NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

Volume 2: Philippine Water Supply and Sanitation Master Plan

Western Visayas Water Supply and Sanitation Databook and Regional Roadmap

Table of Contents

List of Tables

List of Figures

Acronyms

AAGR	Average Annual Population Growth Rate
ADB	Asian Development Bank
AHFF	Agriculture, Hunting, Fishery and Forestry
AM	Assistance to Municipalities
ARMM	Autonomous Region of Muslim Mindanao
BCC	Behavior Change Communication
BPO	Business Process Outsourcing
BOD	Biological Oxygen Demand
BWSA	Barangay Water and Sanitation Association
CapEx	Capital Expenditure
CBO	Community-Based Organization
DA	Department of Agriculture
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DJF	December, January and February
DOH	Department of Health
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
EDCOP	Engineering and Development Corporation of the Philippines
EPANET	Environmental Protection Agency Network
EMB	Environmental Management Bureau
FA	Financial Assistance
FHSIS	Field Health Service Information System
FIES	Family Income and Expenditure Survey
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
HH	Household
HUC	Highly Urbanized City
IEC	Information, Education and Communication
IHRB	Ilog-Hilabangan River Basin
iWASH	Initiative on Water, Sanitation and Hygiene
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JJA	June, July and August
JRB	Jalaur River Basin
LCE	Local Chief Executive
LDP	Local Development Plan
LFPR	Labor Force Participation Rate
LGU	Local Government Unit
LSSP	Local Sustainable Sanitation Plan
LWUA	Local Water Utilities Administration
M&E	Monitoring and Evaluation
MAM	March, April and May
MDG	Millenium Development Goals
MGB	Mines and Geosciences Bureau
NAMRIA	National Mapping and Resource Information Authority
NCR	National Capital Region
NDRRMC	National Disaster Risk Reduction Management Council
NEDA	National Economic and Development Authority
NGO	Nongovernment Organization
NRW	Nonrevenue Water
NSSMP	National Sewerage and Septage Management Program
NWRB	National Water Resources Board
OBS	Observed Baseline
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDP	Philippine Development Plan
PEM	Philippine Environment Monitor

PNSDW	Philippine National Standards for Drinking Water
PRB	Panay River Basin
PRIMEX	Pacific Rim Innovation and Management Exponents, Inc.
PSA	Philippine Statistics Authority
PSGC	Philippine Standard Geographic Code
PWSSMP	Philippine Water Supply and Sanitation Master Plan
RBCO	River Basin Control Office
RWSA	Rural Waterworks and Sanitation Association
SALINTUBIG	Sagana at Ligtas na Tubig
SDG	Sustainable Development Goals
SON	September, October and November
STP	Septage Treatment Plant
TC	Tropical Cyclone
UN	United Nations
WASH	Water, Sanitation and Hygiene
WD	Water District
WQMA	Water Quality Management Area
WRR	Water Resources Region
WSP	Water Service Provider
WSS	Water Supply and Sanitation
WSSPMO	Water Supply and Sanitation Program Management Office
ZOD	Zero Open Defecation

Units

%	percent
°C	degree Celsius
CY	Calendar Year
km²	square kilometer
km	kilometer
lpcd	liters per capita per day
lps	liters per second
m³	cubic meter
MCM	million cubic meters
mm	millimeter
mg/L	milligrams per liter
PhP	Philippine peso

7

Western Visayas Region

Region VI Western Visayas

Introduction

Western Visayas is located in the central part of the Philippine archipelago.

Designated as Region VI, it is bordered on the north by the Sibuyan Sea, on the northeast by the Visayan Sea, on the east by the Guimaras Strait, on the south by the Iloilo Strait and the Panay Gulf, and on the west by the Sulu Sea. The region consists of the major island of Panay, the smaller island of Guimaras, and half of Negros Island, as well as several outlying islands.

The region is subdivided into six provinces, namely Aklan, Antique, Capiz, Guimaras, Iloilo and Negros Occidental. It has 118 municipalities, 15 cities and 4,039 barangays, which make up 18 congressional districts. It has two highly urbanized cities (HUCs): Iloilo City (also the regional center) and Bacolod City.

