



PROVINCIAL COMMODITY  
INVESTMENT PLAN  
2019 - 2021  
FOR  
**SEAWEEEDS**



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## List of Abbreviations and Acronyms

A and D	Alienable and Disposable
ACFT	Annual per Capita Food Threshold
ACPT	Annual per Capita Poverty Threshold
AES	Agro-Edaphic Suitability
AIP	Annual Investment Plan
ARMM	Autonomous Region in Muslim Mindanao
BEMO	Bohol Environment Management Office
BFAR	Bureau of Fisheries and Aquatic Resources
BOI	Board of Investments
BPSFPC	Bohol Provincial Seaweed Farmers Producers Cooperative
CCA	Climate Change Adaptation
CDA	Cooperative Development Authority
CLUP	Comprehensive Land Use Plan
CPT	Commodity Prioritization Tool
CSO	Civil Society Organization
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DRRM	Disaster Risk Reduction and Management
DTI	Department of Trade and Industry
ELA	Executive Legislative Agenda
EO	Executive Order
E-VSA	Expanded Vulnerability and Suitability Assessment
FA	Farmers' Association
FMR	Farm-to-Market Road
GAP	Good Agriculture Practices
GEF	Global Environmental Facility
I-BUILD	Intensified Building-Up of Infrastructure and Logistics for Development
IEC	Information Education Campaign
IP	Indigenous People
I-PLAN	Investment for AFMP Planning at the Local and National Levels
I-REAP	Investments for Rural Enterprises and Agricultural and Fisheries Productivity
LGU	Local Government Unit
M&E	Monitoring and Evaluation
MCPI	Marine Colloids for Pilipino Integrity
MLGU	Municipal Local Government Unit
MOA	Memorandum of Agreement
MPA	Marine Protected Area
NCIP	National Commission on Indigenous Peoples
NGA	National Government Agency
NOL	No Objection Letter
NPCO	National Project Coordination Office
NSCB	National Statistical Coordination Board
OPA	Office of Provincial Agriculturist
OPV	Office of Provincial Veterinarian

PCA	Philippine Coconut Authority
PCC	Philippine Carabao Center
PCIC	Philippine Crop Insurance Corporation
PCIP	Provincial Commodity Investment Plan
PCPT	Provincial Core Planning Team
PDC	Provincial Development Council
PDPFP	Provincial Development Physical Framework Plan
PGBh	Provincial Government of Bohol
PLGU	Provincial Local Government Unit
PMIU	Provincial Program Management and Implementing Unit
PO	People's Organization
PPDO	Provincial Planning and Development Office
PRDP	Philippine Rural Development Project
PSA	Philippine Statistics Authority
RBMES	Results-Based Monitoring and Evaluation System
RDS	Raw Dried Seaweed
RPC	Rice Processing Center
RPCO	Regional Project Coordination Office
RROW	Road Right-of-Way
SEAFDEC	South East Asian Fisheries Development Center
SES	Social Environmental Safeguard
SIAP	Seaweed Industry of the Philippines
SP	Sangguniang Panlalawigan
SRC	Semi Refined Carrageenan
SSS	Social Security System
SWCF	Soil and Water Conservation Foundation
TWG	Technical Working Group
VCA	Value Chain analysis

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## Executive Summary

The Provincial Commodity Investment Plan (PCIP) reflects agreement between the Department of Agriculture - Regional Field Office (DA-RFO's), Provincial Government of Bohol (PGBh) with strong participation of the various stakeholders and other government agencies in the context of convergence to leverage resources in helping develop the province's agri-fishery sector. It also aims to maximize the synergy among various players of the value chain (industry players and enablers). The CIP also represents an overarching platform in expanding opportunities in the value chain. The CIP not only rallies around the value chains that are being prioritized, but generate commitments to address the identified bottlenecks of the value chain based on the result of the Value Chain analysis.

Bohol is the fourth seaweed producing province in the country. Seaweed is the leading source of income of the inhabitants in the island barangays particularly in Danajon Bank area. Incorporating the natural biodiversity conservation mechanism and coastal and fisheries management to the GEF covered PLGU-PCIP to ensure better foundation of the natural resources management and institutionalize within the PLGU governance towards a sustainable rural enterprise and agri-fishery productivity in GEF covered site. The PCIP- Seaweeds will serve as the guiding framework for the PRDP I-PLAN component in facilitating the Watershed Ecosystem Approach Analysis. The concerned five (5) GEF pilot municipalities are on the stages of implementation of their Marine Protected Area and Seaweed Enterprise sub-projects with consideration of the Vulnerability and Suitability Assessment (VSA) and Climate Change Resiliency. The sub-project implementation is imperative and essential towards sustainable development and management for the Natural Biodiversity Conservation, and Coastal and Fisheries Resource Management in its administrative jurisdiction. It is a coordinated activity between the concerned GEF-NRM, I-PLAN, I-REAP and I-BUILD Components to come up with the right decision making in order to harmonize management strategies and approaches for the in-depth analysis and appreciation on the importance of natural resources biodiversity conservation and coastal and fisheries resource management.

The conceptualization of Seaweeds PCIP with the integration of Biodiversity Conservation and Fisheries and Coastal Resource Management came to fruition after a series of workshops which started in Camelot Hotel, Quezon City last August 25-29, 2018 with the guidance of the Natural Resource Management of the Project Support Office of PRDP and the I-PLAN group. The workshop was participated by the representatives from the PPMIU of five (5) GEF pilot provinces including Bohol. This was the first step towards the conduct of series of workshops commencing in a final stakeholders' consultation held on October 22, 2018. The final consultation engaged several commodity growers including seaweeds farmers, traders and enablers in order to validate information and to present the industry's challenges and proposed interventions.

Moreover, the inability to apply such defined strategies and approaches embodied in the PCIP could have an adverse effect both on the chances for long term success in the seaweed enterprise and the sustainability of the resource base where these enterprises are based upon.

## Introduction and Rationale

Bohol is one of the selected recipient provinces of the Philippine Rural Development Project (PRDP). It is a six-year project (2013-2019) designed to establish an inclusive and market-oriented agri-fishery sector through strategic investments in priority commodity value chains. It is a poverty reduction program that aims to improve the incomes and food security of the rural poor. Externally, it will focus on expanding market access and improving competitiveness. Through a Memorandum of Agreement, the Department of Agriculture (DA) and the Province of Bohol have come into a joint partnership in implementing the PRDP. Both the DA and the Province will partner with Local Government Units (LGUs) and the private sector in providing key infrastructure, facilities, technology, and information that will raise incomes, productivity, and competitiveness in the countryside.

One of the requirements of PRDP is the formulation of the Provincial Commodity Investment Plan (PCIP). The PCIP is a 3-year rolling plan based on the value chain analyses of the commodities conducted with strong participation of the various stakeholders in the chain. Moreover, it is a strategic plan that rationalizes the interventions within the various segments of the value chain of commodities. These interventions are significant to the province and will contribute to the national goals of the agriculture and fishery sector. The PCIP be the basis for selecting eligible interventions and sub-projects for funding PRDP's I-BUILD and I-REAP project components. However, the CIP is not only focused on the investments of PRDP but also leveraging resources from other NGAs and the private sector.

Furthermore, the PCIP reflects agreements between DA-RFOs, PLGUs with strong participation of the various stakeholders and other government agencies in the context of convergence to leverage resources in helping develop the province's agri-fishery sector. It aims to maximize the synergy among various players of the value chain (industry players and the enablers), and the CIP represents an overarching platform in expanding opportunities in the value chains. The CIP not only rallies around the value chains that are being prioritized, but generates commitment to address the identified bottlenecks of the value chain based on the results of VC analysis.

The adopted planning approach for PCIP formulation is anchored on the use of the value chain approach (VCA) to objectively identify interventions to develop or enhance priority commodities. A value chain is defined as *the full range of activities that are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use.*<sup>1</sup>It involves an analysis of the vertical and horizontal process and players that add value to the product.

To enhance the value chain approach of planning, scientific tools are used, such as the Expanded Vulnerability and Suitability Assessment (E-VSA). It is a user-based online tool available at the PRDP website that uses the VSA result as a database and is collaborated with socio-economic parameters. A map will be generated as visual presentation of municipal ranking based on the parameters used per commodity.

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<sup>1</sup>J. Hellin and M Meijer. *Guidelines for Value Chain Analysis*, (FAO) November 2006, p. 4.

Another important tool used to identify priority commodities is the Commodity Prioritization Tool (CPT). The major criteria for this tool are: suitability, market potential, impact on the poor, and the number of beneficiaries. The identified priority commodities of the province ranked as to the results of the CPT are the following: coconut, dairy, native chicken, high-value vegetables, cassava, inland fishery, mariculture (seaweed), swine, cacao and coffee. These identified commodities that are important to agricultural development will undergo the value chain analysis and will be integrated into the PCIP.

To ensure the successful implementation of the Project, the Governor issued Executive Order No. 05, Series of 2015, creating the Provincial Core Planning Team (PCPT) that is chaired by the Provincial Agriculturist. The PCPT is tasked as the principal mechanism through which the Provincial Commodity Investment Plan (PCIP) will be prepared. The enhanced PCIP of Bohol is a 3-year strategic plan (2019-2021) that rationalizes the interventions within the various segments of the value chain of identified significant priority commodities and will contribute towards the vision of a strong and balanced agri-industrial province.

The Bohol PCIP had undergone series of consultation with various stakeholders. After the National Project Coordination Office (NPCO) issued a No Objection Letter (NOL) for the Value Chain Analysis of the priority commodities, it was presented to the Provincial Governor, the Provincial Project Management Implementing Unit (PPMIU) and to the PCPT. The PCPT started the integration of the approved commodity to the PCIP after it was presented. The planning process being participatory includes technical reviews and stakeholders' consultation with various actors along the chain from the input supplier, producer, processor and traders. All six (6) priority commodities of the province had been subjected to a Stakeholders' Consultation. The final PCIP was presented to the Provincial Development Council for approval and endorsed to the Regional Project Coordination Office (RPCO) for inclusion to the Regional Development Investment Program (RDIP) for possible funding by other agencies. The approved PCIP served as the basis for identifying eligible I-REAP and I-BUILD sub-projects. Likewise, the PLGU also used the PCIP to mobilize resources from other sources such as other National Government Agencies (NGAs), NGOs and the private sector.

The Enhanced Bohol PCIP for 2019-2021 is an updated version and integration of the six (6) approved priority commodities of the province, namely: seaweeds, native chicken, highland vegetables, buffalo dairy, cassava and virgin coconut oil (VCO). Enhancement of the Bohol PCIP is done by mainstreaming biodiversity conservation, climate change resiliency and natural resource management practices.

Aside from the champion commodities prioritized by the Province of Bohol, e.g. seaweed, etc. other lesser important or underutilized commodities will be supported by the LGU, such as biodiversity-based Value Chains (VCs). Biodiversity-based VCs are lesser important commodities which may have business or value-added opportunities only in local markets but these commodities are sources of income and provide opportunities for employment of poor communities attached to the resource base or key biodiversity areas (KBAs) in marine and terrestrial ecosystems. These are; mudcrab, grouper, nature-based ecotourism, sea cucumber, bangus, siganid, etc. These commodities or livelihood activities are so important for these communities in GEF sites, KBAs and critical ecosystems for these will generate income from biodiversity and can help alleviate poverty and conserve biodiversity. In current trends of biodiversity conservation and natural resource management, biodiversity-based VCs are used as strategy in biodiversity conservation and environmental protection. To fully utilize its prospects, value chain development approach has

been applied to these commodities and has increasingly gained attention in recent years as a tool for linking supply capacities to market opportunities. This approach has been experimented by the World Agroforestry Center (ICRAFT) and GEF in some key biodiversity areas in Africa, Palau, and other areas in the Caribbean.

The Value Chain approach is gaining significant results in combining agri-fishery production in harmony with nature for sustainable production. This approach, which integrates poor communities, their land and biodiversity resources in local markets, forms the basis of policies and projects that promote the development of biodiversity-based value chains. For example, in some of the pilot sites in Africa and Palau, ICRAFT and GEF projects are supporting the development of biodiversity-based VCs and nature-based tourism as an income generating activities of KBA communities to alleviate poverty and conserve biodiversity (Conservation International, as cited by Leeuw, et. al., 2016). Based from this experience, there is now an increasing interest to develop initiatives that promote the growth of biodiversity-based value chain approaches that utilize biodiversity in and outside critical watersheds, KBAs and natural resource conservation areas (ICRAFT, Biodiversity-Based Value Chains, Leeuw, et. al., 2016).

Promoting lesser important commodities or underutilized species is one of the priorities of the province for pro-poor growth and biodiversity conservation. Among these commodities that the Local Government of Bohol would like to support are: mudcrab, grouper, sea cucumber, bangus, siganid, etc., to include nature-based tourism. These are also the source of livelihood of communities attached to the resource base/ecosystem in the GEF sites. The province believes that agro-biodiversity plays a fundamental role in the livelihoods of the rural poor. Also, the province recognizes that “commercializing” these biodiversity-based VCs which are embedded in the traditional household systems of the poor resource-based communities will provide significant potential for:

- Improving food security and achieving more balanced nutrition for the coastal areas (social benefits);
- Conserving biodiversity and stabilizing agro-ecosystems (environmental benefits); as well as
- Generating income for the rural poor and creating employment along the value chain (VC) (economic benefits)

Among the communities that this approach will be pilot-tested in the province are the GEF municipalities, i.e. Bien Unido, Talibon, Ubay, Buenavista and Pres. Carlos P. Garcia. This will be expanded to other non-GEF municipalities with potential for biodiversity conservation. Initially, among the projects being implemented which are funded by PRDP-GEF are: Seaweeds Livelihood Enterprise and Enhancement/On- the- Ground Improvement of eight (8) Marine Protected Areas. These will provide the MPA Proponent Groups / communities in GEF sites income and employment generation activities while at the same time protecting the coastal and marine ecosystems. These livelihood/enterprise activities will also veer the stakeholders away from further exploitation of the marine protected areas. Moreover, these projects will provide additional income to the fisher folks while providing the resource base room to recuperate.

Since seaweed is considered as one of the vulnerable commodities, measures have to be taken into consideration to mitigate the impact of climate change and reduce losses. The integration of Biodiversity Conservation and Coastal and Fishery Resources Management approaches is a step to address a climate change resilient agri-fisheries production towards sustainable enterprise operations, Climate Change Adaptation and Disaster Risk Reduction measures. Strengthening Natural Resource Management Program and Biodiversity Conservation measures at the LGU level

would mean preparedness for any changes in climate and vulnerabilities of the commodity. The growing eco-tourism with the influx of tourists due to the opening of Bohol-Panglao International Airport which started operation last November 2018 and other nature-based attraction in the province would mean increase in tourist arrivals from all over the world and may pose a threat to the resource base where these seaweeds are based upon.

## Chapter I. Development Background

Agriculture is one of the economic drivers of Bohol and is the main source of livelihood of majority of the Boholanos. It provides income and livelihood to farmers and fisherfolks and their dependents. Agriculture also enables traders, processors, retailers, and other groups to, directly or indirectly, make a living. Given these facts, it is only logical that the agriculture sector needs to be fully harnessed to enhance agricultural productivity and improve the incomes and welfare of farmers and fisherfolks.

Consistent with this drive and with consciousness that agriculture is one of the main economic drivers of Bohol, the Provincial Government has been steadfast in implementing agri-based support programs and projects to achieve food sufficiency and attain economic growth through agri-industrialization. The Province of Bohol is fortunate to be selected as a one of the sites of the Philippine Rural Development Project (PRDP) that aims to develop an inclusive, market-oriented, climate-resilient agri-fishery sector by strategically investing in priority value chains. Based on suitability, market potential, impact on the poor and number of growers/ producers, identified provincial priority commodities that go through prioritization are the following: coconut, dairy, native chicken, swine, high-value vegetables, cassava, inland fishery, mariculture, cacao and coffee.

The Provincial Government also desires to develop other commodities like banana, mango, balut and other economically beneficial crops like palm oil. Fishery development in the province is also being prioritized, considering that Bohol has rich marine resources. As to livestock and poultry development, the Provincial Government has been continually responsible in improving and safeguarding the said industries with the promotion of native chicken and the ongoing research on the development of a Boholano strain of native chicken.

### Agricultural Production

#### Crops Production

Agricultural activities in Bohol are mainly involved in the cultivation of food crops such as palay, corn, coconut, fruits (mango, banana, watermelon, calamansi, papaya and pineapple), vegetables and rootcrops, raising of livestock and fisheries. Rice is the major staple food and is utilizing a significant area of the provincial agricultural land.

**Rice.** This staple food is mainly produced by small farmers, with a total of 72,589 hectares area planted. The irrigated and rainfed rice area is approximately 38,613 and 33,976 hectares, respectively. The total palay production in 2017 was about 238,728 metric tons, which translates to 3.29 metric tons average yield per hectare. Rice farming serves as the primary source of subsistence and income for about 57,778 farming households.

To enhance rice productivity, the Provincial Government of Bohol has continually worked for the production of hybrid rice and other high-yielding varieties. This helps maintain Bohol's reputation as the rice basket of the Central Visayas. Along this line is the development and expansion of national irrigation systems, as well as the communal irrigation systems, that will increase the productivity and utilization of land for rice production.

**Vegetables.** There are two types of vegetables grown in the province, the leafy and fruit vegetables. The leafy vegetables include pechay, kangkong and green onions while the fruit

vegetables are ampalaya, eggplant, okra, squash, string beans, tomato and ginger. Some lettuce, cabbage and chayote are commonly grown in the highland areas of Duero, Jagna, Sierra Bullones, Candijay and Guindulman. The other vegetables are grown in the different lowland areas with an approximate land area of 1,764 hectares. Eggplant has the most extensive area of 398 hectares and showed the highest volume of production of 1,863 metric tons in 2017.

**Coconut.** Coconut is a major commercial crop in Bohol in terms of agricultural land usage with an approximate area of 35,278 hectares. Total coconut palms are estimated at 4.68 million, of which about 87% are bearing, and 13% are non-bearing. The average planting density of coconut is 132 trees per hectare. About 96% or 1,067 barangays out of 1,109 barangays in the province are with coconut areas.

Coconut is predominantly grown in all parts of the province and serves as the main source of cash for farmers and landowners. Income from coconut production supported the basic needs of most farm families, but has been in the downtrend due to fluctuating price of copra and low productivity caused by the damage inflicted by strong typhoons in the past and the lack of improved varieties and production technologies. Virgin coco oil processing has been established as value-added technologies other than that of copra processing. Although, the province is also producing other commercial crops like coffee, cacao and oil palm, it is coconut that is widely and significantly produced. The crop is still among the top outgoing commodities in the province.

Coconut production is generally increasing with production in the province reaching 163,033.84 metric tons in 2017. At the regional scale, Bohol ranks first in coconut production, sharing 38% of total regional production as based on the 2017 PSA data. Negros Oriental comes second with 34%, while Cebu with 26% share and Siquijor accounted only 2% of the regional production.

**Rootcrops.** In 2017, Bohol's major rootcrops posted a production of 69,793 metric tons. This is lower by 23% from the 2016 production of 89,655 metric tons. Cassava remains to be the dominant crop with a total production of 39,715 metric tons. Camote and ubi produced 7,550 metric tons and 4,900 metric tons, respectively. Gabi, on the other hand, posted 3,546.04 metric tons.

A total of 6,825.11 hectares of land have been harvested with major rootcrops in year 2017. About 56% of these areas were harvested with cassava, camote 22%, with ubi 12%, and gabi showed 10% of the harvested land.

**Fruit Crops.** There are six (6) major fruit crops planted in the province, namely: banana, mango, papaya, pineapple, watermelon and calamansi. As of 2017, the total area planted was 9,323.78 hectares with mango having the largest area covering 5,101 hectares, about 14,186 farmers are involved in mango planting which is dominated by backyard growers. Banana comes second with 3,966.78 hectares.

In 2017, PSA report shows an overall production of selected fruits in the province has increased with an output of 79,505.97 metric tons compared to the 2016 figure of 72,291.30 metric tons. Banana is the dominant fruit in the province in terms of production volume with a total production of 57,774.80 metric tons compared to the production of mango with a total of 19,039.59 metric tons.

## Livestock and Poultry Production

The major livestock and poultry commodities raised in the province include cattle, carabao, goat, hog, chicken and duck. Being a good source of milk, meat and eggs, animal protein requirement of the Boholanos is sufficiently met by our local production. Livestock and poultry raising is a good source of income as it provides alternative livelihood and entrepreneurial opportunities at the household and community levels. Despite being a large contributor to greenhouse gases, livestock and poultry wastes are also good sources of organic fertilizer and renewable energy.

Generally, production is still backyard and livestock and poultry remain to be the most convenient immediate option in critical times like hospitalization and emergencies, educational needs and immediate source of cash. Initiatives have been developed to enhance production and health management yet, more has to be done on the aspects of waste management, the provision of support pre and post-harvest facilities to meet public safety standards and product development requirements. More so, there is a need to educate our local producers, traders, livestock handlers and program implementers on the importance of value chain and to recognize the necessary interventions needed for the total development of the industry to achieve production sufficiency and expand entrepreneurial opportunities.

The province's ruminant production is centered on cattle, carabao and goat which are predominantly on the backyard scale. Although government and private sector initiatives have been pushing to upgrade existing local breeds through artificial insemination and natural breeding, the ruminant population is dominantly of native breed.

**Carabao.** In 2017, carabao inventory reached to 70,057 heads, sharing about 31% of the total number of ruminants in Bohol. For a 5-year period (2013-2017), the carabao population had been generally increasing. However, the said increase is notably very low with only about 6%.

At the regional scene, based on the data from the PSA, Bohol consistently ranks number one in the inventory of carabaos for the past 5 years. In 2017, the province accounted 38% of the total 183,676 carabaos in region 7 followed by Negros Oriental (35%), Cebu (27%) and Siquijor which only shared 0.51%. With the dominant share of supply in the region, the province plays a vital role in providing good quality carabaos for breeding, draft and meat for its neighboring provinces. For the past 5 years, Bohol's main out-shipment points for carabaos are the provinces of Cebu and Leyte.

Being known as silent heaters, carabaos are difficult to breed. The strong upgrading program through artificial insemination being pushed by the Provincial Government through the Office of the Provincial Veterinarian with the support of the Philippine Carabao Center and the Department of Agriculture, has contributed to the genetic upgrading and productivity of the herd.

The infusion of carabaos through dispersal and livelihood programs funded by the Provincial Government of Bohol (PGBh) and other national agencies like Department of Agriculture (DA), Department of Social Welfare and Development (DSWD), the Department of Labor and Employment (DOLE) among others, and the successful implementation of the LETS HELP Bohol Program where original farmers are able to pass on caracalves to new farmers, also contributed to its population increment.

With the increasing carabao demand for dispersal, food and agriculture support, it is apparent that Bohol should build a reliable and sustainable carabao production stream. Among the priority aspects given attention are the following: i) productivity among carabaos through the conduct of heat synchronization and flushing in support to artificial insemination services, ii) provision of drugs and biologics to support animal health program, iii) enhancing the capabilities of AI technicians and the carabao raisers particularly in heat detection, and iv) the provision of incentives to AI Technicians for every calf dropped.

A small population of upgraded carabaos, mostly crosses of American and Bulgarian Murrah Buffaloes, are used as dairy animals. Dairy farmer cooperatives/associations are being organized in the municipalities of San Miguel, Ubay, Alicia, Carmen and Mabini. Locally produced milk in the province are processed at the Philippine Carabao Center (PCC) and milk-based products are being sold at the PCC, the Dairy Boxes in ICM, Tagbilaran City and Carmen, in some school outlets and some resorts in Panglao. In a span of time, value-adding and product development made fresh milk more popular with new product formats booming like milk bars of various flavors, milk-based bread and pastries, ice cream, cheese, yogurts and even milk soaps. The establishment and operation of the milk processing plants of the National Dairy Authority (NDA) side by side with PCC in Ubay, has promoted milk and created public awareness on its availability and affordability.

**Cattle.** The inventory of cattle in 2017 indicated 74,236 heads showing an irregular trend for the past years but increasing towards 2017. Based on the PSA data, Bohol ranks second to Cebu contributing 27% share in the regional inventory of 275,012 heads.

Cattle herd improvement in the province is done through infusion of superior breeds and artificial insemination. The NDA also started with 100 head multiplier dairy farm in 2010 with Holstein Friesian bloodline. These dairy herds can be found in barangay Calanggaman in Ubay.

**Goat.** Goat production in the province has generally shown a positive trend for the past 5 years. From 2013 to 2017, goat inventory increased by 11.6%, with a goat population of 82,907 heads as of 2017 (PSA). At the regional scene, the province only ranks third to Cebu and Negros Oriental contributing only 17% of the total inventory of 500,586 heads in Region 7.

Attempts have been made by private raisers to commercialize goat production in Bohol, yet it is generally backyard. Chevron provides a special yet an expensive menu. It is not commonly sold at the local markets and seldom in the groceries and meat shops. Local goat raisers claimed that there is easy market for goats but production still needs to be given attention. Live goats are not commonly found in livestock pooling areas and local markets and its availability commands a higher price. Among the factors affecting low supply is our farmers' knowledge on goat farming and the importance of forages and pasture development, which should be given consideration in the next 5 years.

**Hog.** Hog population of the province as of 2017 is recorded at 312,288 heads (PSA). Predominantly on backyard scale, hog production accounted for 84% of the total population, with only 16% representing the production in commercial farms. In region 7, Bohol ranks second to Cebu contributing 31% of the regional total population of 1,012,405 heads as of 2017.

Production of hogs has reached the level of commercialization with the private sector on the lead. In fact, there are a number of commercial farms, even breeder farms that are operating in different municipalities. This affected the value of hogs from small scale backyard raisers

resulting to a cheaper/lower buying price or difficulty in marketing for a live weight over 80 kilograms.

The operation of government-operated artificial breeding centers for swine in the municipalities and in some private farms and the mobile boar for hire services, has contributed to the upgrading of existing stocks. On the other hand, native pig production is becoming popular on a “back to basics” husbandry with starter breeders distributed through dispersal projects.

**Chicken.** The chicken population in the province include broiler, layer and native or improved. As of 2017, PSA data shows that the total provincial chicken inventory reached 3,494,575 heads. From this population, broiler represents 33%, layer is 9% while the native or improved chickens which comprise 57% of the total inventory is generally raised at the backyard level. In region 7, Bohol ranks second to Cebu in terms of total inventory followed by Negros Oriental then Siqujor. Likewise, for broiler, layer and native chickens.

Bohol has reached the level of commercializing chicken production more particularly in broiler and layer. In fact, private farms or contract growing is evident and progresses even without government intervention. Production of layers has been assumed by a commercial hatchery owned and managed by a private company.

The increasing awareness of the consuming public on the health properties of native chicken and its palatability slowly shifted the idea from a mere production for consumption to an enterprise endeavor. This has greatly affected the demand and supply of native chicken meat. However, this provided the province the opportunity for expanded enterprise and increased production. Henceforth, the province has considered native chicken as one of its commodity champions along side with dairy.

Strong support has been given by the Provincial Government in the implementation of a Native Chicken Development Program. The provincial institutional farm in Bilar and the municipal native chicken production centers are established and operating starting year 2015, with the intention of providing breeder stocks for massive production. Municipal native chicken growers' associations were also formed to speed up production and unify animal health services particularly vaccination. The organized federation of native chicken raisers named Bohol Association of Native Chicken Growers (BONACGA) is now leveling up its operation from a mere production for consumption into the higher segment in the value chain which is commercial venture such as processing and marketing.

### **Fish Production**

Bohol has 30 coastal municipalities including the City of Tagbilaran, 365 coastal barangays with 73 islands and islets. Three (3) major fishing grounds surround the province, namely: Bohol Sea, Cebu Strait and Danajon Bank with a total area of 27,352.5 km<sup>2</sup> inside and outside Central Visayas. Bohol sea has 273.3 kilometers coastline, Cebu strait has 264.8 kilometers and Danajon Bank has 301.0 kilometers.

**Municipal Fisheries.** The municipal waters cover an area of 624,506 hectares, with a coastal population of 480,247. It is in these areas where most fisherfolks get their catch. There are 8,952 and 11,686 motorized and non-motorized fishing boats, respectively. There are 30 types of

fishing gears commonly used in the province<sup>2</sup>. Total municipal fish production in the province was 14,293.17 metric tons in 2017 from 13,466.91 metric tons in the previous year.

**Commercial Fisheries.** Commercial fishing in the province has been observed to have an irregular trend of fish catch for the past 5 years. Total commercial fish production in the province decreased from 1,871 metric tons in 2010 to 1,226 metric tons in 2014 and slightly increased to 1,510.04 metric tons in 2017.

**Aquaculture.** Aquaculture includes the production of commercial species like bangus, prawn, mudcrab, seaweeds, grouper and tilapia from brackish and freshwater fishponds. Total aquaculture production of Bohol for 2017 reached 57,617.35 metric tons.

Bohol has an area of approximately 18,115 hectares suitable for seaweeds farming. The average yield is 24 metric tons fresh seaweeds per hectare per year with an average of 3 croppings yearly<sup>3</sup>. Some 4,142 hectares are presently producing while 4,673 hectares are potential areas for expansion for shallow seaweed farming and another 9,300 hectares for deep sea seaweed farming. Among the coastal municipalities of Bohol, Bien-Unido is considered the top seaweed growing municipality in terms of existing and potential seaweed growing.

The province of Bohol is among the top producer of seaweeds, ranking number 4 in the whole Philippines. Palawan is the top producer followed by Tawi-tawi, Sulu and Bohol. However, as of 2017 total seaweed production of Bohol reached 53,875 metric tons, decreasing by 34% from the 2016 production of 81,310 metric tons. Bohol contributes about 84% to the total seaweed production in Region VII. Seaweeds are marketed raw in the local markets and in Cebu for food consumption. Dried seaweeds are marketed either in the local buying stations or direct to Cebu from the production areas through middlemen. Buyers of dried seaweeds in Cebu are either direct exporters or processors of carrageenan.

## Development Challenges

There is an apparent necessity to address certain issues that have been hindering the full development of agricultural land in Bohol. Foremost, there are still large areas of idle lands in the province, unutilized or underutilized for agriculture. Only half of the total agricultural area of the province is planted to major crops. With this level of land utilization, there is still a substantial potential for the province to enhance its agricultural productivity and harness other crops suitable for its soil and weather conditions.

Technologies to maximize the upland areas have not yet been fully accepted and practiced by farmers. There is low level of adoption and application of location specific agri-aqua technologies. Many of the rural poor are landless, or have limited farm lands, which may not be appropriate to achieve viable financial returns. These farmers still remain engaged in subsistence farming. Insufficient farm equipment, support infrastructure and production and postharvest facilities also is a challenge in the sector that needs improvement of existing farm equipment and the provision of additional farm machineries and support facilities. Development of agricultural lands has also been impeded by lack of accessibility and limited road networks that link farms to production support facilities and markets.

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<sup>2</sup>PDPFP:2010-2015

<sup>3</sup> Bohol Agriculture Master Plan: 2006-2026



## Topography and Slope<sup>4</sup>

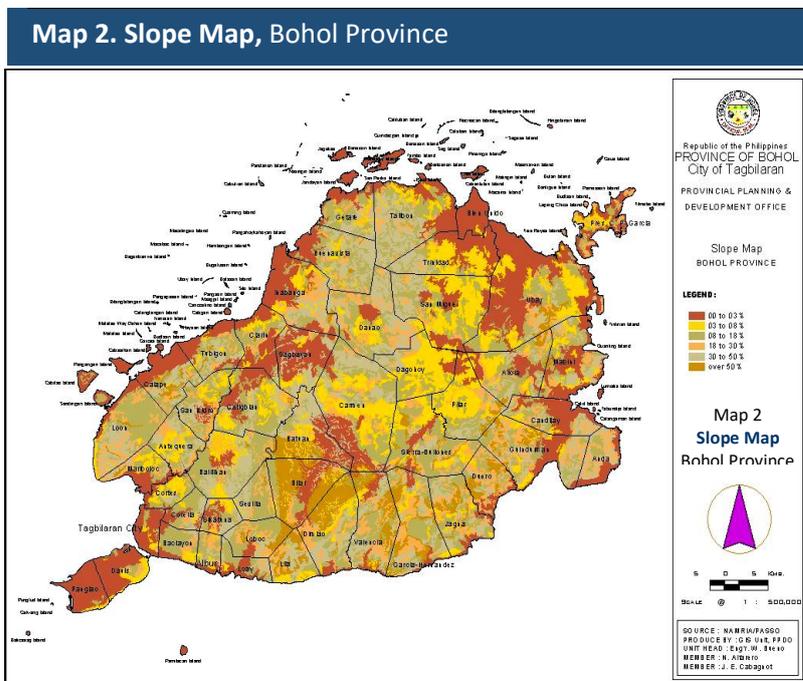
### • Topography Range

Bohol's terrain is variable from nearly flat at the plains to low rolling, moderate to very steep sloping with 5 to 50 meters high cliffs in the Sierra-Bullones limestone formation. The more rugged terrain is found in the southern part of the province although the Ubay volcanic rocks and Boctol serpentinite in the north and northeast are of moderate and rugged slopes in most of their outcrop areas. The central valley is almost rolling to moderately steep.

There are several mountain ranges found in Bohol. Two sets of them are found in the northeastern side of the mainland and located between the municipalities of Alicia and Ubay that generally trend to the north and south directions with a maximum elevation of about 404 meters above sea level. Farther east are two other mountain ranges, the Mt. Tanawan and Mt. Candungao with 460 meters and 500 meters elevation, respectively. Both are prominent landmarks rising as they do several meters above the surrounding landscape. From Mt. Tanawan going southwestward, it declines gradually in height until it finally joins southwestwardly the foothills of Calape. The main range of hills extending from Calape joins to the southwestwardly trending mountain range from the interior, runs south and out to Loon Peninsula terminating in Punta Cruz, Maribojoc. The Sierra Bullones Range follows roughly the trend of the south coast. The highest point of this range and in the entire province is Mt. Mayana in Jagna town with a height of 827 meters above sea level.

### • Slope Range<sup>5</sup>

The province has six slope ranges from level to very steep. Level to nearly level sloping areas are mainly located along the coast and in the outer islands. The steep slopes are prevalent in the mountainous area, covered mainly by carbonate rocks (Wahig Limestone), volcanic extrusive and magmatic rocks (Ubay Volcanics and Jagna Andesite). *Map 2* and *Table 1* show the slope categories and the corresponding area covered in hectares.



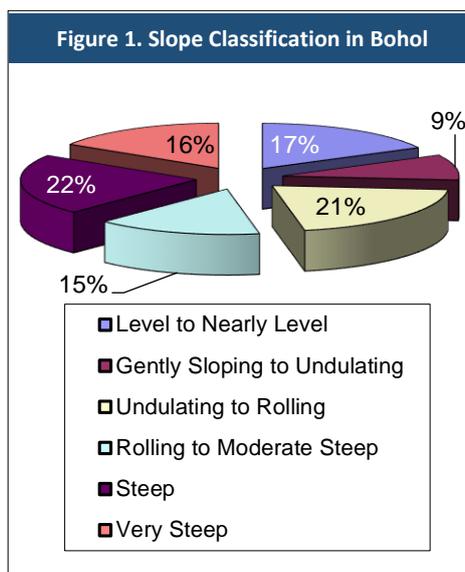
<sup>4</sup> Bureau of Soils and Water Management, DA, Region 7, Cebu City

<sup>5</sup> Philippine Land and Soil Management Atlas for Central Visayas

**Table 1. Slope Classification, Bohol Province**

Slope Category	Classification	Area Covered (has.)	% Distribution
0 - 3 %	Level to nearly level	71,289.00	17.31%
3 - 8 %	Gently sloping to undulating	37,519.00	9.11%
8 - 18 %	Undulating to rolling	84,902.00	20.63%
18 - 30 %	Rolling to moderately steep	62,473.00	15.17%
30 - 50 %	Steep hills & mountains	89,507.00	21.75%
50 % >	Very Steep hills	6,040.00	16.04%
<b>Total</b>		<b>411,726</b>	<b>100%</b>

Source: BSWM, DA, Region7, 1992

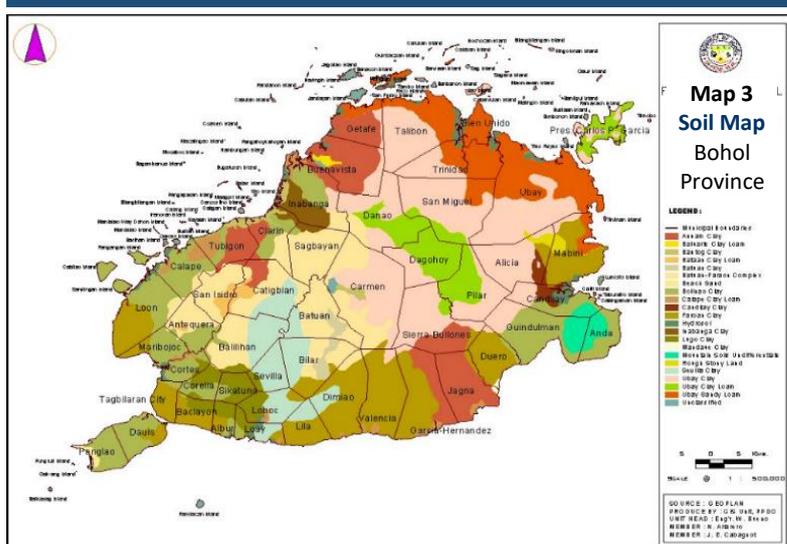


• **Soil Types<sup>6</sup>**

According to the Bureau of Soils and Water Management (BSWM Region 7, Cebu) there are 22 different types of soil that can be found in Bohol, which differ mainly in physical, chemical and morphological characteristics. The soil depth is relatively thin ranging from a minimum depth of 24 centimeters to a maximum of 30 centimeters. Most of the hills and ridges have meager to no soil cover due to fairly rapid surface drainage over most of the province’s land. Clay soils with fine textures are predominant throughout the island province. The dominant soil type is Ubay Clay found in the northeastern part of Bohol constituting 19.34 percent or 79,644 hectares of the total land area of Bohol.

The soil derived from all rock types are generally clay and silty with sandy soil limited in some parts to the coastal area. Soils on steep to very steep side slopes (18-50%) are clay loam to clay. Gently sloping to undulating (3-8%) is clay while the narrow alluvial valleys are silty clay to clay. The soils in the province are predominantly brown having moderate to high inherent fertility (Map 3).

**Map 3. Soil Map, Bohol Province**



<sup>6</sup> Bureau of Soils and Water Management, Department of Agriculture 1992, Region 7, Cebu City

### Existing Land Use and Vegetative Cover<sup>7</sup>

The province of Bohol has five major land uses, i.e., agricultural land, grassland/shrubland, woodland, wetland and miscellaneous land that includes built-up areas, reservoirs and mine sites (*Map 4*). Almost one-half of the province's total land area is covered by grassland/shrubland, while one-third of its total area is utilized for agricultural activities. About 67% of Bohol's land is used for agriculture while forestland occupies 25% of the province's total land area.

