—	—	↓
Change in tropical cyclone intensity	—	↑	↑	↑	↑

SEA LEVEL RISE

PAGASA (2018) reports accelerated sea level rise of up to nearly double the global average rate in certain parts of the Philippines from 1993 to 2015. Under the RCP 8.5 scenario, sea level is projected to further increase by approximately 20 cm at the end of the 21st century.

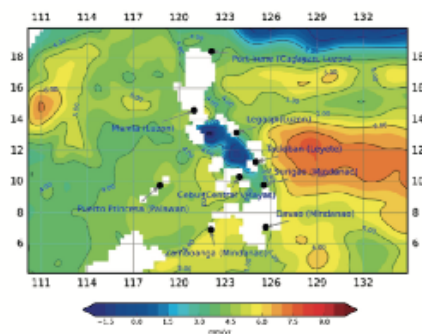


Figure 9. Sea level changes in the Philippines region from 1993-2015. Taken from [9].

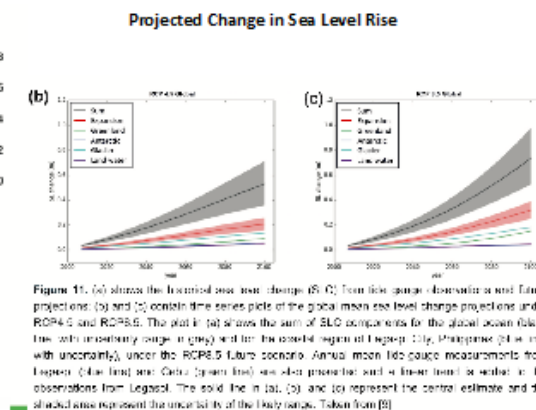


Figure 11. (a) shows the localized sea level change (SLR) from tide gauge observations and future projections. (b) and (c) contain time series plots of the global mean sea level change projections under RCP4.5 and RCP8.5. The plot in (a) shows the sum of SLO components for the global ocean (black line with uncertainty range in grey) and for the coastal region of Legaspi City, Philippines (blue line with uncertainty), under the RCP8.5 future scenario. Annual mean tide gauge measurements from Legaspi (blue line) and Cebu (green line) are also presented and a linear trend is overlaid in the observations from Legaspi. The solid line in (a), (b), and (c) represent the central estimate and the shaded areas represent the uncertainty of the likely range. Taken from [8].

Figure x from Climate Central shows the areas that may be inundated under 1 m and 2 m of water. At 1 m of potential sea level rise, many coastal barangays, particularly in Clarin, Inabanga, and Getafe, are expected to be flooded. Island barangays along the Danaon Bank (e.g. islands offshore Talibon and Bien Unido) are almost entirely inundated. At 2 m of potential sea level rise, more coastal barangays on the eastern side of Bohol will be underwater.

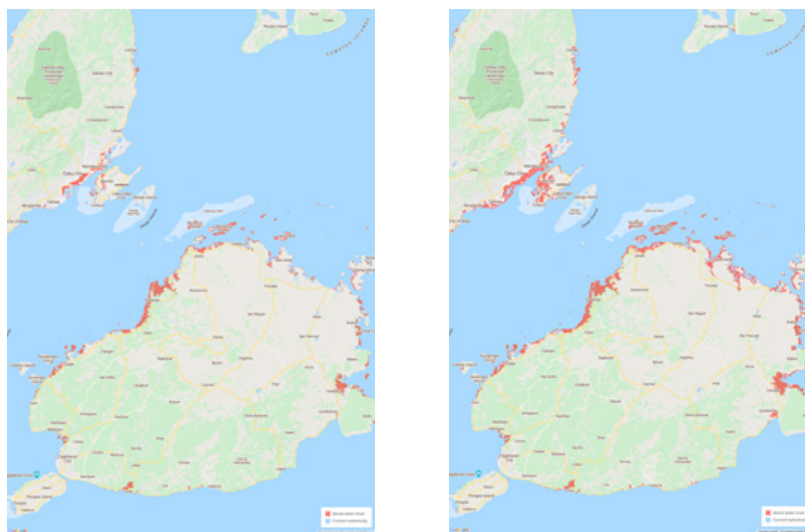


Figure x. Land below 1 m (left), and 2 m (right) of water, derived from Climate Central

The land affected by 2 m of water is similar to that projected to be below annual flood level by 2050.



Figure x. Land projected to be below annual flood level by 2050, derived from Climate Central

SUMMARY OF ADAPTIVE CAPACITIES OF 20 ISLAND BARANGAYS

This process gives Bohol an opportunity to review its existing risk management strategies and check if these are sufficient to protect the communities considering current and future occurrence of hazards. Bohol is known for the rich ecosystems that could help in adaptation. But at the same time, these are also at risk with climate change and are facing a lot of man-made threats. There are some basic infrastructures and services available but at the same time remain insufficient; worse, are lacking or absent in some.

Parameters	Details
Wealth	Fisheries and other ecosystems (fish, seaweeds, shells, crabs, mat weaving,) abundant marine resources (coral reefs, seagrasses, mangroves) Limited agriculture land but not for all islands Mangrove areas, deep wells in some areas, substantial number of residents have boats; a few barangays have sea ambulance (Jetafe); some islands have potential eco-tourism sites; MPAs, churches serving as evacuation centers, rich mangrove forest areas/marine sanctuaries, deployed bantay dagat
Technology	Water refilling stations; water desalination (in Banacon island, but not for all other islands and not enough to cover the needs of all); rain collectors but not sufficient and not for all HHs; MRF ; container gardening practiced in some islands; availability of communication gadgets in some islands but others remain inaccessible; Lots of mangrove planting but high mortality of newly planted mangroves; electricity, mariculture
Institutions	Lending institutions in some islands Availability of stores selling food and water but at a higher price/ DSWD, ALS program, Local Water utilities (for some areas), DENR's greening program (NGP, mangrove plantation), gasoline retailers



Social Capital	Bantay Dagat; Organized fishers, PWDS, neighbors willing to share food; women's organizations, federation of PWDS Culture of bayanihan is strong among island dwellers
Infrastructure	Barangay halls also serving as health center, with wells; some with roads although very narrow; barangay gymnasium/covered court, barangay hall; schools but not for all island barangays and usually just for elementary level; with docking port but not for all islands; with covered court near the sea; a few islands have seawalls but are not long enough; elevated houses (in some barangays)
Information	Ordinance on illegal fishing

POTENTIAL IMPACTS OF FUTURE CLIMATE CHANGE ON BOHOL'S SMALL ISLAND COMMUNITIES

Considering the risk data also received from NGAs and information gathered during this consultation process, the following potential impact chain was generated to help imagine a future without adaptation and mitigation initiatives.

Climate Drivers	Future Risk	Primary Impact	Secondary Impact	Tertiary Impact
Over-all drier climate for Bohol	Drought or less rainfall in general	Water scarcity	Less water for production	Less income/poverty
			Fish kills	Food insecurity
		Decreased potable water supply	Buying of bottled water/ higher prices of potable water	Increased cost of living
		Low livestock production	Limited food supply	Increased crime rate
		Decreased rice production and other crops	Scarcity of food	Malnutrition Decreased incomes
	Warmer seas	Occurrence of red tide	Less fish/protein source	

Stronger TCs / more intense rainfall	Erosion of limestone base/ carbonates underneath	Further land subsidence	Higher tidal flooding and storm surge levels	Will impact all island households
				Health epidemics
			Fire	Possible loss of lives and properties
				Can impact fisheries resources
				Increased health risks
		Can cause collapse of sinkholes	Groundwater contamination	Decreased water quality
		Storm surge	Coastal erosion	Displacement and migration
	Increased losses and damages to agriculture and fisheries	Low farm outputs	Increased poverty	Peace and order deterioration
			Decreased productivity and income	Food shortage and poverty
		Coral bleaching	Less fish/reduced ecosystem economic benefits Affected spawning	Economic loss for households
			Water shortage	Increased cost for families/higher water prices
				Reduced food production capacities
	Landslides	Damage to properties, infrastructures, and potential loss of lives	Loss of income	
		Erosion		
	Increased health risks	Increased cases of heat stroke	Increased costs for families	Decreased income/savings Increased debts
			Decreased work productivity	
	Stronger Storm surges	Increased damage to properties and livelihoods	Disrupted transportation, services, supply of goods, power, desalination, infrastructure, water supply, communication	
		Destruction of marine and coastal resources	Loss of ecosystem protection service	
	Flash floods	Loss of crops and livestock	Loss of income	Hunger, malnutrition
	Threat of isolating islands	Disrupted transportation to islands		

Increased temperatures by 1–2.2°C	Increased water evaporation	More intense thunderstorms		
			Increased fuel costs since fishers have to go further out to sea	Lower income Reduced food security in the islands Effect on marine resources
		Coral destruction		
		Seaweeds affected	No income	Increased poverty
		Effect on water resources	Increased cost of living for island families	
	Extreme heat	Reduced agriculture production (i.e., livestock, crops and fisheries)/ negative impact on seaweed	Lack of food	Malnutrition Hunger incidence
			Loss of income	Poverty
	Forest and bush fires	Destruction and degradation of natural flora and fauna	Lower soil fertility	Lower farm incomes Lower IRA
	Increased health risks	Increased cardiovascular attacks rabies cases Respiratory diseases	Increased health costs of households	
		Increased health problems (skin diseases, heart attacks, hypertension)	Increased mortality	
	Drought/drier conditions water resources and marine resources	Sanitation problem	Diseases	
	Extinction of plant and animal species	Reduced biodiversity	Reduced adaptive capacities	

Sea level rise	Higher flooding events / storm surge events reaching further inland	Destruction of corals	Reduction in fish diversity	
		Destruction of homes/ floods reaching evacuation centers, barangay halls and all important facilities	Limited areas for evacuation inland	
		Saltwater intrusion	Water not safe for drinking	
		Destruction of dwellings, infrastructure, schools, barangay halls, recreation facilities	Disruption of services	Hampered medical access, classes, etc. Vulnerable sectors unable to access services
		Increased waste	Sanitation problem	Increased poor sanitation related diseases
		Difficulty to cook	Unable to cook food	Increased costs of living

Climate change is expected to severely affect Island communities. In the long-term, sea level rise could lead to frequent flooding, coastal erosion or even land loss due to permanent inundation. Aggravated by coral bleaching and its negative impact on sediment budget, the natural capacity of islands to adapt to environmental changes may be significantly reduced. Apart from ecological impacts, communities living on islands may suffer from food and water insecurity due to average changes in rainfall patterns.

Time scale	Projected environmental impacts
Long-term (centuries)	Sea level rise Permanent/frequent inundation Coastal erosion and land loss Further coral bleaching due to ocean acidification, resulting in low sediment budget Changing rainfall patterns and drought
Short-term (decades)	Annual wave-driven overwash Saltwater intrusion during tidal flooding Drought Coral bleaching due to increased sea surface temperatures, resulting in low sediment budget Typhoon, storm surge and accelerated coastal erosion

In the short term, extreme events such as tidal flooding during high tide, typhoon, and drought may already have significant effects on the communities.

