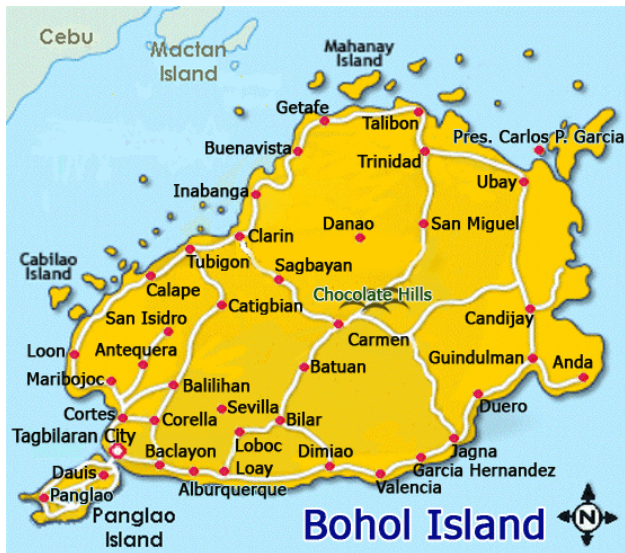


Health Sector Characteristics

Rationale

The Ecotown Demonstration Framework aims at building ecologically stable and climate change resilient communities and local economy. The Abatan river watershed connects the 5 intervention municipalities where the Ecotown approach is being demonstrated. The inclusion of the vulnerability assessment of the health sector in five municipalities in Bohol namely Maribojoc, Antequerra, Balilihan, Catigbian and Cortes lends its significance as a contributing factor in the needed adaptive capacities for the resilience of the community. An assessment of prevailing local health systems and their exposure and sensitivities to climate variability will help us thus develop possible adaptation strategies and measures; which will have to be prioritized given the limitation of resources in the locality. The VAC component shall then provide an overview on the degree of potential climate change impact to the Ecotown sites.

Climate Change and Health in Bohol



Bohol Island is located in Central Visayas region to the east of the island of Cebu. It is a first class province with a population of 1,255,128 according to the 2010 census.¹ Bohol is the tenth largest island of the Philippines. To the northeast is the island of [Leyte](#) and to the south, is [Mindanao](#). Considered a tourist attraction, the Island has a lot of biodiversity to share and be visited.

While it remains blessed with its environs, it also has been attended by disasters over time and is considered to be a climate hotspot. It is no. 9 on the list for islands in

subsidence from a potential eustatic sea level rise of 1 meter.²

In a span of 24 days in the last quarter of 2013, **Bohol** was part of the Central Visayas region that experienced two disasters in October – a 7.2 Richter scale measured earthquake and on November – a 315 km/hr winds storm we called Yolanda (code named Haiyan internationally). The Philippines jumped from 14th to 7th in the climate risk index of *Germanwatch* 2013-2014.³ The sudden increase is believed to have as its cause the global warming phenomena causing climate change and its effect from the extreme weather events caused further by the antecedent rise in temperature.

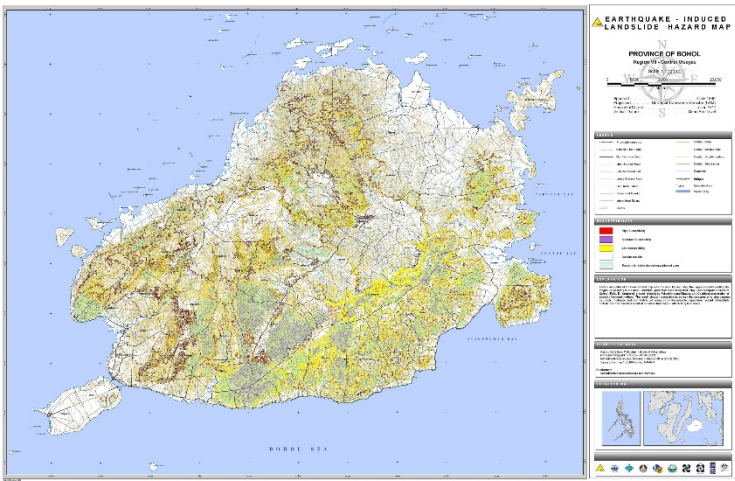
A hazard map pictures Bohol with the potential earthquake induced landslide occurrence and the places of which and what considerations the population and the local government should take upon themselves. The

¹ 2010 Census of Population and Housing. National Statistics Office.

² <http://www.greenpeace.org/seasia/ph/Global/seasia/report/2007/4/the-philippines-a-climate-hot.pdf>

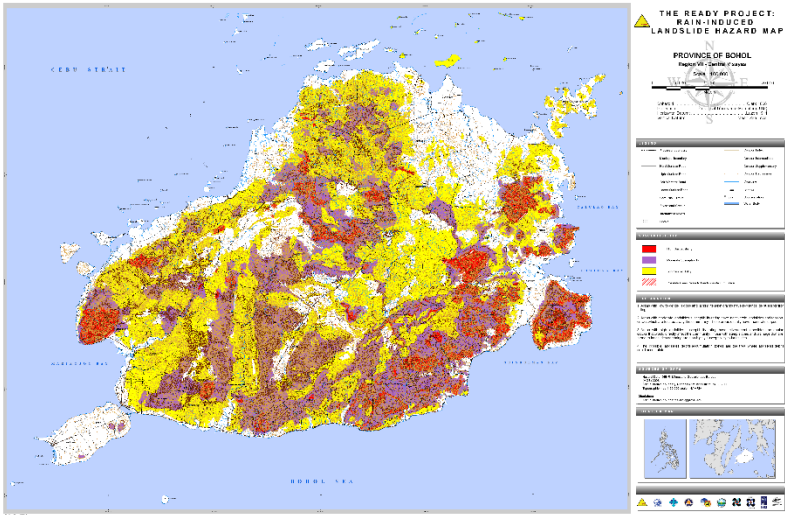
³ <http://archive.sunstar.com.ph/cebu/local-news/2014/02/04/special-report-under-siege-326582>

most recent earthquake of 2013 reported earlier is an example of their vulnerability. From 2011 to 2013 alone, the Philippines had 187 earthquakes at least 5.0 in magnitude, of which 18 were 6.0 to 6.9 in magnitude, and three at least 7.0 in magnitude. The epicentre of the Magnitude 7.2 An estimated 11.3 million people in nine regions over 10 per cent of the country’s population—are affected.



673,042 people are displaced by the typhoon temblor was near Sagbayan, Bohol on Oct. 15, 2013.