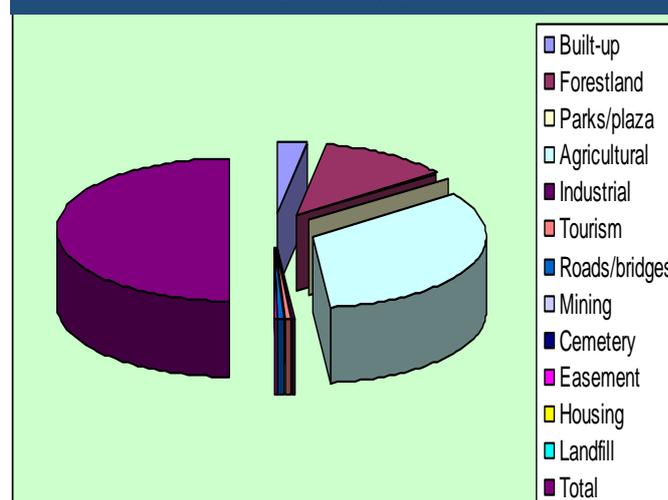
The province has a larger coverage of woodland (10.69%) compared to Cebu and some other provinces in the region. Wetland constitutes 4.92%, which includes mangrove, nipa, beach sands and fishponds while built-up areas comprise 10.22%.<sup>8</sup>

**Table 2. Existing Land Use Distribution in Bohol**

Land Use Category	Area	Percent
Built-up	21,882	5.32%
Forestland	101,271	24.61%
Parks/plaza	196	0.05%
Agricultural	273,950	66.56%
Industrial	2,672	0.65%
Tourism	3,663	0.89%
Roads/bridges	4,612	1.12%
Mining	1,138	0.28%
Cemetery	115	0.03%
Easement	1,916	0.47%
Housing	69	0.02%
Landfill	102	0.02%
<b>Total</b>	<b>411,586</b>	<b>100.00%</b>

Source: *Approved Municipal/ City Land Use Plan*

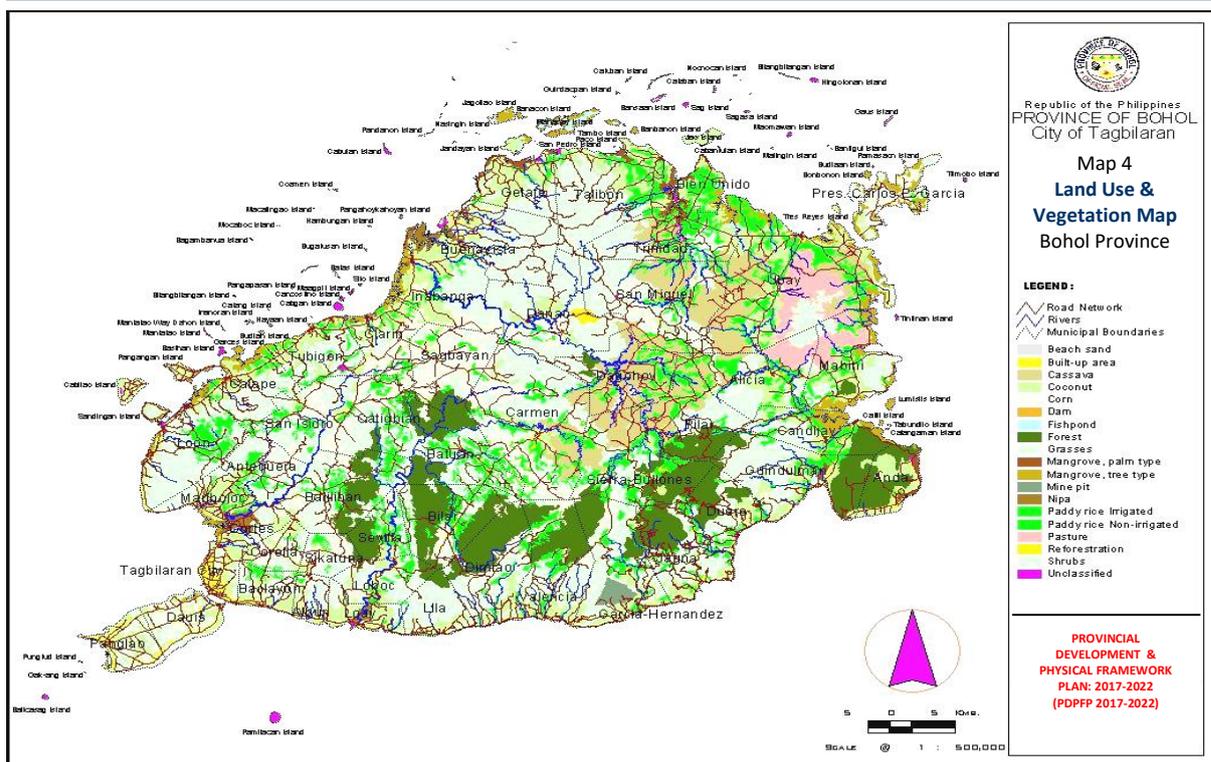
**Figure 2. Present Land Use & Vegetation Cover, Bohol Province**



<sup>7</sup> Bohol Ecological Profile of DENR, 1992

<sup>8</sup> Bohol Ecological Profile, DENR 1992

Map 4. Land Use and Vegetation Map, Bohol



Mangrove forests play a very vital role in shaping the ecology and economy of the Boholanos. Ecologically, mangroves are among the most productive coastal resources of Bohol as they serve not only as feeding, breeding and nursery grounds for many aquatic and terrestrial animals, but also as a protective structure against destructive waves and currents along the shoreline. Bohol has the biggest mangrove area in Central Visayas at 16,287.42 hectares. The biggest mangrove stands are located in Getafe, Talibon, Ubay, Pres. Garcia, Mabini and Candijay municipalities. The province also has the most diverse mangrove ecosystem in the Philippines with some 32 identified species. The largest and most diverse mangrove area is found in Cogtong Bay, which is bounded by Mabini and Candijay towns and covers an area of 2,200 hectares<sup>9</sup>. The most popular man-made mangrove forest in Bohol is around Banacon Island in Getafe town comprising an area of 1,750 hectares.

**Land Classification<sup>10</sup>**

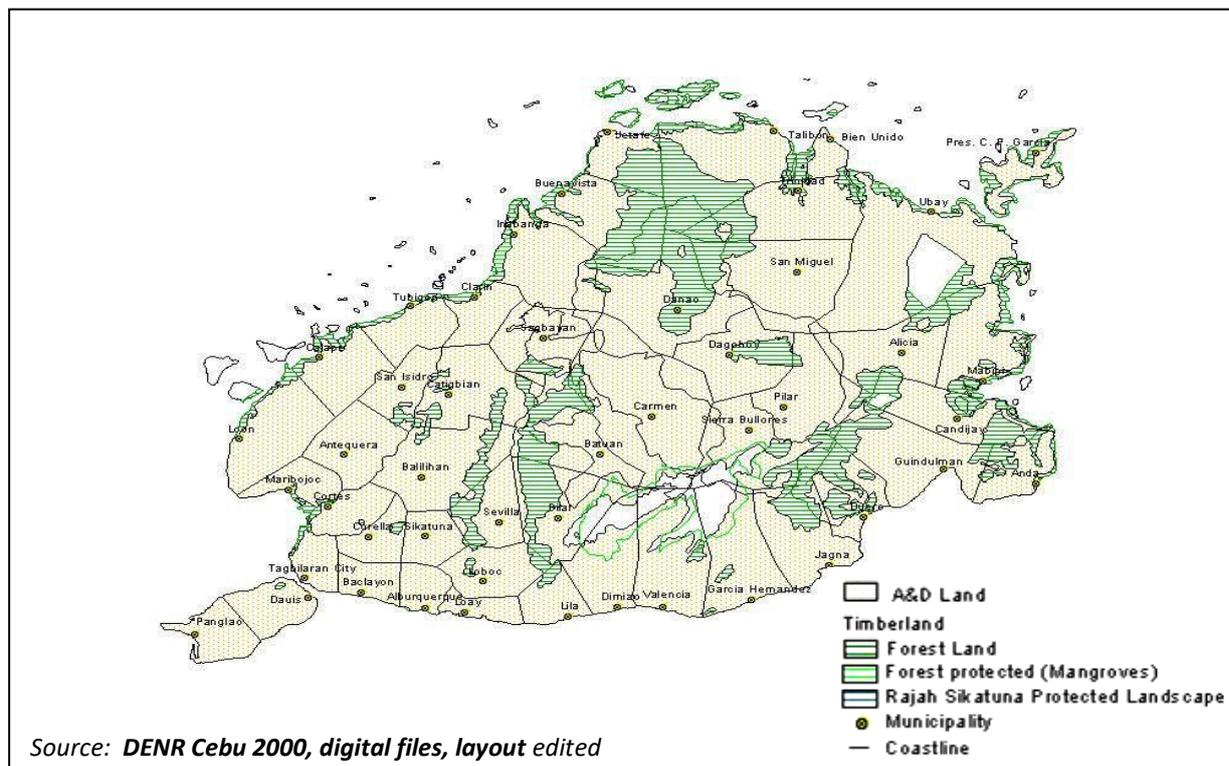
The total land area of Bohol Province is approximately 411,726 hectares representing 43% of the region’s land area and 1.4% of the total land area of the Philippines. About 75% are classified as alienable and disposable (A & D) land. The total area devoted to agricultural use is 273,950 hectares or 66 percent of the total land area of the province. Of the total agricultural area, 54 percent or 148,673 hectares is utilized for the planting of major crops such as rice, corn, coconut and rootcrops. The estimated land area as potential irrigable areas in the province is 40,800 hectares. The existing irrigable and non-irrigable rice lands are classified as priority focus for agricultural production.

<sup>9</sup> Bohol Coastal Environment Profile of 2002

<sup>10</sup> Department of Environment and Natural Resources (DENR), 2000

Bohol's public forestland or timberland occupies an area of about 101,271 hectares or roughly 25 % of its total land area. Almost 15% or 75,766 hectares of the province's land area is under protection through NIPAS System and are classified as environmentally constrained and critical areas.

**Map 5. Land Classification Map, Bohol Province**



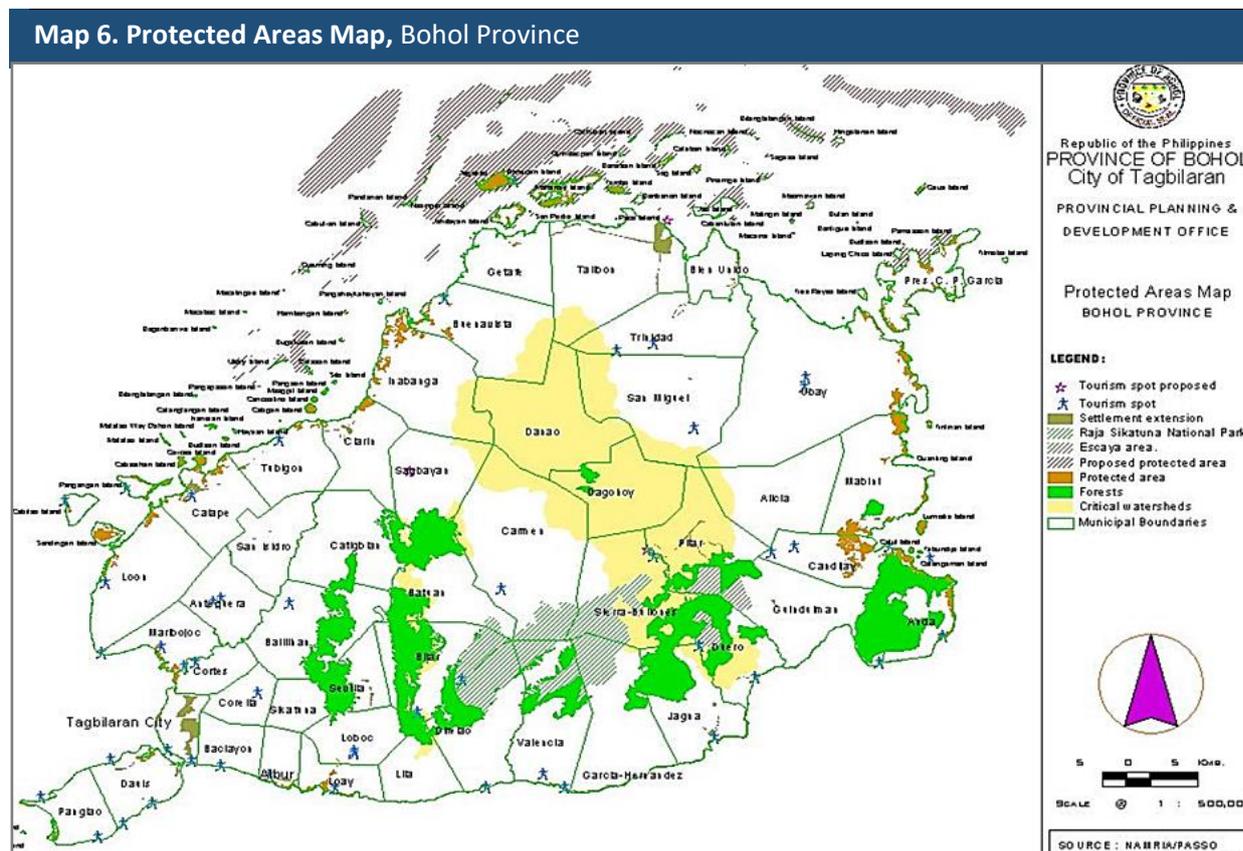
## Physical Resources

Bohol is endowed with a rich biodiversity and natural resources that play an essential role in guiding its future development for agriculture, industry, tourism, settlements, culture and infrastructure in both the medium and long-term time frame. It has a high diversity of flora and fauna found in the different ecosystems of the island such as its forests, reefs, farmlands, in zones along creeks and rivers, caves and marine areas. The quality of life in any given area is extremely dependent on the vibrant condition of these ecosystems and biological resources.

Bohol has a total land area of 411,726 hectares with 654 kilometers of coastline and 6,245 square kilometers of municipal waters covering its major islands and islets. The province is within four major resource boundaries, i.e., upland/forestry, lowland/agriculture, coastal/marine and water boundaries.

Bohol's water supply system for domestic, agricultural and industrial uses is mainly based on 2,224 springs, 59 rivers and 200 creeks. There are 22 rivers basins/watersheds that are valuable sources of water for drinking and irrigation. Surface water from rivers and streams in these basins are impounded and distributed for irrigation, electric generation, industrial use as well as for domestic use.

Surface water in Bohol feeds its watersheds. There are 3 major watersheds in the province that have been declared as protected areas under the NIPAS. The largest reserve is the Wahig-Inabanga Watershed covering 16 municipalities with an aggregated area of 14,000 hectares. The second largest, and first to be proclaimed as a watershed forest reserve in Bohol, is the Loboc Watershed with an area of 10,450 hectares, part of which is inside the Rajah Sikatuna Protected Landscape. The third is the Duero Watershed (that covers an area of 3,620 hectares. The map below shows the location of these watersheds.



Bohol's public forestland or timberland occupies an area of about 101,271 hectares or roughly 25 % of its total land area. Almost 15% or 75,766 hectares of the province's land area is under protection through NIPAS System and are classified as environmentally constrained and critical areas.

In terms of biodiversity assets, Bohol has a high biodiversity level of plant species categorized as: upland, mangrove, coastal areas, cave entrances, cultivated cropland and intensively used lands. Several plant species noted to be abundant before are already extinct, others are becoming rare.

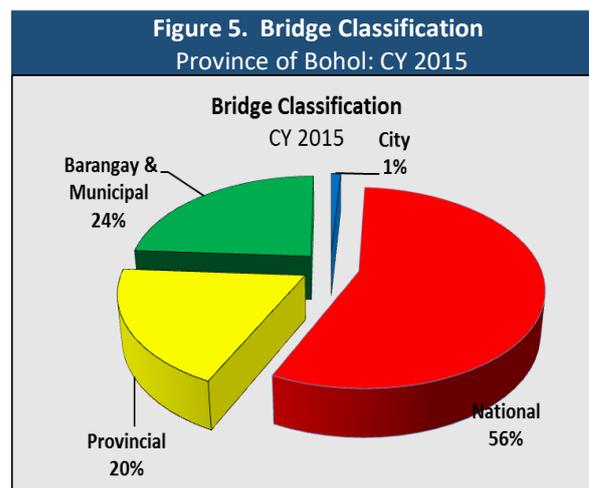
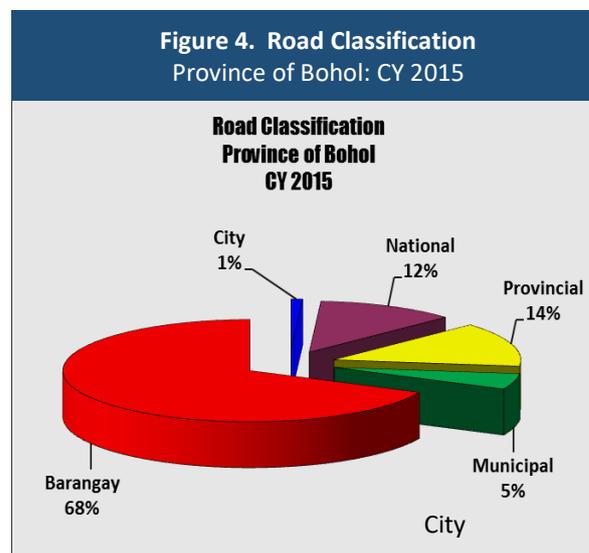
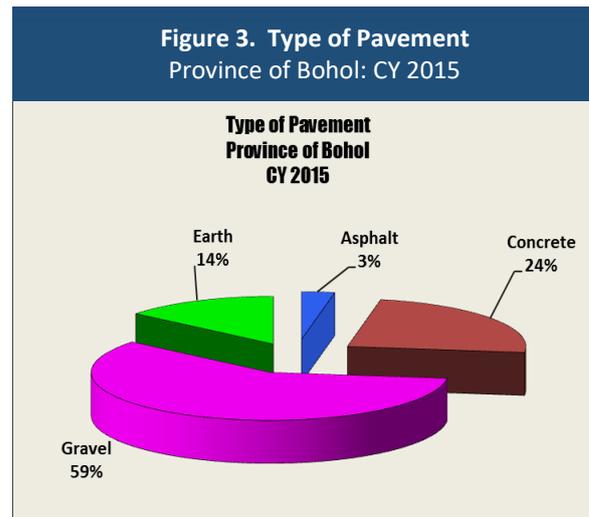
The Province has the biggest mangrove forest in Southeast Asia which is located in Banacon, Getafe. There are about 1,200 species of crabs and shrimps with over 6,000 mollusks species found in 15,000 hectares of Baclayon, Dauis and Panglao (Bohol Marine Triangle). Bohol has one of the the six (6) world-renowned Double Barrier Reefs-the Danajon Double Barrier Reef, covering 13 municipalities. The province has a total of 1,920 hectares of coral reefs and its coastal ecosystem provides the major source of animal protein for the populace.

**Infrastructure <sup>11</sup>**

Bohol’s **total road** length is 6,059.42 kilometers. Of these roads, 12% is classified as national road and 14% provincial roads. The city road only accounts 1% while municipal road 5%. Barangay roads have the longest stretch of roads, accounting 68%. In terms of type of pavement, most of the province’s roads are still gravel, which may be attributed to local roads. Concrete roads account 24%, and continue to increase in length as both national and local governments sustain their projects for road concreting. Asphalt road, on the other hand, shared 3% of the total road length. Meanwhile, 14% of the province road remains to be earth roads, which are mostly classified as barangay roads.

As to bridges, there are 8,226.24 linear meters of bridges within the road network in the province. 64% of this total length is concrete. Steel bridge accounts 22% while bailey 8%. There are still timber bridges in the province, which shared a total length of 6%.

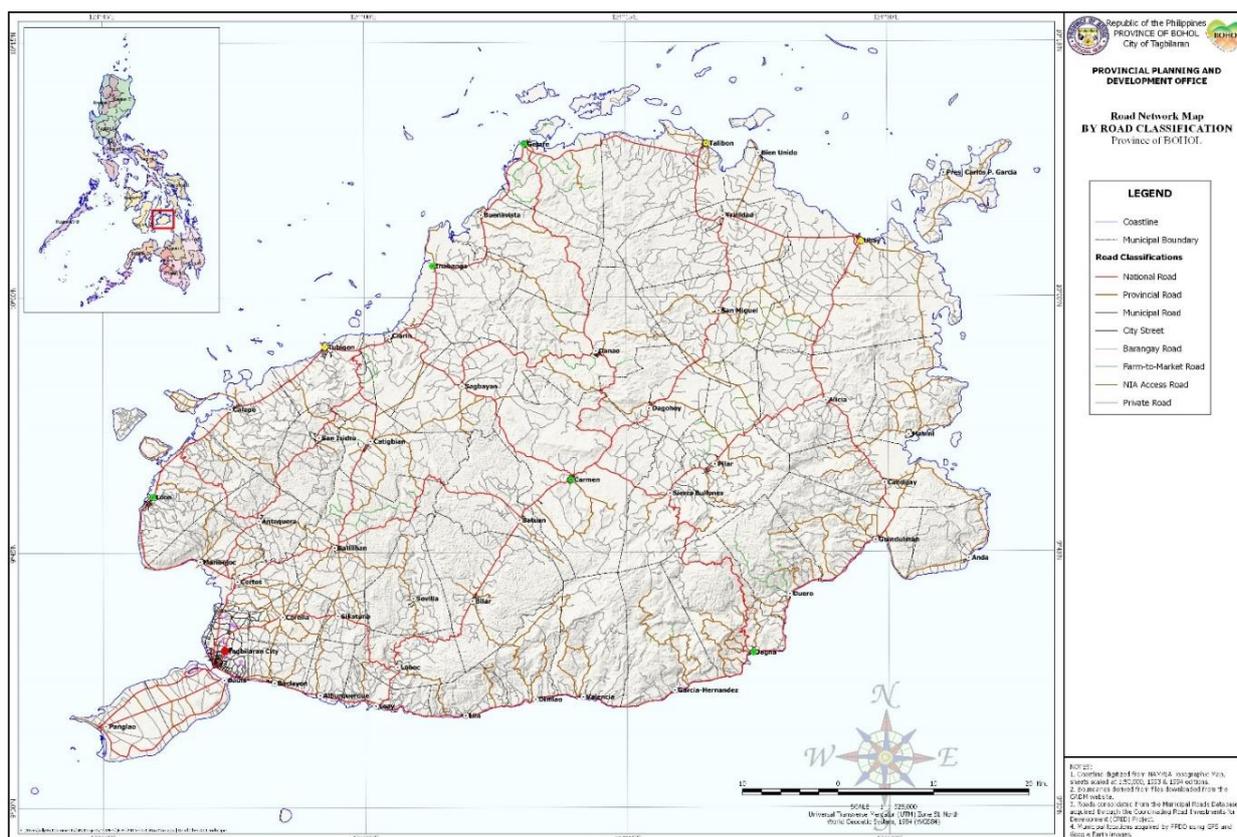
Majority of the bridges in the province are under the jurisdiction of the national government, which accounts 56%. The Provincial Government is maintaining 1,601 linear meters of 20% of these bridges. The rest of the bridges are managed and maintained by the city/ municipal and barangay local governments.



*Source: Department of Public Works & Highways (DPWH)*

<sup>11</sup> Department of Public Works and Highways (DPWH)

Map 7. Road Network Map, Bohol Province



There are **16 ports** in Bohol, serving as the gateways of people and goods to and from the province. Of the 16 ports, there is only 1 baseport, located in Tagbilaran City. There are 4 terminal ports, 9 outports and 2 private ports located in several coastal municipalities. The Port of Tagbilaran is considered a major port of entry while the Port of Tubigon, the busiest among the terminal ports, offer more than ten daily round trips plying the Cebu-Bohol route. The Port of Jagna offers services that ply between Bohol to Cagayan, Nasipit and Camiguin with roll-on, roll-off route.

For **air travel**, the Province of Bohol is being served by only 1 international airport located in municipality of Panglao. Number of flights to the province has been irregular for the past 6 years brought about by airline competition, level of demand for air travel, and changes in aviation regulations.

For **land transportation**, an increasing number of registered cars, vans and trucks in the province for the period 2011-2014 is noted. Such increase posted a yearly average of 8.5%. This is due to the improvement of payment capacities of Boholanos as well as affordable financing schemes offered by car dealerships and banks.

## Socio Economic and Demographic Profile

### Population

Based on the latest 2015 Census on Population, Bohol’s population reached 1.313 Million, showing a 0.87% average annual increase from the 2010 population count. Such annual growth rate is higher than the Central Visayas’ growth rate of negative 2.25%. Bohol’s population growth, however, is lower than that of the 1.70% national annual growth rate. With this growth, estimated population of the province in 2018 is pegged at 1.348 Million and will further increase to 1.432 Million in 2025.

Among the 48 localities, Tagbilaran City has the highest population with 105,051, followed by municipalities of Ubay, Talibon, Carmen, Tubigon, Inabanga, Dauis, Loon, Jagna, and Panglao. Sikatuna is the least populated municipality with only 6,726 population.

While population of Bohol has steadily increased, the pace of increase, however, slowed down from 1.85% average annual increase (1990-2000) to 0.97% (2000-2010) and further to 0.87% (2010-2015).

The municipality of Panglao has the highest growth rate in the Province (3.01%). Among the top 10 localities with high growth rates include Dauis, Jetafe, Sagbayan, Cortes, Trinidad, Baclayon, Corella, Talibon, and Tagbilaran City. The municipalities with negative growth rates include Dimiao, San Isidro, Mabini, Anda, Loboc, Valencia, Danao, and Catigbian.

**BASIC FACTS OF BOHOL PROVINCE**

**Population : 1.255 Million (2010)**  
**1.313 Million (2015)**  
**1.324 Million (2016 Projection)**

**Income Class: 1st Class Province**

**Land Area : 411,726 hectares (411.726 Km2)**

**Pop. Growth Rate : 0.87% (2010-2015)**

**No. of Household : 261,408 (2010)**

**Average HH Size: 4.8 (2010)**

**Pop. Density : 322 persons/ Km2 (2016)**

**Administrative Units**

**: 1 City; 47 Municipalities**

**: 1,109 Barangays**

**: 3 Congressional Districts**

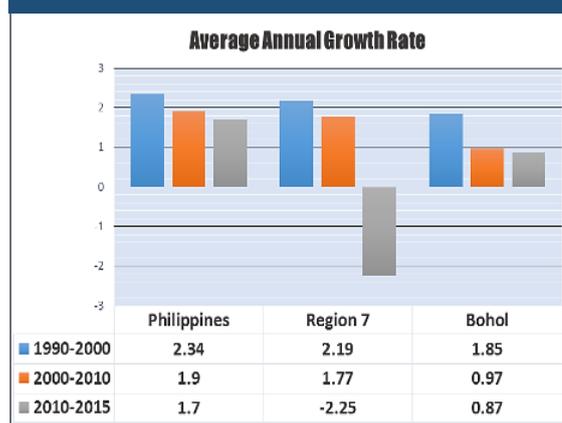
**Coastline: 654 kilometers of coastline**

**Municipal waters : 6,245 square kms**

**Coastal barangays = 304**

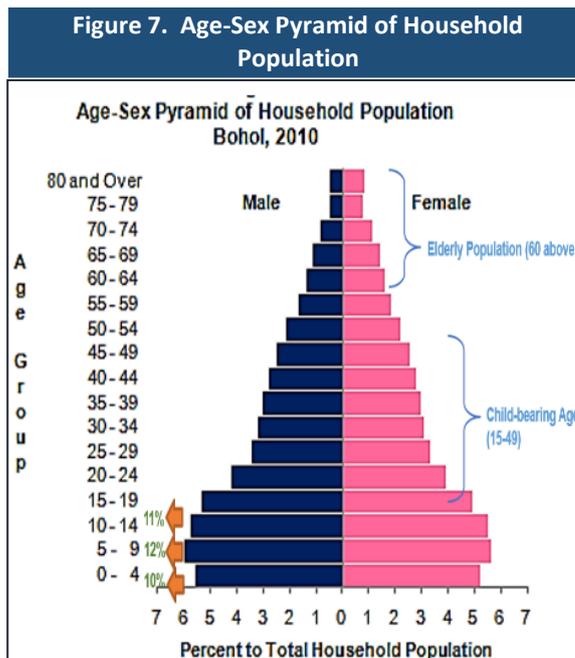
**No. of islets = 72 islets**

Figure 6. Average Annual Growth Rate



Based on the 2010 Census, the population structure of Bohol shows bigger group of younger people (with 34% belonging to age group under 15 years old). Female reproductive Age (Child-bearing age) comprised 23%. Males outnumbered females in the 0-54 years old. Females outlived the males in the older age groups. Those aging 60 and over comprised 10% of Bohol’s Population. During such Census, it was established that the median age is 23.7 or 24 years (meaning half of the population was younger than 24 years). This is higher than the median age of 22 years in year 2000.

Bohol’s population density is 315 persons per sq. km in 2015, which is higher compared to the 305 persons per sq. km in 2010. In 1990, the province’s population density was only 230 persons per sq. km. Most of the densely populated areas in the province are found along the coast, concentrated along the north to northeastern part of Bohol. Among the top 10 most densely populated areas in the province include Tagbilaran City (3432/km<sup>2</sup>), Dausi (1065/km<sup>2</sup>), Tubigon, Panglao, Baclayon, Bien Unido, Loay, Pilar, Mabini and Calape. On the other hand, the least densely populated areas include Balilihan (119/km<sup>2</sup>), Bilar, Batuan, Sevilla, Antequera, Danao, Dimiao, Carmen, Loboc and Duero.

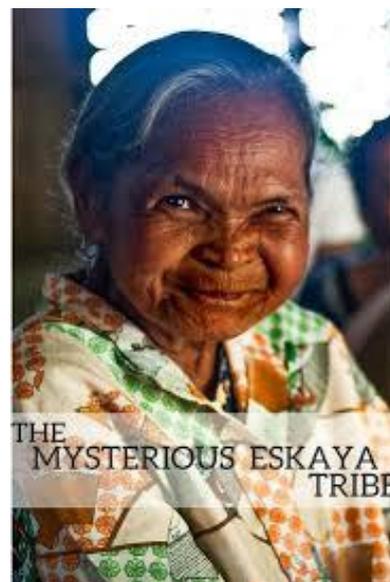


Source: National Census and Statistics Office (NCSO)

**Bohol’s Indigenous Peoples (IP)**

- **Eskaya Tribe**

The Eskaya is an indigenous tribe found in the hinterlands of the towns of Duero, Guindulman, Pilar and Sierra Bullones, in Bohol’s southeast interior. They are a gentle community of about 4,000 people hardy peasants. Likewise known as the “Visayan-Eskaya”, the community is only found in the island province of Bohol. They have a unique cultural heritage, use a distinct language and literature, and have traditional practices that dates way back to pre-Spanish times. The Eskaya people have their own language quite unlike the local Boholano or Cebu dialects, a system of writing, and an intrinsic written literature. While their whole week is devoted to tilling and communal forms, Sundays are set aside for Eskaya classes. Young and old alike learn the Eskaya ways in an attempt to relive and revive the almost forgotten Eskaya legacy.



The first settlement of this tribe is at Biabas, Guindulman, established in the early 20th century by one Mariano Datahan who died in 1949. A second settlement was established in Taytay, in the municipality of Duero in the year 1951 founded by Fabian Baja under Datahan’s instructions. Eventually, the group spread to nearby Barangays of Canta-ub, Lundag, Tambongan, Cadapdapan and Abihilan.

The group was recognized and the community awarded a Certificate of Ancestral Domain Claim (CADC) in 1996 by President Fidel V. Ramos. CADC No. R7-CADC-14 was deemed as an ancestral domain consisting of 3,173 hectares of land in Taytay (Duero), Biabas (Guindulman), Lundag (Pilar), Canta-ub (Sierra-Bullones), and Cadapdapan (Candijay).



Legally, the Eskaya are now classified as an indigenous group under Republic Act No. 8371 entitled “The Indigenous People’s Rights Act of 1997”. No official census has yet been made of the group but a report in 1991 mentioned 130 Eskaya families living in Bohol.

- **Ati**

The Ati community in the Municipality of Loay, Bohol consists of about 200 people with an average family size of 5. Some of them settled along the shorelines of Loay, Bohol which is about 0.30 kilometers from the national highway. Their primary sources of income are fishing, hunting and selling herbal plants and medicines. Most head of families go fishing while mothers with their children sell herbal medicines.



The Atis are believed to have originally come from Panay Island. They are from the Negrito ethnic group in Panay, located in the Visayas Islands of Cebu, Bohol, Siquijor, Leyte, Samar, Masbate, Negros and Guimaras. They are genetically-related to other Negrito ethnic groups in the Philippines such as the Aeta of Luzon, the Batak of Palawan, and the Mamanwa of Mindanao.

- **Badjao**

The Badjaos are an indigenous ethnic group of Malaysia and the southern Philippines. In Bohol, they are found largely in Brgy. Totolan, a coastal barangay at the northern part of Dauis, 1.5 kilometers away from the City. This cultural community migrated to this barangay during the tumultuous years in Mindanao in the 70’s and have since then found a haven in the shorelines of said Municipality. Since then, this cultural group of Badjaos had established a community in said area.



The Badjaos are what are considered as sea gypsies. The Bajaos have been a nomadic, seafaring people, living off the sea by trading and subsistence fishing. They generally live in the sea using “bankas” as houses if not on stilt houses along the seashore. Their primary source of income is deep sea fishing. At present, there are 78 families in the community and a population of 545 people.

## Poverty Situation

The reduction, if not the elimination, of poverty continues to be a challenge in Bohol with a number of its families still considered as poor. However, Bohol's Poverty Incidence as well as its Subsistence Incidence<sup>12</sup> among families has been steadily decreasing since 2006. From 40.3 percent in 2006, poverty incidence among families lowered to 30.6 percent in 2012, then to 21.7 percent in 2015 or a decrease of about 20 percent over a period of nine years.<sup>13</sup> This translates to a total of 60,279 poor families in 2015 from 97,368 poor families in 2006. In the same period, the proportion of Boholanos in extreme poverty whose incomes are not sufficient to meet basic food needs registered at 7.2 percent numbering 20,135 Boholano families in extreme or subsistence poverty.

The Annual Per Capita Threshold, however, continued to increase with an Annual Per Capita Poverty Threshold (ACPT) rising from ₱14,098 in 2006 to ₱20,437 in 2015. The Annual Per Capita Food Threshold (ACFT) of ₱9,831 in 2006 to ₱14,249 in 2015, the lowest in Region 7 and the national figure. This means that a family of five in Bohol in 2015 will need around ₱4,088 monthly income to buy their minimum basic food needs; and around ₱7,852.92 monthly for their minimum basic food and non-food needs. Both ACPT and ACFT were higher in the urban areas of Bohol at ₱19,700 in 2012. Bohol improved 2 notches higher in its cluster standing of poorest provinces in 2015, from Cluster 1, the bottom or poorest cluster of provinces in 2006 to Cluster 2 in 2009 and 2012, then to Cluster 3 in 2015.

The income gap in 2015, which measures the amount of income required by the poor in order to get out of poverty, was estimated by PSA at 25.7 percent. This means that, on the average, a Boholano poor family of five members, needed an additional monthly income of about ₱5,252.00 to move out of poverty in 2015. Using this as a hypothetical benchmark to eradicate poverty in the province thru a mere cash transfer to all poor households to cross the poverty line in Bohol, government would need about ₱ 0.317 billion, at the minimum, to eradicate poverty in the province in 2015.

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<sup>12</sup> Families with income below the food threshold; subsistence incidence is often referred to as the proportion of Boholanos in extreme or subsistence poverty

<sup>13</sup> 2015 official poverty statistics released by PSA at the sub-national level

Table 3. Poverty Profile, Bohol Province

Annual Per Capita Poverty & Food Thresholds, Poverty & Subsistence Incidence & Magnitude of Poor Families & Other Poverty Indicators in Region 7 & Bohol Province: 2006, 2009, 2012 & 2015												
Region/ Province	Annual Per Capita Poverty Threshold (in Pesos)				Poverty Incidence among Families (%)				Magnitude of Poor Families			
					Estimates (%)				Estimate			
	2006	2009	2012	2015	2006	2009	2012	2015	2006	2009	2012	2015
PHILIPPINES	13,357	16,871	18,935	21,753	21.0	20.5	19.7	16.5	3,809,283	4,036,915	4,214,921	3,746,513
Region VII	13,963	16,662	18,767	21,914	30.7	26.0	25.7	23.6	411,431	378,221	405,694	394,336
Bohol	14,098	16,633	18,847	20,437	40.3	36.6	30.6	21.7	97,368	93,942	83,455	60,279
Cebu	15,064	17,770	18,855	21,740	25.6	22.3	18.9	17.9	209,301	200,481	185,603	179,162
Siquijor <sup>b/c/</sup>	13,971	16,469	18,420	21,675	25.6	27.2	24.0	48.9	5,027	5,676	5,319	16,866
Region/ Province	Annual Per Capita Food Threshold (in Pesos)				Subsistence Incidence among Families (%)				Magnitude of Subsistence Poor Families			
					Estimates (%)				Estimate			
	2006	2009	2012	2015	2006	2009	2012	2015	2006	2009	2012	2015
PHILIPPINES	9,308	11,780	13,232	15,189	8.8	7.9	7.5	5.7	1,596,850	1,553,082	1,610,865	1,303,549
Region VII	9,765	11,635	13,048	15,357	14.9	11.1	11.1	9.8	200,484	161,818	175,581	164,496
Bohol <sup>b/</sup>	9,831	11,596	13,155	14,249	21.9	16.6	12.2	7.2	52,901	42,619	33,288	20,135
Cebu	10,519	12,360	13,049	15,139	11.6	9.7	7.0	6.8	95,289	86,825	68,383	68,345
Siquijor <sup>c/</sup>	9,756	11,500	12,863	15,136	18.7	5.9	8.7	18.8	3,672	1,236	1,916	6,495
Region/Province	Income Gap				Poverty Gap				Severity of Poverty			
	2006	2009	2012	2015	2006	2009	2012	2015	2006	2009	2012	2015
PHILIPPINES												
Region VII	30.8	27.7	28.1	27.9	9.4	7.2	7.2	6.6	4.0	2.8	2.9	2.6
Bohol	33.6	28.7	24.5	25.7	13.5	10.5	7.5	5.6	6.0	4.3	2.6	2.1
Cebu	29.8	28.4	26.3	26.3	7.6	6.3	5.0	4.7	3.1	2.6	1.9	1.8
Siquijor <sup>a/</sup>	33.9	21.0	25.0	25.7	8.7	5.7	6.0	12.6	3.5	1.6	2.0	4.3

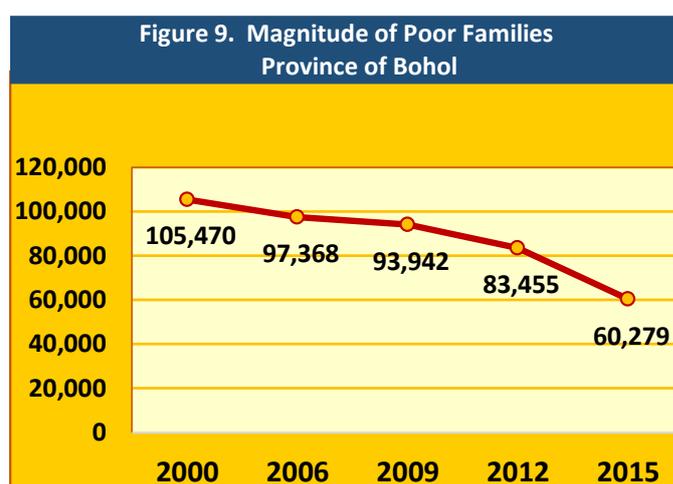
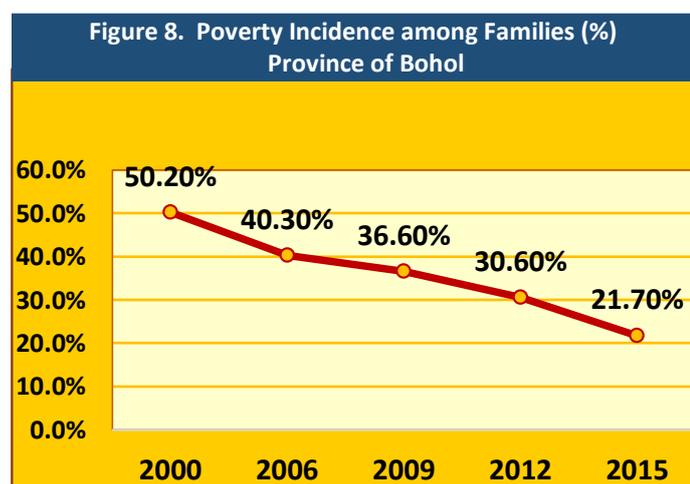
Note: a/ Caution in utilizing the estimate for these provinces due to its very small sample size.

b/ Coefficient of variation of 2015 subsistence incidence among population is greater than 20%.

c/ Caution in utilizing the estimate for these provinces due to its very small sample size.