During the community consultations conducted across seven municipalities spanning Danajon Bank, all island and coastal

barangays included in the study reported to have had experienced tidal flooding. These communities shared how tidal flooding affected large portions of their populations, particularly in terms of their houses, public spaces (e.g. barangay halls), farmland, and schools. High tides contributed to higher flood levels in these areas.

The tropical cyclones that directly hit these communities in the past have also affected them in different ways, with communities living in islands and coastlines being more concerned with storm surge, and those living near rivers and estuaries with flash flood.

On the other hand, El Niño-induced drought events have caused water shortage across all barangays included in the study, driving up water prices in addition to damaging agricultural produce and seaweed farms. Some barangays have also reported lower fish catch, and death of shallow corals during these events.

As many of the families living in these communities have natural resource-dependent livelihoods, they are especially vulnerable to these extreme events. As crops are damaged during droughts, and fishermen are unable to go fishing during tidal flooding and tropical cyclones, they are often left with no income and no food.

Despite being at the forefront of these climate-related impacts, however, many of these communities remain more concerned about the various development challenges that they face in their day-to-day life. Thus, in order to create effective adaptation strategies, there is a need to consider a constellation of development challenges that shapes the unique reality of island communities. To truly understand the underlying drivers of climate vulnerability for island communities, there is a need to examine their socio-economic problems.

Based on the community consultations, some of the development challenges highlighted by the island communities were:

- Accessibility – lack of transportation, communication, money transfer options
- Livelihood – low seasonal income, precarious activities (e.g., rainfed agriculture, fishing during inclement weather), limited resources for sustaining/expanding livelihood (e.g., no drying facility for boneless danggit, no fishport, lack of promotion of existing eco-tourism facilities)
- Unstable economy – impact of pandemic, volatile prices (e.g., water), poor access to loans / low repayment
- Poor infrastructure – no public toilets, limited electricity, narrow/slippery roads, inadequate healthcare resources (i.e., medicines, facilities), lack of water tanks, lack of schools on islands (children have to commute to islands with schools, increasing out-of-school youth)
- Vulnerable groups – children, PWDs, elderly, women
- Environmental concerns – cutting of mangroves, fishing inside MPAs, decreasing fish catch due to overfishing, poor trash collection, siltation of rivers (leading to more flooding), lack of honorarium for bantay-dagat patrollers

However, during the consultation, the communities also highlighted other potential options that not only help them adapt to climate change but address their development challenges, as well. Some examples of these are:



and raising roads in order to adapt to frequent tidal flooding. Jamero's study shows that stilted houses are the most effective as they have great allowances for flooding, and even for high waves during typhoon and monsoon seasons. However, the houses also needed to be properly engineered against strong winds as they were mostly made out of light materials. Apart from being ineffective, raising floors and roads may also prove to be maladaptive, especially as they were carried out using coral stones. Unabated coral mining can negatively affect fishing grounds, upon which the island communities rely for their income and food.

			Hard Measures					
		Flooding	Stilted House		Raised Floor		Raised Road	
Severity	Island	Median Height (cm)	Cases Not Flooded (%)	Median Height (cm)	Cases Not Flooded (%)	Median Height (cm)	Cases Not Flooded (%)	Median Height (cm)
Low	Pangapasan	20.5	100%	87	73%	29	0%	
	Bilang-bilangan	24.5	100%	79	67%	27.5	0%	
Medium	Batasan	36	100%	100	22%	44	0%	
	Ubay	43	100%	120.5	46%	67.25	100%	70.5
			Effective		Ineffective		Ineffective	
			Never Flooded		Flooded sometimes		Always flooded, except Ubay	
			Significantly higher than flood level (+0.55m to +0.78m		Hardly higher than flood level (+0.03m to +0.25m)		Completely submerged, except Ubay (+0.28m)	
			*Evaluated during a 2.0m high tide event					

In addition to hard measures, soft measures such as evacuating, elevating belongings, and using taller furniture were also implemented in Tubigon (Jamero, 2017).

ROADMAP 2021–2030

In this roadmap, five main pillars have been identified as the foundation for survival and thriving of Bohol's small island communities towards 2030:

1. Enhancing Accessibility
2. Human Security
3. Water Security
4. Food and Income Security
5. Ecological Integrity/Environmental Conservation
6. Knowledge Management and Capacity Building

Under each pillar, measures were identified to ensure the climate adaptiveness of the Boholanos, particularly the province's vulnerable population in small islands and coastal communities while preserving the environment that supports the development and the way of life in these communities.

OBJECTIVES

This climate emergency roadmap is designed to particularly address the vulnerabilities of Bohol's Northern Small Islands that are now greatly affected by tidal flooding and could further be enhanced by sea level rise, by intense rainfall and even by practices of groundwater extraction and much more by a repeat of another earthquake (return is hard to predict).

It is the policy of the province and the affected municipalities to promote the general welfare of its inhabitants in accord with the constitutional right of the people to a healthful ecology in accord with the rhythm and harmony of nature. At this time, frequent climate events have already adversely affected the well-being and livelihood of the residents of the municipality. Therefore, it is timely and important to undertake proactive hard and soft measures. We must do this while respecting the beauty and variable behavior of nature. This way, the harsh consequences of impending disasters will be at least mitigated with a minimum impact on lives and livelihoods.

IMPLEMENTATION AND COORDINATION

There shall be established a Provincial Climate Emergency Council. This Council is to be co-chaired by the Governor composed of affected municipalities' heads of all offices under the Local Chief Executive and the members of the Sanggunian. Additionally, there will be two representatives each from civil society organizations, youth organizations not limited to the Sangguniang Kabataan, and the private sector.

The Council's objective is to accomplish the following:

- Monitor and ensure implementation of the various plans identified in this roadmap.
- Ensure that all agreements by all relevant agencies in the local government unit tasked to carry out the provisions of the ordinance are included in the respective annual plans with budget.
- Submit these plans for funding either through the Office of the Municipal Mayor or, if they are specifically funded, through the annual appropriations ordinance.

The province will partner with different players and institutions in the implementation of this roadmap for the benefit of the most vulnerable island communities.

PILLAR 1. ENHANCING ACCESSIBILITY

During the community consultations, the island communities identified accessibility as one of their main concerns, as well safety during sea travel.

MEASURE 1. ENSURE SAFE SEA TRANSPORT FOR EMERGENCY AND REGULAR TRANSPORT SERVICES FOR THE PUBLIC.

Island communities often lack regular transport services, much less for emergency transport. Communities need at least a "sea ambulance" service vessel in times of community and medical emergencies.

At the same time, sea transport safety should be declared a must for all transport services and sea travel.

Action points:

- Repair existing sea vessels or provide new vessels for emergencies.
- Regularize transport services that can be collectively run as an enterprise by local folks.
- Provide life vests in every home or per vessel.
- Push for ordinance requiring wearing of life vest for all sea travel.

MEASURE 2. PERFORM IMMEDIATE REPAIR OR MAINTENANCE OF BRIDGES CONNECTING ISLANDS TO MAINLAND.

Some areas are connected by bridge to the mainland. These infrastructures should be maintained so as to allow continued access and free flow of goods in and out of the island.

Action points:

- Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers).

MEASURE 3. GIVE ACCESS TO COMMUNICATION GADGETS.

Some of the islands are still not reachable by signals of telecom companies. Communication to and from these islands is an essential service.

Action points:

- Request telecom companies to put up cell sites in strategic areas.
- Equip barangays with satellite phones or other important communication gadgets.

PILLAR 2. HUMAN SECURITY

In terms of human security, the main question remains: how far should area development go in these small islands considering the islands' geological nature? Experts consulted in this process raised the issue of carrying capacity of these islands. To what level can these islands support infrastructure development, settlements, and resource utilization towards sustainable island living?

The introduction of any developmental or disaster-mitigating structures to an island has to be first checked with the island's carrying capacity. Small islands have natural limits to support life and settlements. Knowledge of the carrying capacity will give information on whether the island is meant to be inhabited in the first place or if there is a need to limit current inhabitants or offer relocation (if possible). This study will also help determine which among the green, gray (i.e. will a mangrove forest be better for the island's circular pattern or its oceanographic condition) and/or hard infrastructures are appropriate for the island.

To determine the kind of infrastructure needed, the UP Marine Science Institute suggested studies on circulation or sedimentation patterns.

There were also proposals for seawalls, roads, and other hard infrastructures within the islands and in the marine area. Other suggested studies involve analyzing water quality studies from river water discharge, submarine groundwater discharge, and carbonate, especially bedrock. The suggested studies also aim to see whether the discharge is karst-cified or if there's untreated water discharge that can affect marine biodiversity.

These studies have to be done as any change in beach morphology may severely affect community livelihoods, which is largely fishing and kelp harvesting.

The effect of climate change, particularly sea level rise, takes on more ferocity and unprecedented impact year-on-year. Some of the measures being practiced now may prove to be environmentally unsustainable and disastrous in the long run, such as the harvesting of hardened corals to serve as foundations for raised homes.

Safety of the island communities is important. There is a need for higher preparedness levels for them considering their distance from the mainland.

A detailed study on sea level rise also needs to be done to simulate which areas and how far inland will be inundated with 1 meter sea level rise. We have to integrate the awareness, knowledge, skills-raising, and financial mobilization in order to put all our plans in motion.

Increased access to government and even private services

The distance of these islands also makes it harder for government services to be made accessible and regular. There is a need for various services to help increase adaptive capacities of small island dwellers.

MEASURE 1. CAREFULLY CONSIDER THE CARRYING CAPACITY OF THE ISLAND AND OTHER BASELINES TO SERVE AS BASIS OF INTERVENTIONS, PARTICULARLY INFRASTRUCTURE DEVELOPMENT.

Action points:

- Research to determine the carrying capacity of the different small islands of Bohol, especially the ones that are most affected by tidal floods and sea level rise.
- Study water circulation, ocean currents, water discharge from the islands, etc.
- Regulate infrastructure building on top of sinkhole areas.

MEASURE 2. INCREASE COMMUNITY PREPAREDNESS AGAINST EVERY HAZARD.

Action points:

- Designate an evacuation center for island dwellers within the island and in the mainland. Ensure that these are not located in hazard-prone areas.
- Establish hazard-based EWS in the island communities.
- Have contingency plans, including evacuation plans for island dwellers.
- Research to determine potential impacts of sea-level rise.
- Request MGB to conduct an evaluation of all island communities for a more detailed assessment.
- Provide home repair support to upgrade homes.
- Elevate schools.
- Construct multi-purpose covered courts and evacuation centers.

MEASURE 3. PROVIDE BASIC COMMUNITY SERVICES.

Action points:

- Provide basic medical supplies and services (medicines, medical equipment, etc.)
- Schedule regular visits of medical providers.
- Provide sea emergency vessel.
- Give access to reproductive health services; i.e., birthing homes with corresponding trained individuals to assist.
- Have food banks/food reserves ready for potential food relief.
- Establish ALS/TESDA programs.

MEASURE 4. ESTABLISH COMMUNITY-BASED EARLY WARNING SYSTEMS AND PROTOCOLS.

Action points:

- Install early warning systems and monitoring devices.
- Have contingency plans ready, organized by hazard, by island barangay.
- Train communities on contingency plans.

MEASURE 5. SET UP APPROPRIATE INFRASTRUCTURE AND NATURE-BASED SOLUTIONS BASED ON SOUND RESEARCH.