On November 8, a category 5 storm hit the Philippines including Bohol and displaced a sizable amount of the population. An estimated 11.3 million people in nine regions over 10 per cent of the country’s population—are affected. 673,042 people are displaced by the typhoon.⁴ In both situations, the toll and cost to human health are of considerable sum so that whatever public health inputs from existing international donor funded initiatives and of national (DOH) programs definitely suffered.



Bohol’s climate as classified by PAG-ASA belongs to Corona’s 4th 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 has illustrated a declining trend of 250 mm over a period of 35 years of about 7mm a year due likely to climatic change in the Southeast Asian Region.⁵

Population

The land to person ratio in the province of Bohol is declining as the land comes under increasing population stress. The province land to person ratio decreased from 0.272 persons per hectare to 0.206 hectares per

⁴ <http://www.unhcr.org/528228cf9.pdf>
⁵ PAG-ASA Report and Bureau of Soil and Water Management

person over the last ten years. This has reduced the average farm size (0.6 ha/family) below the prescribed economic size of 1-3 hectares per family.⁶

Bohol's population is increasing at a slower pace in 2007 compared to the annual population growth rate (APGR) of 2.95% between 1995-2000. Its APGR of 1.06 percent (2000-2007) is among the lowest in the region (regional average is 1.59%), lower than the country's comparable growth rate of 2.04%. In 2007, the Rate of Natural Increase (RNI) was calculated at 13 persons per 1,000 population compared to 16 persons per 1,000 population in 2000. Meaning, its population was growing at 13% through natural increase in 2007. Given its current growth rate, the population of Bohol is expected to grow to 1,349,704 by the end 2015. This translates into an additional 119,594 persons starting from year 2008 or an average of 13,288 persons every year assuming current APGR remains.

About 24% or 275,128 of Bohol's population reside in the urban areas or in 12.35% (137) barangays.⁷ Total population in the coastal area of Bohol comprises 42 percent of its provincial population in 2007 compared to 28 percent in 1990. Of the total coastal population, 12 percent of the province's populace were residing in the island barangays of Bohol.

Health Indices

Nationally, Bohol public health budgets are:

For Bohol Province, despite the increase in poverty incidence, the province has achieved improvement in its HDI. From 2000 to 2006, Bohol's HDI increased from 0.531 in 2000 to 0.569 in 2006 indicating an improvement in the overall well-being of Boholanos. However, the assistance to marginalized and vulnerable groups remains a serious challenge in Bohol given that 38.8 percent of families in the province continue to live in poverty.⁸

Life expectancy has increased at birth estimated from 68 years in 1997 to the current 72 years with females having longer lives than males at 74 years and 70 years, respectively. Water-borne diseases still persist in Bohol even as access to water supply source (from 43% in 2000 to 75% households in 2008) and sanitary toilets (from 70% in 2000 to 85% households in 2008) has improved. Access to health/medical services and facilities have also improved with additional health and birthing centers available in the rural areas. Bohol facility based delivery (FBD) increased from 17% deliveries to 46%, deliveries done by medical personnel likewise increased from 74% to 88% in that same period.⁹

According to the Provincial Health Office (PHO) report, only 5-10% of the total budget of majority of LGUs in Bohol is allocated to health. FP commodities are sold in Popshops located in 9 LGUs to meet community FP needs in Tagbilaran City, Ubay, Talibon, Carmen, Bien Unido, Dauis, Inabanga, Candijay and **Catigbian** and a

⁶ Office of the Provincial Agriculturist October 2006

⁷ Urban classification per NSO

⁸ NSCB

⁹ Provincial Health Office, 2008.

Provincial Popshop in Tagbilaran City funded by UNFPA with a clinic that provides services to walk-in clients. USAID through its PRISM1 and 2 project continuing with the present Integrated Midwives Association of the Philippines (IMAP) Midwives mentoring project has likewise given technical assistance to the province through as it helped private practising midwives get accreditation from the PHIC to operate their birthing homes, thus significantly contributing to the facility based delivery efforts as well as skilled birth attendant competency and financial sustainability

Morbidities

According to the Provincial Health Office (PHO), a total of 118,014 or almost 10 percent of Bohol's population got sick in 2008 mostly from diarrhea and respiratory tract infections. About 52% of them are females and mostly belonging to the age group 14 years and below. From the list of leading causes of illness in Bohol, diarrhea has always been at the top along with respiratory diseases. 58% in 2008, 43 % acute respiratory infections. Water-borne disease outbreaks, such as the Shigella outbreak in Loon last 2007, continue to pop up periodically across the province. Contributory to the incidence of water-borne diseases are the old pipes that sip in debris and bacteria and also unsanitary toilets; about 5% of households in the province have unsanitary toilets while 10% of families have no toilets (2008).

Dengue, considered a climate sensitive disease saw 3,725 cases, affecting mostly children, was reported by the PHO to have caused the death of 51 people in Bohol from 2003-2008. DENR records areas with sightings of transient migratory birds suspected to be potential carriers of the disease from confirmed AI infected Asian neighbouring countries. Avian Influenza (AI) was diagnosed in two (2) of our intervention sites out of the identified 12 municipalities in Bohol to be at high risk for this disease, namely, **Cortes and Maribojoc**.

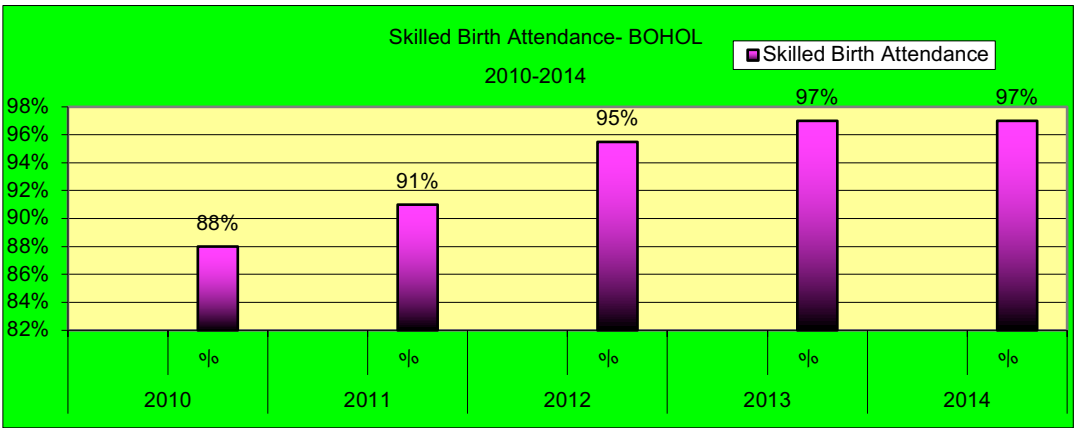
PHO data likewise has it that Bohol has two (2) municipalities endemic to Schistosomiasis namely, Trinidad and Talibon; while these two municipalities are not part of the intervention sites the potential spread to our study areas is there, if climate change persists and the environment becomes favourable for the snail vector (*oncomelania quadrasi*) to thrive. This is likewise considered a climate sensitive disease.