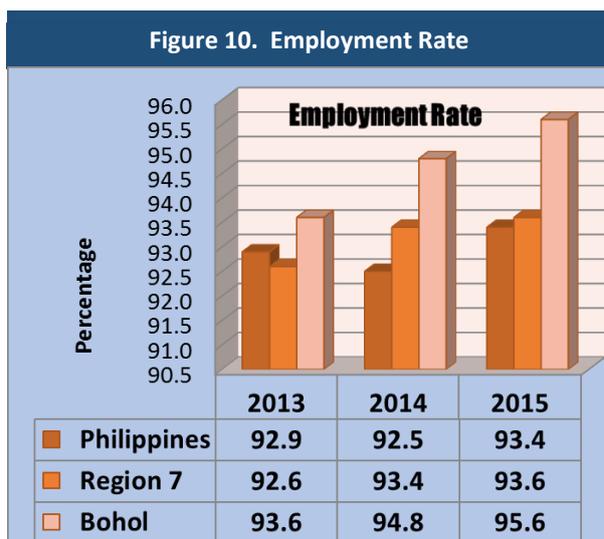
Source: National Statistical Coordination Board (NSCB)

Bohol's poverty incidence has consistently decreased from 2000 to 2015. From a high 50.2% in 2000, poverty incidence improved to 21.70% in 2015 which, for the time, is lower than the regional average of 23.6%. In terms of magnitude of poor families, a total of 60,279 families were considered poor in 2015. This figure is way below the poor families in year 2000 of 105,470.



### Employment

In terms of employment in the Province, employment rate has improved over the past three years. Based on the Labor Force Survey of the Philippine Statistics Authority (PSA), employment rate in the year 2015 is pegged at 95.6%, which is higher to the 93.6% and 94.8% in the year 2013 and 2014, respectively. It can also be noted that the employment rate of Bohol is consistently higher compared to the national and regional averages for the three-year period. Meanwhile, labor force participation rate of the Province has also increased during the same period, with 66.3% in 2015, higher than the 58.2 in 2013 and 60.2% in 2014.



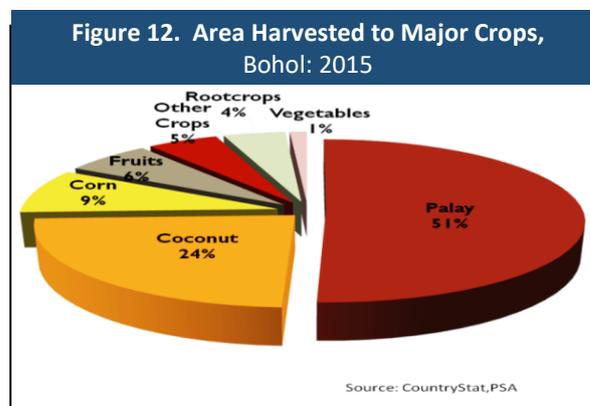
Source: *Philippine Statistics Authority (PSA)*



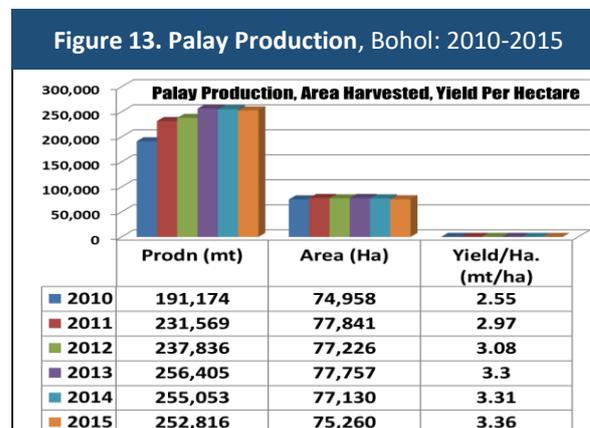
Source: *Philippine Statistics Authority (PSA)*

### Economy and Priority Industries

The economy of Bohol is largely agri-based with agricultural activities focused on the cultivation of crops on its vast agricultural land. With this, home-based industries, which are mostly of the micro and cottage types, play a vital role in the economy. The government continues to provide support to sustain the development and production of major crops such as palay, corn, high value commercial crops, and fisheries through upland and marine aquaculture, organic agriculture and livestock. The development of dairy products is also being pursued in collaboration with appropriate government agencies and livestock farmers’ groups. Support for this program would allow further value-adding processing of cow and carabao’s milk, which in turn, will provide higher income for farmers.

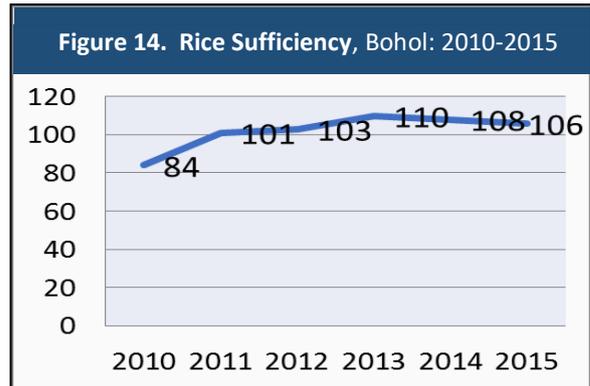


Source: *CountryStat, PSA*



Source: *CountryStat, PSA*

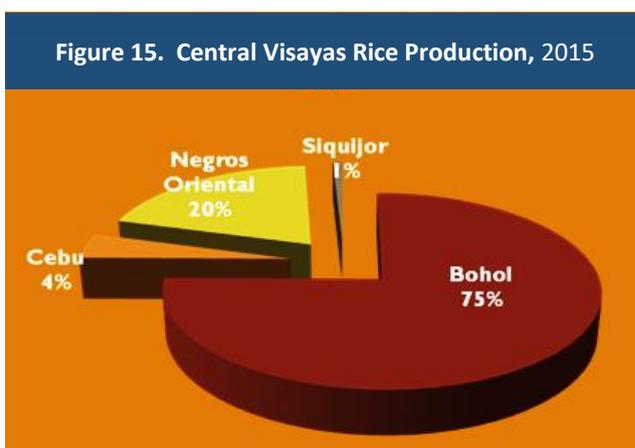
**Agriculture** is the largest sector in terms of providing employment as well as in land use. Of the total land area of the province, 273,950 hectares (66%) are available and use for agriculture. 148,673 hectares or 54% of this area is planted with and harvested of major crops. Among the major crops plated in the area include palay (51%), coconut (24%), corn (9%), fruits, root crops, and vegetables. The rice production in the province is generally on the uptrend for the last six years, with increasing yield per hectare despite the effects of El Niño. With the introduction of right mix of technology, appropriate varieties of seeds, and continuing support to farmers, average yield per hectare has reached to 3.36 metric tons in 2015, which is way better to the 2.55 tons back in 2010. Irrigated lands provided the highest yield of 3.91 metric tons/hectare while rain fed rice land yielded an average of 2.82 metric tons/ hectare.



Source: *CountryStat, Philippine Statistics Authority*

Bohol remains to be a rice sufficient province with rice sufficiency levels sustained above 100% since 2011. With estimated per capita consumption of 109.367 kilograms per year, the estimated demand for rice for 2015 is at 152,527 metric tons, which is within the rice supply of the province for that same year.

Considering the unfavorable weather conditions such as El Niño and typhoons, rice sufficiency of the province remains high at 106% in 2015. Major rice producing municipalities of Bohol include Ubay, Trinidad, Carmen, Pilar, Dagohoy, Talibon, San Miguel, Alicia, Candijay, and Catigbian.



Source: *CountryStat, Philippine Statistics Authority*

At the regional setting, the Central Visayas’ food requirement for rice is largely dependent on Bohol. In 2015, the province provided 75% of the region’s production, which is significantly higher compared to the production share of the other provinces.

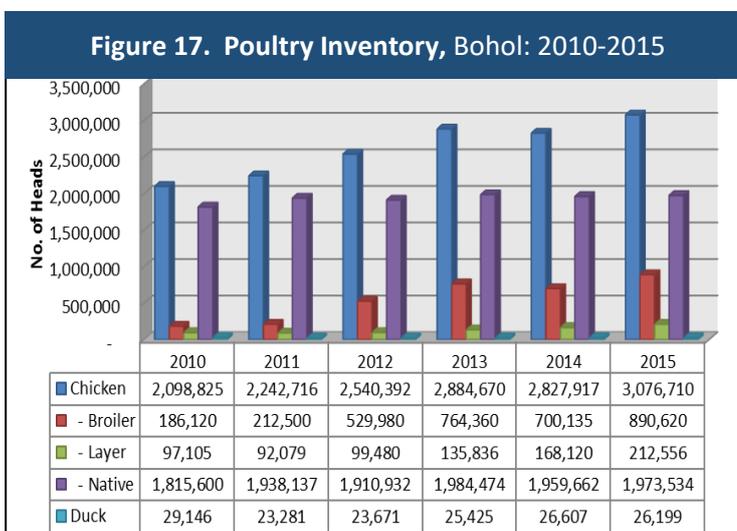
In terms of **livestock production**, there is generally an increasing inventory of carabaos, cattle and goat in the province. Among the livestock inventory, hog remains to be the largest in number with 284,841 in 2015. This is followed by goat, cattle and carabao.



Source: *CountryStat, Philippine Statistics Authority*

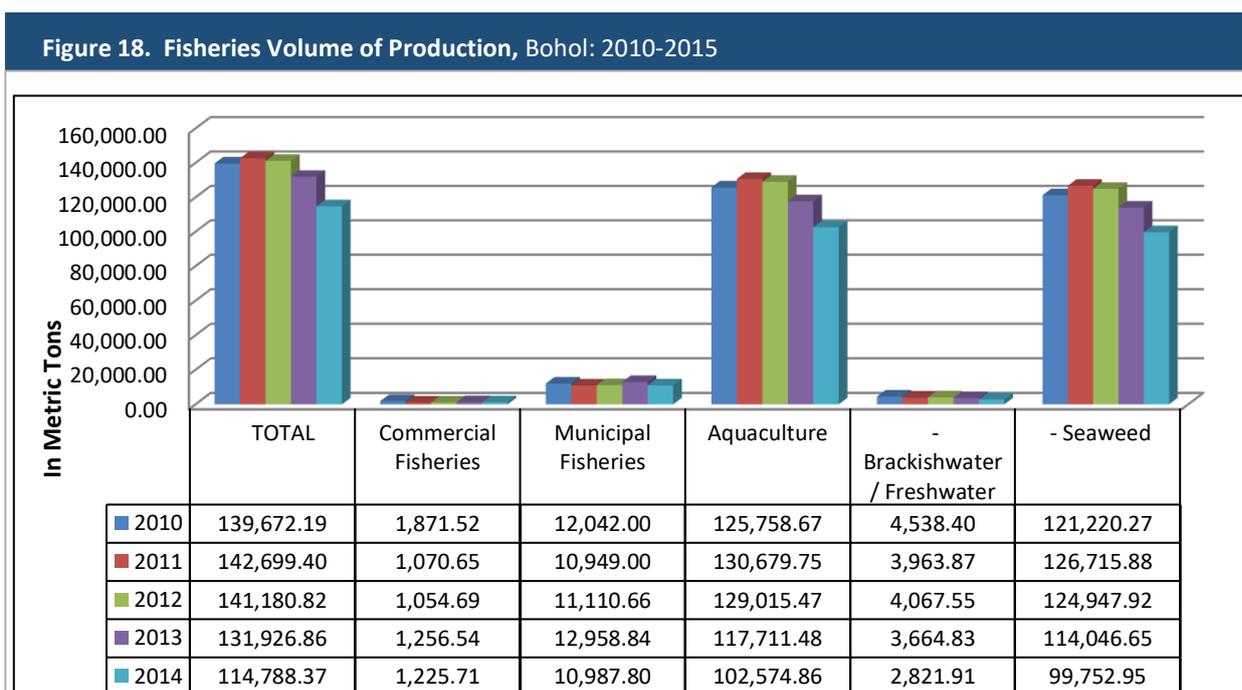
**Poultry production** in the province, on the other hand, is seen to be consistently increasing from most of the poultry products.

Chicken remains to the major poultry commodity of Bohol with over 3 Million inventories in year 2015. Of this number, 64% is attributed from native chicken production. Broiler and layer inventory, though generally increasing for the past 6 years, still accounts the minority with 36%. Meanwhile, duck inventory is somehow irregular over the period, with yearly increases and decreases observed.



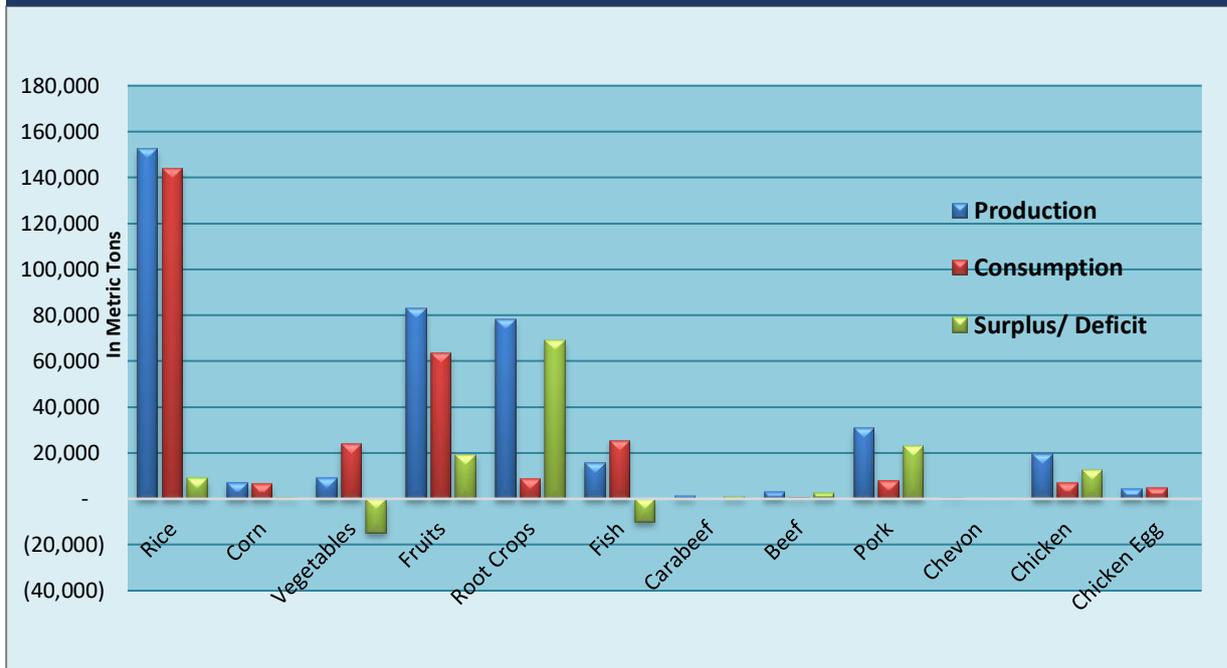
Source: *CountryStat, Philippine Statistics Authority (PSA)*

For **fisheries**, production from aquaculture remains to be highest contributor to the volume of fishery production in the province. In 2014, aquaculture posted 47% share in total production and closely followed by seaweeds accounting 46% share. Municipal fishery shared only 5% of the production, with commercial fishing and brackish water/ freshwater fishing both contributing only 1%. Comparing the production and consumption of major food commodities in the year 2015, the province of Bohol has surplus production for rice, corn, rootcrops, carabeef, beef, pork, chevon, and chicken. Food commodities where the province have recorded deficit in terms of production include vegetables, fruits, fish and marine products, and eggs.



Source: *CountryStat, Philippine Statistics Authority*

Figure 19. Production and Consumption of Major Commodities, Bohol, 2015

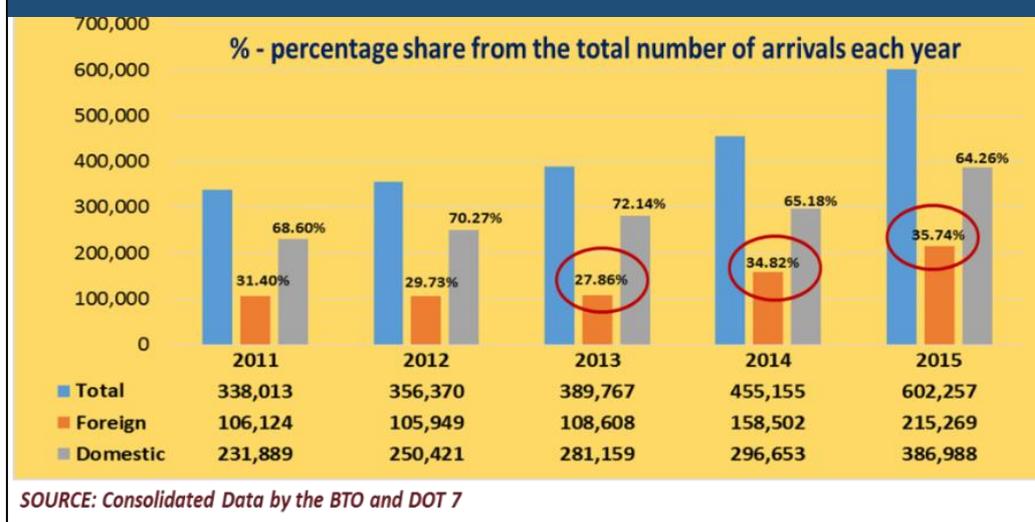


Source: CountryStat, Philippine Statistics Authority

**Tourism** is another industry that is sustained by both the private sector and government. It has been noted that Bohol’s visitor arrivals have increased throughout the years and such trend has significantly contributed to the province’s economic growth.

Domestic visitors still account the majority share of the total arrivals with an average of 67.6% for the period 2011-2015. Foreign visitors, while on average shared 32.4% for the period, has increased in number faster relative to domestic visitors, with growing share from 27.86% in 2013 to 35.74% in 2015.

Figure 20. Visitor Arrivals, Bohol: 2011-2015



SOURCE: Consolidated Data by the BTO and DOT 7

Among the foreign visitors in the province for 2015, Koreans dominated the tourism market, sharing 30%. It is followed by the Chinese accounting nearly a quarter of the foreign visitors during the year. Other top foreign visitors include Americans, French, Japanese, Germans, British, Australians, Russians, and Canadians. It is worthy to note that for the period 2014-2015, the French posted the highest increase in visitor arrivals with recorded 75.25%. Russians, on the opposite, recorded a decrease in visitor arrivals.

**Figure 21. Top 10 Foreign Travelers, 2014-2015**

COUNTRY	MARKET SHARE	2015	2014	GROWTH RATE (2014-2015)
KOREA	29.96%	51,592	32,334	59.56%
CHINA	24.61%	42,387	28,080	50.95%
USA	10.90%	18,765	13,472	39.29%
FRANCE	5.55%	9,553	5,451	75.25%
JAPAN	5.45%	9,385	8,090	16.01%
GERMANY	4.76%	8,204	6,514	25.94%
UNITED KINGDOM	4.16%	7,161	4,287	67.04%
AUSTRALIA	3.58%	6,165	5,262	17.16%
RUSSIA	2.69%	4,640	5,252	-11.65%
CANADA	2.64%	4,544	3,361	35.20%

SOURCE: Consolidated Data by the BTO and DOT 7

As to the regional scene, Bohol accounts 13% of the total visitor arrivals of Central Visayas. Cebu, the major gateway and hub in the region, still accounts the significant share of 72%. For regional domestic visitors, Bohol shared 15% while accounting only 11% in foreign visitors. It is expected that tourist arrivals will improve and increase since the New Bohol Airport in Panglao Island started its operation in 2018.

Local and foreign industry players continue to pour in investments in this sector considering the consistent and stable growth of the tourism industry in the province and bright outlook of the future. Improvement of infrastructure and support facilities in the province has also entice larger investments through the years. For accommodation services, for example, the number of accommodation facilities has doubled for the period of six years. Based on the data available, number of accommodation facilities in year 2015 has reached to 360, which is twice the number of facilities in 2009. Correspondingly, the number of rooms has more than doubled in the period, with total rooms of 6,370 in 2015, which is significantly higher than that of 2,982 in 2009.

**Table 4. No. of Accommodation Facilities, Bohol**

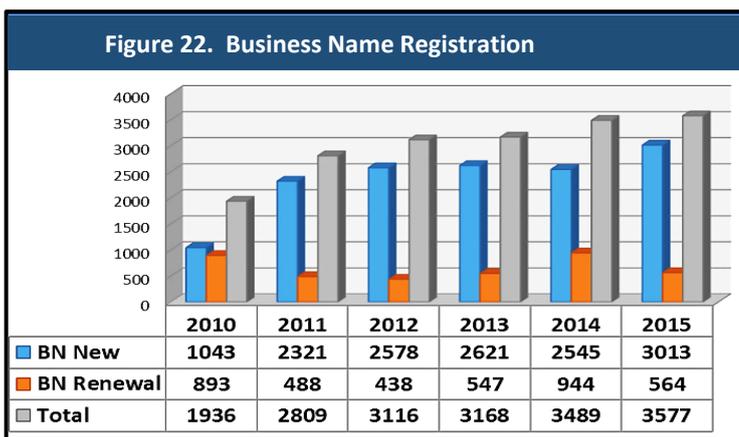
Year	No. of Accommodation Facilities	No. of Rooms
2009	180	2,982
2012	232	3,375
2015	360	6,370

Source: Bohol Tourism Office

**In terms of trade, investments and livelihood,** an estimate of over P6 Billion from large investments were poured in the province for new hotels, resorts and malls (for the period 2013-2015). Another P8 Billion investments were capitalized for agri-business from private sector sources.



Also, micro, small, and medium enterprises (MSMEs) in the province sustained its increasing trend over the last 6 years (2010-2015) with a total of 3,577 businesses registered in 2015. Such number is notably higher compared to the 2010 figure of only 1,043. These MSMEs provided significant number of jobs from 4,605 in 2010 to 8,740 in 2015. Investments from MSMEs reached to P6.561 Billion in 6 years.

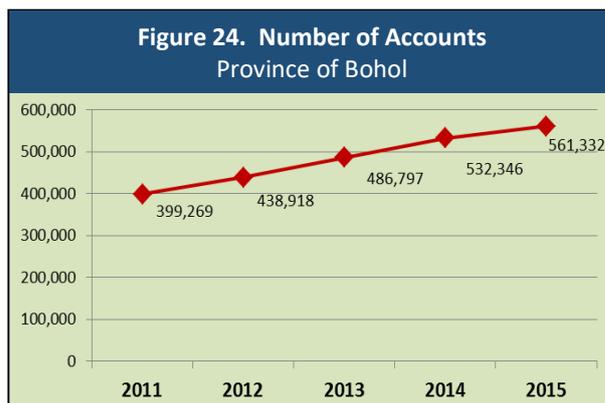
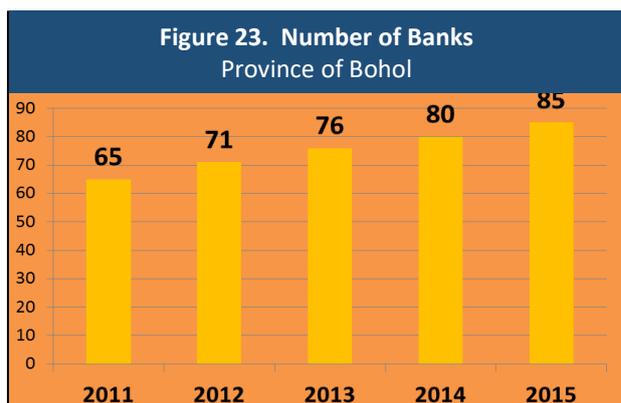


Source: Department of Trade and Industry (DTI)

Furthermore, the operation of cooperatives in the province is also thriving to provide socio-economic benefits to its members. In 2015, there were already 565 cooperatives in Bohol (with 299 CDA-compliant cooperatives), operating with P2.54 Billion total assets and with a total membership reaching to 113,348.

The banking sector in the province has also shown a stable and growing economy with an increasing number of banks established in Bohol. For a span of 5 years, a total of 20 new bank branches were established in the province, making the total number of banks to 85 in the year 2015. Total number of accounts also rose from 399,269 in 2011 to 561,332 in 2015. Total bank deposits grew to P32.87Billion in 2015 from just P19.26 Billion in 2011.

Another new but promising industry in Bohol is the sector on Information Technology, particularly for business process and knowledge process outsourcing. With the improvement of information technology highway, following the installation of fiber optic technology in Bohol by private telecommunication firms, the province may soon providesignificant employment opportunities for its capable workforce for such related services.



Source: Philippine Deposit Insurance Corporation

**Biodiversity**

Bohol has a high biodiversity level of plant species categorized as: upland, mangrove, coastal areas, cave entrances, cultivated cropland and intensively used lands. Several plant species noted to be abundant before are already extinct, others are becoming rare. Data about Bohol’s terrestrial and

freshwater flora and fauna is scarce except for studies conducted in Rajah Sikatuna Protected Landscape (RSPL) conducted by Soil and Water Conservation Foundation, Inc. (SWCF) and University of Bohol Community Development Foundation, Inc. (UBCDFI).

The greater part of the tourism industry is based on Bohol's biodiversity. Unless we get very serious about conserving and protecting it, we will lose the tourism to other sites in the Philippines and other Southeast Asian Countries.

There is a diverse wildlife species in the province including: 33 mammals, 29 reptiles, 8 amphibians, several bat species, the Philippine tarsier and flying lemurs, 192 butterflies, 29 ants, 20 dragon flies, 116 birds species belonging to 28 families, 411 fish species and 60% of country's marine mammal species found in Pamilacan, Baclayon and almost 16% of deptirocarp species including the rarest in the country (30% of the total national deptirocarp) are found in Bohol (Source: SWCF Research Study & BMT 2006).

However, the biodiversity is under threat due to persistent and excessive utilization and sale of different species coupled with conversion of forests to agricultural and urban areas, monoculture farming with exotic species, farming on steep hillsides and mountains, coral reef destruction and over-fishing. In fact, several plant species noted to be abundant before are already extinct on the island while others are becoming rare and endangered.

- **Caves in Bohol**

Caves, we are losing them to exploitation for tourism, guano collection, swift-nest collection, vandalism. Maybe one in ten caves could be used for tourism purposes but only after careful study as to how to use it. In the meantime, with present activities, the bats move out, swiftlet young are killed and surface areas deforested causing siltation in the caves.



- **Flora in Cultivated Croplands and Intensively Used Lands**

Generally, the extremely diverse and dispersed vegetation in open fields could well evolve into forests without human intervention. However, most of these potential lands are within alienable and disposable areas and if these are within timberland areas, they are covered under the Integrated Social Forestry Program with a Certificate of Stewardship Contract (CSC). Constant cultivation and burning inhibit forest evolution and encourage the proliferation of grasses such as cogon (*Imperata cylindrical*) and other shrubs like kanding-kanding (*Lantana camara*). To develop systems closer to natural forests, agroforestry shall be established in these areas.

Data about terrestrial fauna in Bohol are scarce. In the few studies conducted in Rajah Sikatuna Protected Landscape eight mammal species have been identified. These do not include the recent identification of 14 bat species (including one endangered species) inside the protected area. Forest regeneration by bats as keystone species for the reason that they are pollinators and seed dispersers of greater ecological value.

Most fauna classes such as reptiles, amphibians and insects have not been studied. Recent bird studies have positively identified 56 bird species with 18 more species still unidentified. Actually, recorded bird observations in Bohol, mainly near Bilar, go back to the mid-1800. However, there are now birds previously seen on the island that are not positively identified. This includes the Philippine Cockatoo last seen in RSPL in 1995. The most well-known animal in Bohol is the Philippine tarsier, one of the smallest primates in the world. Although not on international endangered lists, it is fast losing its habitat areas on the island. This is true of Bohol's flying lemurs, civet cats, wild pigs, grey squirrels and Philippine monkeys.

### Water Resources<sup>14</sup>

Bohol's water supply system for domestic, agricultural and industrial uses is mainly based on 2,224 springs, 59 rivers and 200 creeks. There are 22 rivers basins/watersheds that are valuable sources of water for drinking and irrigation. Surface water from rivers and streams in these basins are impounded and distributed for irrigation, electric generation, industrial use and potable water. The province has an average rainfall varying from 1,331 mm/yr along the coastal areas to 2,006 mm/yr in the mountainous part of the island that supplies the island.

At present, the quality of water in the province's catchments and streams is poor and will continue to deteriorate as human development activities increase. The water resources should be managed in order to meet the growing demand for domestic, agricultural, tourism, industrial, recreational and commercial uses. Proper management should prevent public health hazards associated with increasing incidence of water contamination and pollution from negligent human activities.

- **Surface Freshwater and Groundwater Resources<sup>15</sup>**

Bohol has eleven watersheds (see Table 8 Watershed Map). The biggest one is Inabanga Watershed followed by Loboc, Abatan, Ipil, Carood, Manaba, Soom, Mualong, Alijawan, Lumbay and Panampan watersheds. Three of the major watersheds are declared as protected areas under the NIPAS. The largest reserve is the Wahig-Inabanga Watershed (PP No 468, amended to PP No. 223), covering 17 municipalities with an aggregate area of 14,000 hectares. The second largest, and first to be proclaimed as a watershed forest reserve in Bohol, is the Loboc Watershed (PP No. 450) with an area of 10,450 hectares, part of which is inside the Rajah Sikatuna Protected Landscape (PP No. 127 as amended April 2000). The third is the Duero Watershed (PP No. 881) that covers an area of 3,620 hectares.

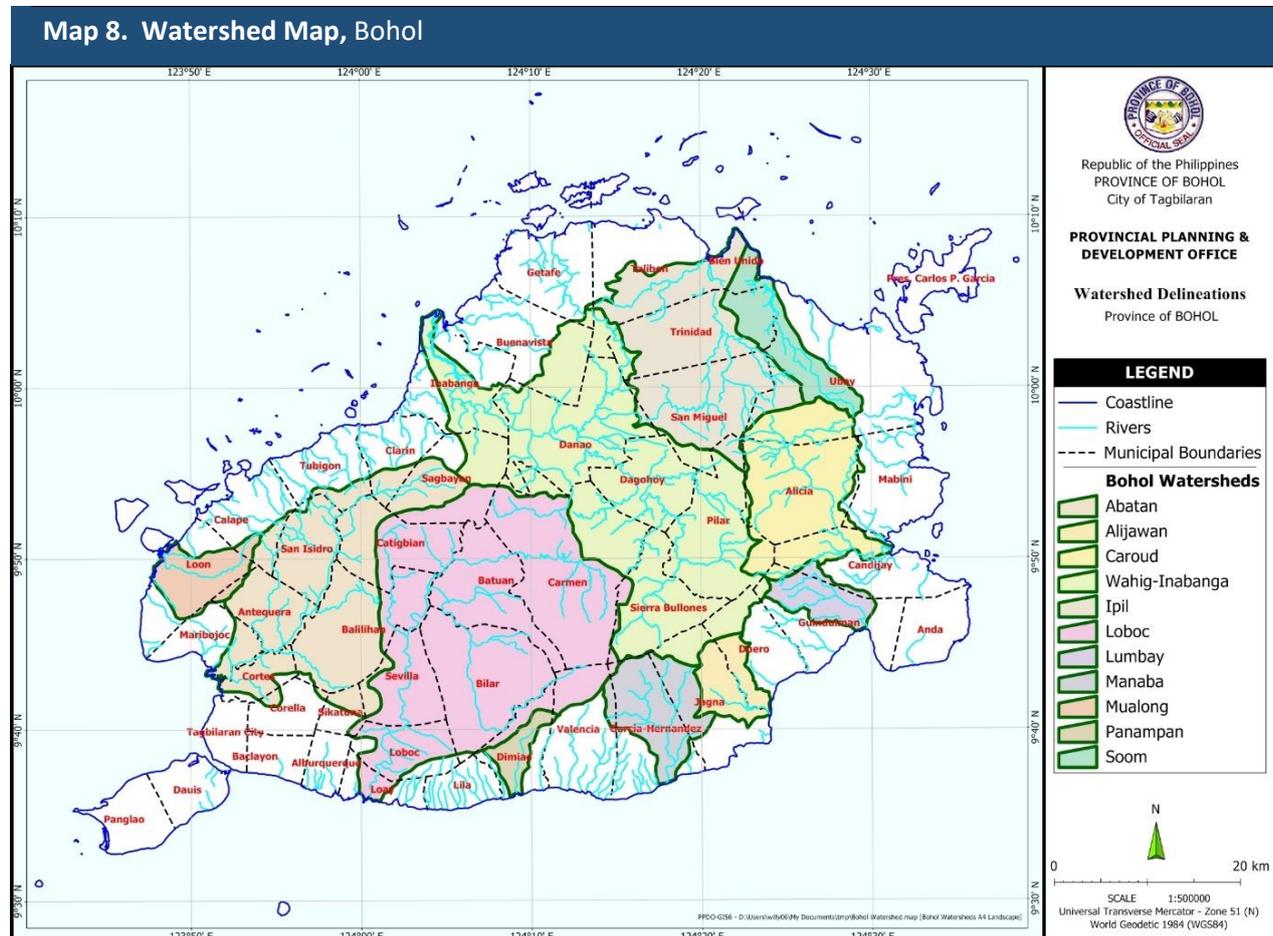
The rivers and river estuaries are used in many ways. They commonly serve as harbors and navigation routes, areas for aquaculture development (Inabanga River), fishing and sand

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<sup>14</sup> BW4SMP Master Plan of Bohol 1999

<sup>15</sup> DENR Bohol and Region 7

quarrying areas (Abatan River), and recreation and tourism (Cambuhat River in Buenavista and the Loboc River in Loboc and Loay, Bohol). They also provide water for irrigation (Malinao Dam on the Wahig River that feeds the Bohol Irrigation Project Stage I) as well as domestic and industrial uses such as power supply (Loboc River hydro-power plant and mini hydro-power plant in Balilihan).