Its component cities include Bago, Cadiz, Escalante, Himamaylan, Kabankalan, La Carlota, Passi, Roxas, Sagay, San Carlos, Silay, Talisay, and Victorias.

Land Classification

The region has a total land area of 20,794 square kilometers (km^2) representing around 6.74% of the country's total land area. Negros Occidental has the largest land area, followed by Iloilo, Capiz and Antique. Guimaras occupies the smallest land area.

Forestlands cover 32% of the region, while alienable and disposable lands cover 68%.

About 43% percent of the region’s land resources are devoted to agricultural production.

Economy

As of 2015, the region’s average share in the country's gross regional domestic product (GRDP) was estimated at 4% and contribution to GDP growth at 2%. In comparison to the previous years’ figures, the region’s GRDP increased to 8.3%.

Region VI has shown an impressive overall economic performance in recent years owing to the recovery of the agriculture, hunting, forestry and fishing (AHFF), industry and services sectors, according to the National Economic and Development Authority (NEDA) Regional Office VI.

In 2016, the largest share of the region’s economy came from the service sector at 55.4%, followed by the industry sector at 24.0% and the AHFF sector at 20.6%. Close to 40% of the region’s labor force depends on the latter.[1]

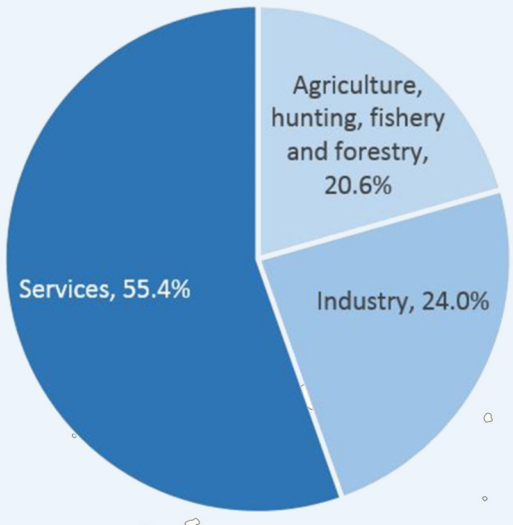


Figure 1: GRDP Contributions per Sector, 2016

Labor and Employment

According to the Philippine Statistics Authority (PSA), as of January 2016, the total labor force participation rate (LFPR) was estimated at 63.7% of the total population of the region, equivalent to nearly 4.8 million.

Province-wise, the data show that Capiz had the highest LFPR among the six provinces with 68.4%, though the other provinces did not differ significantly.

The employment rate in the region in was considerably high at 95.2%. On a provincial scale, Antique had the highest employment rate at 96.4%.[2]

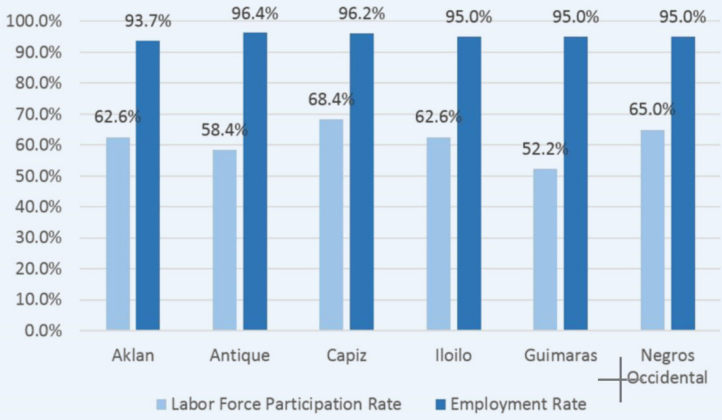


Figure 2: Labor Force Participation and Employment Rates per Province, 2016

[1] Philippine Statistics Authority; CountryStat Philippines, Region VI, 2016
[2] Philippines Statistics Authority; Labor Force Survey 2016

40°0.000′E
40°0.000′W
40°0.000′N
60°0.000′S
20°0.000′N
60°0.000′S
N
10 0 10 20 30 40 km
WGS 1984 - UTM Zone 51 N
7
40°0.000′E
40°0.000′W