Mortalities

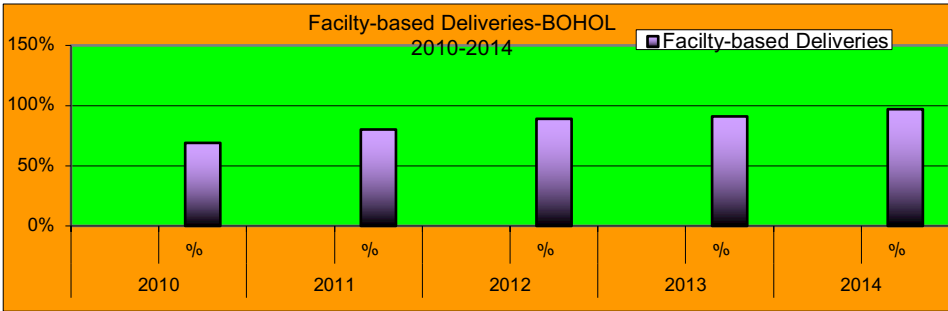
Chronic, debilitating non-communicable diseases Lifestyle Diseases where the cause of mortalities. Top three leading causes of mortality accounting for 47% were heart disease, pneumonia and cancer. Pneumonia accounted for about 4% of infant deaths, the leading cause of death among this age group.

Maternal and Child health indices

It will be important to note that maternal and child health indicators of skilled birth attendants, facility based delivery and ante natal follow

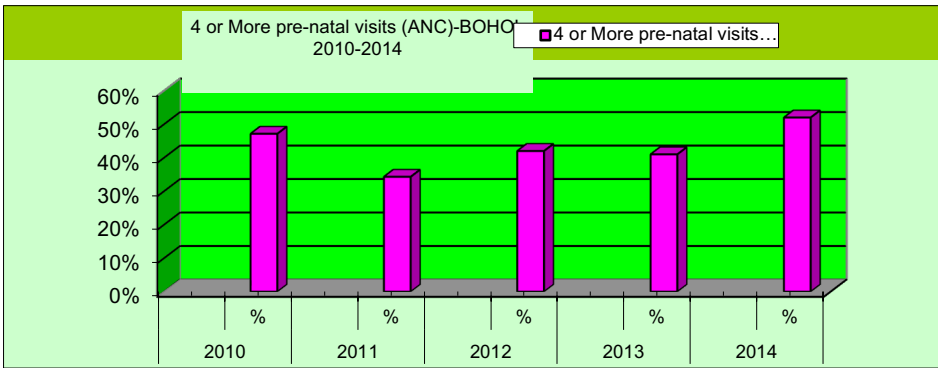


ups are a mark of the readiness of the public health system to respond to the basic health needs of our mothers and children considered one of the most affected segments of the populations as to the potential health impacts of climate change. The Skilled birth attendants (97%) and the facility based



deliveries (gives us a picture of the competency level and availability of service providers who should be able to deliver at properly equipped facilities). This will

be an indirect metric of the availability of public health equipment to give the basic community social and health services. The indicator on four antenatal visits (as required by DOH) shows us an indirect metric of the level of quality of service where it becomes important that a mother is screened four times in the duration of her pregnancy in order to ensure her safe delivery. These MCH indicators give us a general picture of the readiness of the public health system as of the moment and the potential for them to respond to the potential climate change health impacts on top of the public health need.



The table below shows the mothers and children who have died due to pregnancy related diseases, again a proxy indicator of the delivery of basic health services. MDGs 4 and 5 says that we should be at 52/100 maternal deaths and 23/1000 infant deaths.

Province of Bohol										
Particulars	2010		2011		2012		2013		2014	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Infant Deaths	205	8/1000 LB	287	12/1000 LB	254	10/1000 LB	120	5/1000 LB	104	4/1000LB
Maternal Deaths	12	49/100k LB	24	102/100k LB	16	63/100k LB	19	76/100K LB	14	60/100K LB
Neonatal Deaths	no data available						33	1.33/1000LB	23	.99/1000LB

As human induced climate change comes upon us, it will be important to focus on making our public health systems better if not continue to be at a point where we will be able to cope with the potential health impacts of the likes of emerging diseases, deaths due to landslides and flooding and other natural hazards brought about by extreme weather events that are projected to come at increasing intensity and frequency.

Pilot Intervention Municipalities

Antequerra



Antequerra is a fourth income class [municipality](#) in the [province](#) of [Bohol](#), [Philippines](#), 18 km. north of [Tagbilaran](#), in the southern part of Bohol. It is part of the 1st district and is composed of 21 barangays all located mainland. According to the 2010 census, it has a population of 14,481.¹⁰ The primary economic activities are farming, handicraft or cottage industries (especially [basket weaving](#)), and carpentry (including bamboo and wood furniture making). Its main agricultural produce comprises coconut, rice, corn, root crops, and vegetables.¹¹

Health Characteristics and highlights

The PDMS 2009 survey showed the following health development indicators¹². 91 (6.03 %) Child/Children are Malnourished. 497 (16.02 %) Households are below the Food Threshold. 1 (0.03 %) Households are below the Meals Threshold. These three indicators go hand in hand to contribute to the possible indirect cause of the health impact of malnutrition in climate change.

These indicators -838 (11.41 %) Person/s are Unemployed and 960 (30.94 %) HHs are below the Income Threshold, shows us the sensitivity there is as a support mechanism for adaptive capacity for payment of health services. Water and sanitation conditions likewise give us a picture of the

¹⁰ www.antequera-bohol.lgu.ph
¹¹ "[Brief municipal profile](#)". Municipality of Antequerra.
¹² <http://www.ppdobohol.lgu.ph/municipal-links/1st-district/antequera>

vulnerability to climate sensitive and related diseases: water borne and feco-orally transmitted ones like typhoid and cholera - 3,065 (98.78 %) HHs have Unsanitary Toilet. 208 (6.7 %) Households are using Non-Potable/Doubtful Drinking Water

Food Security

The food balance analysis in relation to standards set by the FNRI shows a continuous deficit in the major crop of rice with a deficit yield of 898 mt in 2004 to 1112 mt in 2013. Fish and eggs as staples were also seen to be in the deficit at 476 mt and 62 mt respectively for 2013. With its reported 2010 population of 14,481, it will be important to focus on increasing the adaptation capacities on achieving food self-sufficiency.