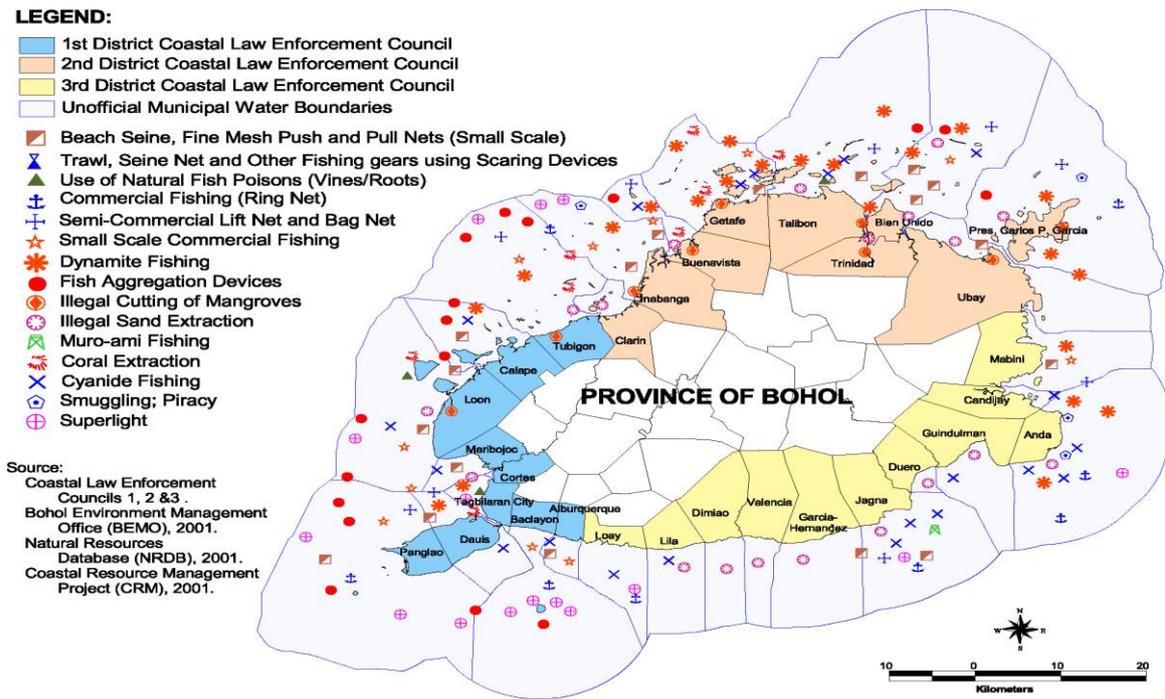


### • Protection of Bodies of Water

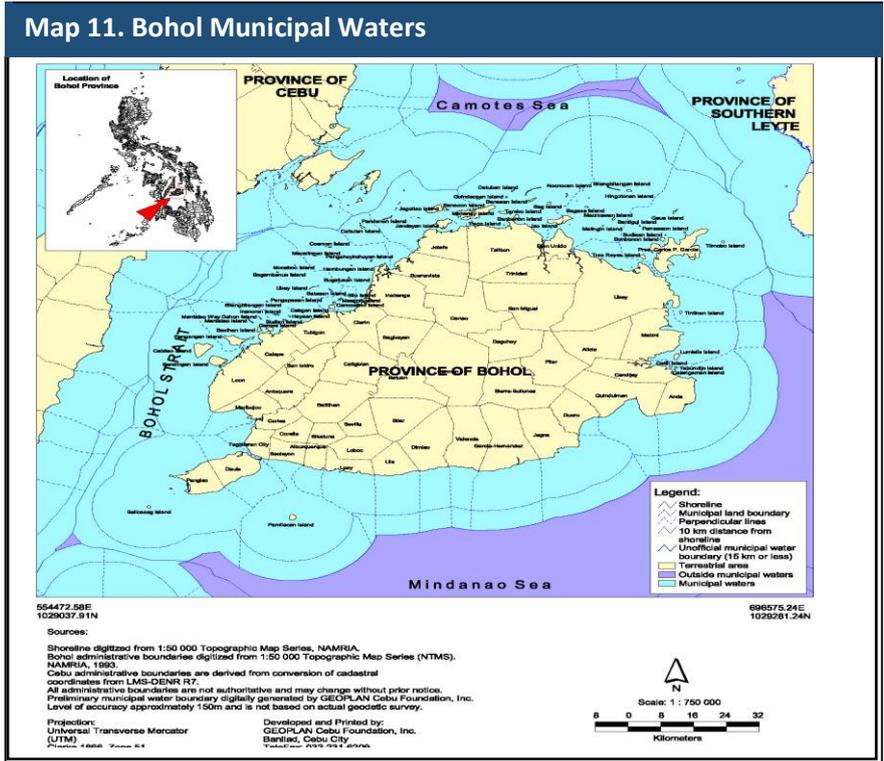
Water is a vital resource for Bohol's future prosperity. Its sustainability and management for economic, social and environmental gains underpin activities in government, industry, business and communities. The Bohol Environment Code contains a number of policies intended to preserve, protect and conserve the island province's water resources, including minimization of pollution in ground and surface waters. Data on surface and groundwater quality are scarce in the province. Based on the survey of wells conducted by SWECO revealed that the water for drinking do not satisfy the water quality standards for safe and potable. An estimated of 5000 wells have water quality problems caused by higher salinity content, excessive amounts of iron and manganese and bacteriological pollution (*see River Network Map below*). Water for home consumption is often prone to contamination due to inadequate sanitation practices and characteristics in limestone inherent substrate (karst). It is important to designate strict water production areas for drinking water purposes and establish buffer zones to protect the same from activities that will harm them.



**Map 10. Coastal Resources Map of Bohol**



The joint DA/BFAR and DENR General Memorandum Order No. 3, Series of 1991, tried to respond to the problem of idle, unproductive, abandoned and/or illegal fishpond areas by reverting them into their original classification of timberland. Fishpond areas with FLAs that are found to be violating this policy will be reverted to the administration of DENR. All applications within timberlands, which have not been released for fishpond development by DENR, shall automatically be returned without being acted upon. However, not even one idle unproductive, abandoned or illegal fishpond has been reverted to the category of timberland.



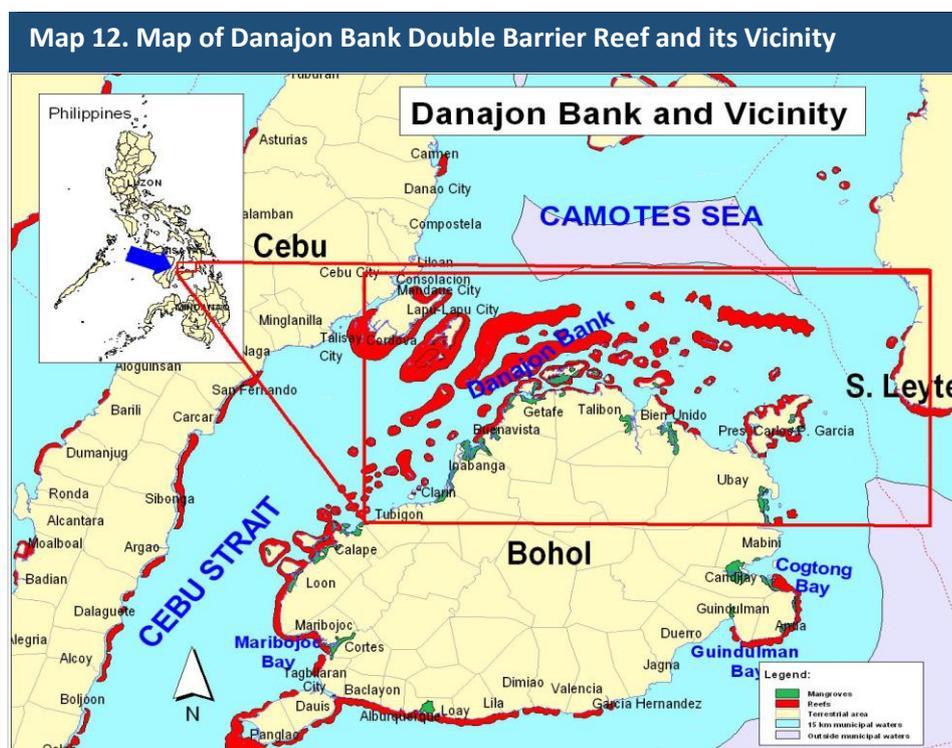
- **Coastal Habitats**

Bohol boasts of its white, sandy beaches that are commonly used as sites for tourism development (hotels, restaurants, beach resorts among others), fish and boat landings, and as a source of construction materials. These areas are evidence of healthy coral reef ecosystems. Many environmental issues focus on the beach ecosystem as it is prime land for commercial and household development due to its aesthetic value. It attracts the interest of many people to the shoreline, mangroves, coral reefs and fisheries that inhabit the near shore waters.

The area covering municipal waters is measured 15 kilometers seaward from the furthest inhabited shoreline to one kilometer inland if the shoreline contains estuaries, mangrove forests or marshlands.<sup>17</sup> This means the total municipal waters of the 29 towns and one city is two and one-half times larger than Bohol's land area. It also indicates that there is a remarkably huge area to consider in planning, yet only a few coastal LGUs have started to manage coastal areas. With the enactment of the Philippine Fisheries Code of 1998 and the Bohol Environment Code, the national government recognized that a paradigm shift is needed to adequately provide for the development, management and conservation of coastal resources.

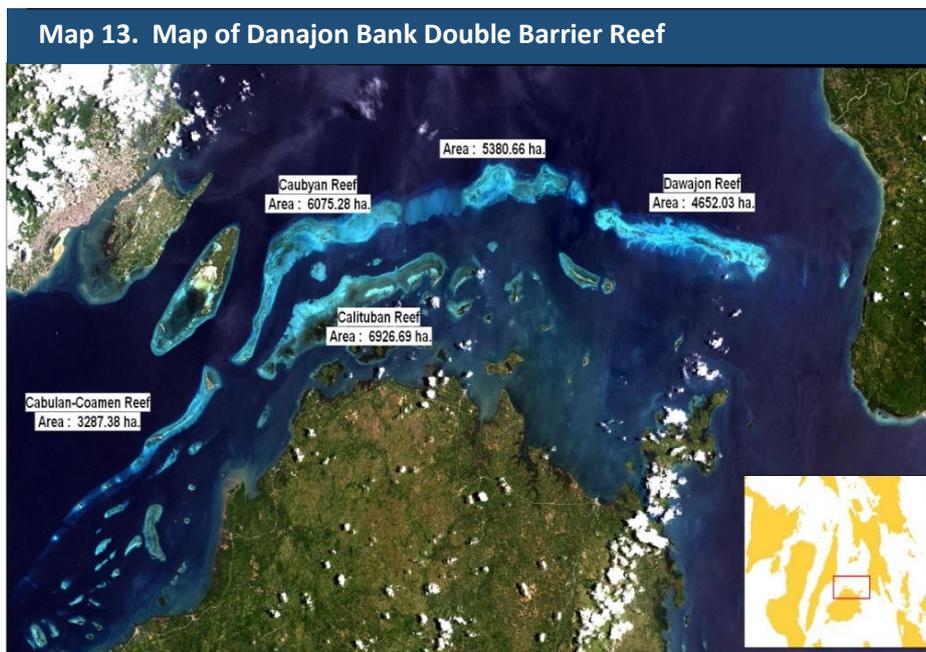
- **Danajon Bank Double Barrier Reef**

The Danajon Bank is a double barrier reef that runs parallel to the northern coast of Bohol and is proposed as a designated provincial rehabilitation, conservation and protection area (see Danajon Map). The Danajon Double Barrier Reef is one of the six double barrier reefs in the world and the only one in the Philippines which could likely be nominated as national heritage site. Because of its unique coral reef ecology, Danajon Bank is a major breeding ground and habitat of many different species of fishes, marine mammals, mollusks, seagrasses and seabeds.



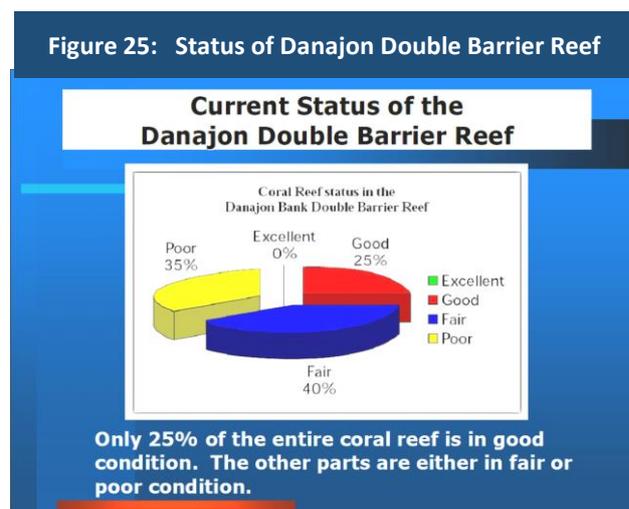
<sup>17</sup> Republic Act 8550 (The Philippine Fisheries Code of 1998, Chapter 1, Section 4(58))

It is composed of the outer Caubyan and inner Calituban barrier reefs. It runs along the coastline of four municipalities, Getafe, Bien Unido, Talibon and Ubay in the south and into the Camotes Sea in the north. To the west it runs all the way to Cebu and to the east and northeast to Leyte and Southern Leyte. The establishment of the protected reef area should serve as an excellent example of how northern coastal towns of Bohol, from Tubigon to President C. Garcia can work together to implement an inter-provincial Coast Resource Management program to protect and preserve this unique treasure. However, marine resources like coral reef ecosystems, seagrass beds, mangrove forests, estuaries and inter-tidal seascapes are fragile and have limited potential if they are utilized improperly. Because these ecosystems are stressed by increasing population, environmentally-degrading consumption patterns, pollution wastes and human encroachment in coastal zones, there is an urgent need to protect and conserve the integrity of the ecosystems in order to continue to provide benefits to the present and future generations.



• **Status of Coral Reefs and Sea Grass Beds**

Coral reefs, commonly known as rainforest of the sea, while serving as a buffer against underwater current also constitute one of the provinces most productive and diverse ecosystems. They cover an estimated area of 1,920 hectares that include the Danajon Bank Reef in Inabanga, Buenavista, Getafe, Talibon, Trinidad, Bien Unido, Ubay, President Garcia and Mabini. However, the state of the province’s reefs is classified as 35% poor condition, 40% fair condition, only 25% in good condition and 0% excellent (BFAR, UP-MSI, CRMP and DENR surveys, FISH Project-USAID Survey 2005). This means that Bohol has already lost more than three quarters of its known corals. This has had a significant effect on the breeding grounds of many marine biodiversity. Significant human threats to coral reefs include collecting and exporting, blasting, use of cyanide, siltation, boat anchorage (especially diving



boats), illegal fishing methods, storms, coral bleaching due to increase temperature, pier wharf and breakwater and other construction activities.

- **Initiatives to Danajon Bank under the Philippine Rural Development Project – Global Environmental Facility (GEF) (PRDP-GEF)**

Bohol is one of the six (6) pilot provinces in the Philippines funded by the Global Environmental Facility (GEF). It is a 5-year World Bank grant package included under the Philippine Rural Development Project. The project aims to strengthen the conservation of the coastal and marine base in targeted program areas through biodiversity conservation and fisheries resources management. Among the pilot municipalities for the GEF sites are Ubay, Talibon Pres. Carlos P. Garcia, Bien Unido and Buenavista.

### **Disaster Risk Reduction Management (DRRM) and Climate Change Adaptation (CCA)**

- **Climate Change Mitigation and Adaptation**

Climate change is one of the strongest development agenda of the 21<sup>st</sup> century; global scientific studies conducted by the Intergovernmental Panel on Climate Change (IPCC) have already confirmed that the change in global temperature is already unequivocal. In the Philippines, the manifestation of extreme weather events that resulted to losses in terms of livelihoods, infrastructure, and even lives, have become more frequent in recent years.

With the passage into law of Republic Act 9729 or the Climate Change Act of 2009, local government units (LGUs) were tasked to serve as frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas. Cognizant of the fact that climate change is a multi-sectoral concern, the involvement of all levels of government in the urban resilience planning process is crucial in order to attain higher probability of desired outcomes.

In **Section 14 of RA 9729** which is the ***Local Climate Change Action Plan***, further states *that* the Local Government Units (LGUs) shall be the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas, consistent with the provisions of the Local Government Code, the DRM-CCA Framework, and the National Climate Change Action Plan. Barangays shall be directly involved with municipal and city governments in prioritizing climate change issues and in identifying and implementing best practices and other solutions. Municipal and city governments shall consider climate change adaptation as one of their regular functions. Provincial governments shall provide technical assistance, enforcement and information management in support of municipal and city climate change action plans. Inter-local government unit collaboration shall be maximized in the conduct of climate-related activities.

Resilience to extreme weather and climate change will greatly impact the communities as adaptation and mitigation measures provide opportunities for local governments to enhance the well-being of communities by lessening its impacts/vulnerability to them.

- **Climate and Hazard Profile**

The effects of climate change are now being felt in the Province of Bohol. The impact of this change has affected Bohol's forest, its biodiversity, water, agricultural, fishery resources and cultural assets with wide-range adverse impact on human health and loss of life. The ten (10) warmest years on record in the world all occurred in the years 1880 to 2000. Temperature changes are known to affect the transmission of infectious diseases like malaria, dengue and respiratory tract infections. Rising incidence of morbidity cases from these infectious diseases, particularly respiratory tract infections has been recorded in Bohol with pneumonia as a leading cause of illness in the province affecting 10% of Bohol's population in 2008, mostly children.

Bohol is among the areas in the Philippines threatened by drastic effects of global warming. It is ranked 9<sup>th</sup> among top 20 provinces in the Philippines vulnerable to a one (1) meter sea level rise.<sup>18</sup> Its seascape, as an eco-tourism asset, is vulnerable to threats of global warming that may result in sea-level rise, causing loss of tourism and business investments. Cutting of trees in the upland communities is commonly practiced. There is degradation of marine environment due to pollution from industries, agriculture, including animal husbandry and settlements. Coastal erosion and sedimentation are not properly addressed and resulted to occurrence of sea level rise. Dumping and burning of solid wastes that include toxic materials and chemicals still pose a problem as well as the overflowing of sewers. There is an increase in frequency and intensity of the El Niño and La Niña phenomenon resulting to agricultural and ecological problems (e.g., disruption of wildlife) and damage to property.

Changes in rainfall patterns, typhoon frequency and the irregular period of occurrence, and sea level rise are now becoming noticeable. The connection between local environmental threats and climate change is an emerging concern among local government units. It is in the context that local government must play a major role in implementing measures on climate change mitigation and adaptation due to their authority to control the necessary changes.

Based on the distribution of rainfall during the year, Bohol's climate as classified by PAG-ASA belongs to Corona's 4<sup>th</sup> Type, characterized by rainfall more or less evenly distributed throughout the year. Intensification of the southwest monsoon usually occurs during the months of July to October. The rainfall varies from about 1,200 mm/yr around the coast to slightly more than 2,200 mm/yr in the mountainous areas in the province. Based on the climatological records of Tagbilaran City weather station, the province has an annual average of 161 rainy days. Average rainfall and trend illustrated a declining trend of 250 mm over a period of 35 years or about 7mm a year, which is likely due to climatic change in the Southeast Asian Region. The coastal area of the province is warm in contrast with the interior part, which is colder especially during the night. Mean temperature is at 27.40 degrees centigrade. Prevailing wind direction is towards northeast with an average speed of 2 miles per record. Bohol is not included in the so-called typhoon belt of the country, as typhoons rarely pass in the province. Those passing below or above the island contribute to the greater volume of precipitation. The frequency of typhoon passage is 0-10% from the average of 20 typhoons passing over the Philippines per year.<sup>19</sup>

Based on the data on climate change scenario, the projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-

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<sup>18</sup> Source: Climate Hotspot, Climate Change Impacts in the Philippines conducted by Greenpeace Southeast Asia, Climate and Energy Campaign, 2007

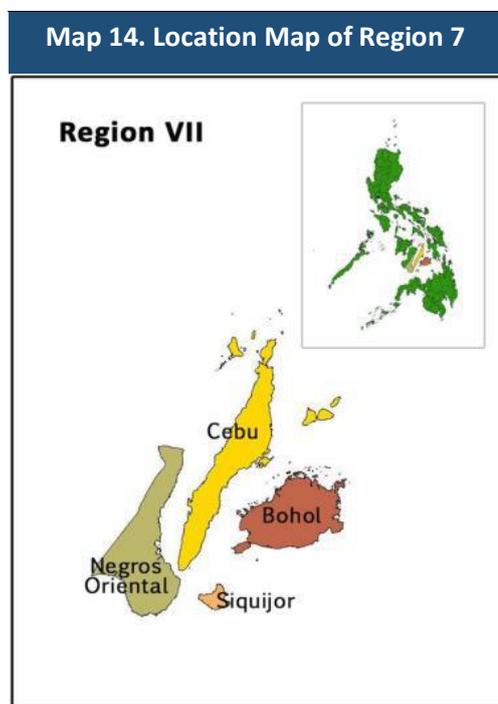
<sup>19</sup> DENR-BSWM 1991 Preliminary Climatic Classification of 15 selected Provinces in the Philippines

range emission scenario in the provinces in Region 7 are presented in Table 5, Table 6 and Table 7, respectively.

- **Climate Projections in 2020 and 2050 of Bohol and other Provinces in Region 7**

Bohol is facing the real impacts of climate change that are threatening its development prospects and exacerbates the vulnerability of its poor communities. With projected changes in precipitation, temperature, intensity of tropical cyclones and frequency of extreme weather events, considerable efforts would be required to prepare in dealings with the impacts of climate change on the different climate-sensitive sectors e.g. agriculture, forestry, biodiversity, water, coastal/marine resources and health. Adaptation will be an essential part in response to the threats of climate change.

Scientific basis for adaptation and vulnerability assessment studies were already conducted by PAGASA which provides the opportunity to understand the future changes in climate and how these changes will affect the province in the future and what adaptation efforts will be done. Based on the data on climate change scenario, the projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-range emission scenario in the provinces in Region 7 are presented in Tables 5, 6 and 7, respectively. To use the tables and arrive at values of seasonal mean temperature and seasonal rainfall in 2020 and 2050 in any of the provinces, the projections are added to the observed values (presented in each of the tables). For Bohol province, the projected values are:



- DJF mean temperature =  $(26.6\text{ }^{\circ}\text{C} + 0.9\text{ }^{\circ}\text{C}) = 27.5\text{ }^{\circ}\text{C}$ ;
- DJF rainfall =  $\{376.1\text{mm} + 376.1(9.8\%) \text{ mm}\} = (376.1 + 36.9\text{m})$  or 413mm;
- Number of days with  $T_{\text{max}} > 35\text{ }^{\circ}\text{C}$  in Tagbilaran City during the 2006-2035 period (centered at 2020) = 1,710;
- Number of dry days in Tagbilaran City during the 2006-2035 period (centered at 2020) = 6,836; and
- Number of days with rainfall  $> 300\text{mm}$  in Tagbilaran City during the 2006-2035 period (centered at 2020) = 1.

**Table 5: Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces in Region 7**

Provinces	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
<b>Bohol</b>	26.6	28.0	28.2	27.8	0.9	1.2	1.2	1.0	1.8	2.3	2.3	1.9
<b>Cebu</b>	26.8	28.4	28.2	27.9	0.9	1.2	1.1	1.0	1.9	2.4	2.1	1.9
<b>Negros Oriental</b>	27.0	28.4	28.0	27.8	0.9	1.2	1.0	1.0	1.9	2.3	2.0	1.9

**Table 6: Seasonal rainfall change (in %) in 2020 & 2050 under medium-range emission scenario in Provinces in Region 7**

Provinces	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
<b>Bohol</b>	376.1	209.6	412.9	514.5	9.8	-7.1	4.5	6.8	21.2	-11.9	18.9	22.6
<b>Cebu</b>	324.0	228.3	595.1	607.4	17.7	0.8	7.7	7.7	19.6	0.5	18.9	17.8
<b>Negros Oriental</b>	225.8	226.0	639.5	636.9	15.0	-4.9	9.3	4.7	17.4	-6.8	20.7	10.5

**Table 7: Frequency of extreme events in 2020 & 2050 under medium-range emission scenario in Provinces in Region 7**

Provinces	Stations	No. of Days w/ Tmax>35 °C			No. of Dry Days			No. of Days w/ Rainfall >100mm		
		OBS (1971-2000)	2020	2050	OBS	2020	2050	OBS	2020	2050
<b>Bohol</b>	Tagbilaran	260	1710	3413	8176	6836	6473	15	21	23
<b>Cebu</b>	Mactan	25	1488	2463	7112	5720	5693	12	4	17
<b>Negros Oriental</b>	Dumaguete	66	826	1499	8451	6032	5642	5	7	6

- Climate Change Threats and Potential Impacts

**Table 8: Trends in Climate Change Impacts**

Climate Change Impacts	Areas or location affected (Municipalities/Barangays)	Trend	Intensity	Frequency of Occurrence
Sea level rise	30 coastal towns including Tagbilaran City	Same areas	Every year	Increasing every year
Prolonged drought	47 towns and 1-city	Expanding to coastal areas	Every year	Every year
El Nino events	47 towns and 1-city	Expanding to coastal areas	Every year	Every year
Floods	336 out of 1,109 brgys (47 towns and 1-city)	Expanding to other areas	Increasing	Increasing every year (flash flooding, seasonal, river overflow, coastal flooding due to heavy rains, dam overflow)
Storm surge	30 coastal towns and 1-city	Same areas	Increasing	Increasing every year

Climate Change Impacts	Areas or location affected (Municipalities/Barangays)	Trend	Intensity	Frequency of Occurrence
Monsoon rains a) Southwest Monsoon or Habagat; b) Northeastern Monsoon/ Amihan	47 towns and 1-city	Expanding to interior part of the province	Increasing even dry season	Increasing every year

- **Disaster Risk Management Resiliency to Disasters and Climate Change**

Bohol, as an island province, is vulnerable to various hazards resulting from natural and man-made disasters such as flooding, rain-induced landslides, earthquake, storm surges, liquefaction, fire, air and water pollution and contaminated land. Inappropriate location and design of developments can aggravate exposure to and impact of hazards and climate change impacts like sea-level rise, storm surges, among others.

### Vulnerability Assessment

- **Climate-related Hazards and Impacts**

**Past Hazards and Climate Events.** Phenomena such as increased precipitation, heat stress, floods and other extreme weather events, are referred to as climate exposures and are increasingly having an impact on infrastructure and systems within local governments. As part of developing the LCCAP, the local government of Bohol collected available local climate data including previous disasters and future climate projections. Using the data provided by the Office of the Civil Defense and PhiVolcs, a list of past hazards and climate-related disasters experienced in Bohol from 2004 to 2013 is consolidated in the Table below. The Office of Civil Defense reported a total of 78 disaster incidences during the period in the province with a total approximate damage cost of Php 7.949 Billion. The geologic and hydro-meteorological disasters that hit Bohol were flashfloods, landslide, and earthquake.

Date of Event	Type of Hazard	Frequency of Occurrence	Location	Impacts of the Event (Cost of Damage in million Pesos)
October 2004	Flashflood	1	Jagna	Php 0.100
January to December 2005	Heavy rains, landslide, fire incidents, typhoon, earthquake	7	Jagna, Getafe, Calape, Tagbilaran City	15.048
January to December 2006	Disease outbreak (diarrhea), lightning incidence, landslide, sea mishap, capsized	18	Loon, Pilar, Tubigon, Ubay, Valencia, Loay, Panglao, Jagna, Candijay, Bien Unido, Getafe, Cortes,	16.450

**Table 9: List of Past Hazards and Climate-related Disasters Experienced in Bohol Province: CY 2004-2015**

Date of Event	Type of Hazard	Frequency of Occurrence	Location	Impacts of the Event (Cost of Damage in million Pesos)
	vessel, tidal waves, land cracks, typhoons		Alicia, Sierra Bullones, Batuan	
January to December 2007	Landslide, fire incidents, whirlwind (alimpus), lightning incidents, poisoning, drowning, earthquake, capsized motor bancas, typhoon	18	Tagbilaran City, Jagna, Pres. Garcia, Talibon, Getafe, Trinidad, Pilar, Tubigon, Valencia, Ubay, Loon, Loboc, Loay, Candijay	6.547
January to December 2008	Flashflood, fire incident, landslide, typhoon, capsized vessel/fishing boat, airplane crash	28	Clarin, Tubigon, Tagbilaran City, Cortes, Buenavista, Panglao, Balilihan, Pilar, Talibon, Loon, Lila, Getafe, Dimiao, Loboc, Pres. CPG, Guindulman, Inabanga	30.828
March 2010-October 2013	Earthquake	6	17 hardest municipalities: North and south-western part of Bohol; Maribojoc, Loon, Tubigon, Calape, Clarin Inabanga, Buenavista, Danao, Sagbayan, Catigbian, San Isidro, Antequerra, Balilihan and Cortes; Southern municipalities of Loboc, Carmen, Lila, Guindulman, Duero, Jagna, G-Hernandez, Valencia, Loay Albuquerque, Baclayon and Tagbilaran City	7.8 Billion
<b>Total</b>		<b>78</b>		<b>Php 7.949 Billion</b>

- Hazard-Prone Areas in Bohol**

Minor and major fault lines are evident on the island as shown by terraced encarpments occurring in its southern and central parts. The terraced escarpments in the Ilihan Steep escarpments notably in Loon, Tagbilaran and in Anda Peninsula further prove vertical upliftment caused by tectonics. Earthquakes have been felt in Bohol but only an average of one perceptible shock is reported each year (refer to Map below).

The Provincial Development and Physical Framework Plan (PDPFP) must consider the flood-prone areas, given the numerous river systems in the province (see map below). A comprehensive Geo-hazard Assessment per municipality in Bohol was conducted by the Mines and Geo-Sciences Bureau of DENR Region 7 in September 2007 (see table below). Each barangay was rated with low, moderate or highly susceptible to landslide and/or flooding. There are other risks and

potential disasters to be addressed: landslides, tsunamis, tropical cyclones, earthquake, among others. Majority of the coastal zones in Bohol is highly susceptible to liquefaction, storm surges and tsunami (refer to the maps on next succeeding pages). The Provincial Government of Bohol thru the Provincial Disaster Risk Management Council (PDRPMC), the newly installed Provincial Disaster Risk Reduction Management Office (PDRRMO) in collaboration with the PHIVOLCS-DOST, MGB and OCD, is continuously undertaking several initiatives to ensure its readiness to cope up with the challenging needs during natural and man-made disasters. The Multi-Geo-Hazard Maps of Bohol was developed thru the Hazard Mapping and Assessment for Effective Community-Based Disaster Risk Management -- the 1<sup>st</sup> component of the READY Project implemented in the province since February 2007.

Table 10 below shows the summary matrix for hazard susceptibility of the 47 municipalities and one city in the province of Bohol. All municipalities and Tagbilaran City are susceptible both to earthquake and earthquake-induced landslide (EIL). In summary, there are eight (8) municipalities (Cortes, Duero, Guindulman, Inabanga, Jagna, Loay, Maribojoc and Valencia) that are highly susceptible to all type of hazards; forty-seven (47) municipalities that are susceptible to three hazards, namely: earthquake, earthquake-induced landslide and rain-induced landslide. This is followed by liquefaction with 33 vulnerable municipalities. Next is the storm surge with 29 susceptible municipalities, followed closely by tsunami with 28 prone municipalities. The last but not the least is the flood with only 18 susceptible municipalities.

**Table 10. Summary Matrix for Hazard Susceptibility, Province of Bohol**

Municipality	Geologic Hazards				Hydro-meteorologic Hazards			
	EQ	Liquefaction	EIL	Tsunami	Floods	RIL	SS	Others
Alburquerque								
Alicia								
Anda								
Antequera								
Baclayon								
Balilihan								
Batuan								
Bien Unido								
Bilar								
Buenavista								
Calape								
Candijay								
Carmen								
Catigbian								
Clarin								
Corella								
Cortes								
Dagohoy								
Danao								
Daus								
Dimiao								
Duero								
G-Hernandez								
Getafe								
Guindulman								

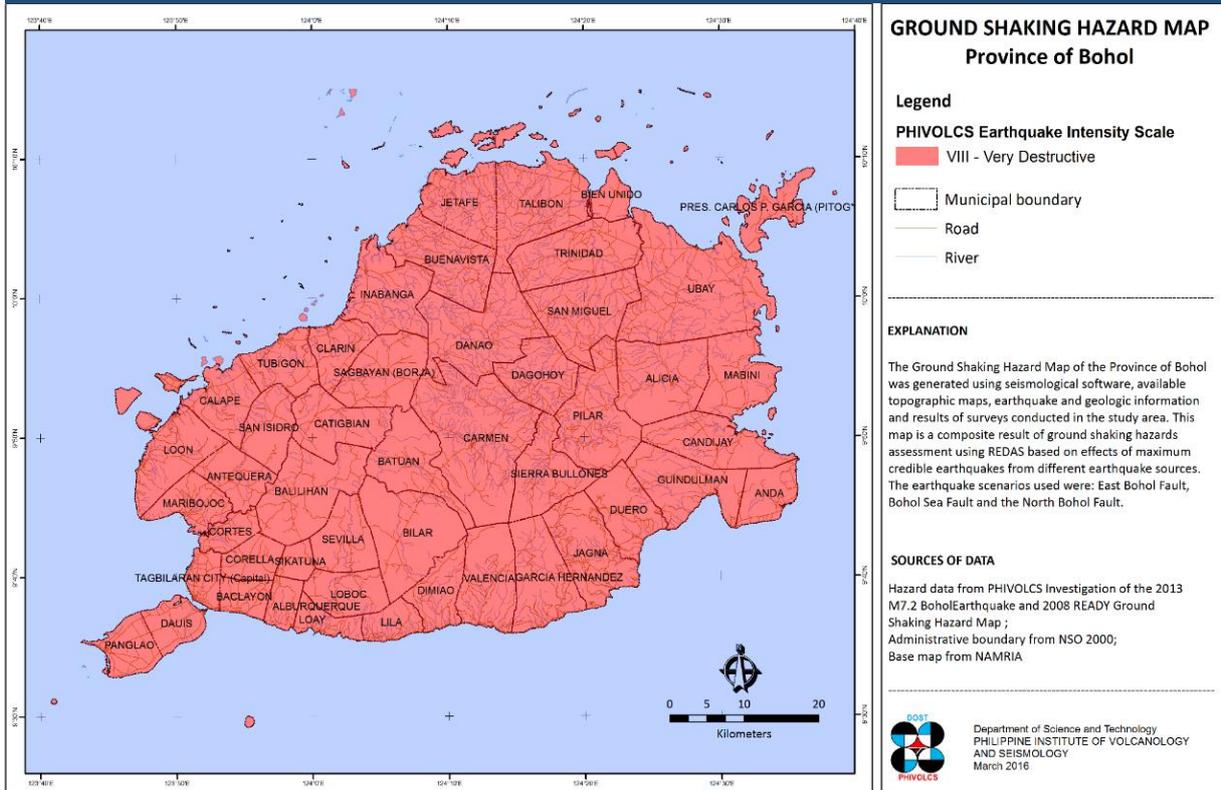
**Table 10. Summary Matrix for Hazard Susceptibility, Province of Bohol**

Municipality	Geologic Hazards				Hydro-meteorologic Hazards			
	EQ	Liquefaction	EIL	Tsunami	Floods	RIL	SS	Others
Inabanga								
Jagna								
Lila								
Loay								
Loboc								
Loon								
Mabini								
Maribojoc								
Panglao								
Pilar								
Pres. Garcia								
Sagbayan								
San Isidro								
San Miguel								
Sevilla								
Sierra Bullones								
Sikatuna								
Tagbilaran City								
Talibon								
Trinidad								
Tubigon								
Ubay								
Valencia								

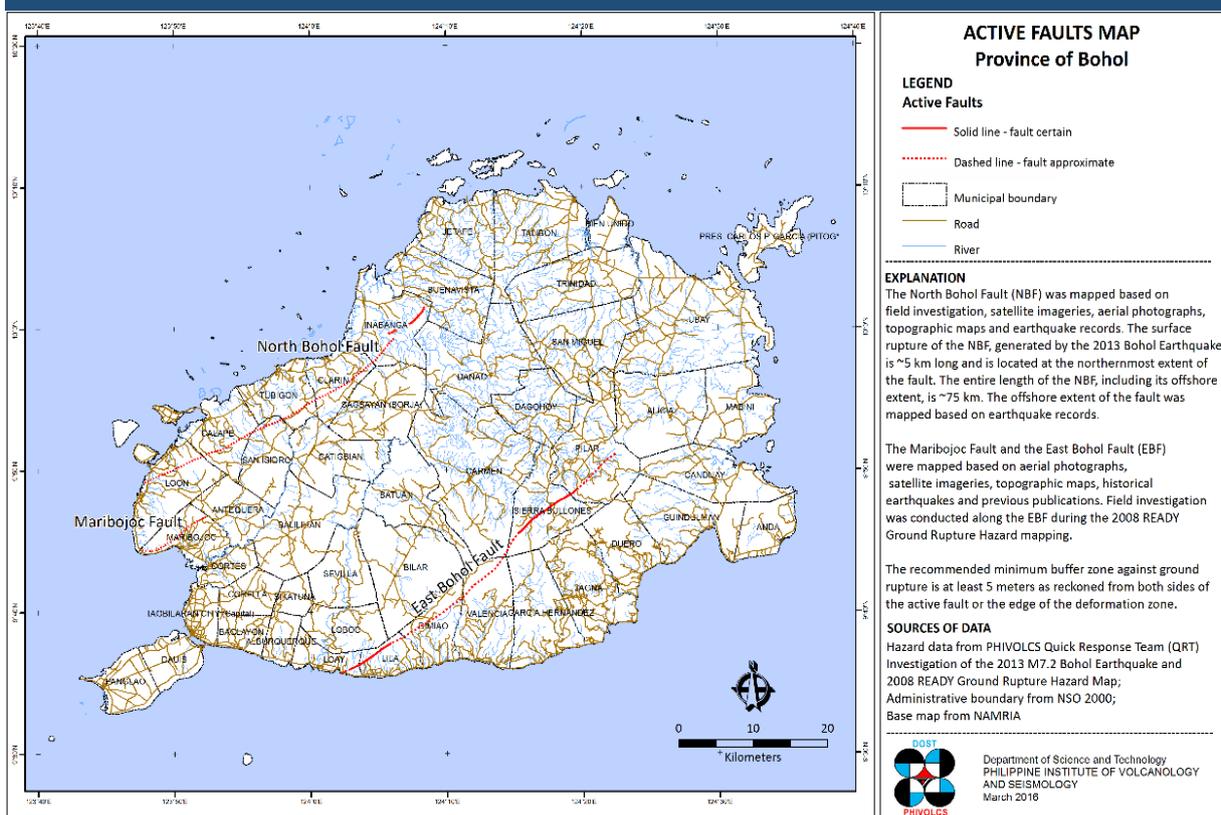
**Legend:**  
 EQ – Earthquake  
 EIL – Earthquake-Induced Landslide  
 RIL – Rainfall-Induced Landslide  
 SS – Storm Surge

For floods, there are only 18 municipalities that are susceptible to this hydro-meteorological hazard, namely: Antequera, Balilihan, Candijay, Carmen, Cortes, Dagohoy, Danao, Duero, Guindulman, Inabanga, Jagna, Loay, Loboc, Maribojoc, Pilar, San Isidro, Sierra Bullones, and Valencia. Only the municipality of Panglao is not susceptible to rain-induced landslide (RIL) among the 47 towns and one city.