Action points:

- Construct seawalls, complete the existing ones (subject to feasibility).
- Plant more mangroves (subject to study).
- Build evacuation centers. (Subject to study. Good design and water capture capability must be integrated in the design.)
- Build roads (subject to study).
- Finish concreting pathways.
- Upgrade seaport.

PILLAR 3. WATER SECURITY

Drought is a recurring problem in Bohol. Under the driest condition projections for Bohol, there will be reductions in rainfall for

all the seasons. The future indicates a drier climate for Bohol. This is why adaptation measures should be in place, especially for water resources and the agriculture sector.

Water Desalination

Steps are needed to be taken to ensure that island communities have consistent and constant access to clean, safe, and affordable water.

A desalination facility can be the most potent solution to the problem of fresh water for small-island localities. The locals themselves should be trained to run it, while rainwater can be harvested for use for household chores.

Rainwater Harvesting

A rainwater harvesting system is essential but remains insufficient in many island barangays. Experts consulted about this process, however, have recommended that it would be more effectively done at the community scale rather than at household level. If employed, it should be integrated in the design of community facilities (an evacuation center, a community hall, or maybe a multi-purpose facility). Tap experts who can help design such facilities with capacity to store water.

Groundwater Resources Protection

Groundwater resources can provide communities with clean water for drinking. Protection of this resource is important as contamination can lead to health problems as well as be a danger to marine biodiversity.

MEASURE 1. IMPROVE ACCESS TO SAFE WATER.

Action points:

1. Perform water desalination.
2. Build rainwater harvesting tanks and structures.
3. Do regular water treatment.
4. Prioritize water connection to islands.
5. Have collective management of water resources.
6. Design community facilities with water storage capacities.
7. Protect groundwater quality by establishing proper sanitation practices or installing sanitation systems.
8. Protect water wells (i.e. sealed, fenced) to ensure water does not become contaminated.

MEASURE 2. PROVIDE COMMUNAL SANITATION FACILITIES.

Action points:

1. Install communal toilets with sealed septic tanks. These should be located downstream of water source.
2. Perform regular maintenance of public toilets.

MEASURE 3. ASSESS AND DESIGN ISLAND'S GROUNDWATER RESOURCES PROTECTION.

Action points:

1. Do research on processes and operations.
2. Plan for groundwater protection.

PILLAR 4: FOOD SECURITY AND INCOMES

Food is often expensive and difficult to access for island communities. Because of their location, islanders are naturally prone to food price inflation. This is made worse during disasters as goods are mostly sourced outside the islands. This pillar hopes to

address availability of food, affordability, and diversity in nutrition. It also seeks to determine additional sources of income as island incomes are also limited.

To reduce vulnerability of island communities in this regard, communities will have to strive harder to increase food self-sufficiency levels. Efforts will have to concentrate on technologies that can support this particular objective.

MEASURE 1. PROMOTE GREATER FOOD SECURITY AND NUTRITION IN ISLAND BARANGAYS.

Action points:

1. Set up hydroponics gardens in island barangays.
2. Set up compost pits to transform waste into potential soil condition/medium.
3. Link island barangays to NFA to help set up Bigasan centers within the islands.
4. Set up water collection to enable crop production even in limited capacity.
5. Have alternative cooking systems.
6. Establish a community savings program.
7. Provide fishing gear to fisher communities.

MEASURE 2. DEVELOP APPROPRIATE ALTERNATIVE LIVELIHOOD/ENTERPRISE DEVELOPMENT PLANS FOR ALL ISLAND BARANGAYS.

Action points:

1. Set up livelihood measures for PWDs and women's groups.
2. Set up livelihood/enterprise programs for fisherfolks.
3. Set up livelihoods/enterprises for the out-of-school youth.
4. For farm areas affected by saltwater intrusion, consider converting to fishponds.
5. Establish a tourism plan that can be a source of alternative livelihoods for island dwellers.
6. [Consolidate island products.](#)
7. [Link island products to bigger markets/marketing programs.](#)
8. [Have an early warning system for island livelihoods.](#)
9. [Create biodiversity enterprises.](#)

MEASURE 3. ESTABLISH SOCIAL PROTECTION MEASURES AGAINST LOSSES AND DAMAGES BROUGHT ABOUT BY CLIMATE HAZARDS.

Action points:

- Place insurance coverage of crops, animals, common facilities, [fishing boats/gears, guso farms, and homes.](#)
- [Set up climate information services for agriculture and fisheries as early warning for the sector.](#)
- [Prioritize islanders in cash transfers program.](#)
- [Enforce price control during natural disasters.](#)

PILLAR 5. ENVIRONMENTAL INTEGRITY

Other critical island issues are environmental. Bohol is a paradise and home to a genetic reservoir of marine organisms. Bohol hosts Danajon Bank, which spans 97 miles along the islands of Bohol, Cebu, Leyte, and Southern Leyte. It is one of just six double barrier reefs in the world. Not only is Danajon Bank a rare geologic formation, it is also considered one of the richest areas of marine biodiversity anywhere. It's the place from which almost all Pacific marine life evolved.

Solid Waste Management

Since small islands and islets have very limited land area, a waste management system should be developed. This should be responsive to island dwellers. Ideally, trash should be collected and processed sustainably in the nearby mainland.

UP Marine Science Institute's Carolina Jaraula has suggested for scientists to carefully document and study Bohol's biodiversity before we lose the natural beauty. Documentation is needed so we know how to conserve and preserve the natural gifts of Bohol.

MEASURE 1. CREATE A SOLID WASTE MANAGEMENT SYSTEM.

Action points:

Design proper solid waste management of islands.

- MRF
- Create common collection system of waste—separating biodegradable from recyclables.
- Maintain storage.
- Residual waste can be regularly brought to mainland with landfill.
- Promote reduce, reuse, and recycle program.

MEASURE 2. CONSIDER SETTING UP OF NATURAL GEOLOGICAL MUSEUMS TO PROMOTE BIODIVERSITY CONSERVATION.

Action points:

1. Organize inventory of marine biodiversity.
2. Set up natural geological museums in partnership with SUCs.
3. Create a conservation and management plan.

MEASURE 3. PRESERVE AND PROTECT NATURAL ASSETS OF THE ISLANDS.

Action points:

1. Support Bantay Dagat enforcers and strengthen NFARMCs.
2. Protect and continue coastal ecosystems management with science as basis.
3. Build fisheries management structures. And create plans to help manage common fishery grounds and protected areas; identify potential benefit stream in managing resources.
4. Protect groundwater quality with proper sanitation or by installing sanitation systems.
5. Protect water wells (i.e., sealed, fenced) to ensure it is not contaminated.
6. Generate alternative livelihoods to address poverty and resource conservation.
7. [Promote Adopt a Mangrove and Adopt a Coral Area program.](#)
8. [Establish LGU development alliance on the protection and conservation /rehabilitation of Danajon Bank.](#)

PILLAR 6. KNOWLEDGE MANAGEMENT

MEASURE 1. INTENSIFY IEC ON CLIMATE CHANGE, SEA LEVEL RISE, AND EARLY WARNING RISK INFORMATION.

Action points:

1. Establish IEC on CC and risk management solutions.
2. Create IEC on nature-based solutions to CC, importance of biodiversity.
3. Undertake research studies on island concerns.
4. Publicize results of studies.



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LGU records

CLIMATE EMERGENCY RESPONSE ROADMAP BY BOHOL LGUS, WITH POSSIBLE PARTNERS AND IMPLEMENTATION PERIOD

LGU

BIEN UNIDO

Pillars	Measures	Specific Actions	Possible Partners	Implementation timeframe
1. Enhancing accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PSF, PLGU, NGAs	Long term
		Equip barangays with 2-way radios or other communication gadgets in areas with no signal	BLGU, MLGU, PLGU	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Repair or provide new sea vessels for emergencies		Immediate
		Regularize transport that can be collectively managed as an enterprise by local folk	PSF, MLGU	Midterm
		Put out ordinance requiring life vest for all sea travel	MLGU	Immediate
		Provide life vests in every home or vessel	BLGU, MLGU, PLGU, NGAs	Immediate
		Construct docking port	PLGU, NGAs, PSF	Midterm

2. Human security	Set up appropriate infrastructures and nature-based solutions based on sound research	Build evacuation centers	MLGU, PLGU, PSF	Immediate
		Do research on carrying capacity of the island	PSF	Midterm
		Build seawalls (subject to feasibility study)	MLGU, PLGU, NGAs	Long term
		Build roads (subject to feasibility study)	PLGU, MLGU, PSF	Long term
	Establish community-based early warning systems and protocols	Install early warning systems (EWS) and monitoring devices	MLGU, BLGU, PLGU, NGAs, PSF	Immediate
	Provide basic community services	Provide sea vessels for emergencies	BLGU, MLGU, PSF	Immediate
		Provide medical supplies	BLGU, MLGU, PLGU, NGAs	Immediate
		Conduct regular visits of medical service provider	MLGU, PLGU, BLGU, NGAs	Midterm
		Give home repair support	MLGU, PLGU, BLGU, NGAs	Midterm
		Provide access to reproductive health service—birthing homes with corresponding trained individuals to assist	MLGU, PLGU, NGAs	Long term
	Ensure increased community preparedness for every hazard	Conduct training of communities on contingency plans/ drills	BLGU, MLGU	Immediate
		Designate an evacuation center for island dwellers within the island and in the mainland. Ensure that these are not located in hazard-prone areas	BLGU, MLGU	Midterm

Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions, particularly infrastructure development	Create contingency plans	MLGU, PLGU	Long term
	Let island barangays create contingency plans for each hazard	BLGU, MLGU	Immediate
	Establish hazard-based EWS in the island communities	MLGU, PLGU	Immediate
	Request MGB to conduct an assessment of all island communities for a more detailed assessment	MLGU, PLGU, NGAs	Midterm
	Establish an EWS for island dwellers	MLGU	Midterm
	Regulate infrastructure building on top of sinkhole	MLGU, PSF	Long term

3. Water security	Improve access to safe water	Establish rainwater harvesting and water treatment	MLGU, PLGU, NGAs, PSF	Immediate
		Launch collective management of water resources	MLGU, PLGU, NGAs	Immediate
		Set up water desalination system	PLGU, NGAs, PSF	Midterm
		Design community facilities with water storage capacities	PSF	Midterm
		Protect water wells (i.e., fenced, sealed) to ensure water inside does not get contaminated	BLGU, MLGU	Long term
		Set up water harvesting to enable backyard/ container gardening	BLGU, MLGU	Long term
	Provide access, and design island's groundwater resources protection	Plan for groundwater protection	BLGU, MLGU, PLGU, NGAs	Immediate
		Protect groundwater quality through proper sanitation	MLGU, PLGU	Midterm
		Do research on water circulation, ocean current, water discharge from the islands	PLGU, NGAs, PSF	Long term
		Do research on groundwater resources	PLGU, others (SUCs)	Long term