Table 40
Food Supply and Demand for 2004-2013 (in metric tons/year)
Municipality of Antequera

Food Items	2002 (metric tons)			2004 (metric tons)			2013 (metric tons)		
	supply	demand	def/surp	supply	demand	def/surp	supply	demand	def/surp
Rice	400	1,277	(877)	441	1,339	(898)	684	1,696	(1,012)
Corn	1,679	1,277	402	1,851	1,339	512	2,872	1,696	1,176
Root crops	1,753	708	1,045	1,933	743	1,190	2,998	941	2,057
Vegetables	6,030	640	5,390	6,648	671	5,977	10,313	850	9,463
Fruits	3,404	896	2,508	3,753	940	2,813	5,822	1,190	4,632
Meat	491	387	104	540	406	134	1,391	514	877
Fish	-	358	(358)	-	376	(376)	-	476	(476)
Milk	-	335	(335)	-	352	(352)	-	446	(446)
Eggs	-	47	(47)	-	49	(49)	-	62	(62)

Source: Municipal Agriculture Office 2002
Assumption: Computation is based from Food and Nutrition Research Institute (FNRI)

It is recommended that a shift in food production should prioritize HH needs and sufficiency over commercial production as this may increase malnutrition indices recorded earlier in the PDMS 2009 at 6.03% and a corresponding 16.02% below the food threshold. Further recommended were off – farm potential revenues as

complementing needs. A shift to backyard meat and livestock production is likewise going to help.

Health Infrastructure

There are presently 5 Barangay Health Stations (BHS) where 3 or 4 barangays on the average are covered by 1 BHS. There is a 1 midwife: 1 brgy ratio of personnel with 1 corresponding nurse deployed to each municipality as part of the National DOH Nurse Deployment program (NDP). The following basic health services are being offered in the BHS: antenatal examinations, vitamin a, immunization, weighing, feeding, Family Planning counselling and deworming.



The farthest barangay is Quinapon and Sto Rosario (20 min from RHU Poblacion or 7 km, rough roads but accessible by ambulance). The mountainous barangays are composed of Sto Rosario , Quinapon –an and Bantolinao.

It was also gathered that there are several barangays that get easily flooded. They are Sto Rosario, Poblacion (RHU is flooded, due to no drainage system, can’t afford to build), Viga,

Quinapon-an, Tupas (near river). Some of the reasons given for flooding: silted brooks; upliftment of land (more than 1 meter) due to the 2013 earthquake. This produced a new lake – Lake Tupas (a potential tourist spot for boating, 7 fathoms deep, it formerly was a three meter lake ~ now already 200 meters wide – forest and mountains on side)

Landslides have also occurred in Quinapon-an, Can-omay (near cementery) due to earthquake, Bongahan, Tabo-an, Tagubaas, Viga, Tupas, Ubuhan and Danao. While these hazards are not always climate change related, those that are caused by frequency and intensity increase in rains escalates the population sensitivity to cope with climate change and health impacts.



Another proxy health metric to consider is the municipality competitive index. It has two sub-indicators for health which when weighed with other non-health indicators contributes to a seal of good governance score. When awarded, it can be used to access a governance performance fund which can be a potential adaptive capacity fund. The framework was culled out from Michael Porter, an economist.¹³ The Competitive Index at the municipal level is a qualitative metric which deals more with measuring the desirability of a municipality.¹⁴ While they are a matrix of indicators for competitiveness, it can in a way look at the health indicators including that of the inclusion of a disaster preparedness program which may help us gauge the likelihood of response and adaptive capacities.

It has three general indicators – Economic Dynamism, Government Efficiency and Infrastructure. **Sub-indicators for health are found in the Government Efficiency indicator – capacity of health services,**

¹³ <http://www.quickmba.com/strategy/porter.shtml>

¹⁴ http://pdf.usaid.gov/pdf_docs/PA00K5T2.pdf

and under the compliance to national directives - the presence of a disaster preparedness plan and in the Infrastructure Indicator- Health Infrastructure.

The government efficiency indicator defines health capacity: Health is another basic government service. The capacity of health manpower to meet the health demand is an indication of government effectiveness. Its attendant Input indicator: **1. No. of doctors, nurses, caregivers, mid-wives in the locality 2. Population of locality.**

Capacity of Health Services	375	0.106838	152	0.119904
-----------------------------	-----	----------	-----	----------

As for the disaster preparedness it has to have a plan (DRRMP), an office and staff that run it as well as a policy cover. This measure is under the compliance to national directives metric under the government efficiency indicator.

As for the Indicator of health infrastructure capacity. It is defined as lack of hospital space that poses danger to health delivery and worsens quality. The input indicator is **1. Number of hospital beds in locality 2. Population.** These two indicators only give us a small picture of the governance and infrastructure component of the health portion. When seen together with the other non-health indicators it will give you a gauge of the progress of the competitive index of a municipality.

Health	668	0.019563	235	0.141700
--------	-----	----------	-----	----------

The overall score is rank 651/ score 22.1123.

Overall Total Score	651	22.1123	281	24.4845
---------------------	-----	---------	-----	---------

The index in part will give us a rough picture of the government efficiency and infrastructure level that may be needed in adaptive capacities.

A focused interactive discussion using a participatory approach to get health workers and community was done to identify the a) Health hazard and Exposure: Determine Historical Timelines of perceived Diseases; b) Health Vulnerabilities: Determine ‘climate sensitive’ diseases and their occurrence in the area; and c) Health vulnerabilities in the area using a health infrastructure and disease vulnerability ranking process. An initial adaptation capacity assessment to determine response mechanisms to the diseases (current, cross sector, gaps and weaknesses in response to the outbreaks) was likewise done to give us an illustration of the climate change and health situation.

The table below shows the Antequera data gathered historical timeline of perceived diseases in the last 10-15 years.