Population Density

PSA, 2015 Census

Legend

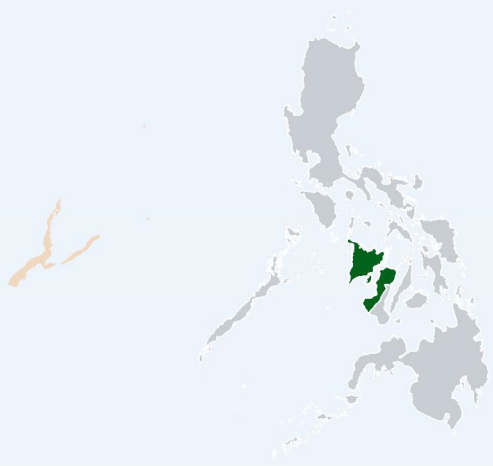
2015 Population Density
per Square Kilometer

- 0.07 - 0.76
- 0.76 - 1.36
- 1.36 - 1.86
- 1.86 - 2.39
- 2.39 - 2.92
- 2.92 - 3.70
- 3.70 - 4.73
- 4.73 - 6.76
- 6.76 - 11.77
- 11.77 - 479.77

N

10 0 10 20 30 40 km

WGS 1984 - UTM Zone 51 N



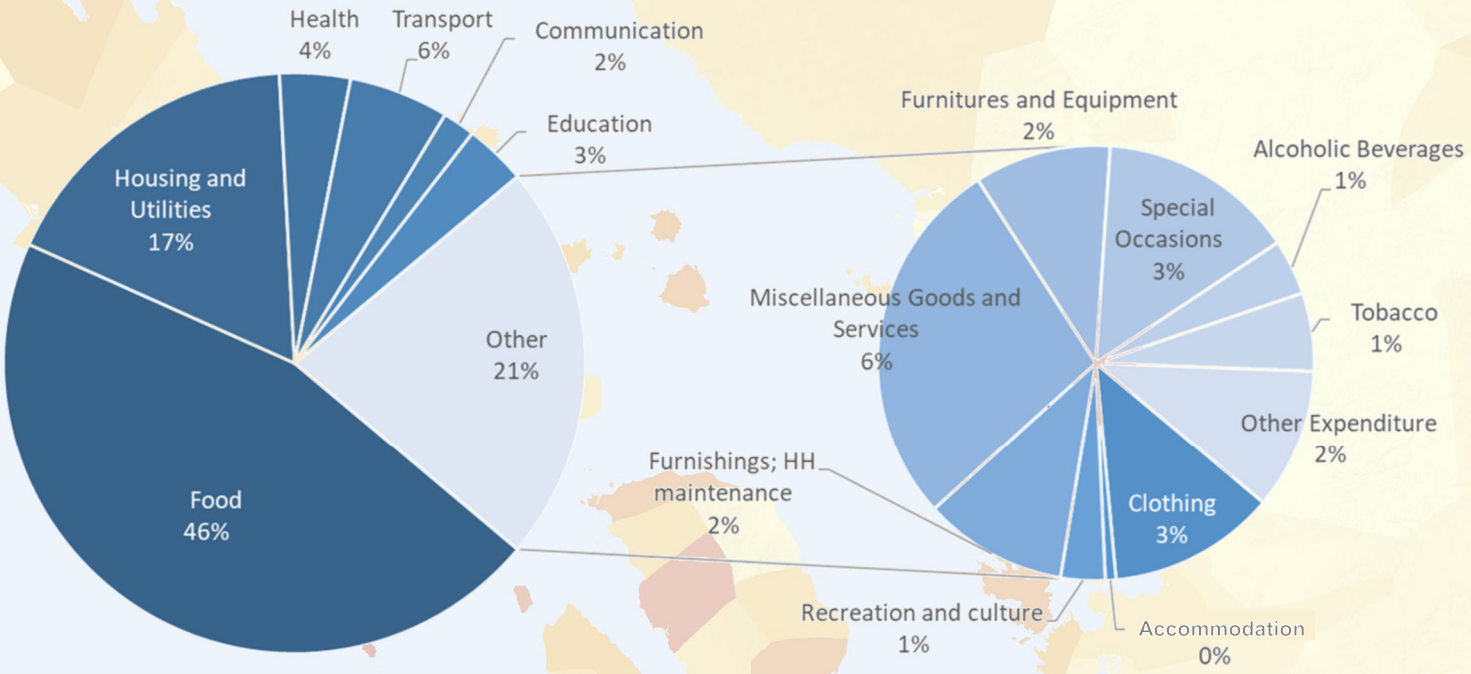


Figure 3: Distribution of Family Expenditure, 2015[3]