4. Food and income security	Develop appropriate alternative livelihoods/ enterprises development plans for all island barangays	Promote biodiversity products/ crafts development/ enterprises	PLGU	Long term
		Launch alternative livelihoods to address poverty and resource conservation	PLGU	Immediate
		Link island barangays to NFA to help set up bigasan centers within the island	MLGU, NGAs, PLGU	Midterm
		Ensure island products consolidation to access market	PLGU	Midterm
		Link island products to bigger markets	PLGU	Midterm
	Promote greater food security and nutrition in island barangays	Set up bigasan centers	MLGU, NGAs, PSF	Immediate
		Set up hydroponics gardens in the island	BLGU, MLGU, PLGU, NGAs, PSF	Immediate
		For farms affected by saltwater intrusion, consider converting to fishponds	PLGU, PSF	Midterm
		Enforce price control during disasters	MLGU	Midterm
		Set up food banks/reserves for food relief during emergencies	BLGU, MLGU	Long term
		Set up compost pits to transform wastes into potential soil conditioner/ medium	MLGU, PLGU, NGAs, PSF	Immediate

5. Ecological integrity/ environmental conservation	Establish solid waste management	Set up compost pits to transform waste into potential soil conditioner/medium	MLGU, BLGU	Immediate
		Promote reduce, reuse, recycle program	MLGU, BLGU	Immediate
		Regularly bring residual waste to mainland with landfill	MLGU, BLGU	Immediate
		Establish hazard-based EWS in the island communities	MLGU, PLGU	Midterm
		Normalize common collection system of waste, separating biodegradable from recyclable	MLGU	Midterm
		Build a materials recovery facility	BLGU, MLGU	Long term
		Set up storage of waste materials	BLGU, MLGU	Long term
	Preserve and protect natural assets of the island	Organize inventory of marine biodiversity	MLGU, NGAs	Immediate
		Promote Adopt a Mangrove and Coral Area program	MLGU	Midterm
		Establish LGU development alliance on the protection and conservation/ rehabilitation of Danajon Bank	PSF	Midterm
		Develop mangroves (subject to feasibility study)	BLGU, MLGU	Long term
	Set up appropriate infrastructures and nature-based solutions based on sound research	Support Bantay Dagat and strengthen NFARMCs	MLGU, NGAs	Immediate
		Protect and continue coastal ecosystems management with science as basis	BLGU, MLGU, PLGU, NGAs	Immediate
		Do research on water circulation, ocean current, water discharge from the islands	PSF	Midterm

6. Knowledge management and capacity building	Conduct trainings and seminars	PLGU	Immediate
	Create ordinance requiring policy	MLGU, PLGU	Immediate
	Ensure research development	PLGU, BLGU, PSF	Midterm
	Establish marine park	PLGU, MLGU, NGAs	Midterm
	Conduct biome survey	BLGU, PSF, others	Long term

LGU

CALAPE

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	MLGU, PSF, others	Immediate
		Equip barangays with satellite phones or other communication gadgets	PSF, others	Midterm
		Set aside budget for Internet connection	BLGU	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Repair or provide new sea vessels for emergencies	PLGU, others, NGAs (BFAR)	Immediate
		Regularize transport that can be collectively managed as an enterprise by local folk	MLGU, PLGU	Midterm
		Provide sea vessels for emergencies	PLGU, others (NGO), NGAs (BFAR)	Immediate
		Design a public transport system for island dwellers (possibly managed by a cooperative organized by island dwellers)	BLGU	Long term
		Upgrade seaport		
	Ensure access to sitios within islands	Conduct concreting of pathways		

2. Human security	Set up appropriate infrastructures and nature-based solutions based on sound research	Designate an evacuation center for island dwellers within the island and in the mainland and ensure that these are not located in hazard-prone areas	MLGU	Immediate
		Give home repair support to upgrade/ elevate homes	MLGU	Immediate
		Conduct regular visits of medical providers	MLGU	Immediate
		Regulate infrastructure building on top of sinkhole	MLGU	Midterm
	Establish community-based EWS and protocols	Enforce permanent relocation	PSF, others, NGAs	Long term
		Install EWS and monitoring devices	BLGU, MLGU, others, PLGU, NGAs (MGB, etc.)	Immediate
	Provide basic community services	Provide basic medical supplies (medicines) and services	MLGU, BLGU	immediate
		Provide access to reproductive health services— birthing homes with corresponding trained individuals to assist	MLGU, BLGU	Immediate
	Increase community preparedness for every hazard	Establish climate information services for agriculture and fisheries as early warning for the sector	PLGU, MLGU, NGAs	Immediate
		Complete seawalls (subject to feasibility study)	MLGU, NGAs	Midterm
		Conduct forced evacuation to mainland		
		Provide life vests in every home or per vessel	PLGU, MLGU, NGAs	Immediate

3. Water security	Improve access to safe water	Protect water wells (i.e., sealed, fenced) from contamination	MLGU, PLGU, BLGU	Immediate
		Ensure collective management of water resources		Long term
		Build more water collectors (best tank)	MLGU, BLGU	Immediate
		Water connection to the island (under water)		
	Provide communal sanitation facilities	Install communal toilets with sealed septic tanks. These should be located downstream of water source	BLGU, MLGU, PLGU	Immediate
		Repair communal toilets (only 4 out of 7 toilets are functional)		Immediate
		Regularly maintain toilets (community)	BLGU, MLGU	Immediate
		Conduct rain water harvesting and water treatment	MLGU, PLGU, BLGU	Immediate
		Plan for groundwater protection		Long term
		Design community facilities with water storage capacities		Long term
	Access and design island's groundwater resources protection	Protect groundwater quality by conducting proper sanitation or by installing sanitation systems	PSF	Midterm
		Set up water desalination system	PLGU, PSF	Long term

4. Food and income security	Develop appropriate alternative livelihoods/enterprises development plan for all island barangays	Create livelihood/enterprise programs for the out-of-school youth (OSY)	PLGU, NGAs, others	Immediate
		Create livelihood/enterprise programs for fisherfolk	PLGU	Immediate
		Create livelihood/enterprise programs for PWD and women's groups	PLGU	Midterm
		Link island barangays to NFA to help set up bigasan centers within the islands	MLGU	Immediate
		Establish food banks/food reserves ready for potential food relief	BLGU, MLGU, PLGU	Immediate
		Set up insurance coverage of crops, animals, fishing boats/gear, guso farm and homes	MLGU, NGAs (DA)	Immediate
		Prioritize islanders in cash transfer programs	MLGU, PLGU, NGAs (national government)	Immediate
	Impose social protection measures against losses and damages brought about by climate hazards	Link island products to bigger markets	MLGU, PLGU, others	Midterm
		Set up food reserves/storage	BLGU, MLGU	Immediate
		Set up alternative cooking system	BLGU, MLGU, PLGU	Immediate
		Establish fisheries management structures and plans to help manage common fishery grounds and protected areas		Midterm
		Provide fishing gear		
		Set up community savings program		
		Set up hydroponics gardens in island barangays	BLGU, MLGU, PLGU, NGAs (DA)	Long term
	Promote greater food security and nutrition in island barangays			

5. Ecological integrity/ environmental conservation	Prioritize solid waste management	Promote reduce, reuse, recycle program	MLGU, BLGU	Immediate
		Build a materials recovery facility	MLGU, BLGU	Immediate
		Set up compost pits to transform waste into potential soil conditioner/ medium	MLGU, BLGU	Immediate
		Set up common collection system of waste separating biodegradable from recyclable	BLGU, MLGU	Immediate
	Preserve and protect natural assets of the island	Regularly bring residual waste to mainland with landfill	MLGU	Immediate
		Protect and continue coastal ecosystems management with science as basis	NGAs (DENR), MLGU, PLGU	Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs	NGAs (DENR), MLGU, PLGU	Immediate
	Consider setting up of natural geological museums to promote biodiversity conservation	Promote Adopt a Mangrove and Coral Area program		Immediate
		Set up biodiversity enterprises		Long term
6. Knowledge management and capacity building		Request MGB to conduct an assessment of all island communities for a more detailed study	PLGU	Immediate
		Create contingency plans including evacuation plans for island dwellers	PLGU	Immediate
		Create contingency plans by hazard by island barangays	PLGU	Immediate
		Establish hazard-based EWS in the island communities	PLGU	immediate
		Develop mangroves (subject to study)	PLGU	Midterm
		Do research on water circulation, ocean currents, water discharge from the islands, etc.	PLGU	Midterm

		Prioritize IEC and advocacy on cc, MPAs, biodiversity	MLGU	Immediate
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GETAFE

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing Accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PLGU	Immediate
		Equip barangays with satellite phones or other important communication gadgets	NGAs	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Regularize transport services that can be collectively run as an enterprise by local folk	BLGU, MLGU	Immediate
		Put out ordinance requiring life vest for all sea travel	BLGU, MLGU	Immediate
		Repair or provide of new sea vessels for emergency	MLGU	Midterm
		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	BLGU	Midterm
		Provide life vests in every home or per vessel	MLGU	Long term
		Provide sea emergency vessel	MLGU	Long term
	Conduct immediate repair/ maintenance of bridges connecting islands to mainland	Build roads (subject to study)	BLGU, MLGU, NGAs	Immediate
		Link island products to bigger markets	BLGU, MLGU, PLGU	Midterm
		Repair bridges connecting islands to mainland	MLGU, BLGU, NGAs	Long term

2. Human security	Establish community-based EWS and protocols	Install EWS and monitoring devises	BLGU, MLGU,	Immediate
		Establish contingency plans by hazard by island barangays	MLGU	Midterm
	Provide basic community services	Provide basic medical supplies (medicines) and services	MLGU, BLGU	Immediate
		Carry out regular visits of medical providers	MLGU, BLGU	Immediate
		Give access to reproductive health services—birthing homes with corresponding trained individuals to assist	MLGU	Midterm
		Hire health personnel/ additional manpower	MLGU, BLGU	Midterm
	Increase community preparedness against every hazard	Put up evacuation centers (subject to study, with good design and capacity for water capture)	MLGU	Immediate
		Create contingency plan, including evacuation plans for island dwellers	BLGU, MLGU	Midterm
		Give home repair support to upgrade homes	BLGU, MLGU	Long term
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions	Enforce permanent relocation	BLGU, MLGU, PLGU, NGAs, PSE, others	Immediate
		Designate evacuation centers for island dwellers within the islands and in the mainland and ensure that these are not located in hazard-prone areas	BKGU, MLGU	Midterm
		Regulate infrastructure building on the top of sinkhole areas	MLGU	Long term

3. Water security	Set up social protection measures against losses and damages brought about by climate hazards	Set up EWS for island livelihoods	BLGU, MLGU	
		Set up climate information services for agriculture and fisheries as early warning for the sector		Immediate
		Build sea wall (subject to study)	BLGU	Midterm
		Prioritize islanders in cash transfer programs	MLGU	Long term
	Improve access to safe water	Protect water wells (i.e. sealed, fenced) from contamination	MLGU	Immediate
		Perform rainwater harvesting and water treatment	PLGU	Immediate
		Set up water desalination system	NGAs, PLGU, others	Long term
		Do collective management of water resources	PLGU	Long term
		Do research on island's ground water	PLGU	Long term
	Provide communal sanitation facilities	Install communal sealed septic tank with individual pipelines to HH. These should be located downstream of water sources	PLGU, NGAs	Immediate
	Access and design island's groundwater resources protection	Create a conservation and management plan	BLGU, NGAs, PSF	Immediate
		Protect groundwater quality with proper sanitation or by installing sanitation system	NGAs, others	Midterm
		Plan for groundwater protection	PLGU	Long term
		Set up water collection to enable crop production even in limited capacity	MLGU, NGAs	Long term