Disease Outbreak/ Mortality	Month/ Year	Weather/Hazard Events
Diarrhea – 20 cases (2 weeks duration)	2005 2014	Rainy season – continuous rains and after the rainy season Flooding (Typhoon Seniang)
Dengue – 14 cases with one mortality	2009	Rainy season – after (students went home from Tagbilaran – might be the host or carrier)
Dengue (in two weeks)	May 2015	Warm weather/summer, but with rains
Skin diseases	December 2014	Flooding

There were two recollected episodes of Dengue hemmorrhagic fever happening in 2009 and May 2015; the former occurring during the rainy season, the episode noted students who were coming in from the city and upon which the cases clustered (population specific). The latter (2015) had warm weather, considered summer but had the episodes of rain (starting).There was also noted an area with stagnant water, caused by erring contractor who installed incomplete culverts just for show (inspection) and was a potential cause.

Diarrhea was picked up in 2005/2014, both happening during the rainy seasons; the latter year was characterized by continuous rains accompanied by flooding (Typhoon Senyang). They recalled that it was the children and the elderly – (20 cases occurring during a span of 2 weeks). Disease was believed to be transmitted due to exposure to the elements as families were living in tents and evacuation centers during that time vacating from the floods. There were also non weather parameters which were believed to have agg ravated the condition: drinking water from untreated spring water/ contaminated food handling; Garbage being thrown anywhere which is believed to have exacerbated water borne disease.

A complementary table below shows the initial adaptive responses which was recollected during the event of the disease. Of note is the cross sector response of allied agencies like the municipal social welfare department (MSWD) that did a daycare center-based feeding and deworming program.

DIARRHEA	
Questions	Responses

1. What are the current responses of the LGU/concerned agencies/ communities to the noticeable increase in the diseases (human and financial)?	Provision of Oresol and Metronidazole for medicines Provided early diagnosis Availability of IVs Water sampling and checking wells/springs Chlorination and oral tablet to clean water (DOH investigated and monitor) Conduct of health education Sanitation program: gave toilet bowls, with policies Segregation policy; closed drainage policy Municipal investment plan for health
2. What are the cross sector responses to the disease outbreak?	Agriculture → for composting; gives seedlings for families with malnourished children MSWD – undertaking deworming and feeding – center-based Nutrition program with feeding program Presence of the a task force on climate change for CC activities and interventions
3. What are the gaps/weaknesses in the response to the outbreak?	Budget is not enough to respond – 50 to 60% budgetted and used → 40% is the gaps Laboratory is not complete

December 2014 skin diseases were noted on the rise during a flooding episode.

Balilihan

Balilihan is a 4th class municipality in the province of Bohol, Philippines. Balilihan is located 22 kilometers northeast of Tagbilaran City via Cortes (thru CPG North Avenue) and 19.7 kilometers northeast via Corella (thru J.A. Clarin Street). It holds the fourth (4th) largest land mass of the province, having 15,022 hectares/150.22 square km of its land area. It has 31 Barangays.¹⁵

It is bounded in the north by the Municipality of Catigbian, in the Northeast by the Municipality of



Batuan, in the East by the municipality Sevilla, in the South by the Municipality of Sikatuna and Corella, in the Southwest by the Municipality of Cortes and in the West and Northwest by the Municipality of Antequera where the famous Abatan River served as the common boundary of the two municipalities.¹⁶ The Abatan river traverses or has tributaries along our ongoing intervention sites. This becomes significant as it is a natural resource for health purposes as well as a potential hazard in the event of increase in over flow and river volume and surges during storms and flooding amongst

riverbank barangay populations.

According to survey, it has a population of 17, 131 (2007 NSCB) / 18, 380 (2008 Health Survey) people and 9,176 registered voters as for May 2010 elections. It has 3, 101 (2000 NSO count) household, with an average household size of 5. In recent field work, we gathered that health service providers and

¹⁵ <http://balilihan.gov.ph/>
¹⁶ Abatan River tour Integrated framework Plan

clients alike were articulating that there is a need for more personnel who can give health services as well as equipment for treatment and diagnosis.

The following health infrastructures are available: 1 Main Health Center; 6 Barangay Health Stations; 2 Ambulance; Balilihan Assistance Rescue Team (A 24-hour emergency rescue unit).

The Balilihan CLUP shows a total health worker population of 229. Divided as such (1-physician, 1-nurse, 6-midwives, 1-dentist, 1-sanitary inspector and 1-med-tech); with the population progression the projected needs are shown in the table below where they would have needed (by 2011) an additional physician, public health nurse, dentist and 6 more midwives.

Table No. 19
Current and Projected Requirements for Medical Personnel
CY 2002 – 2011

MEDICAL PERSONNEL	YEAR				
	2002	2004	2006	2008	2011
Municipal Health Officer	1	1	1	2	2
Public Health Nurse	1	1	1	2	2
Rural Health Midwife	6	6	6	12	12
Dentists	1	1	1	2	2
Pharmacists	none	1	1	1	1
Rural Sanitary Inspector	2	2	2	2	2
Medical Technologist	1	1	1	2	2
Others (Vol'tr. Health Workers)	186	186	186	186	186
(Brgy. Nutrition Scholars)	31	31	31	31	31

Source: Municipal Health Office

Health Characteristics and highlights

The population of Balilihan remains a very young pyramid base (7,372 in the age group = 1- 24). Its productive citizens in the cluster 15 – 39 age group (5,133) remain either a boon or bane as they will be dependent on the opportunities available. The unemployment rate as per the PDMS is reported at 1102 (11.79%) person(s). Being a fourth class municipality, dependence on Internal Revenue Allotment (IRA) is very high, poverty incidence remains high with Boyog Norte having the highest at 32.56% total deprivation.¹⁷

¹⁷ Computed total deprivation across all PDMS core poverty indicators

Table No. 6
HOUSEHOLD POPULATION BY AGE-GROUP, SEX
CY – 1995

AGE GROUP	BOTH SEXES	MALE	FEMALE
All Ages	14,395	7,191	7,204
Under 1	293	163	130
1 – 4	1,390	749	641
5 – 9	1,773	908	865
10 – 14	1,679	856	823
15 – 19	1,409	730	679
20 – 24	1,121	561	560
25 – 29	974	468	506
30 – 34	868	444	424
35 – 39	751	371	380
40 – 44	683	309	374
45 – 49	622	315	307
50 – 54	625	298	327
55 – 59	574	265	309
60 – 64	468	234	234
65 – 69	390	188	202
70 – 74	306	144	162
75 – 79	255	108	147
80 and Over	214	80	134

Source NSO 1995

The 2006 PDMS data shows the following: 1,561 (48.12%) HHs are living below the food threshold; 237 (12.41%) Child/Children are malnourished; while 2,130 (65.66%) HHs are living below the Income Threshold. 24 (0.74%) HHs are living below the meal threshold.¹⁸ This becomes noteworthy as it increases the sensitivity of the population to coping with the potentially adverse effects of climate change on health as malnourishment compromises our young. Income that is compromised also becomes an indicator when it comes to seeking and paying for health services.