Family Income and Expenditure

There are about 1.7 million families in Western Visayas, with an estimated total annual average income of PhP384,039 and a total annual average expenditure of PhP299,808.

In terms of income class, all have incomes greater than their expenditures.

With family size as an indicator, a family of seven or more has the largest income-expenditure difference, while a single-person household has the least. This indicates that a seven (or more)-member family has more savings as compared to other family sizes.

With respect to the disbursement patterns of families in the region and across income levels, the Family Income and Expenditure Survey (FIES) conducted in 2015 revealed that food expenditure registered the highest among the major expenditure groups at 46%. Housing and utility expenses followed at 17%. Figure 3 shows the expenditure distribution indicating that most families spend more for their basic needs.

Demography

As of 2015, Western Visayas had a total population of 7,536,383. Among the six provinces of the region, Negros Occidental (excluding Bacolod City) had the largest population at 2.5 million followed by Iloilo (excluding Iloilo City) at 1.94 million. Guimaras had the smallest population at 175,000.

The regional population growth rate between 2010 and 2015 was approximately 1.24%.

The population density of Western Visayas in 2015 averaged 362 persons per square kilometer. A large percentage of its population is concentrated in the cities (as shown on the map on the left).

Its predominantly rural population is estimated at 66%. Household size in the region averages 4.36 persons (see Table 2).

Table 1: Population per Province/HUC, 2015

Region/Province/City	Population	Land Area (km^2)	Population Density (persons/km^2)
Western Visayas	**7,536,383**	**20,794**	**362**
Aklan	574,823	1,821	316
Antique	582,012	2,729	213
Capiz	761,384	2,595	293
Guimaras	174,613	605	289
Iloilo (excluding Iloilo City)	1,936,423	5,001	387
Iloilo City	447,992	78	5,719
Negros Occidental (excluding Bacolod City)	2,497,261	7,803	320
Bacolod City	561,875	163	3,454

Table 2: Urban and Rural Population per Province/HUC, 2015[4]

Region/Province/City	Urban Population	Rural population	HH Size
Western Visayas	**37%**	**66%**	**4.36**
Aklan	18%	82%	4.28
Antique	8%	92%	4.48
Capiz	18%	82%	4.22
Guimaras	5%	95%	4.30
Iloilo (excluding Iloilo City)	4%	96%	4.43
Iloilo City	52%	48%	4.43
Negros Occidental (excluding Bacolod City)	56%	44%	4.35
Bacolod City	97%	3%	4.33

[3] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[4] Philippine Statistics Authority, Philippine Standard Geographic Code, 2015

Climate

Western Visayas' climate is tropical with an average temperature of 27°C.

Two distinct types of climate prevail. The upper part of Panay and Negros Occidental has a Type III climate, where seasons are not very pronounced. It is relatively dry from November to April and wet the rest of the year. The lower part of Panay has a Type I climate with two pronounced seasons: dry from November to April and wet the rest of the year.

Disaster Risk

The region's geographical location makes it vulnerable to geohazards. This is evident in the number of destructive calamities in the region that have snuffed out lives of untold numbers and damaged property and infrastructure.

With the Negros Trench and the Antique Fault underlying the Negros and Panay Islands, the region is exposed to seismic hazards , i.e. earthquakes, volcanic eruptions (the most active volcano in central Philippines, Mt. Kanlaon, is found in Negros Occidental).

Climatological hazards threatening the region include tropical cyclones (TCs), flooding, rain-induced landslides and storm surges.