4. Food and income security	Develop appropriate alternative livelihoods/ enterprises development plan for all island barangays	Create livelihood/ enterprise programs for senior citizens	BLGU	Immediate
		Set up insurance coverage of crops, animals, fishing boats/ gear, guso farm and homes	PLGU, NGAs	Immediate
		Create livelihood/ enterprise programs for PWD and women's groups	MLGU, NGAs	Immediate
		Create livelihood/ enterprise programs for fisherfolk and farmers	MLGU, NGAs	Immediate
		Organize island product consolidation	MLGU, PSF	Midterm
		Create livelihood/ enterprise programs for OSY	MLGU	Immediate
		Build fisheries management structures and plans to help manage common fisheries grounds and protected areas	PLGU	Long term
		For farm areas affected by saltwater intrusion, consider converting to fish ponds	NGAs	Long term
	Develop and promote potential eco-tourism sites	Create a tourism plan that can be a source of livelihood for island dwellers	PLGU, NGAs	Immediate
		Create municipal tourism plan	MLGU	Immediate
		Launch infrastructure projects for tourism sites	NGAs, PSF, PLGU	Midterm
	Promote greater food security and nutrition in island barangays	Link island barangays to NFA to help set up bigasan centers within the island	NGAs, MLGU	Immediate
		Set up hydroponics gardens in island barangays	NGAs, MLGU	Immediate
		Enforce price control during disasters	NGAs	Immediate
		Set up alternative cooking system	PLGU, MLGU, others	Midterm
		Set up food banks/food reserves ready for potential food relief	BLGU, MLGU, PLGU	Midterm
		Hire nutritionist	MLGU	Midterm

5. Ecological integrity/ environmental conservation	Establish solid waste management system	Promote reduce, reuse, recycle program	MLGU, BLGU	Immediate
		Build a materials recovery facility	MLGU, BLGU	Immediate
		Set up compost pits to transform waste into potential soil conditioner/ medium	MLGU, BLGU	Immediate
		Set up common collection system of waste separating biodegradable from recyclable	BLGU, MLGU	Immediate
		Regularly bring residual waste to mainland with landfill	MLGU, BLGU	Immediate
		Establish hazard-based EWS in the island communities	MLGU, PLGU	Midterm
	Preserve and protect natural assets of the island	Build storage facility for solid waste	BLGU, MLGU	Long term
		Organize inventory of marine biodiversity	MLGU, NGAs	Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs	MLGU, NGAs	Immediate
		Promote Adopt a Mangrove and Coral Area program	MLGU	Midterm
		Establish LGU development alliance on the protection and conservation/ rehabilitation of Danajon Bank	PSF	Midterm
	Set up appropriate infrastructure and nature-based solutions supported by sound research	Develop mangroves (subject to feasibility study)	BLGU, MLGU	Long term
		Protect and continue coastal ecosystems management with science as basis	BLGU, MLGU, PLGU, NGAs	Immediate
		Do research on water circulation, ocean currents, water discharge from the islands, etc.	PSF	Midterm

6. Knowledge management and capacity building	Consider setting up natural museums to promote biodiversity conservation	Train communities on contingency plans/ drills	MLGU, PLGU	Immediate
		Create contingency plans by hazard by island barangay	MLGU, PLGU	Immediate
		Do research to determine potential impacts of sea level rise	MLGU, PLGU	Midterm
		Request MGB to conduct an assessment of all island communities for a more detailed assessment	MLGU, PLGU	Midterm
		Set up natural geological museums in partnership with SUCs	PLGU	Long term

LGU

CLARIN

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing accessibility	Provide access to electricity and communication gadgets/facilities	Request telecoms company to put up cell sites in strategic areas	community (BLGU), MLGU, PLGU and NGAs	Immediate
		Equip barangays with satellite phones or other communication gadgets	BLGU, MLGU, PLGU	Immediate
		Install solar power generator for electricity	BLGU, MLGU, PLGU	Immediate
		Install EWS and monitoring devises	BLGU, MLGU, PLGU	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Repair or provide new sea vessels for emergencies	BLGU, MLGU, PLGU, NGAs	Immediate
		Regularize transport that can be collectively managed as an enterprise by local folk	BLGU, MLGU, PLGU, NGAs	Immediate
		Provide sea emergency vessels	Others	Immediate
		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	Others	Immediate

2. Human security	Set up appropriate infrastructure and nature-based solutions using sound research	Designate an evacuation center for island dwellers within the island and in the mainland; ensure that these are not located in hazard-prone areas	BLGU, MLGU, PLGU	Immediate
		Regulate infrastructure building on top of sinkhole	BLGU, MLGU, PLGU	Immediate
		Do research	MLGU, PLGU, NGAs	Midterm
		Protect and continue coastal ecosystems management with science as basis	PLGU	Midterm
		Build seawalls (subject to feasibility study)	PLGU, NGAs	Long term
		Build roads (subject to feasibility study)	PLGU, NGAs	Long term
	Set up social protection measures against losses and damages brought about by climate hazards	Put out ordinance requiring life vests for all sea travel passengers	BLGU, MLGU, PLGU	Immediate
		Provide life vests in every home or per vessel	BLGU, MLGU, PLGU	Immediate
	Establish community-based EWS and protocols	Install early warning devices	BLGU, MLGU, PLGU, NGAs	Immediate
	Provide basic community services	Carry out regular visits of medical providers	MLGU	Immediate
		Give access to reproductive health services— birthing homes with corresponding trained individuals to assist	MLGU	Immediate
	Increase community preparedness against every hazard	Establish hazard-based EWS in the island communities	MLGU	Immediate
		Request MGB to conduct an assessment of all island communities for a more detailed study	BLGU, MLGU, NGAs	Midterm

Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions particularly infrastructure development	Create contingency plans including evacuation plans for island dwellers	BLGU, MLGU, NGAs	Midterm
	Give home repair support to upgrade homes	BLGU, MLGU, NGAs	Midterm
	Prioritize islanders in cash transfers program	BLGU, MLGU, NGAs	Midterm
	Enforce permanent relocation		Long term
	Conduct regular maintenance of toilets	MLGU	Immediate
	Ensure provision of basic medical supplies (medicines) and services	MLGU	Immediate
	Do research to determine the carrying capacity of the different small islands especially the ones that are most affected by the floods and sea level rise	BLGU, MLGU, NGAs	Midterm

3. Water security	Improve access to safe water	Protect water wells (i.e. sealed, fenced) to ensure water inside is not contaminated	BLGU, MLGU, PLGU, NGAs	Immediate
		Design community facilities with water storage capacity	BLGU, MLGU, NGAs	Immediate
		Plan for groundwater protection	Others	Midterm
		Set up water collection to enable crop production even in limited capacities	Others	Midterm
		Do research on water circulation, ocean currents, water discharge from the islands, etc.	MLGU, PLGU, NGAs	Long term
		Perform desalination	MLGU, PLGU, NGAs	Long term
	Access and design island's groundwater resources protection	Ensure collective management of water resources	BLGU, MLGU	Immediate
		Protect groundwater wells (i.e., sealed, fenced) to ensure water inside does not become contaminated	BLGU, MLGU	Immediate
		Conduct rainwater harvesting and water treatment	MLGU, PLGU, NGAs	Immediate
		Install communal toilets with sealed septic tanks; these should be located downstream of water source	MLGU	Immediate
		Protect groundwater quality with proper sanitation or by installing sanitation systems	MLGU	Immediate
4. Food and income security	Develop appropriate alternative livelihoods/enterprises development plan for all island barangays	Create tourism plans that can be a source of alternative livelihoods for island dwellers	BLGU	Immediate
		For farms affected by saltwater intrusion, consider converting to fishponds	BLGU	Immediate

Promote greater food security and nutrition in island barangays	Set up hydroponics gardens in island barangays	BLGU	Immediate
	Set up food banks/ food reserves ready for potential food relief	BLGU	Immediate
	Create alternative livelihoods to address poverty and resource conservation	BLGU, MLGU, PLGU, NGAs	Immediate
	Create livelihood measures for PWD and women's groups	BLGU, MLGU, PLGU, NGAs	Immediate
	Create livelihood/ enterprise programs for fisherfolk	PLGU	Immediate
	Set up alternative cooking systems		Immediate
	Link island barangays to NFA to help set up bigasan centers within the island	MLGU, NGAs	Immediate
	Create livelihood/ enterprise programs for OSY		Immediate
	Support Bantay Dagat enforcers and strengthen NFARMCs		Immediate
	Set up island products consolidation	PLGU	Midterm
	Link island products to bigger markets	PLGU	Midterm
	Repair bridges connecting islands to mainland	PLGU, NGAs	Long term
	Set up climate information services for agriculture and fisheries as early warning for the sector	PLGU	Immediate
	Set up insurance coverage of crops, animals, common facilities, fishing boats/gear, guso farms and homes	PLGU	Immediate
	Establish EWS for island livelihoods		Immediate
	Enforce price control during disasters		Immediate
	Set up food storage		Immediate

5. Ecological integrity/ environmental conservation	Establish solid waste management	Build material recovery facilities	BLGU, MLGU, PLGU, NGAs	Immediate
		Promote reduce, reuse, recycle program	BLGU, MLGU, PLGU	Immediate
		Set up common collection system of waste separating biodegradable from recyclables	BLGU	Immediate
		Set up compost pits to transform wastes into potential soil conditioner/ medium		Immediate
		Promote Adopt a Mangrove and Coral Area program		Immediate
		Establish LGU development alliance for the protection and conservation/ rehabilitation of Danaon Bank		Immediate
	Provide communal sanitation facilities	Organize inventory of marine biodiversity	MLGU, PLGU, NGAs	Midterm
		Set up conservation and management plan	PLGU	Midterm
		Regularly bring residual waste to mainland with landfill		Immediate
		Set up fisheries management structures to help manage common fisheries ground and protected areas and identify potential benefit stream in managing resources		Immediate

6. Knowledge management and capacity building	Preserve and protect natural assets of the islands	Develop mangroves (subject to study)	PLGU, NGAs	Immediate
		Create contingency plans by hazard by island barangay	PLGU, NGAs	Midterm
		Train communities on contingency plans	PLGU, NGAs	Midterm
		Create biodiversity enterprises		Midterm
		Do research to determine potential impacts of sea level rise	PLGU, NGAs	Long term
		Build evacuation centers (subject to study; integrate water capture in the design)		Long term
		Set up natural geological museums in partnership with SUCs	PLGU, NGAs, others (SUCs)	Long term

LGU

CLARIN
(NOTE:DUPLICATE
CONTENT)

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing Accessibility	Provide access to electricity and communication gadgets/facilities	Request telecoms company to put up cell sites in strategic areas	Community (BLGU), MLGU, PLGU and NGAs	Immediate
		Equip barangays with satellite phones or other communication gadgets	BLGU, MLGU, PLGU	Immediate
		Install solar power generator for electricity	BLGU, MLGU, PLGU	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Install EWS and monitoring devices	BLGU, MLGU, PLGU	Immediate
		Repair or provide new sea vessels for emergencies	BLGU, MLGU, PLGU, NGAs	Immediate
		Regularize transport that can be collectively managed as an enterprise by local folk	BLGU, MLGU, PLGU, NGAs	Immediate
		Provide sea emergency vessels	Others	Immediate