¹⁸ <http://www.ppdobohol.lgu.ph/municipal-links/1st-district/balilihan/>

Water and sanitation figures further state that 875 (26.97%) HHs have unsanitary Toilet – not water sealed (Antipolo pit privy type) and 252 (7.77%) have Non Potable Water. This increases the potential towards affectation from water borne and vector borne: feco-oral transmission of climate sensitive/related diseases, typhoid, cholera, and related gastrointestinal ailments.

2014 Balilihan Morbidities¹⁹

1. ACUTE UPPER RESPIRATORY TRACT INFECTION, UNSPECIFIED	- 1249 - 73/1000
2. COUGH	- 512 - 29/1000
3. ACUTE BRONCHITIS	- 338 - 19/1000
4. CUTANEOUS ABSCESS, FURUNCLE & CARBUNCLE, UNSPECIFIED	- 242 - 14/1000
5. URINARY TRACT INFECTION	-177 - 10/1000
6. OPEN WOUND OF UNSPECIFIED BODY REGION	-170 - 10/1000
7. PNEUMONIA, UNSPECIFIED	- 162 - 9/1000
8. HYPERTENSION, STAGE II	- 149 - 8/1000
9. POST TRAUMATIC WOUND INFECTION, NOT ELSEWHERE CLASSIFIED	- 149 - 8/1000
10. ASTHMA	- 122 - 7/1000

The table above notes that the morbidities experienced in the 2014 municipal health report shows a majority of respiratory infections – 1st, 2nd, 3rd, 7th which may be primarily bacteria/viral and exacerbated by climate related changes for the most part and 10th (Asthma) which is considered a climate sensitive disease. The 4-6th causes are more non-climatic affected primarily. It will be important then to surface how these diseases can be prevented to help increase adaptive capacities.

The following table shows that for the most part deaths were of the extreme of ages, secondary to lifestyle diseases; interesting to note that no.5 cause is still a potential indirect effect of climate change on health through malnutrition, a possible increase in the sensitivity of extremes of ages contributing to the condition.

2014 top 10 Mortality Causes

1. SENILITY	- 12 - 1/1000
2. STROKE NOT SPECIFIED AS HEMORRHAGE OR INFARCTION	- 11 - 1/1000
3. ACUTE MYOCARDIAL INFARCTION	- 7 - 1/1000
4. ACUTE MYOCARDIAL INFARCTION UNSPECIFIED	- 6 - 1/1000
♦ RESPIRATORY FAILURE UNSPECIFIED	- 6 - 1/1000
5. UNSPECIFIED PROTEIN- ENERGY MALNUTRITION	- 5 - 1/1000
6. HEART FAILURE UNSPECIFIED	- 4 - 1/1000
7. PNEUMONIA UNSPECIFIED	- 3 - 1/1000
♦ CONGESTIVE HEART FAILURE	- 3 - 1/1000
♦ UNSPECIFIED RENAL FAILURE	- 3 - 1/1000
8. CRUSHING INJURY OF HEAD	- 2 - 1/1000
9. NON- INSULIN DEPENDENT DIABETES MELLITUS WITH MULTIPLE COMPLICATION	- 2 - 1/1000

19 MHO Report 2014

Food security is an important consideration as an indirect effect of health affected climate changes that may lead to malnutrition. A **food balance analysis** of the municipality in the CLUP²⁰ recommended a slight diversion of agricultural production concentration from rice and corn to other agricultural products such as fruit trees, assorted vegetables whose demand in the market is high and whose buying price is higher compared to the former.

It has to be considered also that irrigation facilities are lacking as such and they are thus limited to 2 crops/yr yield. This contributes to the earlier data of 1,561 (48.12%) HHs living below the food threshold; 237 (12.41%) Child/Children are malnourished as of 2006 PDMS data. Note that requirements as of 2011 has decreased for rice and slightly increased for corn giving them a deficit. While this does not seem to be a corrective mechanism, out-migration to the city is a consideration.

Table No. 34
Food Supply and Demand

Municipality of Balilihan

Commodities	1999			2011		
	Production (metric tons)	Demand/ Requirement (m.t.)	Surplus/ Deficit (m.t.)	Production (Metric tons)	Demand/ Requirement (m.t.)	Surplus/ Deficit (m.t.)
Rice	2,946.82	1501.14	1,445.68	3,241.50	2,589.06	652.44
Corn	222.35	55.74	166.61	444.60	502.81	(58.21)
Root crops	718.2	334.17	384.03	790.02	482.26	307.76
Vegetables	284.09	784.57	-500.48	340.89	1,132.27	(791.38)
Fruits	174.9	406.81	-231.91	209.88	587.66	(377.78)
Meat (chicken)	13.23	16.89	-3.66	213.22	100.22	113.00
Beef	12.4	16.69	-4.29	14.90	33.75	(18.85)
Carabeef	17.21	2.79	14.42	19.01	19.08	(0.07)
Swine	149.02	200.35	-51.33	223.11	289.42	(66.31)
Chevon	0.32	3.49	-3.17	0.84	5.04	(4.20)
Eggs	35.28	60.91	-25.63	52.92	82.48	(29.59)

Source: MPDC, MAO Note: Per capita consumption is based on figures
from the Bureau of Agricultural Statistics

Response to emergencies are also a good hallmark for adaptation and mitigation. For immediate medical response, the municipality has a free hospitalization program for the indigents. The reported

²⁰ Balilihan Comprehensive Land Use Plan

Balilihan Assistance Rescue Team (BART) is a "24-hour alert team" initiative which has at its service two standby ambulances for its use in cases of emergency. This is complemented by complete communication facilities connecting to all of the 31 barangays in the municipality.

From the foregoing Competitive index done, the governance ranking for capacities for health puts Balilihan as rank 306 for a score of 0.059952; for its infrastructure for health 206/0.0177126. Overall ranking puts Balilihan at no. 402 with a score of 26.9580²¹ in the 3rd-6th class municipalities.