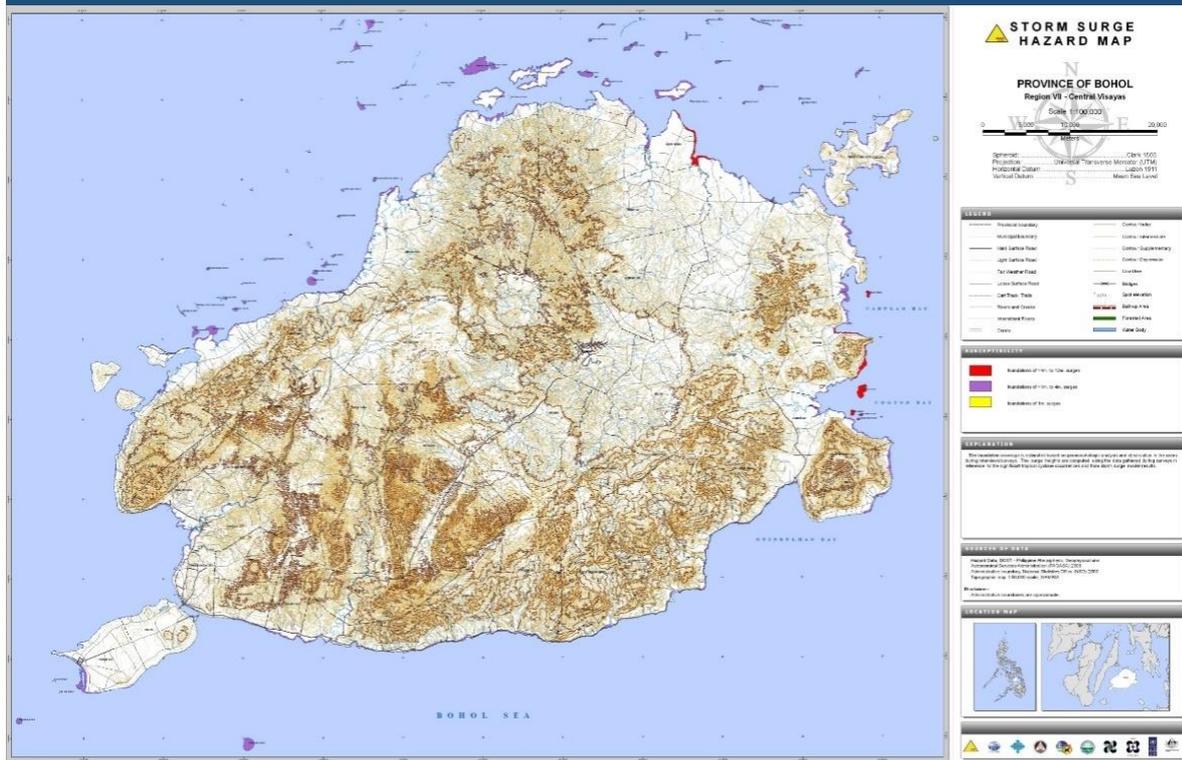
Map 15. Ground Shaking Hazard Map, Bohol



Map 16. Active Faults Map, Bohol

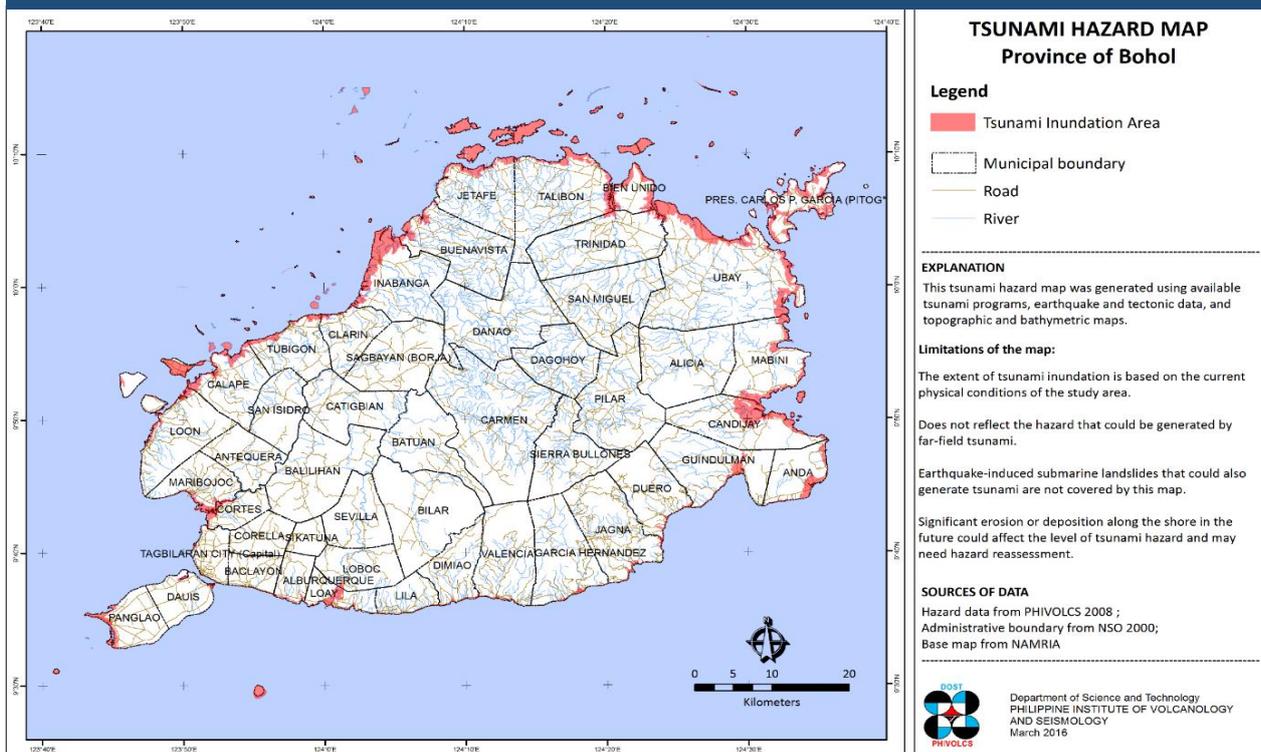


Map 17. Storm Surge Hazard Map, Bohol

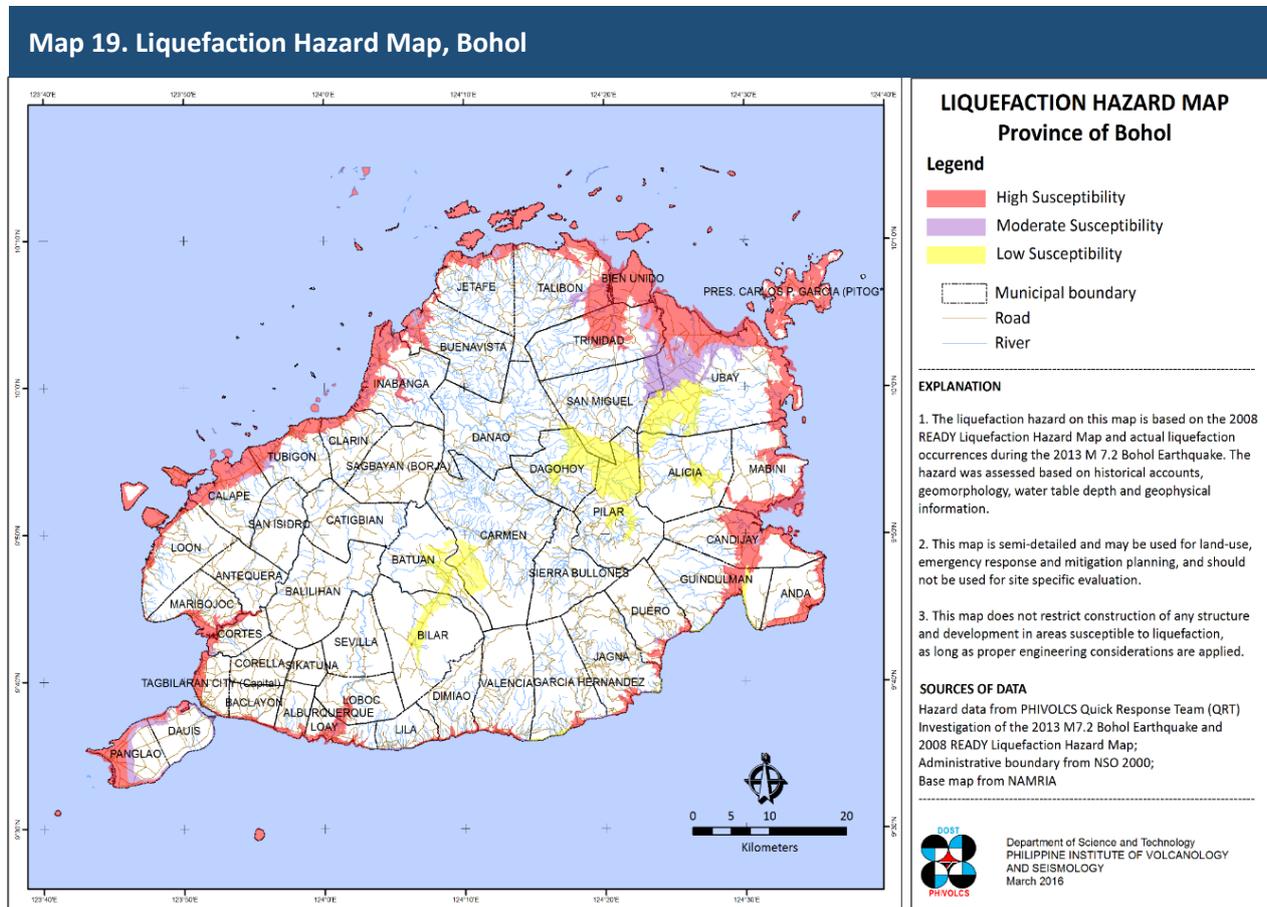


There are **29 municipalities** that are susceptible to storm surge, namely: Alburquerque, Anda, Baclayon, Bien Unido, Buenavista, Calape, Candijay, Clarin, Cortes, Dauis, Dimiao, Duero, Garcia Hernandez, Getafe, Guindulman, Inabanga, Jagna, Lila, Loay, Loon, Mabini, Maribojoc, Panglao, Pres. Garcia, Tagbilaran City, Talibon, Tubigon, Ubay, and Valencia.

Map 18. Tsunami Hazard Map, Bohol



For tsunami, there are **28 municipalities** that are susceptible while the rest of the 20 inland municipalities are not tsunami-prone, namely: Alicia, Antequera, Balilihan, Batuan, Bilar, Candijay, Carmen, Catigbian, Corella, Dagohoy, Danao, Loboc, Pilar, Sagbayan, San Isidro, San Miguel, Sevilla, Sierra Bullones, Sikatuna, and Trinidad. Most of the liquefaction-prone municipalities are the same municipalities that are also tsunami-prone.



For liquefaction, only the following 15 municipalities are not susceptible to such hazard, namely: Antequera, Balilihan, Candijay, Carmen, Catigbian, Corella, Danao, Loboc, Sagbayan, San Isidro, San Miguel, Sevilla, Sierra Bullones, Sikatuna, and Trinidad. It could be concluded from this data that most inland municipalities are not prone to liquefaction and that all coastal municipalities are susceptible to this geologic hazard.

## Chapter II. Development Framework of Bohol

### Over-all Vision Statement and Development Goals

The Province of Bohol's development has been guided by its vision and mission statements. These statements, which have been crafted through consultative and participatory processes with practically all stakeholders and sectors represented, continue to serve as the overall guiding beacon of what Bohol wants to be, summarizing the aspiration of its people and the foundation of government's continued efforts of providing services, facilities and overall governance of the province.

The vision and mission statements, for several provincial administrations, have been adopted and revalidated to ensure that the province's goals, strategies and programs are aligned with such long-term development state. Below are the vision and mission statements of the Province of Bohol.



To effectively achieve this vision, the Provincial Government of Bohol (PGBh) has periodically updated its Development Framework, which basically covers the medium-term (term-based) development priorities for the next three years. Such priorities are attuned to current realities and situation, to make government-led interventions as pro-active as possible to address issues and concerns of all sectors.

For the year 2016-2019, an overarching development framework has been crafted with an updated set of strategies for each of the pillars of development. These pillars and strategies were identified through series of participatory workshops participated by Provincial Government Officials, heads of national government agencies, the local government units, civil society organizations and the private sector. This system of consultative activities was undertaken to ascertain the need and doability of the programs and projects identified as well as gain the commitment and support of all stakeholders through synergy, counterparting arrangements and complementation of initiatives.

The development framework of the PGBh can be summarized in the tagline **InSPIRED HEAT-IT Bohol** towards the **BIG LEAP**, as described in the following section.



The updated development framework supports the achievement of the development vision of the Province and gives more emphasis on the following:

- Infrastructure Support:** On top of regular projects for roads and bridges, other infrastructure development interventions will be pursued for agriculture, social welfare service facilities, classrooms, hospitals and government buildings. Public-private partnerships will be strengthened to continue to implement programs for bulk water supply and power development. The strong partnership and collaboration with the national government agencies will be sustained for large infrastructure investments for airport, ports, and irrigation development.

- **Social Well-being and Shelter:** Development interventions and services for vulnerable groups, persons with disabilities including the conduct of mobile services. Collaboration with various stakeholders for the relocation of vulnerable communities as well as the completion of the construction of core shelter for the earthquake victims in the province. Enhancement of disaster preparedness and response capabilities shall also be continued. Through fund-sourcing, shall establish rehabilitation service facility. Also, to continue to advocate for the prevention of illegal recruitment and human trafficking.
- **Peace and Order:** This is a continuing concern in the province, not just for anti-illegal drugs but for all forms of criminality including efforts to maintain internal security. Convergence for anti-criminality programs through the Provincial Peace and Order Council (PPOC) and Joint Task Force Dagon. Support shall be continued for the enhancement of capabilities of law enforcement agencies/ LGUs including the upgrading of facilities and equipment to fight and prevent crimes. Jail decongestion program and designation of additional anti-illegal drug court shall be supported in collaboration with appropriate national government agencies. A drug rehabilitation center will also be constructed.
- **Interconnectivity:** Sustaining partnerships and collaboration among LGUs, NGAs, CSOs, and the Private Sector in pursuing common development goals, through counterparting arrangements and sharing of technologies and skills. Strategic convergence with stakeholders for various socio-economic development initiative implementation in the province. Also, to improve physical interconnectivity through various infrastructure projects for information technology, power, water, communications, roads and bridges.
- **Reforms in Governance:** The PGBh shall continue to initiate reforms for more efficient, developmental, accountable and responsive governance. Strategies to achieve these include increase in local revenue generation, improvement of systems and processes and policy implementation especially for public financial management and human resource capacity development. The operation of local special bodies shall also be strengthened and local codes needed shall be enacted/ reviewed.
- **Equitable Economic Growth with Environmental Sustainability:** The PGBh shall continue to improve the performance of the province's economic drivers on agriculture, tourism, trade and investments and new industries for IT – based services in collaboration with stakeholders. The establishment of micro-small-medium enterprises shall be supported and the operation of the Negosyo Center and Business One Stop Shop shall be sustained. In doing this, the protection and preservation of the environment shall be underscored and benefits shall trickle down to the grassroot level.
- **Disaster Risk Reduction & Management/ Climate Change Adaptation:** Considering that the province is prone to multiple natural hazards, building capacities and awareness for disaster preparedness, mitigation, response shall be heightened. Among the strategies to be supported are: establishment of early warning system, awareness campaign at the community level, strengthening of local DRRM offices, upgrading of capabilities and facilities/ equipment, and mainstreaming of DRRM to local development plans.

The programs for Health, Education, Agriculture, Tourism, and Information Technology (HEAT-IT) shall also be continued:

- **Health and Sanitation:** Pursuing programs to improve hospital and sanitation services, hospital facilities and equipment upgrading, special universal Philhealth Program, medicine and medical supply management, specialization of hospital services, and sustaining effective health programs.
- **Education and Skills Development** – Improving school facilities, providing other avenues to develop the skills of labor force, which are responsive to the industries available in the province, implementation of the Dynamic Learning Program, establishment / operation of municipal libraries, CPG Scholarship Program, and strengthening partnerships with various national government agencies and stakeholders to pursue education and skills development.
- **Agriculture and Food Security:** Continue to implement and expand the services for agriculture, fisheries, livestock sectors thru the different programs of the provincial government, NGAs and other LGUs. Modernization of agri-livestock and fishery facilities, promotion of agri-business, strengthening agri-database, and capacity development for project implementers.
- **Tourism and Livelihood:** This shall include support to product development of new tourism sites and improvement of existing sites. Extensive promotion and marketing for Bohol's tourism industry, provision of infrastructure support to tourism, and creative tourism development.
- **Information Technology:** Though this is mainly driven by the private sector, the Province is working closely for the availability of needed resources (human resource and skills) and infrastructure support (reliable power, communication network) for the IT industry, as well as facilitating, with LGUs to provide an investment-friendly environment for IT. Also to be sustained are the implementation of the Bohol Information System Strategic Plan, and the development/ maintenance of processes and application software/ systems.

Another priority item added is **Boholano Culture and Heritage Preservation**, which covers the revitalization and promotion of our culture and the arts, creation of arts groups, capacity development support program for Boholano artists, and support for the creation of municipal culture office in LGUs. Furthermore, mainstreaming the Boholano culture and arts development across development sectors and planning shall be promoted.

On top of the Framework, the "**GREEN BOHOL**" banner is included to stress the province's priority to pursue sustainable development and the protection of the environment, supporting programs and projects that are climate change responsive, and the development/ utilization of renewable resources.

At the center of the Framework is the long-term vision-mission of Bohol, with still, **poverty reduction** as the main goal. While the province has been successful in reducing poverty incidence among its people, the latest survey shows that 24.7% of the families are still living in poverty. While this figure is way below the 50.2% poverty incidence in year 2000 wherein Bohol was among the 20 poorest provinces in the country, the government would still sustain its socio-economic programs to uplift the lives and welfare of Boholano constituents.

The PGBh will be pushing for the attainment of other goals set for **Environment Protection and Management, Social Equity, Economic Development and Wealth Creation, Cultural Heritage and Boholano Values, and responsive, Transparent and Accountable Governance.**

Looking into the different development pillars, the identified goals and strategies for the province of Bohol at the medium-term, and the eventual implementation of programs and projects, as embodied in the Provincial Development and Physical Framework Plan (PDPFP), Executive Legislative Agenda (ELA), Annual Investment Plan (AIP) and the Annual Appropriations of the PGBh, other LGUs, and various national government agencies, Bohol hopes to promote **inclusive growth** for all that will eventually **lead to equitable and accelerated prosperity.**

### **Agriculture Sector Vision and Goals**

Agriculture is one of the economic drivers of Bohol and is the main source of livelihood of majority of the Boholanos. It provides income and livelihood to farmers and fisher folks and their dependents. Agriculture also enables traders, processors, retailers, and other groups to, directly or indirectly, make a living. Given these facts, it is only logical that the agriculture sector needs to be fully harnessed to enhance agricultural productivity and improve the incomes and welfare of farmers and fisherfolks.

Consistent with this drive and with consciousness that agriculture is an economic driver of Bohol, the Provincial Government has been steadfast in implementing agri-based support programs and projects to achieve food sufficiency and attain economic growth through agri-industrialization. The province is fortunate to be selected as a one of the sites of the Philippine Rural Development Project (PRDP) that aims to develop an inclusive, market-oriented, climate-resilient agri-fishery sector by strategically investing in priority value chains. Based on suitability, market potential, impact on the poor and number of growers/producers, identified provincial priority commodities that go through prioritization are the following: coconut, dairy, native chicken, swine, high-value vegetables, cassava, inland fishery, mariculture, cacao and coffee.

The Provincial Government also desires to develop its high-value crops, vegetables, banana, mango, coconut and other economically beneficial crops like palm oil and cassava. Fishery development in the province is also being prioritized, considering that Bohol is a major source of fishery products in Region VII. As to livestock and poultry development, the Provincial Government has been continually responsible in improving and safeguarding the said industries with the promotion of native chicken and the ongoing research on the development of a Boholano strain of native chicken.

Much attention has been focused in the agriculture sector, Bohol being predominantly agricultural with more than half of its total land area devoted to agriculture. The development effort of the province is guided by its vision for a **Green Bohol, a Competitive and Sustainable Agro-industrial Province in the Visayas**. The figure below presents the mindmap of the agriculture sector with the overall goal for an Enhanced Green Economy through Agri-fishery and Livestock and its suggested strategies towards the attainment of the goal.



## Chapter III. Priority Commodity Value Chain Development

The priority commodities identified in the province are: coconut, livestock-dairy, native chicken, vegetable, cassava, inland fishery, swine, mariculture (seaweeds), cacao and coffee. The identified commodities were ranked using the criteria as to suitability, market potential, impact on the poor and as to the number of growers or producers.

**Table 11. Priority Commodities, Bohol, 2015**

Commodity Prioritization Worksheet (CRITERIA)	Weight		Priority Commodities					
			COCONUT		LIVESTOCK-DAIRY		NATIVE CHICKEN	
			Raw Score	Weighted Score	0	Weighted Score	Raw Score	Weighted Score
<b>I. Suitability</b>	<b>20%</b>		-	<b>0.00</b>	<b>0</b>	<b>0.00</b>	<b>0</b>	<b>0.00</b>
<b>II. Market Potential</b>	<b>30%</b>			<b>2.70</b>		<b>2.70</b>		<b>2.34</b>
1. Market size		20%	1.0	1.80	1.0	1.80	1.0	1.80
3. Market growth potential		20%	1.0	1.80	1.0	1.80	1.0	1.80
4. Ease of entry		20%	1.0	1.80	1.0	1.80	1.0	1.80
5. Potential for value addition		40%	1.0	3.60	1.0	3.60	1.0	2.40
<b>III. Impact on the Poor</b>	<b>20%</b>			<b>1.80</b>		<b>1.80</b>		<b>1.80</b>
1. Number of Poor People Involved		50%	1.0	4.50	1.0	4.50	1.0	4.50
2. Potential to Raise/Create Income		50%	1.0	4.50	1.0	4.50	1.0	4.50
<b>IV. Number of Growers/ Producers</b>	<b>30%</b>		1.0	<b>2.70</b>	1.0	<b>1.80</b>	1.0	<b>1.80</b>
<b>Total Weighted Score</b>	<b>100%</b>			<b>7.20</b>		<b>6.30</b>		<b>5.94</b>
<b>RANK</b>				<b>1st</b>		<b>2nd</b>		<b>3rd</b>

Criteria	Weight		Priority Commodities					
			HI-HV VEGETABLE		CASSAVA		TILAPIA-HITO -IF	
			Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score
<b>I. Suitability</b>	<b>20%</b>		0	<b>0.00</b>	0	<b>0.00</b>	0	<b>0.00</b>
<b>II. Market Potential</b>	<b>30%</b>			<b>1.98</b>		<b>2.34</b>		<b>1.62</b>
1. Market size		20%	9	1.80	9	1.80	6	1.20
3. Market growth potential		20%	9	1.80	9	1.80	6	1.20
4. Ease of entry		20%	9	1.80	9	1.80	9	1.80
5. Potential for value addition		40%	3	1.20	6	2.40	3	1.20
<b>III. Impact on the Poor</b>	<b>20%</b>			<b>0.90</b>		<b>1.80</b>		<b>0.60</b>
1. Number of Poor People Involved		50%	3	1.50	9	4.50	3	1.50
2. Potential to Raise/Create Income		50%	6	3.00	9	4.50	3	1.50
<b>IV. Number of Growers/Producers</b>	<b>30%</b>		6	<b>1.80</b>	6	<b>1.80</b>	3	<b>0.90</b>
<b>Total Weighted Score</b>	<b>100</b>			<b>4.68</b>		<b>5.94</b>		<b>3.12</b>
<b>RANK</b>				<b>4th</b>		<b>5th</b>		<b>6th</b>

Criteria	Weight		Priority Commodities							
			SWINE		MARICULTURE		CACAO		COFFEE	
			Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score	Raw Score	Weighted Score
<b>I. Suitability</b>	<b>20%</b>		0	<b>0.00</b>		<b>0.00</b>		<b>0.00</b>		<b>0.00</b>
<b>II. Market Potential</b>	<b>30%</b>			<b>2.52</b>		<b>1.50</b>		<b>1.50</b>		<b>1.50</b>
1. Market size		20%	9	1.80	6	1.20	6	1.20	6	1.20
3. Market growth potential		20%	9	1.80	6	1.20	6	1.20	6	1.20
4. Ease of entry		20%	6	1.20	7	1.40	7	1.40	7	1.40
5. Potential for value addition		40%	9	3.60	3	1.20	3	1.20	3	1.20
<b>III. Impact on the Poor</b>	<b>20%</b>			<b>0.60</b>		<b>0.90</b>		<b>0.80</b>		<b>0.50</b>
1. Number of Poor People Involved		50%	3	1.50	3	1.50	2	1.00	2	1.00
2. Potential to Raise/Create Income		50%	3	1.50	6	3.00	6	3.00	3	1.50
<b>IV. Number of Growers/Producers</b>	<b>30%</b>		6	<b>1.80</b>	2	<b>0.60</b>	2	<b>0.60</b>	2	<b>0.60</b>
<b>Total Weighted Score</b>	<b>100%</b>			<b>4.92</b>		<b>3.00</b>		<b>2.90</b>		<b>2.60</b>
<b>RANK</b>				<b>7th</b>		<b>8th</b>		<b>9th</b>		<b>10th</b>

## Commodity Value Chain 1: SEAWEEDS

### A) COMMODITY PROFILE<sup>20</sup>

- **Product Discription**

Seaweeds refer to a wide range of photosynthetic non-flowering plant-like organisms that live either in marine or brackish water environment. Scientists classified them as algae because these are plants that have no true roots (rhizoids), stems and leaves. They are also called macro algae which differentiates them from micro-algae (Cyanophyceae), which are microscopic in size and are often unicellular.

Seaweeds are often classified into three main groups based on pigmentation i.e. green (Chlorophyceae), brown (Phaeophyceae) and red (Rhodophyceae). Brown seaweeds are usually large, with the Giant Kelp as one of the most popular examples. Red and Green seaweeds are usually smaller, generally ranging from a few centimeters to about a meter in length. Red seaweeds however, are not always red in appearance: their color can range from being purplish to brownish though they are still classified as Rhodophyceae due to their relative characteristics (McHugh, 2003).

In the Philippines, commercial domestication of seaweeds started in the late 1960s to early 1970s. The country's long coastlines proved to be ideal to cultivate *Eucheuma cottonni*, *Eucheuma spinosom*, especially in Tawi-tawi, Sulu, Zamboanga del Sur, Sacol Islands, Palawan, Cuyo Island, Danajon Reef of Central Visayas, and Southern Leyte.<sup>21</sup> These are red seaweeds which are processed for food processing and pet food uses. Other species grown in the country are *Gracilaria*, *Caulerpa*, *Sargassum*, *Hydroclathrus*, *Porphyra*.<sup>22</sup>

### **Commodity Uses**

Aside from being a primary producer in the marine ecosystem and as a habitat and breeding ground for various organisms, several species of seaweeds are identified to be commercially valuable for food consumption and industrial applications. The main uses of seaweeds are: as a source of agar, as a source of carrageenan, as a source of alginate, and for culinary or food use. The species used for each purpose also differs. However, there are also seaweeds species that can both be eaten raw or cooked or processed into agar, alginate, or carrageenan. There are at least 221 species of seaweeds exploited globally. Of these, 145 species are for food and 101 species for phycocolloid production (Zemke-White and Ohno 1999).

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<sup>20</sup> Value Chain Analysis: Seaweeds (Carrageenan) Visayas Cluster, DA-PRDP

<sup>21</sup> The Economics of Seaweed Farming in the Philippines, Jose E. Padilla & Harlan C. Lampe

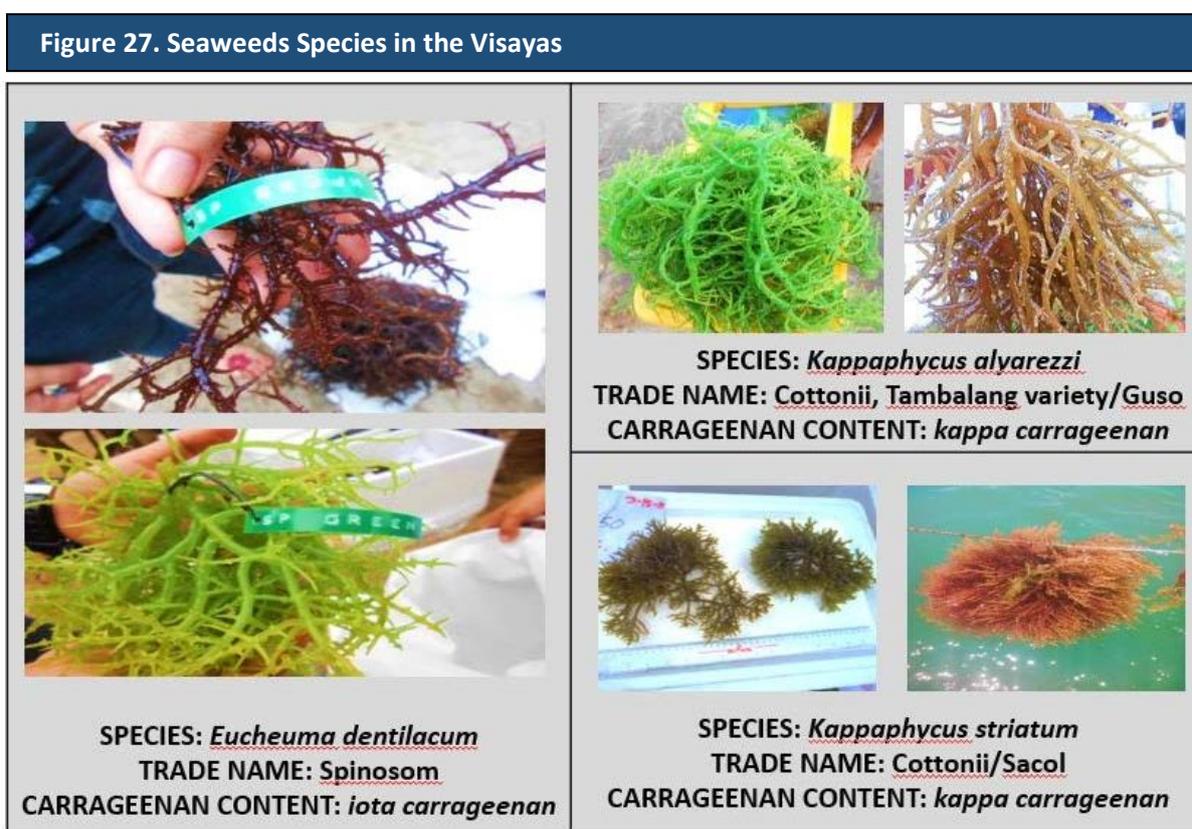
<sup>22</sup> Seaweed Industry of the Philippines by Rizalina M. Legasto,

<http://www.fao.org/docrep/field/003/AB719E/AB719E09.htm>

### Product Forms in the Philippines

In the Philippines, there are about 893 species of seaweeds recorded (Ang, et. al, 2013). About 350 of these species are found to have some economic value however, less than 5% of these are economically important and most have still to be developed (Trono, 1999).

The *Kappaphycus*, *Eucheuma*, *Caulerpa*, and *Gracilaria* species are the most collected and cultivated species in the country. About 98% of the total seaweed production is made of *Kappaphycus* and *Eucheuma* species which are mainly used for the production of carrageenan. The figure below shows the major species used by farmers in the country. Each species has many cultivars or varieties and strains that differ in color, branching, thallus characteristics, and preferred environment.



**Source:** BFAR Region VI/BFAR Region VII

Aside from processing into carrageenan, these red seaweeds can also be served as salads or pickled or processed into seaweed crackers and noodles. The technology of processing of seaweed crackers and noodles have already been transferred to several fisherfolk associations in the provinces through the efforts of BFAR and DTI. These value-added products are often sold at trade fairs or product expos that are arranged by DTI or private companies. Some also sell their seaweed chips and crackers at school canteens and sarisari stores though this is not done regularly and only depends on availability of labor and raw materials.

Figure 28. Product Forms of Seaweeds in Central Visayas



Caulerpa and Gracilaria though cultivatable in some areas, are still mostly from wild harvest. Caulerpa (“sea grapes” or “green-caviar”) is consumed raw or served as salad. Gracilaria can be processed to produce agar or cultured to feed sea abalones. It can also be eaten in the form of salad.

The product forms of carrageenan in the Philippines are the following:

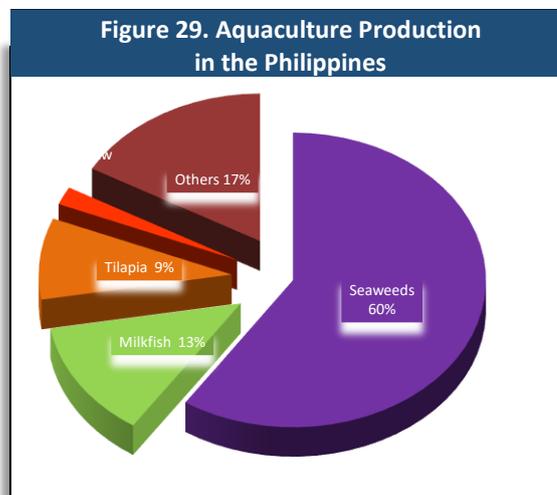
- a) **Raw Dried Seaweeds (RDS)** - Raw material for processing into carrageenan; can either be cottonii or spinosom; with 38% or less moisture content. Farmers, traders, local processors, and exporters maybe engaged in the trading of RDS.
- b) **Alkali Treated Cottonii (ATC) or Alkali Treated Cottonii Chips (ATCC)** - These are dried alkaline treated RDS. Alkaline treatment enhances the gelation properties of carrageenan. These are sold to carrageenan processors for further refining though most carrageenan processors undertake the alkaline-treatment activities themselves.
- c) **Semi-Refined Carrageenan (SRC)** - The SRC is milled dried ATC and sold in powder form. There are two major grades for SRC, namely: pet and food grade. Food grade SRC is also labelled as Philippine Natural Grade (PNG) or Processed Eucheuma Seaweed (PES) in the world market.
- d) **Refined Carrageenan (RC)** - The RC consists of two types: alcohol precipitated and the gel pressed. Gel pressed RC is cheaper than the alcohol precipitated RC. Alcohol precipitated RC is generally used when retaining true color of food is very critical.
- e) **Carrageenan Blended Products** - These are SRC and RC blended with other hydrocolloids and ingredients (i.e., sugar, salt, gum, etc.) to produce custom-made formulations for end-user clients.

## • Production Trends

Production in the Philippines fishery sector was valued at Php 316.7 billion in 2012. The biggest contributor is aquaculture, accounting for 29% of total value of fishery production.

Seaweeds contribute 60% of the total aquaculture production. Milkfish is second, contributing 13% of the overall aquaculture production. Tilapia is also a major aquaculture product, contributing 9% of total production.

The fishery sector is a major export earner for the Philippines, reaching US\$ 883 million in revenues. Seaweeds is the second top export of the Philippines from the fishery sector, accounting for 24% of total export earnings for the sector.



The local seaweed industry contributes at least P10 billion (US\$ 200 million) to the Philippine economy. Growth in the industry is said to be inclusive because seaweed growers are said to capture 60% of total value added. The Philippine seaweed industry provides livelihood for up to 200,000 coastal families involving 1.2 million people.

Seaweed growing is also known to benefit the marine ecosystem. It attracts other marine species to thrive in the area by providing food, shelter and breeding grounds. Seaweed growing also promotes ecological stability and sustained productivity in the reef. In the Danajon Reef, it reduced destructive fishing practices by providing an alternative livelihood for fishing households.

*Eucheuma*, *Gracilaria* and *Caulerpa* are the most commonly cultured and collected species of seaweeds in the country. Majority or 91% of total seaweeds produced is of the *Eucheuma* variety. The *Eucheuma cottonii* is the most popular among seaweeds grower because it is easy to cultivate and has a high market price.

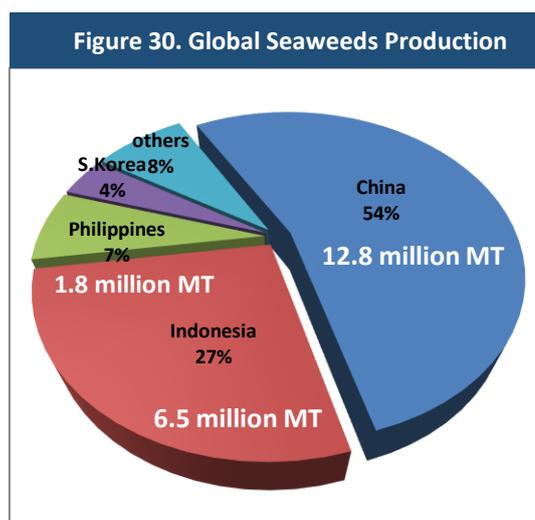
The *spinosum* variety is easier to produce because less capital is needed compared to *cottonii*. Unlike *cottonii* which is grown in monolines, *spinosum* can be grown in the rocky seabed and when managed properly, can be harvested all year round without the need for further replanting. But there are reports that some seaweed growers have



begun to grow *spinosum* in mono lines and productivity is higher compared to growing in the seabed.

Majority or 98.4% of local seaweed production is sold in the export market in raw dried seaweed (RDS) form or carrageenan extracts. Majority of the RDS being exported from the country is *E. cottonii*. But because of the opening of new markets, particularly in China and South Korea, *E. spinosum* is now up to 50% of RDS exports. The major suppliers of *cottonii* are ARMM, which contribute 55%-60% of Philippine production, and Zamboanga Peninsula and Palawan which contribute 35% and 10% of total production, respectively. The major suppliers of *Euचेuma spinosum* are Bohol, Palawan and ARMM. Bohol reportedly contributes 80% of national production.

The Philippines used to be the top supplier of raw dried seaweeds in the world, providing 70% of global supply of RDS. Now, the Philippines only contribute only 40% of global RDS supply. But the country remains the top supplier of Carrageenan in the world, serving 65% to 70% of worldwide demand. 54% of global seaweed production comes from China. This is equivalent to 12.8 million MT of fresh seaweeds. Indonesia is the second largest producer of seaweeds, contributing 27% or 6.5 million MT of global production, while the Philippines is now third, contributing 7% or 1.8 million MT of fresh seaweed production.



**Table 12: Global Seaweeds Production (in M.T.): 2012-2016**

	2012	2013	2014	2016	2017	AAGR%
<b>WORLD</b>	<b>20,609,818</b>	<b>23,870,512</b>	<b>26,775,211</b>	<b>28,452,624</b>	<b>28,960,921</b>	<b>9.01%</b>
<b>China</b>	9,958,670	10,638,585	12,819,685	13,082,005	13,360,280	7.88%
<b>Indonesia</b>	6,514,854	9,298,474	10,076,992	11,269,341	11,631,000	15.54%
<b>Philippines</b>	<b>1,751,071</b>	<b>1,558,378</b>	<b>1,549,576</b>	<b>1,566,361</b>	<b>1,404,519</b>	<b>-5.20%</b>
<b>South Korea</b>	1,019,587	1,126,578	1,082,027	1,193,348	1,348,065	7.45%
<b>North Korea</b>	444,300	444,300	489,000	489,000	489,000	2.52%
<b>Japan</b>	424,070	402,252	353,742	384,992	375,423	-2.71%
<b>Malaysia</b>	331,490	269,431	245,332	260,760	205,989	-10.60%
<b>Zanzibar</b>	150,876	110,438	133,020	172,490	111,142	-3.06%
<b>Madagascar</b>	1,400	3,575	6,970	15,377	17,423	96.06%
<b>Solomon Islands</b>	6,990	11,812	12,162	12,200	10,580	14.74%
<b>Tanzania</b>	6,510	6,689	6,705	6,750	7,500	3.69%

Note: These include production of other type of seaweeds like gracilaria, brown seaweeds, sargassum, fusiform, kelps, etc. of minimal quantity. The production is dominated by Red Seaweeds of *Euचेuma* variety.