Climate Change and Hydrological Hazards

The Philippines is at great risk of climate-related hazards, such as tropical TCs, floods, droughts and sea level rise. The effects of observed changes in extreme events and severe climate anomalies include increased occurrence of extreme rains causing: (a) floods and landslides; (b) longer and more intense droughts which cause massive crop failures, water shortages and forest fires; and (c) increased occurrence of TCs.

Global climate models, which were used to run two possible scenarios (A1B and A2), were downscaled to calculate projected Philippine rainfall. Studies show a general increase in rainfall for 2020, 2050 and beyond. The models, however, show higher variability in rainfall with increased peak rainfall during the wet season and longer dry conditions during the dry season. (Rainfall variability means changes in water supply dynamics spatially and year-to-year.)

Water supply is highly vulnerable to changes in river flows and the rate of replenishment of groundwater resources. Lower river flows will result in water shortages. More intense rainfall events may not necessarily mean more groundwater recharge compared to rain that is more evenly spread throughout the year. Lower than average rainfall or longer pronounced dry days may affect soil porosity and vegetation, which could lead to reduced soil infiltration rates. This means less groundwater recharge. Given this scenario, more water stress will likely be experienced by 2020 and 2050.

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events (temperatures higher than 35°C, days when rainfall is more than 300 mm, and rainy days that outnumber dry days) in Region VI based on the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) downscaled climate projections are shown in Tables 3 and 4. Four seasons are provided: December, January and February (DJF); March, April and May (MAM); June, July and August (JJA); and September, October and November (SON). The projections were added to the observed values in the past 30-year baseline (1971-2000).