Catigbian



Catigbian is a 4th class municipality in the province of Bohol, Philippines. According to the 2007 census, it has a population of 23,333 people. Catigbian is located in the interior part of Bohol, north of Balilihan, south of Sagbayan and Tubigon, west of Batuan and east of San Isidro. Thirty five (35) kilometers northeast of Tagbilaran City, the capital of the Province of Bohol. Total Land: 11,301.7032 hectares Number of Barangays: 22 Barangays.²²

Characteristics and Highlights

PDMS in 2004 showed the following health determinants and indicators. 526 (22.4%) Child/Children malnourished, with 2 (0.05%) HHs having Child Mortality. In relation to the malnourished children reported, 2,525 (60.73%) HH(s) live below the Food Threshold and 15 (0.36%) HH(s) live below the Meal Threshold. This will increase the sensitivity of the child population to cope with the potential health impacts of climate change.

It was likewise gathered that 3,109 (74.77%) HH(s) are living below the Income Threshold and 2,461 (21.26%) Person(s) are unemployed. The deprivation index shows the top five barangays – Mahayag Norte at 29.79%, Kang- iras, Maitum, Ambuan and Liboron. This is significant as these also are indicators of available resources to allocate for basic needs such as health services and food.

It was also noted that 614 (38.82%) HH(s) have unsanitary toilet that raises the sensitivity of the population to water and feco oral borne diseases which may exacerbate in weather extremes of flooding of dry spells. Further to this reports also showed that 214 (5.15%) HH(s) have makeshift

²¹ <http://www.competitive.org.ph/cmindex/pages/profile/?lgu=Balilihan>

²² <http://catigbian.gov.ph/>

Housing Materials. This exposes these individuals and families to the adverse effects of potential high velocity storms and winds and health impacts brought either directly through injuries to life and limb and indirectly through diseases aggravated due to lack of protection from the elements.

Cortes



The Municipality of Cortes is a 5th class municipality in the province of Bohol, Philippines. Municipality of Cortes has 14 barangays De La Paz, Fatima, Loreto, Lourdes, Malayo Norte, Malayo Sur, Monserrat, New Lourdes, Patrocinio, Poblacion, Rosario, Salvador, San Roque and Upper De La Paz. According to the 2010 census, it has a population of 13,798 people in 2,987 households. Cortes is a town northeast of Tagbilaran City. They had already a form of government before the coming of the Spaniards. The town was established later, probably in 1862. The town was renamed after the Spanish conquistador, Hernan Cortes.²³

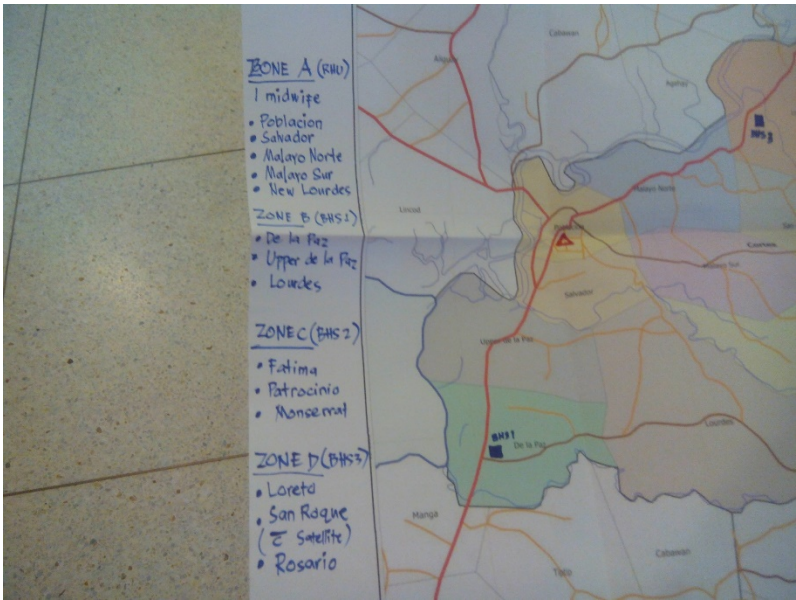
Overall score 795/17.5330; capacity of health services 763/0.032051; health infrastructure 745/0.007386

PDMS Survey Year 2009

- 1. 8 (0.48 %) Child/Children are Malnourished
 - 2. 6 (0.22 %) Households have Child Mortality
 - 3. 169 (6.08 %) Households have Crime Incidence
 - 4. 349 (12.55 %) Households are below the Food Threshold
 - 5. 59 (2.12 %) Households have Makeshift Housing
 - 6. 729 (26.21 %) Households are below the Income Threshold
 - 7. 3 (0.11 %) Households are below the Meals Threshold
 - 8. 849 (30.53 %) Households have Unsanitary Toilet
 - 9. 204 (7.32 %) Person/Persons are School Dropouts
 - 10. 471 (16.94 %) Households are Not Owning the Lot
 - 11. 938 (12.32 %) Person/Persons are Unemployed
 - 12. 131 (4.71 %) Households are using Non-Potable/Doubtful Drinking Water
-
- 13. There are 1,900 NHTS families in Cortes: more NHTS in Loreto and San Roque – around 50%; covered by Philhealth
 - 14. Philhealth utilization → 100% for Philhealth members
 - 15. RHU does deliveries since 2009, with 15 deliveries a month, but not all are nhts or philhealth members
 - 1. became accredited 2 years ago; able to claim from Philhealth - less than 100K;
 - 16. RHU equipment – 90% complete in equipment; problem is Med Tech (the current MedTech comes once a week to RHU (from Province but for the TB program)
 - 1. No Med Tech, no laboratory → but the RHU wish to do CBC, urinalysis for OPB

²³ <http://www.boholislandtravel.com/town1.html>

- 2. Can't procure equipment without Med Tech → there is a request for microscope, none till now
- 17. Lifestyle diseases are topping the list – because the Municipality is near Tagbilaran



At a glance²⁴

Population (2010): 15294
Population (2000): 12702
Number of households (2000):2547
Land area: 4377 ha
Number of barangays: 14
Distance from Tagbilaran: 10 km

Upon visitation it was seen that the townhall is in need of repair; the rural health unit likewise was affected by the earthquake in 2013. Services though are

there but equipment is lacking. There are NDPs deployed in the area. There is a lack of resources as their IRA cannot sustain these.