2. Human security		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	Others	Immediate
	Set up appropriate infrastructure and nature-based solutions using sound research	Designate an evacuation center for island dwellers within the island and in the mainland; ensure that these are not located in hazard-prone areas	BLGU, MLGU, PLGU	Immediate
		Regulate infrastructure building on top of sinkhole	BLGU, MLGU, PLGU	Immediate
		Do research	MLGU, PLGU, NGAs	Midterm
		Protect and continue coastal ecosystems management with science as basis	PLGU	Midterm
		Build seawalls (subject to feasibility study)	PLGU, NGAs	Long term
		Build roads (subject to feasibility study)	PLGU, NGAs	Long term
	Set up social protection measures against losses and damages brought about by climate hazards	Put out ordinance requiring life vest for all sea travel	BLGU, MLGU, PLGU	Immediate
		Provide life vests in every home or per vessel	BLGU, MLGU, PLGU	Immediate
	Establish community-based early warning systems and protocols	Install early warning devices	BLGU, MLGU, PLGU, NGAs	Immediate
	Provide basic community services	Conduct regular visits of medical providers	MLGU	Immediate
		Give access to reproductive health services— birthing homes with corresponding trained individuals to assist	MLGU	Immediate
	Increase community preparedness against every hazard	Establish hazard-based EWS in the island communities	MLGU	Immediate

3. Water security	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions, particularly infrastructure development	Request MGB to conduct an assessment of all island communities for a more detailed study	BLGU, MLGU, NGAs	Midterm
		Set up contingency plans, including evacuation plans for island dwellers	BLGU, MLGU, NGAs	Midterm
		Give home repair support to upgrade homes	BLGU, MLGU, NGAs	Midterm
		Prioritize islanders in cash transfers program	BLGU, MLGU, NGAs	Midterm
		Enforce permanent relocation		Long term
		Regularly maintain toilets	MLGU	Immediate
	Improve access to safe water	Ensure provision of basic medical supplies (medicines) and services	MLGU	Immediate
		Do research to determine the carrying capacity of the different small islands especially the ones that are most affected by the floods and sea level rise	BLGU, MLGU, NGAs	Midterm
		Protect water wells (i.e. sealed, fenced) to ensure water inside is not contaminated	BLGU, MLGU, PLGU, NGAs	Immediate
		Design community facilities with water storage capacities	BLGU, MLGU, NGAs	Immediate
		Plan for groundwater protection	Others	Midterm
		Set up water collection to enable crop production even in limited capacities	Others	Midterm
		Do research on water circulation, ocean currents, water discharge from the islands, etc.	MLGU, PLGU, NGAs	Long term
		Conduct desalination	MLGU, PLGU, NGAs	Long term

4. Food and income security	Access and design island's groundwater resources protection	Set up collective management of water resources	BLGU, MLGU	Immediate
		Protect groundwater wells (i.e., sealed, fenced) to ensure water inside does not become contaminated	BLGU, MLGU	Immediate
		Do rainwater harvesting and water treatment	MLGU, PLGU, NGAs	Immediate
		Install communal toilets with sealed septic tanks; should be located downstream of water source	MLGU	Immediate
		Protect groundwater quality with proper sanitation or by installing sanitation systems	MLGU	Immediate
	Develop appropriate alternative livelihoods/ enterprises development plan for all island barangays	Create tourism plans that can be a source of alternative livelihood for island dwellers	BLGU	Immediate
		For farms affected by saltwater intrusion, consider converting to fishponds	BLGU	Immediate
		Set up hydroponics gardens in island barangays	BLGU	Immediate
		Set up food banks/ food reserves ready for potential food relief	BLGU	Immediate
		Set up alternative livelihoods to address poverty and resource conservation	BLGU, MLGU, PLGU, NGAs	Immediate
		Set up livelihood measures for PWD and women's groups	BLGU, MLGU, PLGU, NGAs	Immediate
		Set up livelihood/ enterprise programs for fisherfolk	PLGU	Immediate
		Set up alternative cooking systems		Immediate
		Link island barangays to NFA to help set up bigasan centers within the island	MLGU, NGAs	Immediate
		Set up livelihood/ enterprise programs for OSY		Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs		Immediate

5. Ecological integrity/ environmental conservation	Promote greater food security and nutrition in island barangays	Consolidate Island products	PLGU	Midterm
		Link island products to bigger markets	PLGU	Midterm
		Repair bridges connecting islands to mainland	PLGU, NGAs	Long term
		Set up climate information services for agriculture and fisheries as early warning for the sector	PLGU	Immediate
		Set up insurance coverage of crops, animals, common facilities, fishing boats/gear, guso farms and homes	PLGU	Immediate
		Set up EWS for island livelihoods		Immediate
		Enforce price control during disasters		Immediate
		Set up food storage		Immediate
	Create solid waste management system	Build material recovery facilities	BLGU, MLGU, PLGU, NGAs	Immediate
		Promote reduce, reuse, recycle program	BLGU, MLGU, PLGU	Immediate
		Set up common collection system of waste, separating biodegradable from recyclables	BLGU	Immediate
		Set up compost pits to transform wastes into potential soil conditioner/ medium		Immediate
		Promote Adopt a Mangrove and Coral Area program		Immediate
		Establish LGU development alliance for the protection and conservation/ rehabilitation of Danajon Bank		Immediate
		Organize inventory of marine biodiversity	MLGU, PLGU, NGAs	Midterm
		Create a conservation and management plan	PLGU	Midterm

6. Knowledge management and capacity building	Provide communal sanitation facilities	Regularly bring residual waste to mainland with landfill		Immediate
		Build fisheries management structures to help manage common fisheries ground and protected areas and identify potential benefit stream in managing resources		Immediate
	Preserve and protect natural assets of the islands	Develop mangroves (subject to study)	PLGU, NGAs	Immediate
		Create contingency plans by hazard by island barangay	PLGU, NGAs	Midterm
		Train communities on contingency plans	PLGU, NGAs	Midterm
		Create biodiversity enterprises		Midterm
		Do research to determine potential impacts of sea level rise	PLGU, NGAs	Long term
		Build evacuation centers (subject to study; integrate water capture elements in the design)		Long term
		Set up natural geological museums in partnership with SUCs	PLGU, NGAs, others (SUCs)	Long term

LGU

PRESIDENT CARLOS
P GARCIA (CPG)

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PLGU	Immediate
		Equip barangays with satellite phones or other communication gadgets	PLGU	Midterm
	Ensure safe sea transport for emergency and regular transport services for the public	Repair or provide new sea vessels for emergencies	MLGU	Midterm

2. Human security		Regularize transport that can be collectively managed as an enterprise by local folk	MLGU	Long term
	Conduct immediate repair/ maintenance of bridges connecting islands to mainland	Put out ordinance requiring life vest for all sea travel	MLGU	Immediate
		Construct new concrete bridges at Aguinig	NGAs	Midterm
		Repair bridges connecting islands to mainland	NGAs	Immediate
	Set up appropriate infrastructures and nature-based solutions using sound research	Build evacuation centers (subject to study; water capture elements should be integrated in the design)	PLGU	Long term
		Carry out mangrove reforestation		
	Provide access to secondary education	Construct new school building (Sto. Rosario)	NGAs	Immediate
	Establish community-based EWS and protocols	Train communities on contingency plans/ drills	PLGU	Immediate
		Install EWS and monitoring devices	BLGU	Midterm
		Create contingency plans including evacuation plans for island dwellers	MLGU	Long term
	Provide basic community services	Provide sea vessels for emergencies	MLGU	Immediate
		Provide basic medical supplies (medicines) and services	MLGU	Immediate
		Conduct regular visits of medical service provider	MLGU	Immediate
		Provide access to reproductive health services —birthing homes with corresponding trained individuals to assist	MLGU	Immediate

3. Water security	Increase community preparedness against every hazard	Designate an evacuation center for island dwellers within the island and in the mainland; ensure that these are not located in hazard-prone areas	MLGU	Immediate
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions particularly infrastructure development	Do research on water circulation, ocean current, water discharge from the islands, etc.	Others	Long term
		Do research to determine the carrying capacity of the different small islands especially the ones that are most affected by tidal floods and sea level rise	Others	Long term
		Regulate infrastructure building on top of sinkholes	MLGU	Midterm
	Improve access to safe water	Conduct rainwater harvesting and water treatment	MLGU, PLGU, BLGU	Midterm
		Set up collective management of water resources	MLGU, PLGU, BLGU	Midterm
		Set up water desalination system	PLGU, MLGU, others	Immediate
		Design community facilities with water storage capacities	MLGU, PLGU, BLGU	Immediate
		Protect water wells (i.e. fenced, sealed) to ensure water inside does not get contaminated	MLGU, PLGU, BLGU	Long term
		Protect groundwater quality with proper sanitation or by installing sanitation systems	BLGU, MLGU, PLGU	Long term
		Protect groundwater quality with proper sanitation or by installing sanitation systems	BLGU, MLGU, PLGU	Long term
	Provide communal sanitation facilities	Install communal toilets with sealed septic tanks; should be located downstream of water source	BLGU, MLGU, PLGU, NGAs	Immediate
		Do regular maintenance of community toilets	BLGU, MLGU, PLGU	Long term
	Access and design island's groundwater resources protection	Plan for groundwater protection		Long term

		Do research on groundwater resources		Long term
4. Food and income security	Develop appropriate alternative livelihoods/ enterprises development plan for all island barangays	Set up livelihood/ enterprise programs for fisherfolk, farmers and mat weavers	BLGU, PLGU, MLGU, others	Immediate
		Set up alternative livelihood to address poverty and resource conservation	MLGU, PLGU, PSF	Midterm
		Set up livelihood/ enterprise programs for senior citizens	MLGU, PLGU	Midterm
		For farms affected by saltwater intrusion, consider converting to fishponds		
5. Ecological integrity/ environmental conservation	Establish solid waste management system	Promote reduce, reuse, recycle program	MLGU, BLGU	Long term
		Regularly bring residual waste to mainland with landfill	MLGU	Midterm
		Establish hazard-based EWS in the island communities	MLGU	Midterm
		Set up common collection system of waste separating biodegradable from recyclable	MLGU	Immediate
		Set up storage of waste materials	MLGU	Immediate
	Preserve and protect natural assets of the island	Organize inventory of marine biodiversity		Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs	MLGU	Immediate
		Promote Adopt a Mangrove and Coral Area program	BLGU	Immediate
		Create a conservation and management plan		Long term
		Build fisheries management structures and plans to help manage common fisheries grounds and protected areas		Long term

		Protect and continue coastal ecosystems management with science as basis	PSF, BLGU	Long term
		Establish LGU development alliance on the protection and conservation/ rehabilitation of Danaon Bank	MLGU, NGAs	Long term
		Protect groundwater quality with proper sanitation or by installing sanitation systems	BLGU, NGAs	Long term
6. Knowledge management and capacity building	Promote ecotourism	Train locals on ecotourism	BLGU, MLGU, PLGU, NGAs, others	Immediate
		Conduct ecotourism sites' preservation and conservation	PLGU, MLGU, BLGU	Long term
	Launch Romblon product development	Conduct livelihood training on mat weaving and other Romblon products (bags, etc.)	BLGU, MLGU, PLGU, others	Long term