Table 3: Seasonal Projections Under a Medium-Range Emission Scenario

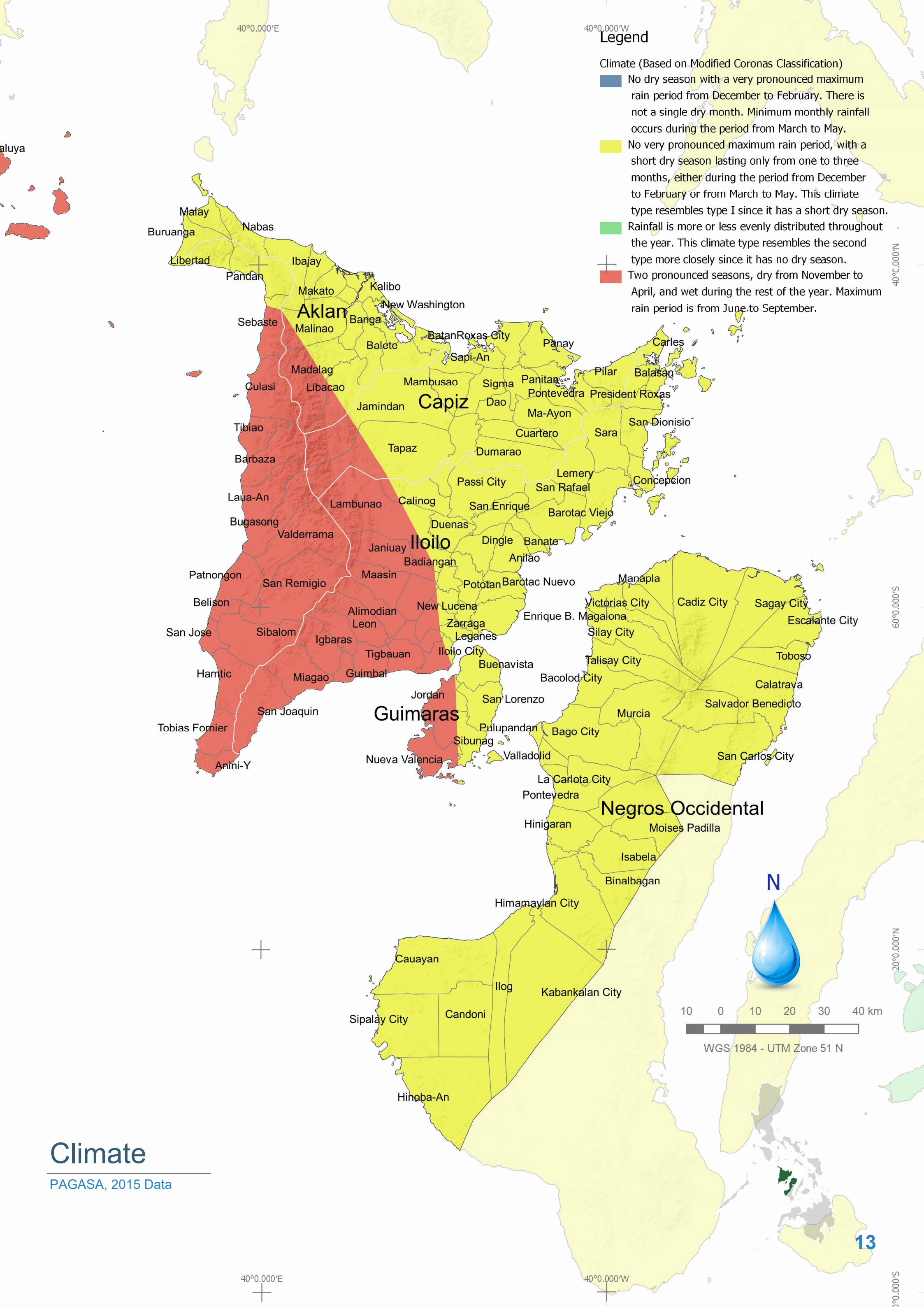
Seasonal Temperature Increase (in °C)	Observed Baseline (1971 - 2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Aklan	26.1	27.9	27.8	27.4	1.00	1.20	1.00	0.90	1.90	2.40	2.10	1.80
Antique	26.6	28.4	27.9	27.7	1.00	1.20	0.90	0.90	1.90	2.20	1.90	1.80
Capiz	25.9	27.7	27.8	27.3	0.90	1.20	1.10	1.00	1.90	2.40	2.20	1.90
Iloilo	26.4	28.2	27.9	27.6	1.00	1.30	1.10	1.00	1.90	2.40	2.10	1.90
Negros Occidental	26.7	28.4	27.8	27.6	0.90	1.20	1.00	1.00	1.90	2.30	2.00	1.90
Seasonal Rainfall Change (in %)	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
Aklan	431.2	322.7	862.5	883.7	3.9	-8.8	-4.0	16.9	14.9	-13.4	-5.5	11.1
Antique	297.9	288.0	995.3	841.4	-17.2	-12.8	9.8	14.6	17.0	-12.6	21.7	11.9
Capiz	469.7	342.0	814.2	889.1	4.6	-5.8	-3.4	18.2	17.5	-12.9	-5.3	12.9
Iloilo	324.8	290.6	932.8	828.3	1.2	-8.6	-0.6	11.5	20.4	-13.3	3.8	3.9
Negros Occidental	234.9	283.0	899.6	784.0	7.1	-3.7	6.0	5.7	7.3	-9.3	11.8	14.3

Table 4: Frequency of Extreme Events in 2020 and 2050 Under a Medium-Range Emission Scenario

Province	Station	No. of Days w/ T_{max} > 35°C			No. of Dry Days			No. of Days w/ Rainfall > 300 mm		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
Capiz	Roxas	52	430	1,327	7,792	5,574	5,340	0	6	11
Iloilo	Iloilo	460	1,431	3,076	7,839	5,227	5,226	0	3	0