Seaweeds production has always been dominated by East Asian and Southeast Asian countries, accounting for 99.49% of global production in 2016. Cultivated seaweeds in East Asia, mainly China, Japan, South Korea and North Korea, are for food consumption while the skyrocketing demand for the hydrocolloids for the past years saw increased production of *Euचेuma*

seaweeds in Southeast Asia and China. China leads in the volume of seaweeds production, holding 46.13% of the global supply, followed by Indonesia with 40.16%, and the Philippines with 4.85% farmed volume of the total world produce. For the past five years, total seaweed aquaculture production has steadily been increasing from 20,609,818 M.T in 2012 to 28,960,921 M.T. in 2016 with an average annual growth of 9.01%.

During the previous years, almost 70% of China's cultured seaweeds is made of brown seaweed varieties. The most notable of them is the *Laminaria Japonica* or Japanese Kelp which grows in temperate cold-water zones.

Both Indonesia and Philippines are red seaweed-producing countries. Red seaweeds which is mainly used for the extraction of carrageenan accounted for about 90% of the world production. From year 2000 to 2015, Indonesia's production has been rapidly increasing with an annual average increase of 31% while the Philippines had a slow growth of only 6% annually for the same period. In 2007, Indonesia overtook the Philippines in seaweeds production, with the latter even experiencing a dip in 2012. In 2015, the gap of the volume of production between Indonesia and Philippines reached over 9 million M.T. dominating the global production of *Eucheuma* seaweeds for carrageenan processing.

Ironically, seaweeds expert from the Philippines helped developed the seaweed industry in Indonesia, especially in improving farming practices and setting-up of seaweed processing facilities. Aside from having larger area suitable for seaweeds farming, more than double of the area of the Philippines, Indonesia's government has been very supportive in developing its seaweed industry.

Country	Estimated Production Capacity	% Share
<b>Philippines</b>	<b>36,400 M.T.</b>	<b>40.6</b>
Indonesia	17,000 M.T.	19.0
China	12,000 M.T.	13.4
South America	4,500 M.T.	5.0
USA	4,500 M.T.	5.0
France	3,500 M.T.	3.9
Spain	3,300 M.T.	3.7
Denmark	3,000 M.T.	3.3
South Korea	2,000 M.T.	2.2
Japan	1,700 M.T.	1.9
Malaysia	1,700 M.T.	1.9

*Source: Adopted from PRDP Visayas Cluster Value Chain Analysis (2014)*

In terms of carrageenan production, Philippines is still the top producing country accounting to more than 40% of the global supply followed by Indonesia and China with 19% and 13% share respectively.

The development of carrageenan industry in the Philippines started in Cebu, where they established a semi-refined carrageenan processing facility for pet food in 1978. After constant research and development, the first refined carrageenan processing facility was launched in

1986. From then on, carrageenan processing has been a highly important product in the country and in the world, being backbone of a multi-million-dollar global industry.

According to the Seaweed Industry Association of the Philippines (SIAP), the foremost Philippine seaweed association, the Philippines' top place in carrageenan production is also in danger of being taken over by Indonesia. Only 15% of the dried seaweed in Indonesia is locally processed. By 2020, the Indonesian government plans to domestically process 50% of its seaweed supply and has already taken efforts in encouraging local carrageenan processing through establishment of more warehouses and processing plants, and increased budget for development of seaweed supply. They have also invited China, their biggest seaweed market, to put up a processing plant in the country. At the rate Indonesia is going, SIAP estimates that the country is bound to overtake Philippines in two years' time. For the Philippines to remain competitive in carrageenan production, it has to increase its local seaweed supply at the most possible time.

Aside from the Philippines and Indonesia, other carrageenan- producing countries are China, South America and USA.

### **Domestic Production**

Seaweeds farming is a commercial domesticated practice of fishermen families along the country's coastlines. Seaweeds contributed 63.82% to total volume of aquaculture production, followed by milkfish (18.09%) and tilapia (11.77%). The table below shows Philippines seaweed culture production from 2012 to 2016.

<b>Table 14. Seaweed Production in the Philippines (in M.T.): 2012-2016</b>						
<b>REGION</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Ave. % Growth</b>
<b>Philippines</b>	<b>1,751,070.63</b>	<b>1,558,377.75</b>	<b>1,549,575,966</b>	<b>1,566,361.70</b>	<b>1,404,519.23</b>	<b>-5.20%</b>
ARMM	629,363.41	609,164.54	622,995.60	627,435.50	613,174.28	-0.62%
Mimaropa	458,525.52	340,691.28	361,352.59	395,125.83	312,922.64	-7.77 %
Zamboana Peninsula	246,304.31	218,789.70	206,161.12	204,180.45	193,107.61	-5.83%
Central Visayas	136,159.08	124,247.39	104,943.46	96,588.56	88,737.40	-10.09%
Western Visayas	71,712.48	65,173.45	77,466.92	80,572.11	81,800.27	3.82%
Northern Mindanao	42,053.33	42,261.32	40,784.83	39,409.13	39,964.14	-1.24%
Bicol Region	61,503.50	61,089.90	59,863.75	55,382.09	34,199.45	-12.10%
Eastern Visayas	34,172.07	27,884.62	17,925.84	18,513.49	18,411.26	-12.85%
Caraga	21,296.59	19,876.72	16,383.89	14,798.71	10,313.22	-16.06%
Davao Region	1,937.17	3,686.46	6,005.49	8,384.02	7,652.49	46.02%
Calabarzon	45,131.03	41,413.27	32,617.74	23,492.73	3,642.01	-35.49%
Central Luzon	1,195.53	1,596.50	2,368.53	1,827.50	300.18	-6.13%
Cagayan Valley	1,138.77	2,243.86	527.18	266.46	196.89	-10.24%
Socargen	506.8	20.58	144.05	358.65	71.36	143.22%
Ilocos Region	69.04	58.16	34.97	26.47	26.03	-20.40%

**Source:** PSA Fisheries Statistics of the Philippines, 2017

The table above shows that ARMM dominated seaweed production in the country with 43.66% share in 2016, followed by MIMAROPA (22.28%) and Zamboanga Peninsula (13.75%). In general, Philippines has experienced a negative growth in terms of seaweed production for the

last five years. Based on reports from industry situationers published by PSA, weather disturbances such as typhoons and El Nino, high incidence of ice-ice, and decreasing farm productivity were the primary reasons for this decline.

The most notable decline in the recent years was recorded in two (2) consecutive years, 4.88 % 2011 to 2012 and 11.0% in 2012 to 2013. Major seaweed producing areas such as Palawan, Zamboanga Sibugay, and Bohol were confronted with various constraints such as heavy siltation of sea water, unavailability of planting materials, “ice-ice” disease, flash floods, strong current and several typhoons that washed out seaweed farms.

Damaged assessment by BFAR showed that more than 2,000 hectares of seaweed farms in MIMAROPA, Central and Eastern Visayas and the Bicol Region were affected by typhoon Yolanda in 2013.

Damages caused by “ice-ice” has reached about 15% production losses between 2011 and 2013, equating to a loss of over US\$ 310 million based on a value (Cook et.al 2016). In 2012, the top producing provinces in Visayas and Mindanao suffered from “ice-ice” disease throughout the year.

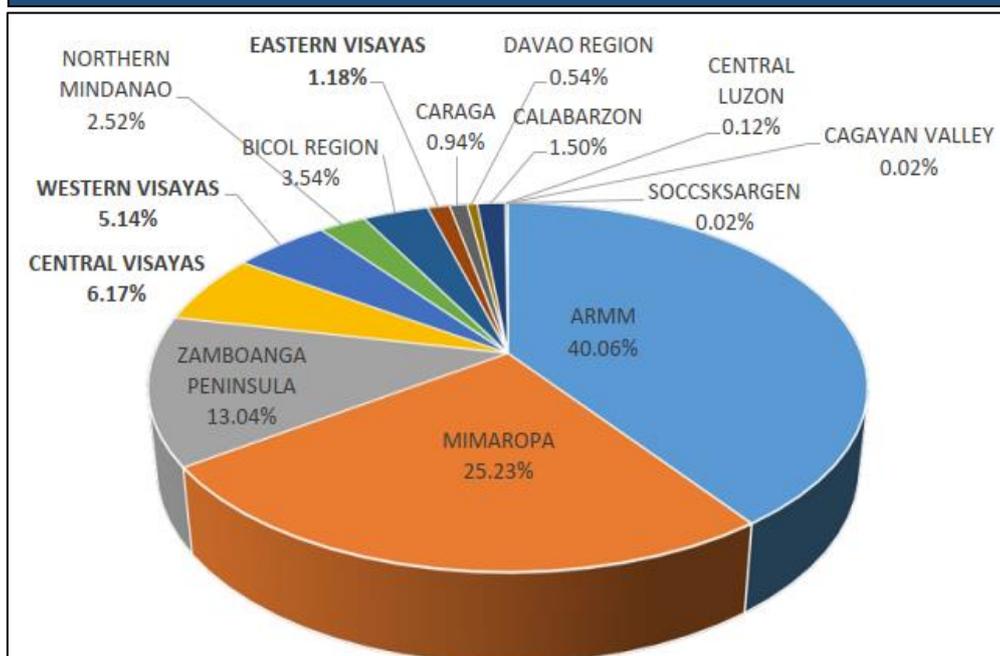
In 2014, the seaweed industry still experienced a decline though it was only reported to be a little less than 1%. Still, factors that contributed to the decrease were strong water current and flash floods which washed-out seaweeds farms, shortage of available planting materials, infestation of “ice-ice” and red tide, and intense heat.

Seaweed production only went up in 2015 with 1.08%. MIMAROPA, ARMM and Western Visayas were the top contributors to the incremental increase. Good weather conditions, less occurrence of diseases and continuous government assistance by way of provisioning planting materials, favored seaweed production all year round.

A huge decline was then again observed in 2016, with a 10.33% lower performance than the previous year. Lower harvest was mainly observed from seaweed farms in MIMAROPA, Bicol Region and CALABARZON. Most seaweeds farm were affected by high water temperature brought by El Niño phenomenon and others were attacked by “ice-ice” disease which resulted to stunted growth. Likewise, insufficient and poor quality of planting materials prompted some operators to venture into other sources of livelihood like construction works.

This negative trend in the total national seaweed supply poses a serious threat to the Philippine Seaweed industry, especially to carrageenan production. If the local supply base can not support the requirements of its local processors, these companies will have to resort to importation of raw materials from mother seaweed producing countries to continue operating. Some multi-national companies may also resort to transferring their base of operations to other producing countries to ensure efficiency and lessen production costs.

The succeeding figure further illustrates the percentage share of regions in seaweed production. The top five (5) seaweed producing regions in the Philippines are ARMM (Region XV), MIMAROPA (Region IV-B), Zamboanga Peninsula (Region IX), Central Visays (Region VII), and Western Visayas (Region VI).

**Figure 31. Distribution of Seaweeds Production in the Philippines: 2016**

The production levels of ARMM and Zamboanga Peninsula comprise about 57% of the Philippines' total seaweed production. Out of the 21 provinces in Mindanao, only about 14 of these provinces have produced more than 100 MT of seaweeds. The top producing provinces in Mindanao are Tawi-tawi, Sulu, Zamboanga Sibugay, Maguindano and Zamboanga City.

MIMAROPA, which is composed of Marinduque, Oriental, and Occidental Mindoro, Romblon, and Palawan, is the second largest seaweed-producing region with more than 25% of the total supply. About 99% of the total seaweed in MIMAROPA is produced in Palawan. The Office of Provincial Agriculturist estimates its seaweed production area to be about 5,698 hectares with 80.0% located mostly in its northern side.

Region VI and Region VII which hold the 5<sup>th</sup> and the 4<sup>th</sup> place respectively in terms of seaweed production are both in the Visayan Region. Eastern Visayas or Region VIII is in the 8<sup>th</sup> place with 1.18% contribution to the total Philippine seaweed culture supply.

Visayas accounts for about 12.0% of the Philippines seaweed supply. Of the 15 carrageenan processors in the country, 7 have processing plants located in the cluster.

The succeeding table shows the production of the Visayas cluster from 2012 to 2016.

<b>Table 15. Seaweeds Production in the Visayas, 2012-2016</b>						
<b>Province</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>Ave % Growth</b>
<b>WESTERN VISAYAS</b>	<b>71,712.48</b>	<b>65,173.45</b>	<b>77,466.92</b>	<b>80,572.11</b>	<b>81,800.27</b>	<b>3.825</b>
Antique	70,146.40	63,632.31	<b>76,686.27</b>	<b>80,018.20</b>	<b>81,087.03</b>	<b>4.23%</b>
Guimaras	1,552.88	1,518.44	748.93	530.75	685.76	-13.21%
Negros Occ.	7.24	4.36	2.87	2.93	18.58	115.57%
Iloilo	2.85	16.4	18.39	20.3	6.27	117.14%
Aklan	3.11	1.94	10.46	-	2.63	
Capiz	-	-	-	-	-	
<b>CENTRAL VISAYAS</b>	<b>136,159.08</b>	<b>424,247.39</b>	<b>104,943.46</b>	<b>96,588.56</b>	<b>88,737.40</b>	<b>-10.095</b>
Bohol	124,947.92	114,046.65	29,752.95	88,372.48	81,310.37	-10.16%
Cebu	10,398.62	9,788.59	4,742.91	7,965.88	7,428.08	0.01%
Negros Oriental	776.01	367.27	408.34	225.03	289.4	-14.44%
Siquijor	36.53	44.88	39.26	25.17	9.55	-21.90%
<b>EASTERN VISAYAS</b>	<b>34,172.07</b>	<b>27,884.62</b>	<b>17,925.84</b>	<b>18,513.49</b>	<b>18,411.26</b>	<b>-12.85%</b>
Leyte	21,541.62	16,331.80	17,571.80	18,085.43	17,948.97	-3.61%
Northern Samar	301.87	371.74	353.86	354.95	284.39	-0.31%
Eastern Samar	12,326.83	11,181.07	0.18	73.11	176.82	10137.3%
Samar -	-	-	-	-	1.08	
Southern Leyte	1.66	-	-	-	-	-
Biliran	0.10	0.01	-	-	-	-

*Source: BFAR, 2017*

**Central Visayas** is the highest seaweeds producing region in the cluster, contributing 46.96% of the total production in the Visayas. Bohol is the top producing province contributing about 92% of the region's total production followed by Cebu, Negros Oriental and Siquijor. In general, these four provinces experienced decreasing trend mostly attributed to the 7.2 magnitude earthquake in Bohol and the consecutive typhoons that affected the region in the last quarter of 2013 up to the end of 2014-Yolanda, Seniang, and Quennie. Seaweed growers were also not able to recuperate since the El Nino phenomenon heavily affected the region in 2015. Both Cebu and Bohol were declared to be in a state of calamity during this season.

**Western Visayas** accounts for about 43% of the total seaweed production in the Visayas. From 2012-2016, it has experienced an average of 1.52% annual growth rate. Though the region experienced a huge decline in 2013 due to bad weather conditions and presence of "ice-ice", there was increased support coming from BFAR, LGUs and NGOs to help fisherfolk in the region who were affected by super typhoon Yolanda.

**In Eastern Visayas**, the top producing provinces are Leyte, Northern Samar and Eastern Samar. Same as in Central Visayas, there was a general decrease in production for the last five (5) years that was attributed to typhoons (Yolanda, Seniang and Queenie) which happened in the region. A massive decline was observed in Eastern Visayas after the typhoon Yolanda. Seaweed growers

in the said province stopped farming and did not restock or replant after the typhoon even with the help and assistance from BFAR and NGOs. They opted for other sources of income since the low price of RDS in the previous months discouraged them from going back to seaweeds farming. Moreover, coastal municipalities of the province received assistance from Japanese International Cooperation Agency (JICA), United Nations Development Programme (UNDP) and other organizations to put up micro-enterprises which they now prefer as their main livelihood.

One of the biggest carrageenan processors in Cebu reported that Eastern Samar is a good source of RDS in terms of quality and is a good contributor to their supply base. There is also a carrageenan processing plant in Tacloban City which requires a stable and quality supply source.

### **World Seaweed Production**

Country	2008	2009	2010	2011	2012	% Share	% Growth
World	15,878,931	17,356,607	19,009,667	20,978,933	23,776,449	-	50%
China	9,933,885	10,495,905	11,092,270	11,549,555	12,832,060	54%	29%
Indonesia	2,145,061	2,963,556	3,915,017	5,170,201	6,514,854	27%	204%
Philippines	1,666,556	1,739,995	1,801,272	1,840,833	1,751,071	7%	5%
S. Korea	921,024	858,659	901,672	992,283	1,022,326	4%	11%
N. Korea	444,300	444,300	444,300	444,300	444,300	2%	0%
Japan	456,337	456,426	432,796	349,737	440,754	2%	-3%
Malaysia	111,298	138,857	207,892	239,450	331,490	1%	198%
Vietnam	35,700	33,600	35,000	206,900	234,600	1%	557%

The country is only growing seaweeds in 60,000 of the 200,000 hectares, or 30% of the areas suitable for seaweed growing. Because of the lack of growth in the seaweed production segment, capacity utilization of seaweed processors has dropped and importation of RDS into the country has increased. Indonesia has overtaken the Philippines in 2007 as the second largest producer of seaweeds. Indonesia accounts for 65% of the coral triangle seacoast, which has been identified to be highly suitable for seaweed production. Seaweed production is well-dispersed in small production farms all over the eastern part of the country.

### **Production Areas per Region**

Based on the estimates provided by SIAP, the Philippines has a total of 700,000 hectares of farmable areas for seaweeds - 500,000 hectares are for deep-sea farming while the 200,000 hectares are located along the coastlines. However, only 60,000 hectares or about 12% has been used or planted. Out of the 60,000 ha. farm areas all over the country, 88% are highly developed or nearly fully utilized. There is still 7,200 hectares that are underdeveloped or undergoing development. This only shows that the country has still a lot of potential to increase production performance considering its untapped and underdeveloped seaweed farmable areas. Out of the 11 areas identified to be highly developed, two are in the Visayas - Antique and Bohol.

The table below shows the existing production areas and potential areas for expansion per province in the Visayas cluster.

<b>Province</b>	<b>Estimated Potential Area (ha.)</b>	<b>Existing Area of Production (ha.)</b>
<b>Region 6</b>	<b>2,014.31</b>	<b>2,924.60</b>
Aklan	1.15	5.15
Antique	1,300	2,370
Capiz	-	-
Guimaras	28.66	39.0
Iloilo	674.50	482.95
Negros Occidental	10.0	27.5
<b>Region 7</b>	<b>504.62</b>	<b>4,024.03</b>
Bohol	149.62	2,714.36
Cebu	200.0	1,120.67
Negros Oriental	150.0	185.0
Siquijor	5.0	4.0
<b>Region 8</b>	<b>5,285.0</b>	<b>2,371.0</b>
Leyte	1,335.0	942.0
Biliran	320.0	1.0
Southern Leyte	230.0	34.0
Samar	990.0	35.0
Eastern Samar	580.0	341.50
Northern Samar	1,830	53.50
<b>Visayas Total</b>	<b>7,803.93</b>	<b>9,679.93</b>

*Source: Consolidated from BFAR*

In addition to the 9,679.93 hectares existing farm areas in the Visayas, an additional 7,803.93 ha. is estimated by local BFAR offices as areas for expansion. Based on the estimate of BFAR PFO Cebu, assuming that a hectare of seaweed farm can contain about 40,000 plants, it can produce about 24,000 kgs. of seaweed or 3,428.0 kgs. of RDS. However, that estimate is not very helpful in projecting production volume considering the many methods and varieties that can be used for planting of seaweeds. In addition, there is no detailed mapping of these areas with the exact coordinates and description of its status that could help in providing baseline data for possible expansion efforts.

Among the regions, **Eastern Visayas** has the largest area for expansion with 5,285 ha. potential area and 1,830 of which is in Northern Samar. Despite the assistance from NGOs to growers in the area, the capacity to upgrade their production has not been fully realized or has not been taken advantage of.

**Western Visayas** follows with the second largest area for expansion led by Antique province at 1,300 hectares. Caluya Island has already been crowded with seaweed farms, while other municipalities in the province have not been fully populated yet. In the province, Caluya has displayed the most mature and developed seaweeds industry.

**In Central Visayas**, the total expansion area is about 504.62 ha. shared almost equally by Bohol, Cebu and Negros Oriental. Siquijor only has an additional 5.0 ha. of estimated expansion area in addition to the existing 4.0 ha. Bohol and Cebu showed the largest planted areas respectively, followed by Negros Oriental and Siquijor.

The table below shows the top 10 producing provinces per region in the Visayas area. The ranking is based on the size of production area however, the number of farmers per municipality is also provided to provide a view of how big is the operations in the area. No production volume was provided since not all municipalities are regularly monitoring volume of production in the area and some can only record those that pay auxiliary fees to LGUs which can not really reflect the production per municipality.

<b>Table 18. Top Seaweeds Producing Municipalities Per Region</b>				
<b>Rank</b>	<b>Province</b>	<b>Municipality</b>	<b>Production Area (ha.)</b>	<b>No. of Farmers</b>
<b>Region 6</b>				
1	Antique	Caluya	2,308.50	3,078
2	Antique	Culasi	308	615
3	Iloilo	Estancia	300	84
4	Iloilo	San Dionisio	131	1,004
5	Iloilo	Concepcion	28.45	108
6	Negros Occidental	Escalante City	25	48
7	Guimaras	Sibunag	24	170
8	Iloilo	Carles	23.50	261
9	Antique	Pandan	19	38
10	Guimaras	San Lorenzo	15	27
<b>Region 7</b>				
1	Bohol	Bien-Unido	2,282	1,500
2	Bohol	Talibon	1,200	1,700
3	Cebu	Bantayan Is.	800	4,000
4	Bohol	Candijay	417	1,100
5	Bohol	Getafe	407	1,200
6	Bohol	Mabini	330	450
7	Bohol	Carlos P. Garcia	109	360
8	Bohol	Panglao	66	75
9	Bohol	Buenavista	55	176
10	Cebu	Sta. Fe	50	80
<b>Region 8</b>				
1	Leyte	Bato	910	1,500
2	Eastern Samar	San Policarpo	99.0	145
3	Eastern Samar	Guiuan	59.50	97
4	Eastern Samar	Gen. McArthur	50	52
5	Eastern Samar	Artetche	49	195
6	Eastern Samar	Salcedo	40	118
7	Samar	Daram	25	50
8	Eastern Samar	Lawa-an	25	26
9	Southern Leyte	Balagawan	19	60
10	Southern Leyte	San Pedro	15	100

*Source: BFAR, 2017*

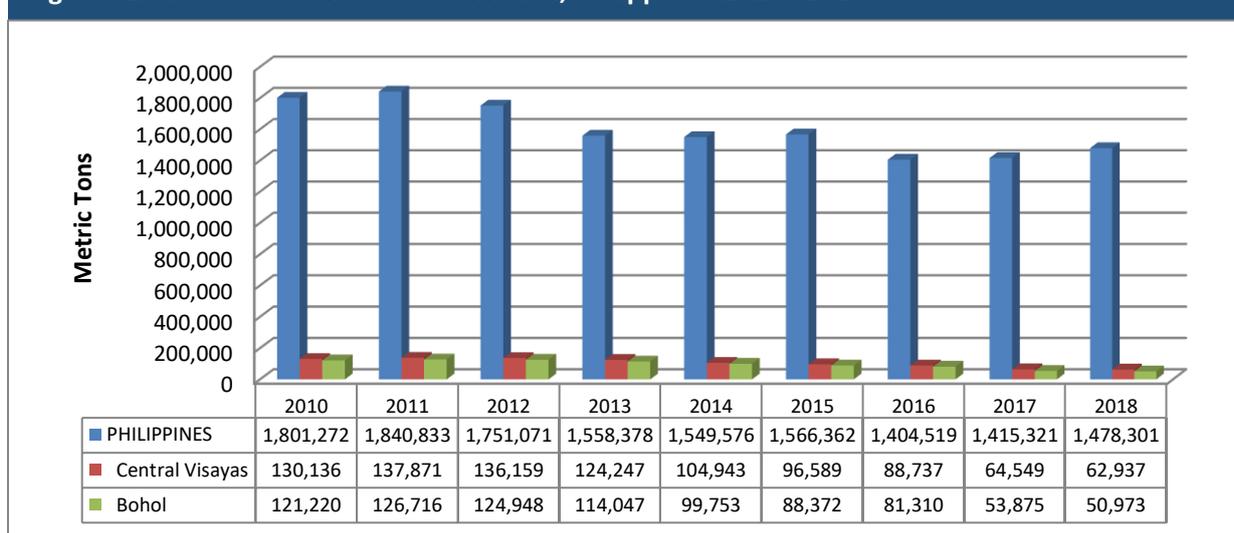
In the whole Visayas, largest production areas are found in Caluya (Antique), Bien-Unido and Talibon (Bohol), Bato (Leyte) and Bantayan (Cebu). Antique and Bohol have highly developed seaweeds farms while Cebu and Leyte have semi-developed farms in selected coastal areas.

Caluya is a first-class municipality of seven islands, comprised of 18 barangays and located 36 km away from mainland Antique. The main livelihood of the coastal families in the area is seaweeds farming, especially in the islands of popular with tourists Sibato, Sibolo, Panagatan Cays and coastal barangays like barangay Imba. Aside from its rich waters that have also been recently popular with tourists, the municipality is also known for the open pit coal mines located in the island of Semirara.

In Central Visayas, Danajon Bank hosts the double barrier reef off the shared coastal waters of Bohol, Cebu, Leyte and Southern Leyte. The reef is a rare geological formation which is a center of marine biodiversity in the Pacific. Due to the protection offered by the double barrier reef, various species have thrived, with rich fishing grounds which has been a source of supply for provinces nearby. When seaweeds farming started in 1980's in the Visayas, the double barrier reef also offered protection to seaweeds cultivated in the areas within Danajon Bank proximity. Major seaweed production areas in Bien-Unido and Talibon, Bohol and Dawahon Reef off Bato, Leyte are an effect of this, as coastal communities who fish in the area also perform seaweeds farming as other means of livelihood. Methods and practices of farmers from Dawahon Island are even adapted from the Danajon area in Bohol since they have almost the same water conditions. Other major seaweeds producing areas with more than 300 ha. seaweed farms are located in municipalities of Candijay, Mabini and Getafe of Bohol.

Seaweeds production in Central Visayas increased by 2.5% from 121,273 MT in 2009, to 124,247 MT in 2013, while production in Bohol increased by 0.2 % from 113,795 MT in 2009, to 114,047 MT in 2013, but production has been declining since 2012 up to 2018 (Figure 32).

**Figure 32. Volume of Seaweeds Production, Philippines: 2010 - 2018**



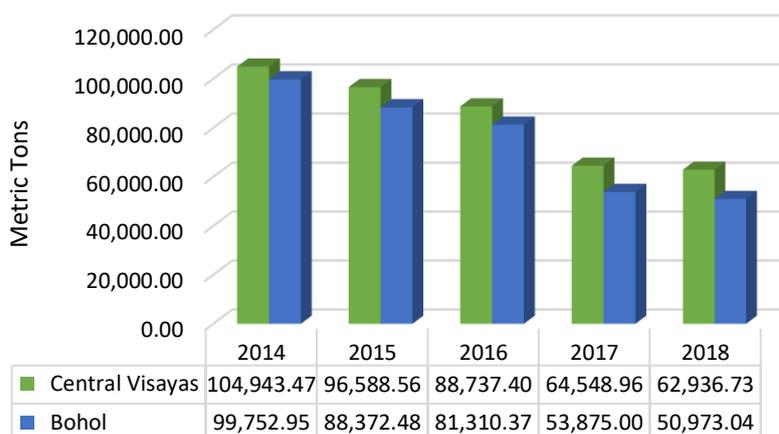
*Source: PSA OpenSTAT, 2018*

Most of the seaweed production in the province is concentrated in the Danajon Bank of Bohol, covering the municipalities of Bien Unido, Talibon and Getafe. Hingotanan Island in Bien Unido, is a major producer of seaweeds. There are several seaweed processors buying RDS from the island. Marine Colloids for Pilipino Integrity (MCPI) buys 10MT of RDS from Hingotanan per month. Other buyers are able to buy more RDS from the municipality because they extend financing to their seaweed suppliers. Getafe is also another major seaweed producing

municipality in Bohol. It produces both *cottonii* and *spinosum* seaweeds in roughly equal volumes. MCPI buys 6 MT of RDS from the municipality each month.

Seaweeds is a global commodity well-suited to the double barrier habitat because of the reef’s shallow depth. The inner and outer reefs are divided by an inshore channel which is only 28 meters deep at most. Seaweeds is not only economically significant for Bohol but also for Region VII. Eighty-one per cent (81%) of seaweeds production in Central Visayas comes from Bohol, and 97% of Bohol’s seaweeds production is harvested from the Danajon Bank seaweeds farms. Thus, it is expected that when Bohol’s production

**Figure 33. Seaweeds Production Volume in Bohol and Region 7: 2014 - 2018**



Source: PSA OpenSTAT, 2018

decreases, production in Central Visayas also decreases. For example, in the recent series of calamities from 2012 to 2014, Bohol seaweeds production decreased and so did the Region’s production performance (Figure 33).

**Figure 34. Economic Contribution of Seaweeds**

**ECONOMIC CONTRIBUTION**

- 58% of total aquaculture value in Bohol
- 4,544 families or 27, 264 people earn their livelihood from seaweeds
- Seaweed growing leads to inclusive growth and poverty reduction strategy as 55%-60% of total value added is captured by seaweed farmers

The province of Bohol has a very huge potential to expand its seaweed production areas. Bohol has 4,142 hectares of seaweed farms, which is mostly concentrated in the municipalities facing the Danajon Reef. But the province still has a potential for expansion of 4,673 hectares for shallow seaweed farming and 9,300 hectares for deep sea seaweed farming. Among the different municipalities of Bohol, Bien Unido is considered the top seaweed growing municipality in terms of existing and potential seaweed growing. Bien Unido has 7,600 hectares allocated as a mariculture zone. 3,700 hectares or 47% is suitable for seaweed growing and it is the biggest potential area for seaweed growing in the entire Visayas.

**Table 19. Existing and Potential Areas for Seaweed Farming in Bohol**

Municipality	Areas in Hectares			
	Planted	Potential	Deep Sea Potential	Total
1. Bien Unido	2,282	1,733	2,000	6,015
2. Talibon	1,200	1,200	1,700	4,100
3. Inabanga	100	600	1,000	1,700
4. Getafe	400	400	1,500	2,300
5. CP Garcia	50	150	700	900
6. Ubay	20	80	300	400
7. Tubigon	30	170	700	900
8. Mabini	10	90	400	500
9. Buenavista	10	90	300	400
10. Clarin	10	90	300	400
11. Panglao	20	30	150	200
12. Candijay	10	40	250	300
<b>TOTAL</b>	<b>4,142</b>	<b>4,673</b>	<b>9,300</b>	<b>18,115</b>

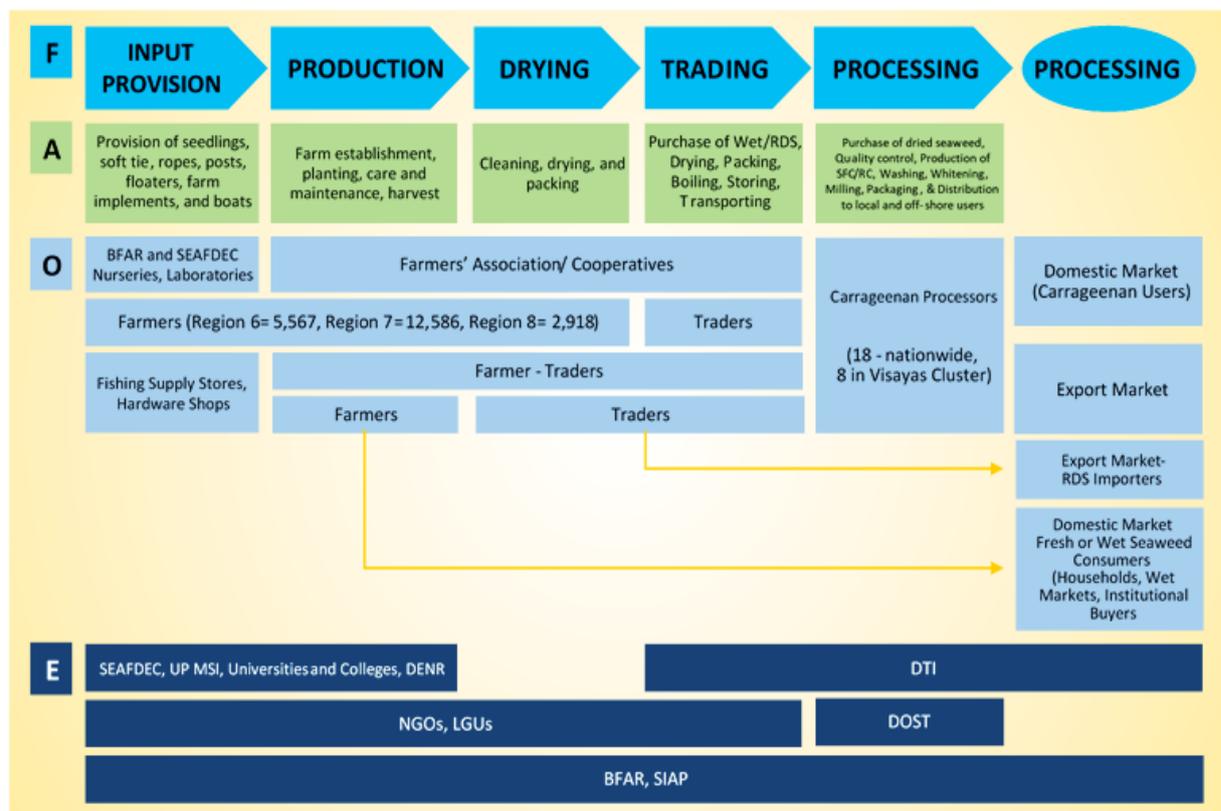
- **Nature and Structure of the Industry**

#### **Value Chain Mapping**

In the case of Central Visayas, Bohol is the main source of RDS. Majority of the seaweeds in Bohol are delivered to Cebu for processing or further transported to Metro Manila and Laguna. These dried seaweeds are loaded to ferries or RORO vessels in local ports of Talibon, Getafe, and Ubay depending on the trader and the proximity to their consolidation areas. Some traders, especially those from island-areas, directly transport their seaweeds using their own motorized boats which can carry about 15-20 MT of dried seaweeds.

The following figure shows the carrageenan value chain map from input provision to final sale.

**Figure 35. Value Chain Map of Seaweeds Carrageenan Industry in the Visayas**



The Carrageenan Value Chain covers five basic segments - input provision, production, drying, trading and processing - before the product is sold to final users which can either be export or local market.

The input supply segment functions as the provider of raw materials needed for seaweed farming such as seedlings, soft tie, PE ropes, and stakes. The cultivation stage or the production segment is responsible for planting, care and management, and harvesting.

After harvest, the seaweeds can either be sold in fresh or dried form. Wet seaweeds are mostly sold to local wet market for direct consumption or institutional buyers such as hotels and restaurants. There are also instances wherein farmers sell young seaweeds to be used as seedlings, often to BFAR for their seedling distribution projects. These however, are onetime transactions only.

The drying segment on the other hand basically include post-harvest activities such as cleaning, drying and packing seaweeds for carrageenan processing or export of dried seaweeds. The trading stage on the other hand involves the collection, consolidation, and delivery of raw dried seaweeds to processors or exporters. Processing turns raw dried seaweeds into Semi-refined Carrageenan and Refined Carrageenan and carrageenan-blended products.

Carrageenan is traded directly by the companies or through a distributorship agreement in a given area. In either mode, agents of carrageenan companies, who are almost always also food technologists, work closely with the user/buyer to develop the appropriate blend and mixture of carrageenan depending on the application. After working out the right formulation, the processor starts the production in mass quantity.

- **Expanded – Vulnerability and Suitability Assessment (E-VSA)**

### ***Project Area Prioritization***

The need to make the agriculture sector sustainable and resilient has been a long-standing concern to withstand the realities of climate change. The DA-PRDP developed a science-based tool for assessing climate change vulnerability. The Expanded Vulnerability and Suitability Assessment (EVSA) is a decision-support tool that could incorporate biophysical variables and climate abnormalities through integration of identified relevant and available parameters and generate a ranking of municipalities based on the established framework.

The EVSA, however, is limited in applicability to non-land-based commodities such as seaweeds. The Provincial Core Planning Team (PCPT) customized a similar tool, nonetheless patterned largely after the EVSA, but which incorporates many other criteria for ranking municipalities according to priority in intervention implementation. The criteria for municipality ranking are as follows:

Poverty Incidence	10%
Number of Seaweeds Farmers	25%
Area Planted	25%
Potential for Expansion	20%
As a GEF site	20%
	-----
<b>TOTAL</b>	<b>100%</b>

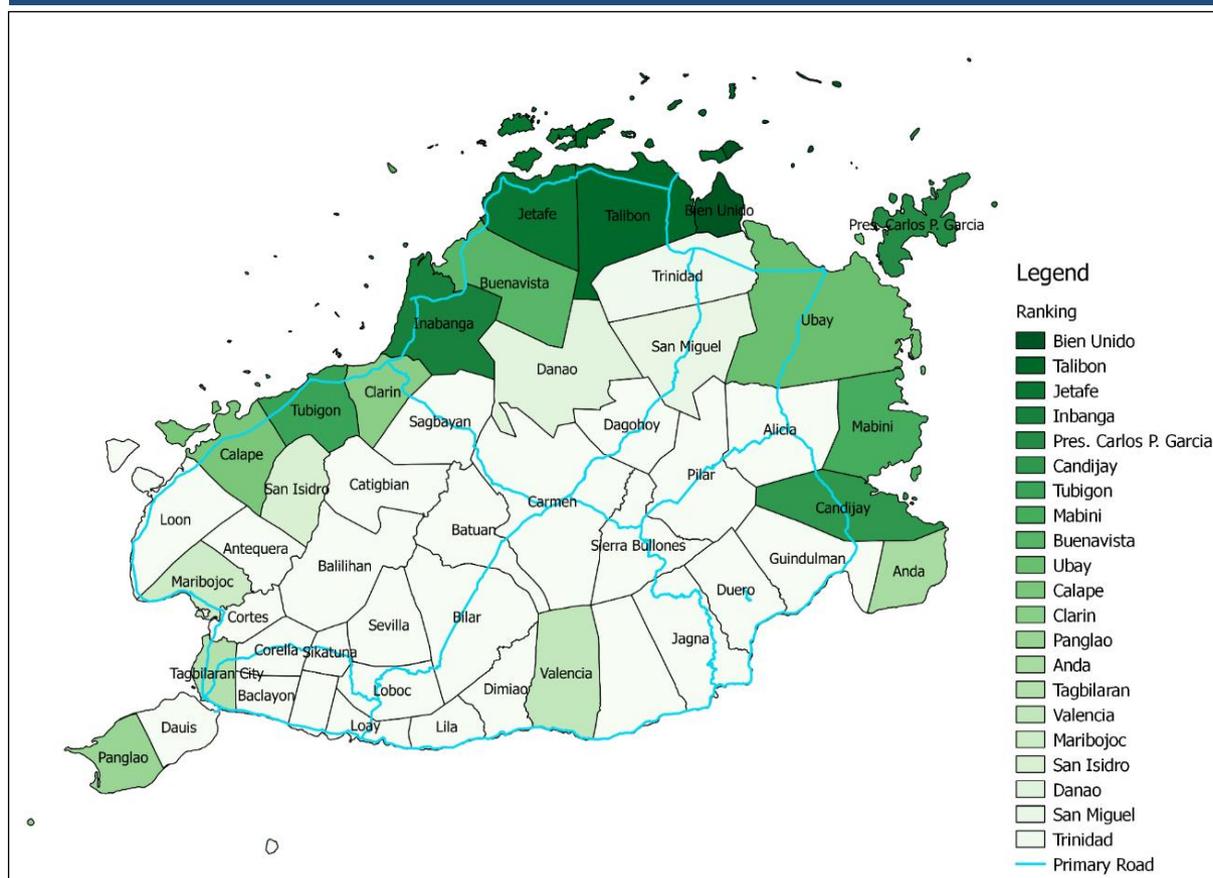
The ranking results based on the above criteria is shown in Table 20 and Map 20.