LGU

GETAFE

(NOTE: DUPLICATE OF CONTENT ON P. 74)

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing Accessibility	Access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PLGU	immediate
		Equipt barangays with satellite phones or other important communication gadgets	NGAs	immediate
	Ensuring safe sea transport for emergency and regular transport services for the public	regularize transport services than can be collectively run as an enterprise by local folks	BLGU, MLGU	immediate
		ordinance requiring lifevest for all sea travel	BLGU, MLGU	immediate
		repair or provision of new sea vessels for emergency	MLGU	midterm

		designing a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	BLGU	midterm
		provision of life vests in every hoome or per vessel	MLGU	long term
		provision of sea emergency vessel	MLGU	long term
	Immediate repair / maintenance of bridges connecting islands to mainland	roads (subject to study)	BLGU, MLGU, NGAs	immediate
		link island products to bigger markets	BLGU, MLGU, PLGU	midterm
		repair of bridges connection islands to mainland	MLGU, BLGU, NGAs	long term
2. Human Security	Establishment of community based early warning systems and protocols	Install early warning systems and monitoring devises	BLGU, MLGU,	immediate
		contingency plans by hazard by island barangays	MLGU	midterm
	Provision of basic communiy services	Provision of basic medical supplies and services (medicines)	MLGU, BLGU	immediate
		regular visit of medical providers	MLGU, BLGU	immediate
		access to reproductive health services --- bitrthing homes with corresponding trained individuals to assist	MLGU	midterm
		hiring of health personnel/ addtitional manpower	MLGU, BLGU	midterm
	Increased community preparedness to every hazard	evacuation centers (subject to study and good designing and water Capture integrated in the design)	MLGU	immediate
		contingency plan, including evacuaiton plans for island dwellers	BLGU, MLGU	midterm
		home repair support to upgrade home	BLGU,MLGU	long term
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions	permanent relocation	BLGU, MLGU, PLGU, NGAs, PSF, others	immediate

		designate and evacuation center for island dwellers within and in mainland and ensure that these are not located in hazard prone areas	BKGU, MLGU	midterm
		regulate infrastructure building on the top of sinkhole areas	MLGU	long term
	Social protection measures from losses and damages brought about by climate hazards	early warning system for island livelihoods	BLGU, MLGU	
		climate information services for agriculture and fisheries as early warning for the sector		immediate
		sea wall (subject for study)	BLGU	midterm
3. Water Security	Improvement of Access to safe water	Islanders as priority in cash transfer programs	MLGU	long term
		Protect water wells (i.e. sealed, fenced) from contamination	MLGU	immediate
		rainwater harvesting and water treatment	PLGU	immediate
		Set up water desalination system	NGAs, PLGU, others	long term
		collective management of water resources	PLGU	long term
	Provision of communal sanitation facilities	research (island's ground water)	PLGU	long term
		install communal sealed septic tank with individual pipelines to HH and should be located downstream of water sources	PLGU, NGAs	immediate
	Access and design island's groundwater resources protection	conservation and management plan	BLGU, NGAs, PSF	immediate
		may mga nakapatong na metacards		
		protect groundwater quality by proper sanitation or installing sanitation system	NGAs, others	midterm
		plan for groundwater protection	PLGU	long term
		set up water collection to enable crop production even in limited capacity	MLGU, NGAs	long term

4. Food and income security	Develop appropriate alternative livelihoods/ enterprises development plan for all island barangays	Livelihood/ enterprise for senior citizens (elderly)	BLGU	immediate
		insurance coverage of crops, animals, fishingboats/gears, guso farm and homes	PLGU, NGAs	immediate
		Livelihood/ enterprise programs for PWD and women's group	MLGU, NGAs	immediate
		livelihood/ enterprise programs for fisherfolks and farmers	MLGU, NGAs	immediate
		island product consolidation	MLGU, PSF	midterm
		livelihood/ enterprise programs for out of school youth	MLGU	immediate
		Fisheries Management structures and plans to help manage common fisheries ground and protected areas	PLGU	long term
		for farm areas affected by saltwater intrusion , consider converting to fish ponds	NGAs	long term
	Develop and promote potential eco-tourism site	tourism plan which can be a source of livelihoodsfor island dwellers	PLGU, NGAs	immediate
		Creation of municipal tourism plan	MLGU	immediate
		Infrastructure projects for tourism site	NGAs, PSF, PLGU	midterm
	To promote greater food security and nutrition in island barangays	to link island barangays to NFA to help set up bigasan centers within the island	NGAs, MLGU	immediate
		set-up hydroponics gardens in island barangay	NGAs, MLGU	immediate
		price control during disasters	NGAs	immediate
		alternate cooking system	PLGU, MLGU, others	midterm
		food banks/ food reserve ready for potential food relief	BLGU, MLGU, PLGU	midterm
		hiring of nutritionist	MLGU	midterm
5. Ecological integrity/ environmental conservation	Solid waste management	Promotion of reduce, reuse, recycle	MLGU, BLGU	immediate
		MRF	MLGU, BLGU	immediate
		set up compost pits to transformwaste into potential soil conditioner/ medium	M:LGU, BLGU	immediate

		Common collection system of waste separating biodegradable from recyclable	BLGU, MLGU	immediate
		Residual waste can be regularly brought to mainland with landfill	MLGU, BLGU	immediate
		establish hazard based EWS in the island communities	MLGU, PLGU	midterm
		Common collection system of waste separating biodegradable from recyclable	BLGU	midterm
		storage (solid waste)	BLGU, MLGU	long term
	Preserve and protect natural assets of the island	inventory of marine biodiversity	MLGU, NGAs	immediate
		support bantay dagat enforcers and strengthen NFARMCs	MLGU, NGAs	immediate
		Promote Adopt a Mangrove and Coral Area program	MLGU	midterm
		establish LGU development alliance on the protection and conservation / rehabilitation of Danajon Bank	PSF	midterm
		Develop mangroves (subject to feasibility study)	BLGU, MLGU	long term
	set-up appropriate infrastructure and nature-based solutions based on sound research	Protect and continue coastal ecosystems management with science as basis	BLGU, MLGU, PLGU, NGAs	immediate
		research on water circulation, ocean currents, water discharge from the islands, etc.	PSF	midterm
6. Knowledge management and capacity building	Consider setting up of natural museums to promote biodiversity conservation	Training of communities on contingency plans/ drills	MLGU, PLGU	immediate
		Contingency plans by hazard by island barangays	MLGU, PLGU	immediate
		Researches to determine potential impacts of sea level rise	MLGU, PLGU	midterm
		Request MGB to conduct an assessment of all island communities for a more detailed assessment	MLGU, PLGU	midterm
		Set up of natural geological museums in partnership with SUCs	PLGU	long term

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PLGU	Immediate
		Equip barangays with satellite phones or other communication gadgets	NGAs	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Put out ordinance requiring life vest for all sea travel	BLGU, MLGU	Immediate
		Repair or provide new sea vessels for emergency	MLGU	Immediate
		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	MLGU, PLGU	Midterm
		Regularize transport services that can be collectively run as an enterprise by local folk	MLGU	Mid term
		Provide life vests in every home or per vessel	BLGU	Immediate
		Provide sea emergency vessel	MLGU	Immedaite
	Repair roads	Upgrade roads within the island community (raising and concreting)	PLGU, NGA	Immediate
	Do immediate repair / maintenance of bridges connecting islands to mainland	Repair bridges connecting islands to mainland	PSF	Immediate
	Provide access to education	Set up integrated school in Barangay Lawis	NGA, LGU,BLGU, PLGU	Midterm

2. Human security	Establish community-based EWS and protocols	Install EWS and monitoring devices for island dwellers	BLGU, MLGU,	Immediate/ idterm
	Provide basic community services	Provide basic medical supplies (medicines) and services	MLGU, BLGU	Immediate
		Conduct regular visits of medical providers	MLGU, BLGU	Immediate
		Establish hazard-based EWS in island communities	MLGU, BLGU, PLGU	Long term
		Provide access to reproductive health services— birthing homes with corresponding trained individuals to assist	MLGU, PSF and NGA	Immediate
	Increase community preparedness against every hazard	Train communities on contingency plans	BLGU, MLGU, PLGU	Immediate
		Give home repair support to elevate homes	BLGU, MLGU, NGAs	Midterm
		Build seawall	NGA	Long term
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions	Create contingency plans including evacuation plans for island dwellers	BLGU, MLGU, province	Immediate
		Create contingency plans by hazard by island barangay		
3. Water security	Improve access to safe water	Design community facilities with water storage capacities and implementation	MLGU, BLGU, NGA	Immediate
		Set up collective management of water resources	PLGU, MLGU	Immediate

	Protect ground water resources through proper sanitation systems	install communal sealed septic tank with individual pipelines to HH; should be located downstream of water sources	BLGU, MLGU	Immediate
		Conduct regular maintenance of toilets	PLGU, MLGU, BLGU	Midterm
4. Food and income security	Develop appropriate alternative livelihoods/ enterprises Create development plan for all island barangays	Link island products to bigger markets	NGAs	Immediate
		Set up insurance coverage of crops, animals, fishing boats/gear, guso farm and homes	PLGU, NGAs	Immediate
		Set up livelihood/ enterprise programs for fisherfolk	MLGU, NGAs	Immediate
		Develop biodiversity enterprises	MLGU,PGU	Midterm
		Set up alternative livelihoods for fisherfolk to reduce fishing effort	PLGU	Midterm
		Develop tourism planning	PLGU	Midterm
	Promote greater food security and nutrition in island barangays	Link island barangays to NFA to help set up bigasan centers within the island	MLGU, NGA, Others	Midterm
		Set up hydroponics gardens in island barangay	BLGU, PLGU	Immediate
		Set up water collection to enable crop production	BLGU	Midterm
		Convert lands affected by saltwater intrusion to fishponds	MLGU	Midterm
		Set up livelihood measures for women, PWDs, elderly and fisherfolk and OSY	MLGU, BLGU	Immediate

5. Ecological integrity/ environmental conservation	Establish solid waste management systems	Promote reduce, reuse, recycle program	MLGU, BLGU	Immediate
		Build materials recovery facilities	MLGU, BLGU	Immediate
		Set up compost pits to transform waste into potential soil conditioner/ medium	MLGU, BLGU	Immediate
		Regularly bring residual waste to mainland with landfill	MLGU	Midterm
		Set up common collection system of waste separating biodegradable from recyclable	BLGU	Immediate
		Set up storage of solid waste	BLGU, MLGU	Midterm
	Preserve and protect natural assets of the island	Organize inventory of marine biodiversity	MLGU, BLGU, PLGU, others	Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs	MLGU, PLGU, BLGUs	Immediate
		Protect and continue coastal ecosystems management with science as basis	BLGU, MLGU, PLGU	Immediate
		Establish LGU development alliance on the protection and conservation / rehabilitation of Danajon Bank	PLGU, MLGU	Midterm
		Create Conservation and management plans	Province	Midterm
		Conduct mangrove reforestation and conservation (subject to feasibility study)	BLGU, MLGU, PLGU	Immediate
		Promote Adopt a Mangrove and Coral Area program	Province	Midterm