Maribojoc²⁵

Maribojoc is a fourth class municipality in the province of Bohol. Located 30 kilometers southwest of Tagbilaran City, the provincial capital, the municipality is composed of 22 barangays whose residents are primarily engaged in farming and fishing. Maribojoc has a total of 20,491 people with a population density of 2.6 persons per hectare as of 2010. Urban population consists of 26.61% of the total town population. The population is predominantly young, with 30% of the total population aged 0-14 years old. The productive force



of the municipality is 60%.²⁶ Maribojoc is a coastal municipality which has the other ecologic complement of mountains, thus giving the municipality a biologically diverse environment. It has nine coastal barangays, namely: Punta Cruz, Guiwanon, Lagtangon, Bood, Dipatlong, Poblacion, Anislag, San Vicente and Lincod. Jandig, Bayacabac, Punsod, Aliguay, Cabawan, Agahay, Busao, Toril, San Roque, Tinibgan, San Isidro, Pagnitoan and Candavid compose the 13 inland barangays.

Land formation of the municipality ranges from sea-level to very steep slopes. Its highest elevation is 304 meters above sea level. Almost 80% of the municipality experience

²⁴ <http://www.bohol.ph/mun17.html>
²⁵ <http://www.boholanalysis.com/>
²⁶ NCSB

erosion. Moderate to severe erosions occur in the areas with very rolling to very steep slopes. While the municipality does not have a sewerage system, water accumulated in the terrain drain towards Maribojoc Bay on its southwest side and the Abatan River on its southeastern boundary.

The earthquake that struck in 2013 left Maribojoc devastated with some reported 8 people missing. The Philippine Institute of Volcanology and Seismology (PHIVOLCS) has already identified the East Bohol Fault, the only known earthquake generator in the island and is located 40 kilometers southwest of Maribojoc. Bohol is also considered one of the seismologically active geographic areas in the country and the last earthquake that the province experienced was only in the 1990.

Health Characteristic and Highlights

Reports gathered²⁷ that 2.53% of children were malnourished, with 0.21% child mortality and 0.03% maternal mortality. These indices will show us the availability of basic health service delivery in the municipality. Malnourishment opens body defences more sensitive to potential climate related diseases. In relation to the malnourished rate of children, the indices of food threshold at 15.33% and unemployment at 18.54% shows us an increase susceptibility to the indirect effects of potential impacts of health with climate change through increasing potential to malnourishment and not having the means to procure or pay for basic health services.

1.63% of HHs do not have potable water and 37.53% do not have sanitary toilets are likewise health determinants that increases the potential for cases of gastrointestinal diseases and diarrhea like that brought about by typhoid and cholera, diseases which are also climate sensitive due to the water borne nature of the vectors which can be exacerbated in excessive flooding or drought. A ranking of environmental problems for Maribojoc showed that the 1st two as waste disposal and poor quality of water, air and land²⁸ that buttresses our point of increased susceptibility to the potential health impacts of climate change with these disabling mechanisms to adaptive capacities. Further, the report showed the following top 5 barangays to be most deprived: San Isidro, Candavid, Pagnitoan, Toril and Guiwanon, which are at the peripherals and considered GIDAs as to distances form the center.

Health Infrastructure

The municipality has 1 Rural Health Unit that is Philhealth accredited (4-in-1 accreditation - Tb dots, mcp, pcb1 and tsek-up) since 2013. It is equipped with the following for its services: oxygen tank, delivery kit, Doppler. There is no Xray machine. The RHU is 13 km away from Tagbilaran so that patients are either referred to the community hospital or they go straight to the government or private hospital in the city. There is also a Birthing home facility that is separate from the RHU.



²⁷ 2010 Poverty Database Monitoring System, Maribojoc
²⁸ EcoBudget 2010 report

They have 8 deployed Nurses as part of the Nurse deployment Program of the DOH. There is 1 barangay health station/barangay. These are staffed with midwives= 1 mw/BHS. Health worker to population ratio is still within the 1:20,000. Candavid which is a mountainous barangay has a satellite station for health and is the farthest, and reports to Pagnitoan. Except for Candavid – travel to RHU is 30 minutes over rough roads. The mode of transport are a modified motorcycle (habal-habal). The other mountainous barangays are Jandig, Tinigban, Pamintoan which are part of the top 10 most depressed barangays in the municipality according to the 2010 PDMS.

The BHS services given are antenatal checkup, immunization, wound dressing and BP check-up. Patients requiring medicines are referred to the RHU. When they are needing higher treatment, they are referred to the 20 bed capacity provincial subsidized government community hospital. An ambulance is available for the conduct of patients but is either limited by budgets of gasoline and repairs.

There are 2000+ Philhealth sponsored members with a high utilization rate for pcb and mcp. There are 1,100 National house targeting system (NHTS) patients. The biggest number are seen to cluster in Barangay Bayacabac which has only a satellite health station, but has the nearby community hospital. Then the other NHTS families are in Dipatong – 33 families, which is near the existing RHU there.

Water –

Water-related diseases can be classified by route of transmission, thus distinguishing between water-borne (ingested) and water-washed diseases (caused by lack of hygiene). There are four main considerations to take into account when evaluating the relationship between health outcomes and exposure to changes in rainfall, water availability and quality:

- linkages between water availability, household access to improved water, and the health burden due to diarrhoeal diseases;
- the role of extreme rainfall (intense rainfall or drought) in facilitating water-borne outbreaks of diseases through piped water supplies or surface water;
- effects of temperature and runoff on microbiological and chemical contamination of coastal, recreational and surface waters;
- direct effects of temperature on the incidence of diarrhoeal disease.

Score	Significance
0-2.1	Low Adaptive Capacity. The health system is lacking in two of the three key areas of adaptive capacity. There is little, if any, of the parameters of Technology, Information and Skills, and Institution, inherent or in place within the organization.
2.2-4.2	Medium Adaptive Capacity. The health system is equipped with baseline features within the three key areas.
4.3-6.3	High Adaptive Capacity. The health system is well equipped to respond to the proliferation of the disease under study. The organization has the ability to prevent transmission of the disease.

A.) Alienable and Disposable (A & D) : 12,897 has. (production & built-up area)

B.) Timberland : 2,125 has. (protected area)

CLASS OF SOIL: Batuan Faraon Clay

MAJOR RIVERS: Abatan, Loboc, Hanopol & Bongbong

SOURCES OF LIVELIHOOD

- Farming – 70.00%
- Cottage Industry - 9.15%
- Hog/Livestock Raising - 3.85%
- Employment - 15.00%
- Business - 2.00%



Dr. Glenn Roy Paraso
December 6, 2018