Municipalities	Poverty Incidence	No. of Seaweed Farmer's	Area Planted	Potential for Expansion	GEF Site	Poverty Incidence (10%)	No. of Seaweed farmer's (25%)	Area Planted (25%)	Potential for Expansion (20%)	GEF Site (20%)	TOTAL	Rank
Bien Unido	48.8	1108	2282	3733	1	4.88	277	570.5	746.6	0.2	1599.18	<b>1</b>
Talibon	36.4	919	1200	2900	1	3.635	229.75	300	580	0.2	1113.59	<b>2</b>
Getafe	43.5	705	400	1900		4.35	176.25	100	380	0	660.60	<b>3</b>
Inabanga	34.7	190	100	1600		3.474	47.5	25	320	0	395.97	<b>4</b>
Pres. Garcia	51.8	300	50	850	1	5.183	75	12.5	170	0.2	262.88	<b>5</b>
Candijay	34.5	400	10	290		3.45	100	2.5	58	0	163.95	<b>6</b>
Tubigon	26.7	16	30	870		2.669	4	7.5	174	0	188.17	<b>7</b>
Mabini	46.8	250	10	490		4.676	62.5	2.5	98	0	167.68	<b>8</b>
Buenavista	45.5	100	10	390	1	4.545	25	2.5	78	0.2	110.25	<b>9</b>
Ubay	39.6	76	20	380	1	3.964	19	5	76	0.2	104.16	<b>10</b>
Calape	25.4	370				2.542	92.5	0	0	0	95.04	<b>11</b>
Clarín	26.4		10	390		2.637	0	2.5	78	0	83.14	<b>12</b>
Panglao	16.4	20	20	180		1.636	5	5	36	0	47.64	<b>13</b>
Anda	30.9	25				3.094	6.25	0	0	0	9.34	<b>14</b>
Tagbilaran City	7.9	30				0.785	7.5	0	0	0	8.29	<b>15</b>
Valencia	28.5	20				2.851	5	0	0	0	7.85	<b>16</b>
Maribojoc	17.3	15				1.73	3.75	0	0	0	5.48	<b>17</b>

**Table 20. Ranking of Municipalities for Priority Intervention Implementation Using Customized Criteria for Seaweeds**

Municipalities	Poverty Incidence	No. of Seaweed Farmer's	Area Planted	Potential for Expansion	GEF Site	Poverty Incidence (10%)	No. of Seaweed farmer's (25%)	Area Planted (25%)	Potential for Expansion (20%)	GEF Site (20%)	TOTAL	Rank
San Isidro	44.9					4.489	0	0	0	0	4.49	18
Danao	42.7					4.274	0	0	0	0	4.27	19
San Miguel	42.7					4.271	0	0	0	0	4.27	20
Dagohoy	40.7					4.067	0	0	0	0	4.07	21
Trinidad	39.7					3.969	0	0	0	0	3.97	22
Pilar	38.8					3.881	0	0	0	0	3.88	23
Carmen	38.4					3.838	0	0	0	0	3.84	24
Catigbian	37.0					3.698	0	0	0	0	3.70	25
Sierra Bullones	35.1					3.505	0	0	0	0	3.51	26
Alicia	33.9					3.393	0	0	0	0	3.39	27
Batuan	32.3					3.229	0	0	0	0	3.23	28
Sevilla	31.7					3.172	0	0	0	0	3.17	29
Balilihan	31.3					3.13	0	0	0	0	3.13	30
Dimiao	30.6					3.06	0	0	0	0	3.06	31
Guindulman	30.3					3.026	0	0	0	0	3.03	32
Duero	29.6					2.961	0	0	0	0	2.96	33
Sikatuna	29.0					2.898	0	0	0	0	2.90	34
G-Hernandez	28.0					2.801	0	0	0	0	2.80	35
Sagbayan	24.0					2.401	0	0	0	0	2.40	36
Bilar	22.6					2.255	0	0	0	0	2.26	37
Loon	22.0					2.198	0	0	0	0	2.20	38
Loboc	21.5					2.152	0	0	0	0	2.15	39
Jagna	19.6					1.963	0	0	0	0	1.96	40
Lila	19.6					1.962	0	0	0	0	1.96	41
Loay	19.3					1.93	0	0	0	0	1.93	42
Antequera	18.5					1.845	0	0	0	0	1.85	43
Corella	17.9					1.788	0	0	0	0	1.79	44
Daus	17.0					1.701	0	0	0	0	1.70	45
Alburquerque	15.9					1.594	0	0	0	0	1.59	46
Cortes	15.9					1.588	0	0	0	0	1.59	47
Baclayon	15.1					1.508	0	0	0	0	1.51	48
<b>TOTAL</b>	<b>30.1</b>	<b>4,544</b>	<b>4,142</b>	<b>13,973</b>	<b>5</b>							

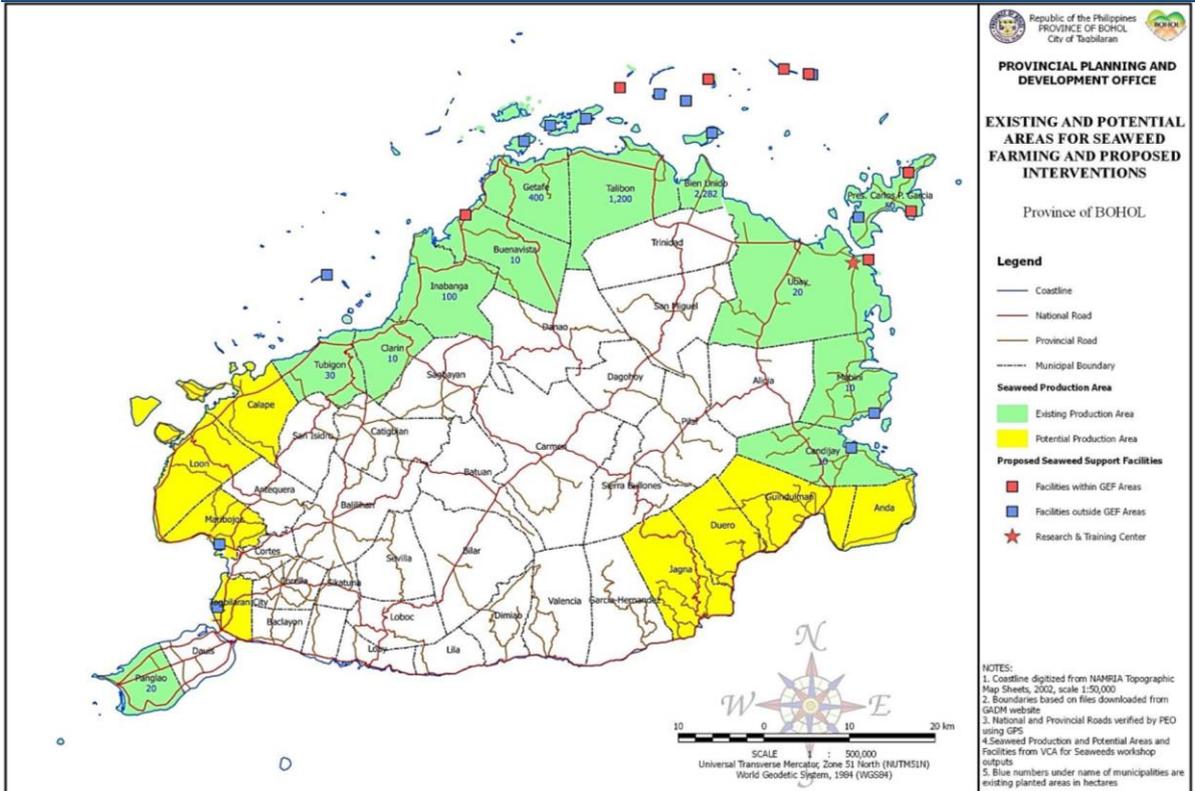
Map 20. Seaweed Municipal Ranking Map



The top priority areas for seaweeds in the province of Bohol are: Bien Unido, Talibon, Getafe, Inabanga, Pres. Carlos P. Garcia, Candijay, Tubigon, Mabini, Buenavista and Ubay. All five Global Environment Facility (GEF) sites, namely: Buenavista, Talibon, Bien-Unido, Ubay and Pres. Carlos P. Garcia are all included and are shown as priority areas in the ranking. The GEF focuses on natural resource management in globally significant biodiversity areas, seascapes and landscapes, and in priority degraded coastal areas. The GEF support is concentrated in Marine Protected Areas (MPAs) within the Danajon Reef, a PRDP priority area with a globally significant biodiversity value, where demand for an improved and effective resource management is high.

The potential interventions in the Investment Plan are based from the identified constraints in the VCA per industry segment. Each intervention is with corresponding target areas that are included as priority areas in the ranking. The locations of the support facilities (research and training center, nurseries, drying platforms and storage facilities) and production expansion areas are all under the top priority areas. However, three inland municipalities of San Isidro, Danao and San Miguel are included in the top 20 ranking due to the consideration on high poverty incidence of the 3 municipalities. Even if the said municipalities are without seaweed production but still, attention must be given using the principle of ridge-to-reef consideration in environmental protection and conservation. Moreover, interventions like agri-support facilities may be established in the areas, as these are proximate to the seaweed production areas of Talibon, Bien Unido, and Ubay.

Map 21. Commodity Map



## B) INVESTMENT PLAN

A leading seaweed processor – exporter aptly puts it, “If you solve the seaweed supply problem, you will solve 80% of the industry’s problems.”

The seaweed value chain in Bohol, especially in the production segment has a vital contribution to the economic development of the region in general, and the province’s agricultural development in particular.

Seaweed processors are located in Cebu while seaweed production is concentrated in Bohol. RDS from Bohol are bought and shipped by traders to processor/exporters in Cebu. Increasing seaweed production in Bohol will help resolve the low capacity utilization of seaweed in Cebu.

Additionally, the value added captured by seaweed growers is also very high. Fifty-five per cent (55%) of total value added captured for the production of Semi-Refined Carrageenan go to seaweed farmers or growers. This would imply that developing the local seaweed industry can most likely lead to inclusive growth and notable reduction of the poverty level in Bohol’s coastal areas.

The biggest market for carrageenan is the dairy industry, accounting for 30% of the total market. The dairy production of Ubay Stock Farm can benefit considerably from the value chain of seaweeds in the province.

However, the Philippines has a big supply deficit and low capacity utilization of seaweed processors. It fills in the supply gap by buying RDS from Indonesia even if Indonesia’s RDS quality is lower than the Philippines.

The Province of Bohol will invest in the seaweed value chain by increasing the efficiency and productivity of its seaweed farms to improve the competitiveness of Philippine RDS in the export market. The investment plan will also lessen the dependence of the local seaweed processors on Indonesian RDS and reduces the risks associated with imported raw materials.

A final note worth considering: During the presentation of the PCIP draft to the Stakeholders, a point raised was the absence of the processing function in Bohol. All processors are in Cebu, yet the bulk of production is in Bohol. It was then suggested that Bohol sets up its own seaweed processing plant and seek funding from PRDP and the group of manufacturers in Bohol and other funding institutions.

The suggestions are apt not only for fast-tracking the economic development of Bohol, but for its competitiveness in the international carrageenan market. As the value of seaweed far exceeds the value of other aquaculture products, venturing into seaweed processing is guaranteed to make Bohol a game changer in the seaweed industry.

- **Competitiveness Vision**

The Seaweed Industry in the Visayas collectively envisioned the cluster to be the:

***“Leading Seaweed and Carrageenan Supplier in the Local and Global Market”***

The competitiveness direction of the Visayas Seaweed Industry for 2018 – 2023, of which the province of Bohol is part of the Visayas cluster is characterized by the following objectives:

- To increase and ensure stable seaweed supply in order to accommodate processors’ requirement through improved access and availability of good quality planting materials.
- To improve over-all farm productivity through adoption of good aquaculture practices, mapping and zoning of farm areas, and climate-adaptive and resilient farming technologies.
- To improve and remain as one of the country’s best RDS supplier by improving post-harvest and logistic facilities.
- Diversify to other seaweed species to take advantage of their market potential with the help of R&D and IEC activities on commercial farming and harvesting practices.
- Contribute to the development of rural and coastal communities with inclusive growth while also taking responsibility for environmental concerns.

Each of the producing provinces will have a different role to take in realizing this collective vision considering the difference in the present industry status and capacity. Central Visayas, on the other hand, can initiate in the diversification of the industry by developing the product and market for other seaweed species while still remaining as a preferred supplier of carrageenan in the global market.

Bohol, being the main supplier of seaweeds in Central Visayas, will invest in the seaweeds value chain by aggressively pursuing increased production while aiming to be environmentally sustainable. As a province with high potential for expansion and a very strong competitive advantage, the challenge is to continue to increase seaweeds production while ensuring economic, social, and environmental sustainability.

To achieve the competitiveness vision, major interventions in the province should be pursued such as the following:

- Expansion of production areas.
- Upgrading of current seedling production system to increase supply and access to good quality seedlings.
- Development and adoption of a climate-smart production system complemented with the use of ridge-to-reef management approach and mapping and site assessment technologies.
- Development of capacity of farmers and sustained adoption of good aquaculture practices that encompass over-all seaweed production system including site selection, seedling management, harvesting, and drying.
- Establishment of common service facilities to upgrade post-harvest practices and serve as buying stations.

- **Summary and Rank of Constraints and Opportunities**

The constraints indicated in the value chain of seaweeds are herein ranked according to priorities. It can be noted that top priority is given to constraints that affect mostly the production of seaweeds due to its declining supply and productivity. However, those that follow are inter-related having one constraint affected and or connected to the next constraints. These also show that proposed interventions are not “stand alone”; it will be simultaneously responded with convergence of resources by a number of players in the value chain.

<b>Table 21. Summary of Constraints</b>	
<b>CONSTRAINTS</b>	<b>RANKING</b>
<b>INPUT SUPPLY SEGMENT</b>	<b>3</b>
<ul style="list-style-type: none"> <li>• Inadequate supply of good quality seedlings               <ul style="list-style-type: none"> <li>- Limited production capacity of multiplier farms of good quality seedlings</li> </ul> </li> </ul>	
<b>PRODUCTION</b>	<b>1</b>
<ul style="list-style-type: none"> <li>• Declining seaweed production and productivity due to:               <ul style="list-style-type: none"> <li>- Lack of climate resiliency measures of seaweeds which are vulnerable to changes in water temperature, salinity, strength of waves, etc.</li> <li>- Intensive crop farming bringing chemicals to tributaries of run-off waters</li> <li>- Poor farm management practices and low adoption of good aquaculture practices</li> <li>- High siltation</li> <li>- High production cost</li> </ul> </li> </ul>	
<b>FIELD PROCESSING/ DRYING / POSTHARVEST</b>	<b>2</b>
<ul style="list-style-type: none"> <li>• Limited drying and storage facilities</li> <li>• Lack of technical capacities for quality control at farm level</li> <li>• Contaminated dried seaweeds with dirt, sand, and other foreign objects affecting quality</li> </ul>	
<b>TRADING</b>	<b>4</b>
<ul style="list-style-type: none"> <li>• Inconsistent quality of traded RDS in some areas</li> <li>• Limited access to market and price information</li> <li>• Fluctuating and unstable prices of RDS</li> <li>• High transport cost from farm to trade areas and processors (Poor road network)</li> <li>• No collective marketing</li> <li>• Low volume of supply of Raw Dried Seaweeds</li> <li>• Limited Access to Capital</li> <li>• Lack of Mobility Logistics</li> </ul>	
<b>SUPPORT SERVICES</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• Lack of info on Good Aquaculture Practices (GAqP)</li> <li>• Lack of providers on GAqP for seaweed farming</li> </ul>	
<b>ENABLING ENVIRONMENT</b>	<b>5</b>
<ul style="list-style-type: none"> <li>• Lack of clear delineation of farm boundaries</li> <li>• Lots of idle seaweed farms</li> </ul>	

<b>Table 22. Summary of Opportunities</b>	
<b>OPPORTUNITIES</b>	
<b>INPUT SUPPLY SEGMENT</b>	
<ul style="list-style-type: none"> <li>• Availability of technology (e.g. branch and spore cultures and micropropagation techniques) that can grow high-yielding and rapidly growing seed stocks</li> <li>• Availability of planting materials at the farm level after each cropping cycle</li> </ul>	
<b>PRODUCTION</b>	
<ul style="list-style-type: none"> <li>• Large potential expansion areas</li> <li>• Seaweeds farms need only permits based on declared farm size</li> <li>• Low start-up costs of seaweed farming</li> <li>• Low maintenance requirements of seaweeds farms</li> </ul>	
<b>FIELD PROCESSING/ DRYING / POSTHARVEST</b>	
<ul style="list-style-type: none"> <li>• Farmers base dryness of seaweeds for sale on physical observation</li> <li>• Improvised drying platforms</li> </ul>	
<b>TRADING</b>	
<ul style="list-style-type: none"> <li>• Huge demand for RDS by local processors and in the export market</li> <li>• Price incentives for good quality raw dried seaweed</li> <li>• Huge market potential for other species and other applications of Kappaphycus</li> <li>• Manufacturing, process technology – capability to extract carrageenan and tailor to specific applications</li> <li>• Advanced processing technology and facilities</li> <li>• High demand for carrageenan in the export market</li> </ul>	
<b>SUPPORT SERVICES</b>	
<ul style="list-style-type: none"> <li>• Established cooperatives and associations that can facilitate technology transfer</li> <li>• Production credit at limited amounts from traders and kin</li> </ul>	
<b>ENABLING ENVIRONMENT</b>	
<ul style="list-style-type: none"> <li>• Seaweed culture is a low- impact, environment-friendly income-generating activity for coastal areas that has potential for eco-development and tourism projects</li> </ul>	

- **Proposed Interventions**

The interventions are ranked according to priority. The reason is to identify the interventions that are urgently needed for a particular value chain segment or function. Prioritization is used so as to create a bigger impact to a particular value chain function even if it is the first to be implemented among all other interventions.

The Core Planning Team formulated customized criteria for ranking the segment where the intervention will be applied. The table showing the ranking is presented below.

**Table 23. Ranking of Interventions of the Value Chain Segments**

Value Chain Segment/ Interventions	Impact to Value Chain/ Industry	Sustains Competive ness	Builds Capacities	Improves Economies of Scale	TOTAL	RANK
	25%	25%	25%	25%		
<b>Input Supply</b>	15	15	25	10	<b>65</b>	<b>3</b>
1) Establishment of On-farm Nursery						
<b>Seaweed Growing</b>	25	15	25	25	<b>90</b>	<b>1</b>
1) Expansion of Production Areas						
2) MPA Strenghtening/ Demo Farms						
3) OD (GAqP, MPA)						
<b>Field Processing</b>	20	25	10	20	<b>75</b>	<b>2</b>
1) Support Facilities						
<b>Trading</b>	10	10	10	10	<b>40</b>	<b>4</b>
1) Ogranizational Devt. (OD)						
2) Farm-to-Market Roads (FMR)						
3) Delivery Vehicles						

Using the value chain segment ranking, all the proposed interventions and the corresponding costs of each proposed interventions are presented in Table 24 below.

**Table 24. Ranking of Interventions and Estimated Project Cost**

Segment/ Function	Rank	Proposed Interventions	Estimated Cost (in Pesos)
<b>Input Supply</b>	<b>3</b>	Upgrading of Seedling Production System	5,500,000.00
		Transfer of Technology on Cultivar Production (GEF sites)	1,200,000.00
		Establishment of On-farm Seaweed Nurseries (Non-GEF sites)	5,000,000.00
		On-farm Seaweeds Nursery (GEF site)	16,900,000.00
		Integrated Natural and Coastal Resources Devt. and Mgt.	7,600,000.00
		Organizational Development	5,150,000.00
<b>Production</b>	<b>1</b>	Development and Adaption of Climate-Smart Production System	
		- 4,130 hectares (Expansion to Potential Seaweed Areas)	743,400,000.00
		- 9,300 hectares (Expansion to Potential Deep-Sea Farms)	1,674,000,000.00
		Mangrove Planting in Heavily Silted Areas	400,000.00
		Provision and Distribution of Floaters, Lines, etc.	3,200,000.00
		Trainings on Good Aquaculture Practices (GAqP)	500,000.00
		MPA Strengthening	40,000,000.00
		Development of Farm Tourism Activities in MPA	1,000,000.00
		Techno Demo	1,000,000.00
<b>Field Processing</b>	<b>2</b>	Construction of Support Facilities	
<b>Drying/</b>		- 14 Communal Drying Platforms with Storage Facilities	140,000,000.00
<b>Postharvest</b>		- 5 Permanent Working Areas and Farm House	37,500,000.00
		- 5 Docking Facilities	25,000,000.00
		- Provision of Weighing Scales and Motor Bancas	1,850,000.00
		Capability development on Proper Drying, Storage and Postharvest Handling	10,000,000.00

Trading/	4	Rehabilitation and Upgrading of Access Roads	
Marketing		- 37 FMRs (204.36 kms. =Total Road Length)	4,474,000,000.00
		Provision of Working Capital	1,000,000.00
		Provision of Delivery Vehicles	2,970,000.00
		<b>TOTAL</b>	<b>7,197,170,000.00</b>

### • Investment Priorities

The over-all estimated investment cost for seaweeds is **P7.2 Billion** where the biggest bulk of the interventions which represents 62% of the total estimated cost is for the rehabilitation and upgrading of access roads. Farm to market road infrastructures play a significant role in providing access and link from production sites to the market. While, the development of the seaweeds industry amounts to P2.8 Billion, of which the largest share, about 89% is for the development and expansion of seaweed production areas.

The proposed interventions identified in the 3-year Investment Plan are based on the gaps and constraints indicated by segments in the Value Chain Analysis conducted for the industry. The formulation of the PCIP has been subjected to series of consultations, arriving at a consensus on the prioritized interventions. Results from the EVSA ranking are used as reference in identifying locations of proposed projects.

Proposed Interventions		Estimated Project Cost (in Pesos)
1	Upgrading of Seedling Production System	5,500,000.00
2	Transfer of Technology on Cultivar Production (GEF sites)	1,200,000.00
3	Establishment of On-farm Seaweed Nurseries (Non-GEF sites)	5,000,000.00
4	On-farm Seaweeds Nursery (GEF site)	16,900,000.00
5	Integrated Natural and Coastal Resources Devt. and Mgt.	7,600,000.00
6	Organizational Development	5,150,000.00
7	Development and Adaption of Climate-Smart Production System	
	- 4,130 hectares (Expansion to Potential Seaweed Areas)	743,400,000.00
	- 9,300 hectares (Expansion to Potential Deep-Sea Farms)	1,674,000,000.00
8	Mangrove Planting in Heavily Silted Areas	400,000.00
9	Provision and Distribution of Floaters, Lines, etc.	3,200,000.00
10	Trainings on Good Aquaculture Practices (GAqP)	500,000.00
11	MPA Strengthening	40,000,000.00
12	Development of Farm Tourism Activities in MPA	1,000,000.00
13	Techno Demo	1,000,000.00
14	Construction of Support Facilities	
	- 14 Communal Drying Platforms with Storage Facilities	140,000,000.00
	- 5 Permanent Working Areas and Farm House	37,500,000.00
	- 5 Docking Facilities	25,000,000.00
	- Provision of Weighing Scales and Motor Bancas	1,850,000.00
15	Capability development on Proper Drying, Storage and Postharvest Handling	10,000,000.00
16	Rehabilitation and Upgrading of Access Roads	
	- 37 FMRs (Total Road Length = 204.36 kms.)	4,474,000,000.00
17	Provision of Working Capital	1,000,000.00
18	Provision of Delivery Vehicles	2,970,000.00
<b>TOTAL</b>		<b>7,197,170,000.00</b>

## • PCIP Matrix for Seaweeds

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
<b>SEGMENT: INPUT SUPPLY</b>														
1. Inadequate supply of good quality seedlings	1. Upgrading of current seedling production system to increase supply and access to various cultivar of good quality seedlings - Upgrading of gene bank where different cultivars can be stored  - R and D on identifying strains that are resilient to changes in temperature and salinity  - Implementation of the latest micro propagation	1 gene bank upgraded  Various strains developed that are CC resistant  Availability of new disease-resistant seedling varieties through tissue culture  Availability of the latest technology on micro		Sinandigan, Ubay	- do-	-do-	Lead: BFAR, DOST-PCAARD, P/MLGU, SEAFDEC, BISU, SUC's Public-Private Partnership – SIAP, NGO'S, Cooperative Association  BISU-Candijay, SEAFDEC BFAR (Sorsogon)-Research  SUPPORT: SIAP-Upgrading of facilities/ Accreditation  BFAR, SUC, SEAFDEC	1.0	2.0	1.0	BFAR OPA	PLGU will provide salary of 1 personnel as counterpart		<ul style="list-style-type: none"> <li>• <b>Sustainability</b> <ul style="list-style-type: none"> <li>- Accreditation of Research Center</li> <li>- Registration or patenting of disease-resistant varieties</li> <li>- Creation of Certifying Body for seedlings</li> <li>- Accreditation of Nursery Operators</li> <li>- Monitoring and Evaluation of Research Center and Nurseries</li> <li>- Formulation and adaption of Operations and Policy Manual for Research Center</li> <li>- Augmentation of staff from BFAR and continuing capability building</li> <li>- Adaptability of new seedlings and methods</li> </ul> </li> <li>• <b>Availability of adequate certified seedlings every cropping season</b></li> </ul>

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub-MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
	techniques and tissue culture technologies to develop and mass produced	propagation (tissue culture)												<ul style="list-style-type: none"> <li>- Adaption of new seedling varieties &amp; farming methods</li> <li>• <b>Adaptability of cultured seedlings from the lab to wild environment</b></li> <li>- More field testing, documentation and further research</li> <li>- Adaptability trials</li> <li>- Water quality monitoring</li> <li>- Consciousness on proper handling</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Transfer of Technology on Cultivar production (Planting materials)</b></li> </ul>	4 GEF On-site demo established	MFO 2	<b>GEF Sites</b> Buenavista - 1 Talibon- 2 Bien Unido- 2 Ubay- 1 CPG 2			BFAR, OPA, DA-PRDP-GEF	0.800	0.2	0.2	NPCO BFAR PLGU FARMLGU			<ul style="list-style-type: none"> <li>• Lack of funds</li> <li>- Tap coops, NGOs, private persons or other agencies</li> <li>• Calamities</li> <li>- Crop Insurance (PCIC)</li> <li>- ACPC</li> </ul>
- Limited production capacity of multiplier farms of good quality seedlings	<ul style="list-style-type: none"> <li>• <b>Set up On-Farm sea-based nurseries at identified seaweeds communities to serve as grow out system</b></li> </ul>	6 Non-GEF sites on farm sea-based nurseries  8 GEF pilot sites sea-based nurseries		Calape-1 Buenavista-1 Getafe-1 Candijay-1 Talibon-1  Talibon-2 BUnido-2 CPG-2 Uba-1 Buenavista -1	Getafe 2 Talibon 2 Bien Unido 2 Mabini 1	Talibon 2 Bien Unido 2 Getafe 2	OPA, BFAR, DA-PRDP SIAP	1.0	2.0	2.0	BFAR PLGU	0.5 ha seaweed nursery Per area		<ul style="list-style-type: none"> <li>• Lack of funds</li> <li>- Tap coops, NGOs, private persons or other agencies</li> <li>• Calamities</li> <li>- Crop Insurance (PCIC)</li> <li>- ACPC</li> </ul>
								8.7	1.6	1.6	DA-PRDP-GEF PG's roll over	GEF sites has 1.0 hectare per area		

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				Y1	Y2	Y3		Y1	Y2	Y3				
									5.0		DA PRDP I-REAP	4.0 Has. Seaweed nursery for AFFAS etc.		
								(based on business plan for total productio n cost including nursery at 1.0 hectare per pilot area)						<ul style="list-style-type: none"> <li>• <b>High mortality during transport</b> <ul style="list-style-type: none"> <li>- Provision of sea transport</li> <li>- Implementation of Good Aquaculture Practices (GAqP)</li> <li>- Use of styro box or appropriate transport box</li> <li>- Mobility support</li> </ul> </li> <li>- <b>Sustainability</b> <ul style="list-style-type: none"> <li>- Formulation and adaption of Operations and Policy Manual for Nurseries and BPSFPC</li> <li>- Use of climate resilient technologies/facilities</li> </ul> </li> <li>• (Climate resilient cultivars/ materials)</li> </ul>
	<ul style="list-style-type: none"> <li>• <b>Integrated Natural and Coastal Resources Development and Management</b> <ul style="list-style-type: none"> <li>- Implementation of GAqP</li> </ul> </li> </ul>			Province wide			OPA, BFAR, BEMO, MLGU	2.800	2.80	2.0	BFAR, PGBh, MLGU, CLEC Clusters	With existing regular functions of PENRO, MENRO and BEMO from existing		<ul style="list-style-type: none"> <li>• Lack of budget of LGUs                             <ul style="list-style-type: none"> <li>- Strengthen Convergence initiatives</li> </ul> </li> <li>• Low priority of LGUs                             <ul style="list-style-type: none"> <li>- Strengthen advocacy</li> </ul> </li> </ul>

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
	<ul style="list-style-type: none"> <li>- Coastal law enforcement</li> <li>- Integrated coastal resource management</li> <li>- Strengthening of Barangay Enforcement Team (BET)</li> <li>- Solid Waste Management</li> <li>- Strengthening of CLEC Cluster and CLEC PTWG</li> <li>- Strengthening of Convergence on Bohol Coastal Resource Mgt. Task Force and Task Group Kalikasan/ Kadagatan</li> <li>- Strengthening on PTWG on CRM Certification</li> </ul>										NRMP of PLGU and MLGUs			
	<b>2. Organizational Development of BPSFPC and I-REAP Proponent Groups</b>	12 Accredited Nurseries  3 trainings  15 Monitoring		14 Nursery sites  1 training	2 trainings	2 trainings	BPSFPC BFAR OPA CDA DTI SIAP NGOs Monitoring Team	.050	5.0 M  .050	.050	BFAR, PLGU, MLGU  OPA, MLGU		<b>Mismanagement of funds</b> <ul style="list-style-type: none"> <li>- Financial literacy</li> <li>- Records keeping</li> <li>- Hire professional management team</li> </ul>	

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				Y1	Y2	Y3		Y1	Y2	Y3				
	<ul style="list-style-type: none"> <li>- Organizational and Financial Management</li> <li>- Training on Nursery Operations and Management</li> <li>- Quality control and monitoring of seedling growers</li> </ul>	1 Monitoring Team functional  1 Monitoring vehicle											in the coop (RPC model)  <b>Culture, attitude and aptitude</b> <ul style="list-style-type: none"> <li>- Organizational development</li> </ul>	
<b>SEGMENT: SEAWEED GROWING (PRODUCTION)</b>														
<b>Declining seaweed production and productivity</b> <ul style="list-style-type: none"> <li>- Lack of climate resiliency measures of seaweeds which is vulnerable to changes in water temperature, salinity, strength of waves, etc.</li> </ul>	<b>1. Development and adoption of a climate smart production system complemented with the use of ridge-to-reef management approach and mapping and site assessment technologies</b> <ul style="list-style-type: none"> <li>• Set up new seaweed farms in highly suitable areas and in potential deep-sea farms</li> </ul>	<b>3,830</b> hectares of existing farmers who will expand to potential shallow seaweed areas mapped and databased  <b>9,300</b> hectares of expansion areas in potential <b>deep-sea farms</b>		Bien-Unido - 2000 has. Talibon- 1,300 has. Inabanga - 20 has. Getafe- 400 has. CPG-150 has. Ubay-15 has Mabini- 90 has. Buenavista - 90 has. Candijay- 50 has. Calape-10 has. Anda-5 has.  <b>TOTAL – 4,130 has.</b>	-do-	-do-	<b>Lead Player:</b> Bohol Provincial Seaweed Farmers Producers Coop (BPSFPC)  Alumar Farmers and Fishers Association (AFFAS) and other 2 PG's recipient of PRDP IREAP  Existing and Potential Seaweed Growers  <b>Support:</b> BFAR, OPA, Processors, MLGUs SIAP	<b>841.140</b> Expansion Cost (4,673 has. @180,000/has.)		<b>1.674 B</b> For Deep-sea Farm 9,300 has. @180,000/ha.)  .100	PRDP PLGU MLGU BFAR			<b>Boundary dispute between Bohol, Cebu, Leyte and Southern Leyte</b> <ul style="list-style-type: none"> <li>- Activation of CeLeBoSoLe</li> <li>- Co-management among 4 provinces</li> </ul> <b>Carrying Capacity of the area</b> <ul style="list-style-type: none"> <li>- Zoning</li> <li>- Regulatory mechanism of the LGU thru the permitting system</li> <li>- Coastal resource mapping</li> <li>- CC mitigating measures</li> <li>- Crop insurance</li> </ul>

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
- Intensive crop farming bringing chemicals to tributaries of run-off waters	Develop mangrove farms in areas with observed heavy siltation to reduce impact of upland and lowland run-off to marine environment	5 mangrove farms established at 1.0 hectare per farm		2.0 has. in Ubay	-	3.0 has. at Calape, Anda, Inabanga	DENR, BFAR, MLGU, Fisherfolk Association/ cooperative	.100						(1000 sq.m/ha will be covered by insurance) - Water quality and substrate monitoring - Enforcement of regulatory measures  <b>Sustainability</b> - Formulation and adaption of Operations and Policy Manual for farming and production - Membership to Bohol coopreneurs
	<b>2. Provision/ Distribution of Floaters, Lines and Other Farm Implements</b>	1 PG from each 11 LGUs		Calape, Mabini, Getafe, Candijay Talibon Bien-Unido Buenavista Pres. Garcia Ubay Inabanga Anda			OPA, BFAR, DA-PRDP	<b>3.200</b>			PRDP, PLGU			

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				Y1	Y2	Y3		Y1	Y2	Y3				
<b>Declining seaweed production and productivity</b> - Poor farming practices	<b>3. Conduct Trainings on Good Aquaculture Practices (GAqP) for Seaweed Farming</b>  <b>4. MPA Strengthening</b> - Mainstream awards and recognition of Best MPAs - Strengthening of MPA Technical Working Group - Biophysical Monitoring and Underwater Assessment of MPA's - Development of Sustainable Mangrove Ecosystems	11 trainings with 330 beneficiaries  8 MPAs under GEF Pilot sites  - Devt. of eco-friendly Boardwalk Mangrove Projects (environmental fee, dispersal of mangrove crablets, establishment of boardwalk, mangrove nursery)		All Seaweed Areas  Asinan Reef Fish Sanctuary (Buenavista Cataban Marine Sanctuary (Talibon) Guindacpan Marine Sanctuary (Talibon) Bilang-bilangan Marine Sanctuary (Bien Unido) Hinogotan West Marine Sanctuary (Bien Unido) Sinandigan Marine Sanctuary (Ubay), Aguing Marine			<b>Lead Player:</b> Bohol Provincial Seaweed Farmers Producers Coop (BPSFPC) (AFFAS)  Existing and Potential Seaweed Growers  <b>Support:</b> BFAR, OPA, Processors, MLGUs, ATI, NGOs	<b>0.500</b> Training Cost: (30 trainings. 050 / training)  <b>40.0</b> (5M per MPA – GEF Funds)					<ul style="list-style-type: none"> <li>• <b>High siltation, freshwater run off and improper waste management</b> <ul style="list-style-type: none"> <li>- Regular monitoring in the implementation of                             <ul style="list-style-type: none"> <li>➢ Integrated Coastal Resource Mgt. (particularly on coastal law enforcement)</li> <li>➢ Integrated Watershed Mgt. (including Bank Stabilization)</li> <li>➢ Solid Waste Management</li> <li>➢ GAqP</li> </ul> </li> </ul> </li> <li>• <b>Weak MPA management</b> <ul style="list-style-type: none"> <li>- Organizational development trainings</li> <li>- Biodiversity Conservation</li> </ul> </li> </ul>	

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
	Establishment of Sea ranching of endemic fish species within the sanctuary  Development of Eco-Tourism Activities within the Sanctuary	-(sea cucumber/sand fish, abalone, brown lip,  Guardhouse rehabilitated managed by PO and Bantay Dagat  Introduction of water activities such as diving and snorkeling  Establishment of Market Buoys, signages among others		Sanctuary (CPG) Sidlakan Marine Sanctuary (CPG)				1.0						
<b>Declining seaweed production and productivity</b> - High Siltation	<b>Riverbank Stabilization</b>  <b>Mangrove Rehabilitation Plantation</b>  <b>Forestry Development</b>  <b>Sloping Agricultural Land Technology (SALT)</b>	Length of riverbanks rehabilitated  No. of hectares planted/rehabilitated  No. of hectares in forest zone rehabilitated  No. of hectares with SALT intervention		Ipil and Carood Watershed			DENR, BEMO, DA, OPA, BSWM, DA, ATI, KBOOM, Carood Management Council, PAMB	0.2			DENR, PLGU/MLGU ATI			