	Set up natural geological museums	Set up natural geological museum in partnership with SUC	PSF, Province	Midterm
		Do research	PSF, province	Midterm

LGU

Talibon

Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	LGU	Immediate
		Equip barangays with satellite phones or other communication gadgets	NGAs	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Put out ordinance requiring life vest for all sea travel	BLGU, MLGU	Immediate
		Repair or provide new sea vessels for emergency	LGU	Immediate
		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	Province	Long term
	Conduct immediate repair / maintenance of bridges connecting islands to mainland	Provision of life vests in every home or per vessel	MLGU, Province	Midterm
		Regularize transport services than can be collectively run as an enterprise by local folk	BLGU, MLGU	Immediate
2. Human security	Provide access to secondary education	Establish a secondary school in every island barangay	NGA, BLGU, MLGU	Immediate
	Establish community-based EWS and protocols	Install EWS for island livelihoods	BLGU, MLGU	Immediate
		Build evacuation centers (subject to study)	MLGU and NGA	Midterm

	Provide basic community services	Provide basic medical supplies (medicines) and services	MLGU, BLGU	Immediate
		Provide access to reproductive health services—birthing homes with corresponding trained individuals to assist	MLGU	Immediate
	Increased community preparedness against every hazard	Conduct training/drills of communities on contingency plans	BLGU	Immediate
		Create contingency plan, including evacuation plans for island dwellers	BLGU, MLGU	Immediate
		Install EWS and monitoring devices	BLGU, MLGU	Immediate
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions	Study carrying capacity of islands	NGA	Long term
		Designate an evacuation center for island dwellers within the island and in the mainland and ensure that these are not located in hazard-prone areas	BLGU, MLGU	Immediate
		Enforce permanent relocation	MLGU, Province	Immediate
	Set up appropriate infrastructures and nature-based solutions using sound research	Regulate building of infrastructures on sinkhole areas	BLGU, MLGU	Immediate
		Build roads	MLGU	Immediate

3. Water security		Build evacuation centers	MLGU, NGA	Midterm
		Give home repair support (upgrade homes to help adapt, i.e., raise homes)	BLGU, MLGU	Immediate
	Improve access to safe water	Protect water wells (i.e. sealed, fenced) from contamination	MLGU, Province	Immediate
		Conduct rainwater harvesting and water treatment	PLGU	Immediate
		Set up water desalination system	PLGU	Midterm
		Set up collective management of water resources	BLGU, MLGU	Immediate
		Do research on island's ground water capacity	PLGU, NGA, PSF Barangay	Immediate
	Provide communal sanitation facilities	Install communal sealed septic tank with individual pipelines to HH; should be located downstream of water sources	MLGU	Immediate
	Access and design island's groundwater resources protection	Do research on water circulation, ocean currents, etc.	PLGU	Midterm
		Protect groundwater quality with proper sanitation or by installing sanitation system	PLGU, MLGU, PSF	Immediate, long term
		Plan for groundwater protection	LGU	Midterm
4. Food and income security	Promote greater food security and nutrition in island barangays	Link island barangays to NFA to help set up bigasan centers within the island	MLGU	Immediate
		Organize island product consolidation	MLGU	Immediate
		Set up hydroponics gardens in island barangay	MLGU	Immediate

		Set up water collection to enable crop production even in limited capacity	PLGU	Midterm
	Social protection measures for the most vulnerable	Enforce price control during disasters	NGAs	Immediate
		Set up insurance coverage of crops, animals, fishing boats/gear, guso farm and homes	PLGU, NGAs	Immediate
		Disseminate climate information services for agriculture and fisheries as early warning for the sector	MLGU	Immediate
		Prioritize islanders in cash transfer programs	MLGU	Immediate
	Develop alternative livelihoods/enterprise for all	Create tourism plan	MLGU	Midterm
		Develop biodiversity enterprise	MLGU	Midterm
		Set up livelihood programs for seniors, fisherfolk/farmers, PWD and women's groups	MLGU	Immediate
5. Ecological integrity/ environmental conservation	Establish solid waste management systems	Promote reduce, reuse, recycle program	MLGU, BLGU, PLGU	Immediate
		Set up compost pits to transform waste into potential soil conditioner/ medium	BLGU	Immediate
		Set up common collection system of waste, separating biodegradable from recyclable	MLGU, BLGU	Immediate
		Regularly bring residual waste to mainland with landfill	NGA	Immediate
		Build storage facility for solid waste	BLGU, MLGU	Long term
	Preserve and protect natural assets of the island with science as basis	Organize inventory of marine biodiversity	MLGU, NGAs	Midterm

		Support Bantay Dagat enforcers and strengthen NFARMCs	MLGU, BLGUs, Province	Immediate
		Promote Adopt a Mangrove and Coral Area program	LGU	Immediate
		Establish LGU development alliance on the protection and conservation/ rehabilitation of Danajon Bank		Midterm
		Develop mangroves (subject to feasibility study)	BLGU, MLGU, Province	Immediate
	Consider setting up a natural museum to promote biodiversity conservation	Build fisheries management structures and develop plans to help manage common fisheries grounds and identify/harness potential benefit stream	MLGU	Immediate
		Set up natural geological museum with sucs	PLGU and NGA	Midterm
		Develop resource conservation and management plan	PLGU, NGA	Midterm
		Set up alternative livelihoods for fisherfolk to reduce poverty and resource degradation		Midterm
6. Knowledge management and capacity building		Do research to determine the carrying capacity of the different small islands	NGA	Long term
		Do research to determine potential impacts of sea level rise	PSF	Midterm
		Request MGB to conduct an assessment of all island communities for a more detailed study	PSF	Immediate

LGU	Tubigon			
Pillars	Measures	Specific Actions	Possible Partners	Implementation time frame
1. Enhancing Accessibility	Provide access to communication gadgets	Request telecoms company to put up cell sites in strategic areas	PLGU	Immediate
		Equip barangays with satellite phones or other communication gadgets	NGAs	Immediate
	Ensure safe sea transport for emergency and regular transport services for the public	Regularize transport services that can be collectively run as an enterprise by local folk	BLGU, MLGU	Immediate
		Design a public transport system for island dwellers (possibly managed by a cooperative organization of island dwellers)	BLGU, MLGU	Immediate
2. Human security	Establish community-based EWS and protocols	Provide life vests in every home or per vessel	MLGU, BLGU	Immediate
		Install EWS and monitoring devices	BLGU, MLGU	Immediate
		Create contingency plans by hazard, by island barangay	MLGU, BLGU	Immediate
	Provide basic community services	Train communities on contingency plans	MLGU, BLGU	Immediate
		Provide basic medical supplies (medicines) and services	MLGU, BLGU	Immediate
		Conduct regular visits of medical providers	MLGU, BLGU	Immediate
		Provide access to reproductive health services— birthing homes with corresponding trained individuals to assist	MLGU	Midterm
		Set up food relief/reserve system for immediate food relief in case of disasters		Immediate
		Provide sea emergency vessel	MLGU, BLGU	Immediate
		Establish hazard-based EWS for island communities	BLGU, MLGU	Immediate
	Increase community preparedness against every hazard	Create contingency plans by hazard, by island barangay	BLGU, MLGU	Immediate
		Give home repair support to upgrade homes	BLGU, MLGU	Midterm

		Request MGB to conduct geological assessment of islands	PSF	Immediate
		Do research to determine potential impacts of sea level rise	PSF	Midterm
	Carefully consider the carrying capacity of the island and other baselines to serve as basis of interventions	Enforce permanent relocation	BLGU, MLGU, PLGU, NGAs, PSF, others	Long term
		Do research to determine carrying capacity of different small islands	PSF	Immediate
		Do research on water circulation, ocean current and water discharge	PSF	Immediate
		Regulate infrastructure building on top of sinkhole areas	MLGU, BLGU	Immediate
	Set up appropriate infrastructures and nature-based solutions using sound research	Mangrove reforestation	PLGU, NGA	Immediate
		Build roads (subject to study)	PLGU, NGA	Immediate
		Build sea wall (subject for study)	BLGU	Midterm
		Build evacuation centers with design integrating water harvesting system	NGA	Midterm
3. Water security	Improve access to safe water	Protect water wells (i.e. sealed, fenced) from contamination	BLGU	Immediate
		Set up water treatment system	BLGU	Immediate
		Set up rainwater harvesting system		Immediate
		Set up water desalination system	NGAs, PSF	Long term
		Establish collective management of water resources	BLGU	Immediate
	Provide communal sanitation facilities	Install communal sealed septic tank with individual pipelines to HH; should be located downstream of water sources	MLGU	Midterm
		Conduct regular maintenance of toilets	BLGU	Immediate
	Access and design island's groundwater resources protection	Plan for groundwater protection	MLGU	Immediate

4. Food and income security	Develop appropriate alternative livelihoods/ enterprises development plan for all island barangays	Set up livelihood/ enterprise programs for senior citizens, farmers, fisherfolk, OSY, women and PWDs	MLGU, Province, NGA	Immediate
		Organize island product consolidation and link to bigger markets		Midterm
		Create a tourism plan and development as alternative livelihoods	PLGU, MLGU, NGA	Midterm
		For farm areas affected by saltwater intrusion, consider converting to fish ponds	NGAs, Province, MLGU	Midterm
		Promote development of biodiversity enterprises		Immediate
	Impose social protection from loss and damage	EWs for livelihoods	NGAs	Mid term
		Set up insurance coverage of crops, animals, fishing boats/gear, guso farm and homes		Immediate
		Enforce price control during disasters	NGAs	Immediate
		Set up climate information service to support EWS for livelihoods	NGAs	Immediate
	Promote greater food security and nutrition in island barangays	Set up bigasan centers within the island	MLGU	Immediate
		Set up compost pits to transform waste into potential soil medium	MLGU	Immediate
		Set up hydroponics gardens in island barangays	NGAs, MLGU	Immediate
		Establish alternate cooking system	PLGU, MLGU, others	Immediate
5. Ecological integrity/ environmental conservation	Develop a solid waste management system	Promote reduce, reuse, recycle program	MLGU, BLGU	Immediate
		Establish common collection system of waste separating biodegradable from recyclable	BLGU, MLGU	Immediate
		Regularly bring residual waste to mainland with landfill	MLGU, BLGU	Immediate
		Build storage facility for solid waste	BLGU, MLGU	Immediate

	Preserve and protect natural assets of the island	Protect water wells (sealed and fencing) to guard against contamination	Barangay, LGU	Immediate
		Support Bantay Dagat enforcers and strengthen NFARMCs	MLGU, barangay	Immediate
		Promote Adopt a Mangrove and Coral Area program	MLGU, BLGU	Immediate
		Establish LGU development alliance on the protection and conservation/ rehabilitation of Danajon Bank	PSF, LGU, province	Midterm
		Build fishery management structures and develop plans to help manage common fisheries grounds and ensure benefit streams for communities	LGU, national	Midterm
		Set up alternative livelihoods for fishers to reduce fishing effort and promote conservation	BLGU, MLGU and national	Immediate
	Set up natural geoloigical musuems	Organize inventory of marine biodiversity	Others, NGAs	Midterm
		Set up geological museum		Long term