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				Y1	Y2	Y3		Y1	Y2	Y3				
	Promotion of Organic Farming	No. of hectares												
	Environmental and Social Safeguards						PGBh DENR, BEMO, BFAR MLGUs Private Sector							<ul style="list-style-type: none"> <li>• Area in conflict with Land Use Plan</li> <li>- Harmonization of CLUPs</li> <li>- Coastal resource mapping</li> </ul>
Declining seaweed production and productivity - High production costs	1. Techno Demo to reduce cost by using Reusable and Biodegradable Materials	No. of Techno Demo Farms		Buenavista Talibon Bien Unido Ubay Pres. C.P. Garcia			LEAD Players: BFAR OPA BPSFPC MLGUs ATI	1.0						<ul style="list-style-type: none"> <li>• Lack of awareness on and willingness to adapt to new technologies</li> <li>- IEC</li> <li>- Waste mgt. (NaOH)</li> <li>- Provide incentives</li> <li>• No insurance of Seaweed Farms</li> <li>- Provision of insurance by PCIC</li> </ul>
<b>SEGMENT: FIELD PROCESSING/ DRYING AND POST HARVEST</b>														
Lack of drying and storage facilities	1. Construction of Drying Platforms and Storage Facilities <ul style="list-style-type: none"> <li>• To be operated and managed by AFFAS</li> </ul> ➤ Construction of Working Areas (Permanent working area and farmhouse)	14 Communal Drying Platforms with Storage  5 Common Service Storage Facilities and Working Areas		Bien-Unido Talibon Inabanga Getafe CPG Ubay Tubigon Mabini Buenavista Clarín Panglao Candijay Maribojoc Tagbilaran City			Lead Player: Bohol Provincial Seaweed Farmers Producers Cooperative Processors Traders SIAP	140.0 Drying Platform  37.5 Storage Facilities (Wareho use)						<ul style="list-style-type: none"> <li>• Natural Calamities</li> <li>- Climate resilient facilities</li> <li>• Sustainability</li> <li>- Regular maintenance</li> <li>- M&amp;E on Facilities</li> <li>- Regular Monitoring and Audit (Financial, Facilities, Equipment)</li> </ul>

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management	
				Y1	Y2	Y3		Y1	Y2	Y3					
	➤ <b>Construction of Docking Facilities</b>	5 Docking Facilities  5 Motor Bancas (K416 Hp Pumpboats  1 Unit Pumpboat  2 units weighing scale		Talibon (San Francisco, Bansa, Sag, Mahanay, Sto. Nino, Guindacpan) Bien-Unido (Hingutanan East, Pinamgo) Getafe (Jandayan, Alumar, Campao Occ.) Candijay Mabini Calape  Calape, Candijay, Mabini, Getafe  Calape, Candijay, Mabini, Getafe				25.0 Docking Platform Type  Motor Bancas & Weighing Scale							
Lack of technical capacities for quality control at farm level	<b>2. Conduct Trainings on Proper Drying, Storage and Postharvest Handling</b>	12 Trainings 360 Participants		All Seaweed Areas			<b>BFAR, OPA, SIAP MLGU's Fishery Technician BPSFPC</b>	10.0 M						<b>Willingness to attend and adapt to new technologies</b> Onsite coaching and monitoring of skills	

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				Y1	Y2	Y3		Y1	Y2	Y3				
Poor quality of dried seaweeds due to contaminated dirt, sand, and other foreign objects	<b>3. Quality control measures through moisture content tester</b>	8 moisture content testers procured					BFAR, OPA							
<b>SEGMENT: TRADING/ MARKETING</b>														
Inconsistent quality of Raw Dried Seaweeds	Consolidation of raw dried seaweeds through establishment of buying station	1 Consolidation Center in Getafe and 12 Buying Stations in Talibon, Buenavista, Mabini, Bien-Unido, CPG, Ubay												-
Unstable and fluctuating prices of raw dried seaweeds	Provision of trading capital for RDS consolidation ➤ <b>Provision of Compactor</b> ➤ <b>Provision of Motor Banca</b> ➤ <b>Provision of Pumpboat</b>	1 compactor 1 motor banca 1 pumpboat 16 HP						1.0 Platform Type: 0.750 K4 16HP Pump boat 0.800 0.300						
No collective marketing (Growers are organized but in small groups)	<b>Capacitate Seaweed Farmer Groups to Engage in Collective Marketing</b> • Strengthening of Lead Players	65 POs		All Seaweeds Areas			LEAD PLAYER; AFFAS							• <b>Uncooperative POs</b> - Incentives - Provision of benefits thru PhilHealth, SSS

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				Y1	Y2	Y3		Y1	Y2	Y3				
	(technology and organizational mgt) • Business Planning and Management													
<b>High transport cost from farm to trade areas and processors</b> - Poor road network	<b>Rehabilitation and Upgrading of Access Roads</b>  (Upgrading of climate resilient FMRs with positive impact on the Value Chain)	<b>37 FMRs, 204.36 kms.</b> total road length for production and trading areas						<b>4,474.50</b>						<ul style="list-style-type: none"> <li>• <b>Natural calamities</b> - Construct climate resilient FMRs with positive impact on the Value Chain</li> <li>• <b>Boundary dispute (RROW)</b> - Negotiate with owners - Social Environmental Safeguards (SES)</li> </ul>
	<b>Bien Unido:</b> • Jct. (TER)-Bien Unido Road • Barangay Roads	<ul style="list-style-type: none"> <li>• 9.860</li> <li>• 10.000</li> </ul>		✓				30.00						
	<b>Talibon:</b> • Pob. (Talibon)-San Isidro Road • Pob. (Talibon)-San Francisco Road	<ul style="list-style-type: none"> <li>• 4.250</li> <li>• 6.200</li> </ul>		✓	✓	✓		20.00	75.00	275.00				
	<b>Getafe:</b> • Getafe Circumferential Road • San Miguel-Tomoc-Getafe Road, Getafe Side	<ul style="list-style-type: none"> <li>• 1.000</li> <li>• 6.000</li> </ul>			✓				25.00					
	<b>Inabanga:</b> • Dagnawan-Dagohoy, Inabanga, FMR	<ul style="list-style-type: none"> <li>• 6.480</li> </ul>		✓				127.00						

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				Y1	Y2	Y3		Y1	Y2	Y3																	
	<ul style="list-style-type: none"> <li>• Pob. (Inabanga)- Lawis Road, Causeway Length</li> <li>• One Way Traffic, Inabanga</li> <li>• Inabanga- Sagbayan via Lapacan- Magtangtang Road</li> </ul>	<ul style="list-style-type: none"> <li>• 6.248</li> <li>• 0.335</li> <li>• 9.340</li> </ul>		✓	✓	✓		31.20	75.00	75.00																	
	<p><b><u>Pres. Carlos P. Garcia:</u></b></p> <ul style="list-style-type: none"> <li>• Popoo-Tugas (C.P. Garcia) FMR</li> <li>• Pitogo-Aguining (C.P. Garcia) FMR</li> </ul>	<ul style="list-style-type: none"> <li>• 9.758</li> <li>• 3.375</li> </ul>		✓	✓	✓		37.50	112.50	106.45																	
	<p><b><u>Candijay:</u></b></p> <ul style="list-style-type: none"> <li>• Road to Candijay Jr. High School</li> <li>• Lungsodaan-Panadtaran Road</li> <li>• Lungsodaan-Panadtaran Road</li> <li>• Lungsodaan (Candijay)-Tambongan (Sierra Bullones) Road</li> <li>• Gabayan-Anoling Road</li> <li>• Jct. (TER)-Tugas-Mahangin-Cambane Road</li> <li>• Jct. (TER)-Guioang-Cogtong Road</li> <li>• Sagumay-Canolin Road</li> </ul>	<ul style="list-style-type: none"> <li>• 1.500</li> <li>• 0.630</li> <li>• 7.010</li> <li>• 4.730</li> <li>• 2.740</li> <li>• 8.140</li> <li>• 1.570</li> </ul>		✓	✓	✓		30.00	12.50	46.73	46.73	46.73	31.53	31.53	31.53	18.27	18.27	18.27	54.23	54.23	54.23	10.47	10.47	10.47			

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				Y1	Y2	Y3		Y1	Y2	Y3				
	<ul style="list-style-type: none"> <li>Jct. (TER)-Candijay-Cogtong Road</li> <li>Cogtong (Candijay)-Panas-Pangpang-Badiang Road</li> </ul>	<ul style="list-style-type: none"> <li>3.570</li> <li>6.100</li> </ul>		✓	✓	✓		23.80	23.80	23.80				
	<p><b>Tubigon:</b></p> <ul style="list-style-type: none"> <li>Cahayag (Tubigon)-Cabanugan-(San Isidro) FMR</li> </ul>	<ul style="list-style-type: none"> <li>10.758</li> </ul>		✓	✓	✓		62.50	112.50	106.45				
	<p><b>Mabini:</b></p> <ul style="list-style-type: none"> <li>Cabulao-Ondol (Mabini)-Union (Ubay) Road</li> <li>Kaporsing-Abaca-San Roque Road, Mabini</li> <li>Jct. (Mabini-Cabulao)-Aguipo Road</li> <li>Jct. (TER)-Ilihan-Cabulao (Mabini) Road (Mabini Side)</li> <li>Jct. (TER)-Mabini-Cabulao-Lungsodaan-Pook Road</li> <li>Sta. Cruz-Minol-Banlas-Tambo Road</li> </ul>	<ul style="list-style-type: none"> <li>6.000</li> <li>6.900</li> <li>1.100</li> <li>5.160</li> <li>17.170</li> <li>6.950</li> </ul>		✓	✓	✓		25.00	100.00	25.00				
	<p><b>Buenavista:</b></p> <ul style="list-style-type: none"> <li>Pob (Buenavista)-Bonotbonot-Tiguman-Overland FMR</li> <li>Mayor Landring Tirol Circum. Road</li> </ul>	<ul style="list-style-type: none"> <li>10.410</li> <li>3.000</li> </ul>		✓	✓	✓		68.20	70.00	70.00				
				✓	✓	✓		20.00	20.00	20.00				

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
	<b>Ubay:</b> <ul style="list-style-type: none"> <li>San Miguel-Bayongan-Bulilis-Mabuhay (Ubay) Road</li> <li>Jct. (Soom)-Humay-Humay Road</li> <li>Road to Ubay Jr. High School</li> <li>Gabi Seed Farm, Ubay</li> <li>Road to Ubay Stock Farm</li> <li>Jct. (TER)-San Pascual (Ubay)-Mahayag (San Miguel) Road</li> <li>Jct. (TER)-Ilihan-Cabulao Road</li> </ul>	<ul style="list-style-type: none"> <li>17.400</li> <li>3.310</li> <li>0.400</li> <li>1.010</li> <li>1.600</li> <li>2.470</li> <li>1.900</li> </ul>		<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> <li>✓</li> </ul>		<ul style="list-style-type: none"> <li>36.00</li> <li>6.20</li> <li>8.00</li> <li>25.25</li> <li>49.40</li> <li>38.00</li> </ul>	<ul style="list-style-type: none"> <li>150.00</li> <li>37.50</li> <li>40.00</li> </ul>	<ul style="list-style-type: none"> <li>150.00</li> <li>37.50</li> </ul>				
<b>SEGMENT: TRADING/ MARKETING</b>														
Low volume of supply of Raw Dried Seaweeds	<b>Facilitate access to capital, roll-over fund for marketing of RDS to organized groups</b>	___% increased supply of RDS  ___ of Identified MFIs infusing capital		All Seaweed Areas			<b>SIAP, Coops, Landbank, OPA, BFAR</b>							<ul style="list-style-type: none"> <li>No buy-in from private sector of capital provision of Inventory Financing</li> <li>Identify sources of capital and financing for the collective marketing of RDS</li> </ul>
Limited Access to Capital	<b>Provision of Working Capital</b>	1 Qualified PG/LGU		Calape, Candijay, Mabini, Getafe			PGBh/OPA, BFAR, DA-PRDP (IREAP)	<b>1.0</b>			PGBh, DA, PRDP-IREAP			

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub- MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
Lack of Mobility Logistics	<b>Provision of Delivery Vehicle &amp; Motorela Tricycle</b>	1-unit Delivery vehicle  1-unit Motorela		Calape, Candijay, Mabini, Getafe			PGBh/OPA, BFAR, DA-PRDP (IREAP)	<b>2.8</b>  <b>0.170</b>			PGBh, DA, PRDP- IREAP			
<b>SEGMENT: SUPPORT SERVICES</b>														
Lack of info on Good Aquaculture Practices (GAqP)  Lack of providers on GAqP for seaweed farming	<b>1. Capacitation of Lead Players</b>  <b>2. Organizational Development of BPSFPS</b>  <b>3. Develop Community-based Seaweed and GAqP Experts (Trainer's Training)</b>  <b>4. Training on Agribusiness Devt. and Business Ethics</b>  <b>5. Provision of Marine-based Livelihood</b>  <b>6. Regular Water Quality, Substrate and Seaweed Sampling for Laboratory Analysis</b>	Lead Players and Private Sector Partners  No. of trainings conducted  No. of participants		All Seaweed Producing Areas			BFAR OPA MLGUs SIAP BPSFPC ATI DOLE				PGBh, BFAR, DA, DOLE, ATI			<ul style="list-style-type: none"> <li>• <b>Trainings will not respond to the needs of the participants</b> <ul style="list-style-type: none"> <li>- Training Needs Analysis (TNA)</li> <li>- Develop Training Modules responsive to the need</li> <li>- Consult Experts</li> <li>- Hire expert Resource Persons</li> </ul> </li> </ul>

Key Gap/ Constraints	Brief Description of Potential Intervention	Target Result/ Outcome	MFO/ Sub-MFO	Target Areas to be covered			Proposed Lead & Other Players for Subproject Implementation	Estimated Project Cost (Php '000 in M)			Proposed Source of Funds	Remarks	Ranking	Risk & Risk Management
				Y1	Y2	Y3		Y1	Y2	Y3				
	7. Benchmarking to Model Sites	20 Pax					BFAR DOST BOI PLGU SIAP							<ul style="list-style-type: none"> <li>Representation of interested non-members</li> <li>- Specify names in the invitation as incentive for PCPT and Lead Players</li> </ul>
	8. Information Education Campaign (IEC) in School						BFAR, DEPEd, OPA, BEMO, DENR, BISU, BCRMPF				BFAR, EPEd, DENR, PGBh			
<b>SEGMENT: ENABLING ENVIRONMENT</b>														
Lack of clear delineation of farm boundaries  Lots of idle seaweed farms	<ul style="list-style-type: none"> <li>Passage of seaweed farming zoning Ordinance</li> <li>Passage of an Ordinance for the optimum utilization of underdeveloped fishery resources</li> <li>Support to Provincial Ordinance on the production, development, protection and conservation of all Banyan Trees Species</li> </ul>	Eliminate resource use conflict		All Seaweed Producing Areas			<b>Lead Players:</b> MLGU PGBh M&E TWG BEMO DENR BISU							<ul style="list-style-type: none"> <li>Resource use conflict</li> <li>- Regulatory Policy/ Ordinance</li> <li>- Awards and Incentive Program</li> <li>- Policy on water pollution</li> </ul>

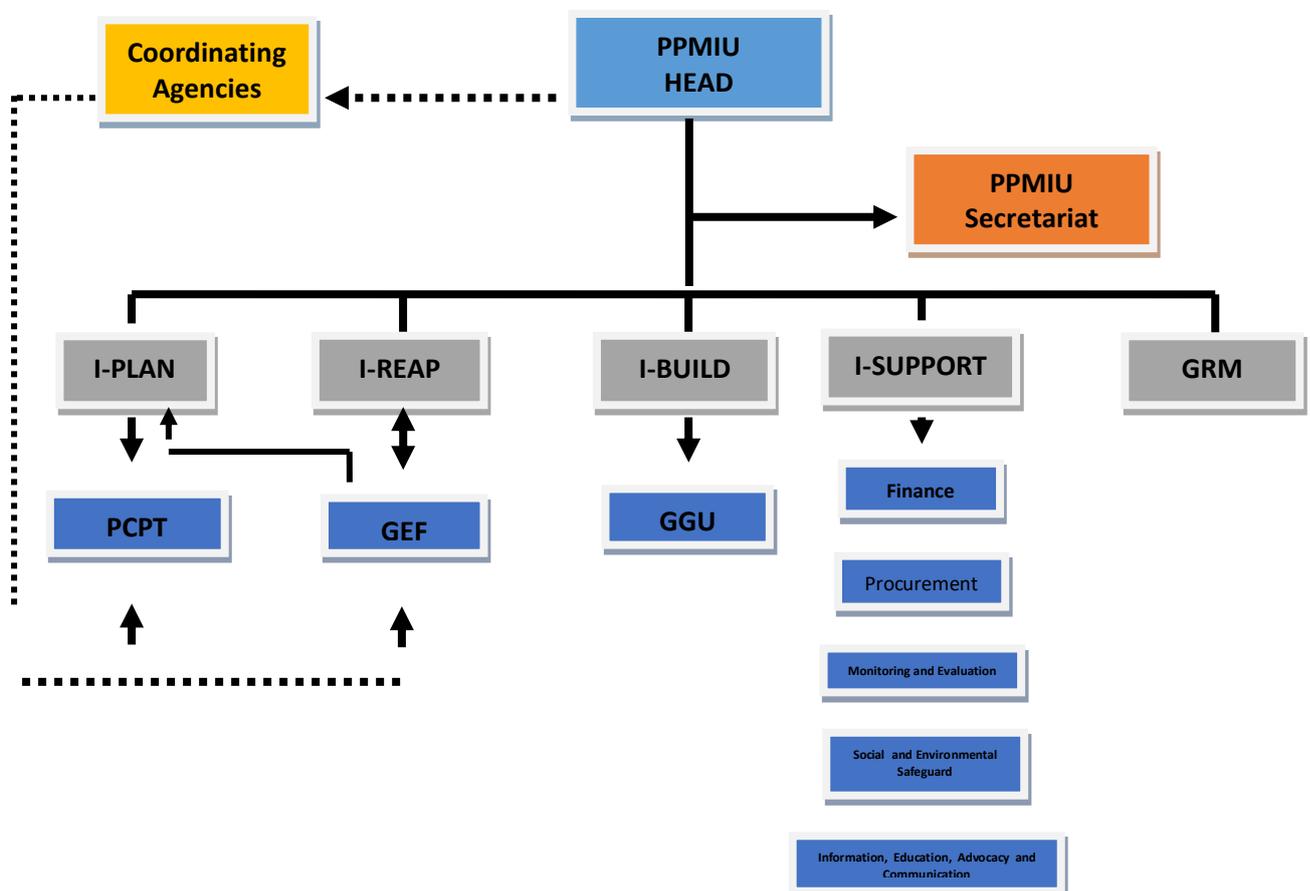
## Chapter IV. Institutional Arrangements

- Implementation/ Supervision**

The implementation and supervision of the Philippine Rural Development Program (PRDP) will be under the Provincial Governor thru the Provincial Program Management and Implementing Unit (PPMIU) created thru EO. No. 05 Series of 2014, with the Provincial Planning and Development Coordinator as the overall head. The PPMIU will be responsible for implementing all sub-projects, including but not limited to the preparation of pertinent documents as required by the program. The Regional Program Coordinating Office (RPCO) headed by the Regional Executive Director of the Department of Agriculture (DA) shall provide technical assistance in implementing the various projects.

- Organization and Management**

The organization and management of the program will be handled by the province through its PPMIU, composing of its unit components (I-PLAN Unit, I- REAP Unit, I-BUILD Unit, I-SUPPORT and GRM Unit) and sub-unit components (Finance Sub-Unit, Procurement Sub-Unit, Monitoring and Evaluation Sub-Unit, Social and Environmental Safeguard Sub-Unit, and Information, Education, Advocacy and Communication Sub-Unit, Provincial Core Planning Team, Global Environment, and Geotagging and Governance Unit). The Bohol PRDP- PPMIU organizational structure is shown below.



- **Monitoring and Evaluation**

A monitoring and evaluation system for the I-PLAN will be installed using the PRDP Results-Based Monitoring and Evaluation System (RBMES), to track the implementation of projects indicated in the plan as well as projects being implemented and completed. Based on the PRDP Results-Based Monitoring, the indicators, means of verification of results and means of data collection are to be adopted. The use of geo-tagging tool/system is to be used in the pre-implementation, implementation and post-implementation of the projects funded under the PRDP. The PPMIU M&E Sub-Unit shall have the following functions:

- 1) Oversee monitoring and evaluation of the I-REAP and I-BUILD components in the province;
- 2) Coordinate all M&E activities of the participating LGUs;
- 3) Implement and Maintain Program Monitoring Information System ensuring that system's problems are immediately attended to or reported to RPCO thru the PPMIU;
- 4) Identify problems and issues which impeded program implementation for remedial actions by the PPMIU;
- 5) Generate and submit the prescribed provincial reports based on the LGU's reports to PPMIU for submission to RPCO;
- 6) Ensure that all completed data capture forms and file copies of the provincial consolidation reports are properly kept for ready reference;
- 7) Validate submitted reports by participating LGUs;
- 8) Provide technical assistance to participating LGUs pertaining to M&E system;
- 9) Prepare and submit reports to the RPCO.

- **Social and Environmental Safeguards**

The province will observe safeguard policies set by the World Bank and the Philippine Government as described in the Social and Environmental Safeguards (SES) Framework of the PRDP.

Social safeguards will be governed by the Indigenous People Development Framework, Land/ Right of Way (ROW) Acquisition and Resettlement Policy Framework. Environmental Safeguards will be governed by the Philippine Environment Impact Statement System and will adopt the Environmental Framework and Guidelines set for by the program.

The SES Sub-Unit of the PPMIU shall carry out environmental guidelines, prepare and implement environmental management plan, resettlement action plan and indigenous people development framework in a manner and substance satisfactory to the World Bank.

## Chapter V. PDC Resolution Approving the PCIP

- **PDC Full Council Res. No. 04-2018 Approving the Enhanced PCIP for Seaweeds**



Republic of the Philippines  
PROVINCE OF BOHOL  
City of Tagbilaran



### PROVINCIAL DEVELOPMENT COUNCIL

EXCERPT FROM THE MINUTES OF THE FULL COUNCIL MEETING OF THE PROVINCIAL DEVELOPMENT COUNCIL HELD ON OCTOBER 24, 2018 AT THE MAGNOLIA PAVILION, REYNA'S HAVEN AND GARDENS, TAGBILARAN CITY, BOHOL, PHILIPPINES

In Attendance:

Gov. Edgar M. Chatto.....Chairman, Presiding Officer  
and  
Majority of the Members of the PDC Full Council

#### PDC FULL COUNCIL RESOLUTION NO. 04-2018

**A RESOLUTION APPROVING THE ENHANCED BOHOL PROVINCIAL COMMODITY INVESTMENT PLAN (PCIP) WITH THE UPDATED VERSION FOR THE SEaweEDS PCIP AND THE NEW VIRGIN COCONUT OIL PCIP AND FAVORABLY ENDORSING THE SAME TO THE CENTRAL VISAYAS REGIONAL DEVELOPMENT COUNCIL (RDC-VII) FOR INCLUSION IN THE REGIONAL DEVELOPMENT AND INVESTMENT PROGRAM (RDIP) AND THE DEPARTMENT OF AGRICULTURE (DA) AND OTHER RELEVANT AGENCIES FOR SUPPORT AND FUNDING ASSISTANCE**

**WHEREAS**, the Enhanced Bohol PCIP is an integration of the six (6) approved priority commodities of the province, namely: seaweeds, native chicken, highland vegetables, buffalo dairy, cassava and virgin coconut oil (VCO) through mainstreaming biodiversity conservation, climate change resiliency and natural resource management;

**WHEREAS**, the Seaweeds PCIP is an updated version with the previous plan already due for updating and the addition of the Virgin Coconut Oil (VCO) PCIP, another priority commodity of the province, with a newly approved Value Chain Analysis (VCA) undertaken and prepared as part of the necessary requisites to ensure effective interventions with the new PCIP enhanced through integration of environmental protection and conservation measures;

**WHEREAS**, the PRDP Project Support Office – Visayas Cluster issued a Memorandum dated February 21, 2017 requiring all PCIPs for endorsement to the Regional Development Council (RDC) for inclusion of the PCIP to the Regional Development Plan and in the Regional Development

Investment Program (RDIP) for funding support, thus ensure that other NGAs will be aware and cognizant in their role as important source of funds for sub-projects and interventions indicated in the PCIP that are in line with the agency's programs;

**WHEREAS**, the matrix of interventions in the PCIP significantly consider potential fund sources to facilitate integration of CIPs in the planning and budgeting processes of the DA and LGUs, specifically for identified interventions relevant to the development of the priority commodity but do not qualify to funding support from PRDP, thus the PLGU may use the PCIP to mobilize resources from other sources or utilize other financing scheme;

**WHEREAS**, the Bohol PCIP was presented to this Body, giving emphasis on biodiversity conservation measures, climate change resiliency and natural resource management, relevant information, gaps and constraints, and needed interventions, which has been identified through a technical review and a stakeholders' consultation involving suppliers, growers, processors, traders, municipal agriculturists, provincial and regional commodity coordinators, and other key players in the industry;

**WHEREAS**, the Bohol PCIP, after review and deliberation, has been found by this Body to be relevant, well-grounded, responsive, and aligned with the provincial goals and priorities, as well as contribute to the regional and national agriculture goals and for these reasons, worthy of its approval and endorsement to the Regional Development Council, Department of Agriculture and other relevant agencies for support;

**WHEREFORE**, upon proper motion duly seconded, be it resolved by this Body in a meeting duly convened –

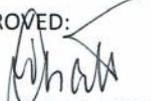
**To approve the enhanced Bohol Provincial Commodity Investment Plan (PCIP) with the updated version for the Seaweeds PCIP and the new Virgin Coconut Oil PCIP and favorably endorsing the same to the Central Visayas Regional Development Council (RDC-VII) for inclusion in the Regional Development and Investment Program (RDIP) and to the Department of Agriculture (DA) and other relevant agencies for support and funding assistance**

**UNANIMOUSLY ADOPTED.**

-0-

I hereby certify to the correctness of the foregoing Resolution.

  
**RONILITA M. BUNADO**  
OIC, PPDO-Bohol  
Head, PDC Secretariat

APPROVED:  
  
**EDGARDO M. CHATTO**  
Governor  
Chairman, PDC-Bohol

C-105-2019-2021

# ANNEXES

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**Annex 1. Farm-to-Market Roads (FMR) for Seaweeds PCIP**

**Annex 2. Visayas Seaweeds Industry Players Directory**

**Annex 1. Farm-to-Market Roads (FMR) for Seaweeds PCIP**  
Province of Bohol

Project Name	Road Length Needed (km.)	Estimated Project Cost (Php '000 in M)		
		Y1	Y2	Y3
<b>1 Bien Unido</b>				
Jct. (TER)-Bien Unido Road	9.86	30		
Brgy. Roads	10.0	100	100	100
<b>2 Talibon</b>				
Pob. (Talibon)-San Isidro Road	4.250	20.00	75.00	275.00
Pob. (Talibon)-San Francisco Road	6.200	5.00	75.00	75.00
<b>3 Getafe</b>				
Getafe Circumferential Road	1.000		25.00	
San Miguel-Tomoc-Getafe Road, Getafe Side	6.000	25.00	62.50	37.50
<b>4 Inabanga</b>				
Dagnawan-Dagohoy, Inabanga, FMR	6.48	127.00		
Pob. (Inabanga)-Lawis Road, Causeway Length One Way Traffic, Inabanga	6.248	31.20	75.00	75.00
Inabanga-Sagbayan via Lapacan-Magtangtang Road	9.340	20.00	125.00	77.50
<b>5 Pres. Carlos P. Garcia</b>				
Popoo-Tugas (C.P. Garcia) FMR	9.758	37.50	112.50	106.45
Pitogo-Aguining (C.P. Garcia) FMR	3.375	25.00	25.00	34.38
<b>6 Candijay</b>				
Road to Candijay Jr. High School	1.50	30.00		
Lungsodaan-Panadtaran Road Lungsodaan-Panadtaran Road	0.63	12.50		
Lungsodaan (Candijay)-Tambongan (Sierra Bullones) Road	7.01	46.73	46.73	46.73
Gabayan-Anoling Road	4.73	31.53	31.53	31.53
Jct. (TER)-Tugas-Mahangin-Cambane Road	2.74	18.27	18.27	18.27
Jct. (TER)-Guioang-Cogtong Road	8.14	54.23	54.23	54.23
Sagumay-Canolin Road	1.57	10.47	10.47	10.47
Jct. (TER)-Candijay-Cogtong Road	3.57	23.80	23.80	23.80
Cogtong (Candijay)-Panas-Pangpang-Badiang Road	6.10	40.67	40.67	40.67
<b>7 Tubigon</b>				
Cahayag (Tubigon)-Cabanugan-(San Isidro) FMR	10.758	62.50	112.50	106.45
<b>8 Mabini</b>				
Cabulao-Ondol (Mabini)-Union (Ubay) Road	6.000	25.00	100.00	25.00
Kaporsing-Abaca-San Roque Road, Mabini	6.900	22.50	125.00	25.00
Jct. (Mabini-Cabulao)-Aguipo Road	1.100		27.50	
Jct. (TER)-Ilihan-Cabulao (Mabini) Road (Mabini Side)	5.160	5.00	62.50	62.50
Jct. (TER)-Mabini-Cabulao-Lungsodaan-Pook Road	17.170	5.00	62.50	62.50

Project Name	Road Length Needed (km.)	Estimated Project Cost (Php '000 in M)		
		Y1	Y2	Y3
Sta. Cruz-Minol-Banlas-Tambo Road	6.950	7.50	62.50	62.50
<b>9 Buenavista</b>				
Pob. (Buenavista)-Bonotbonot-Tiguman-Overland FMR	10.41	68.20	70.00	70.00
Mayor Landring Tirol Circum. Road	3.00	20.00	20.00	20.00
<b>10 Ubay</b>				
San Miguel-Bayongan-Bulilis-Mabuhay (Ubay) Road	17.40	36.00	150.00	150.00
Jct. (Soom)-Humay-Humay Road	3.31	6.20	37.50	37.50
Road to Ubay Jr. High School	0.40	8.00		
Gabi Seed Farm, Ubay	1.010	25.25		
Road to Ubay Stock Farm	1.600		40.00	
Jct. (TER)-San Pascual (Ubay)-Mahayag (San Miguel) Road	2.47	49.40		
Jct. (TER)-Ilihan-Cabulao Road	1.90	38.00		
<b>TOTAL</b>	<b>204.36</b>	<b>1,075.83</b>	<b>1,770.70</b>	<b>1,627.98</b>

## Annex 2. Visayas Seaweeds Industry Players Directory

<b>FARMERS</b>			
<b>BOHOL</b>			
1	Leonardo Conzon	Bilangbilangan Island, Tubigon, Bohol	09099390615
2	Charlito Lingo	Aguining, Pres. Carlos P. Garcia, Bohol	09161287700
3	Rubeniano Valmoria	Saguise, Pres. C.P. Garcia, Bohol	
4	Alan D. Casimsiman	Concepcion, Mabini, Bohol	09359161276
5	Romulo A. Pendon, Sr.	Guindacpan, Talibon, Bohol	09322363305
6	Alexander S. Cabando	Cataban, Talibon	09483165619
7	Tarciso S. Padillo	Asinan, Buenavista, Bohol	09105255922
8	Jose Q. Cuyno	Sinandigan, Ubay, Bohol	09771209254
9	Ralph D. Lagura	Ubay, Bohol	09185112361
<b>EASTERN SAMAR</b>			
1	Estrella H. Dagsa	Brgy. Ngolos, Guian, E. Samar	09554757732
2	Consolacion N. Daganio	Brgy. Ngolos, Guian, E. Samar	09305056371
3	Ines Arpon	Brgy. Ngolos, Guian, E. Samar	
4	Benedicto Garado	Brgy. Ngolos, Guian, E. Samar	
5	Diego B. Dagsa Jr.	Brgy. Ngolos, Guian, E. Samar	
6	Delia A. Padullon	Brgy. Ngolos, Guian, E. Samar	
7	Eusebio bnemenio	Brgy. Ngolos, Guian, E. Samar	09261415147
8	Romeo Caratay	Brgy. Ngolos, Guian, E. Samar	
9	Ma. Cristina A. Francisco	Brgy. Ngolos, Guian, E. Samar	09493072117
10	Rose Ann V. Plaza	Brgy. Ngolos, Guian, E. Samar	09309527256
11	Sherry Ann A. Gaturian	Brgy. Ngolos, Guian, E. Samar	09487852950
12	Mark Anthony Abneme	Brgy. Ngolos, Guian, E. Samar	
13	Benedicto Garado	Brgy. Ngolos, Guian, E. Samar	
14	Teresita C. Dado-acon	Brgy. Ngolos, Guian, E. Samar	
15	Henry D. Tablon	Brgy. Ngolos, Guian, E. Samar	09155500913
16	Jille G. Navidad	Brgy. Ngolos, Guian, E. Samar	09155500913
17	Edita Garado	Brgy. Ngolos, Guian, E. Samar	
18	Danilo A. Tulang	Brgy. Inapulangan, Guian, E. Samar	
19	Primo Allera	Trinidad, Guian, E. Samar	09503572716
20	Editha Mabini	Sitio Converse, Brgy. Ngolos, Guian, E. Samar	09269609931
21	Jose M. Dagsa	Purok 4, Brgy. Ngolos, Guian, E. Samar	09204627065
22	Cherie Ann Abut	Brgy. Cagaut, Salcedo E. Samar	09483866919
23	Jaime Ecoben	Bagtong, Salcedo, E. Samar	09483471398
24	Joey Duran	Camanga, Salcedo, E. Samar	09959911718
25	Roy B. Dadulla	San Roque, Mercedes, Eastern Samar	09758161754
26	Raymundo B. Pagatpat	Cabunga-an, Mercedes, E. Samar	09301832878
27	Felecisimo Dacuno	Brgy. Bolusao, Lawaan, E. Samar	09776409734

<b>FARMERS</b>			
28	Romulo A. Samson	Sto. Nino, Quintapondan, E. Samar	09121603802
29	Christopher Quiza	Brgy. Sta. Margarita, Quintapondan, E. Samar	
<b>ILOILO</b>			
1	Jeley Arabadon	Estancia, Iloilo	
2	Alejandre Dalida	Brgy. Gogo, Estancia, Iloilo	
3	Maribeth Arabadon	Brgy. Gogo, Estancia, Iloilo	
4	Rellan dela Cruz	Estancia, Iloilo	
<b>LEYTE</b>			
1	Ruel Inoc	Dawahon Island, Bato, Leyte	09292453160
2	Teresita Kabundukan	Brgy. Vigan, Gen. MacArthur, Leyte	09095826715
<b>TRADERS</b>			
1	Maishura Igot	Dawahon, Leyte	09297265019
2	Roberto Ecro		09397924787
3	Rosario Rurca		09292153168
4	Purificacion Benedicto	San Dionisio, Iloilo	
5	Nonong Infante	Sibunan, Guimaras	
6	Maximo Cabanatan	Brgy. Nula-Tula, Tacloban City	
7	Susan Borromeo	Guian, Eastern Samar	
8	Andres Magno	Guian, Eastern Samar	
9	Luz Castellano	Guian, Eastern Samar	
10	Delia Morato	Brgy. Tagpuro, Tacloban City	
11	SPPI	Brgy. Natividad, San Policarpio, E. Samar	
12	Carlito Purca	Brgy. Natividad, San Policarpio, E. Samar	
13	Melevecito Padillo	Brgy. Binogawan, San Policarpio, E. Samar	
14	Alberto tero	Catarman, Northern Samar	
15	Rodulfo Sereno	Brgy. Dawahon, Bato, Leyte	
16	Bonifacio Arong	Brgy. Dawahon, Bato, Leyte	
17	Efren Taneo	Brgy. Dawahon, Bato, Leyte	
18	Denetrio Laroza	Brgy. Dawahon, Bato, Leyte	
19	Job Tapayan	Brgy. Dawahon, Bato, Leyte	
20	Marino Meliang	Brgy. Dawahon, Bato, Leyte	
21	Edgardo Igot	Brgy. Dawahon, Bato, Leyte	
22	Arnulfo Taneo	Brgy. Dawahon, Bato, Leyte	
23	Corazon Tsamoudakis	Brgy. Dawahon, Bato, Leyte	
24	Anita Nanoy	Brgy. Dawahon, Bato, Leyte	
25	Ronillo Pinola	Brgy. Dawahon, Bato, Leyte	
<b>PROCESSORS</b>			
1	CP-Kelco	Sibonga, Cebu	
2	Kerry Food Ingredients Phils, Inc.	Mandaue City, Cebu	

<b>FARMERS</b>			
3	FMC Health and Nutrition	Mandaue City, Cebu	
4	Shemberg Marketing Corporation	Mandaue City, Cebu	
5	Shemberg Biotech Corporation	Carmen, Cebu	
6	TBK Manufacturing Corporation	Tacloban City	09237080302
7	MCPI Corporation	Consolacion Cebu	
8	Cebu Carageenan Corp.	Carmen, Cebu	
<b>EXPORTERS</b>			
1	Royal Algaculture Corporation	Cebu City	
2	Pzalms Seaweed and Marine Products	Mandaue City, Cebu	
3	Mythic Seaweed Farm	Cebu City	
4	George Alolor Trading	Mandaue City, Cebu	george_alolor@yahoo.com
5	Cebu Maxan Seaweed Corp.	Consolacion, Cebu	(032) 4246218
6	DATINGBAYAN Agro-Industrial Corporation	Consolacion, Cebu	63-32-345-2751
7	FDIII Trading Incorporated	Cebu City	232-6563
8	Shell Haven Fashion International	Lapu-Lapu City, Cebu	(032) 341-4340

## Provincial Core Planning Team

1. **DR. LARRY PAMUGAS** – OIC, Office of the Provincial Agriculturist (Subproject Component Head)
2. **MS. MA. IMELDA BORROMEIO** – Provincial Planning & Devt. Office (PPDO)
3. **ENGR. EVELYN MALIGSA** – Office of the Provincial Agriculturist (OPA)
4. **MS. REMEDIOS REGACHO** – Office of the Provincial Agriculturist (OPA)
5. **MS. DAISY BASCO** – Office of the Provincial Veterinarian (OPV)
6. **ENGR. EVELYN AYUBAN** – Office of the Provincial Engineer (PEO)
7. **MS. AURELIN EUGENIA MAYOL** – Bureau of Fisheries & Aquatic Resources (BFAR)
8. **MR. JOSE ALLAN CAJILOG** – Philippine Coconut Authority (PCA)

# PHOTO DOCUMENTATION

## 1) PRDP-GEF PCIP Enhancement Workshop 25-29 June 2018



## 2) Bohol PCIP Enhancement Writeshop 8-9 August 2018



**3) Enhanced PCIP Writeshop**  
**17-18 September 2018**



#### 4) Stakeholders' Consultation 22 October 2018



**5) Enhanced Seaweeds PCIP Presentation to the Provincial Development Council (PDC)  
24 October 2018**