Climate

PAGASA, 2015 Data



40°0.000'E

40°0.000'W

Contour

NAMRIA

Aklan

Capiz

Antique

Iloilo

Guimaras

Negros Occidental

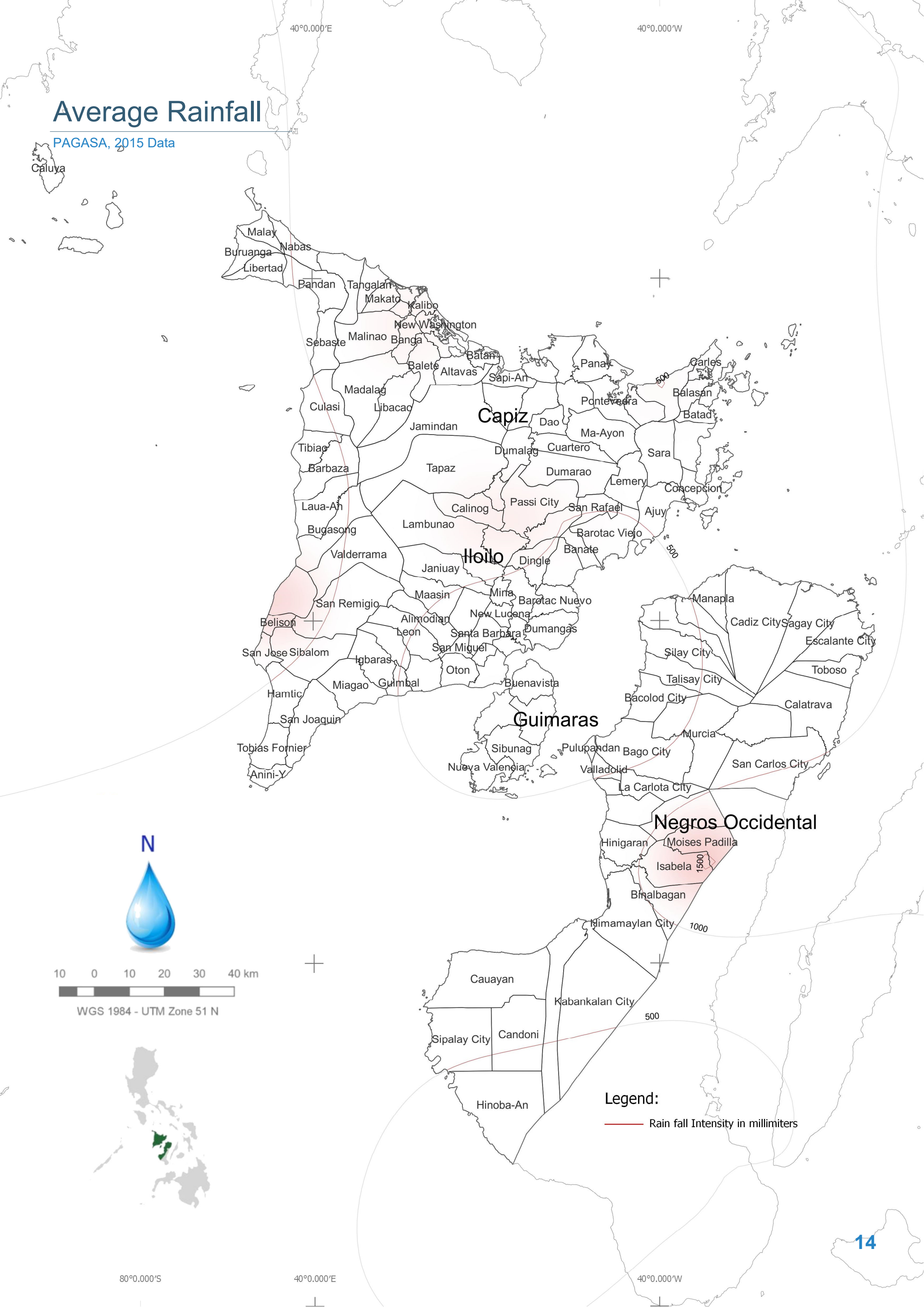
80°0.000'S

40°0.000'E

40°0.000'W

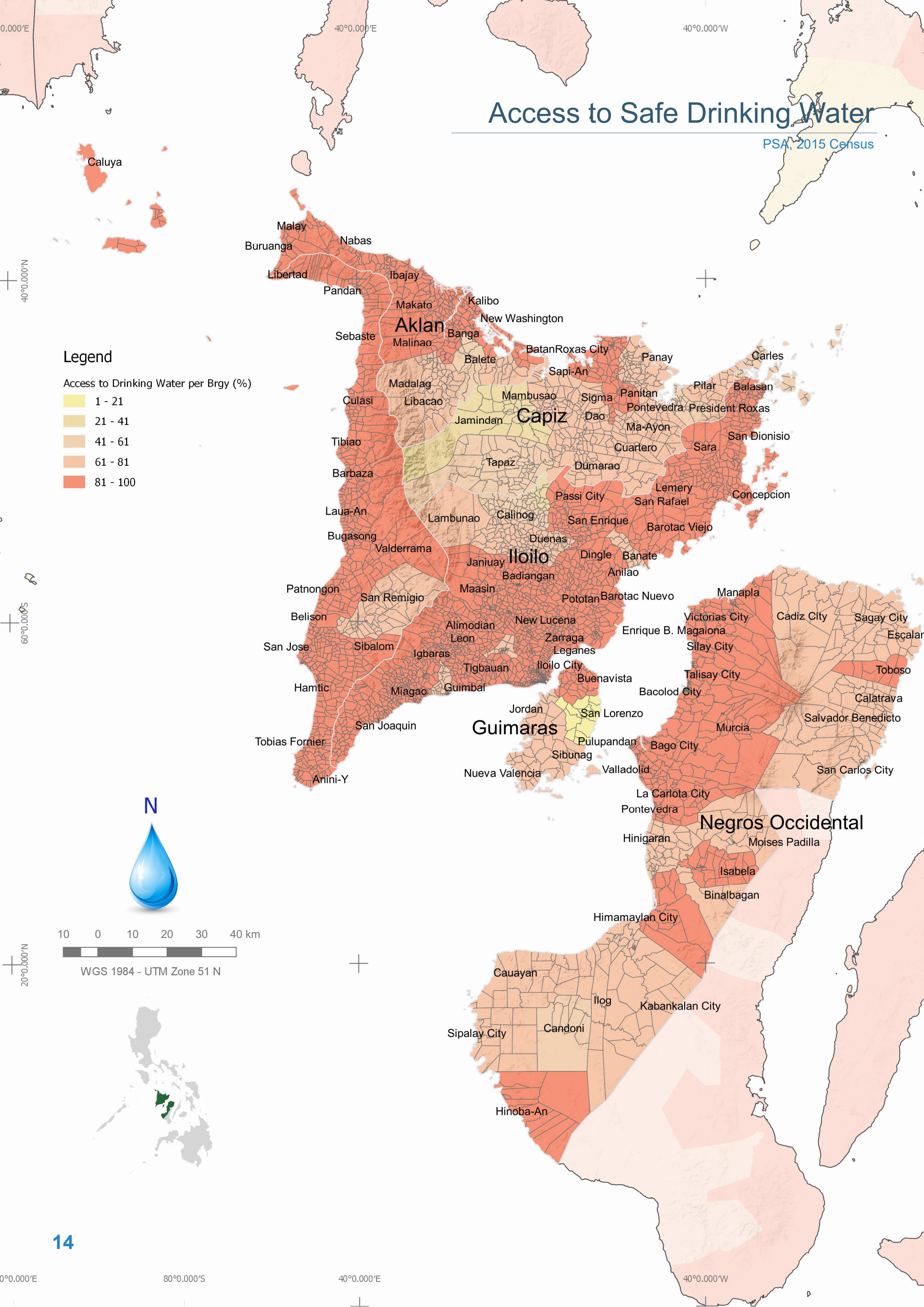
Average Rainfall

PAGASA, 2015 Data



Access to Safe Drinking Water

PSA, 2015 Census



WSS Sector Status

Access to Safe Water

Approximately 73% of Western Visayas' population had access to safe water sources in 2015[5].

This figure translates to approximately 1.26 million households (HHs). Approximately 25.4% of the population has Level III service connections in their own homes, while 7.4% has Level II connections that they share with the community.

Access to Level I (safe sources) comprises 40.5%. Safe sources of water under this category include tubed and/or piped deep or shallow wells (which users themselves own or share with the community), protected springs, rivers, streams, etc.

The region's access to safe water is below the national average — a discrepancy of about 14%.

Table 5: National and Regional Access to Water Supply[6]

Level of Service	National	Western Visayas
Level III	44.1%	25.4%
Level II	11.2%	7.4%
Level I (Safe Sources)	32.4%	40.5%
Subtotal (Safe Sources)	*87.7%*	*73.3%*
Level I (Unsafe Sources)	12.3%	26.7%
Total	100.0%	100.0%

Figure 4 shows the percentage distribution of the region's various water sources.

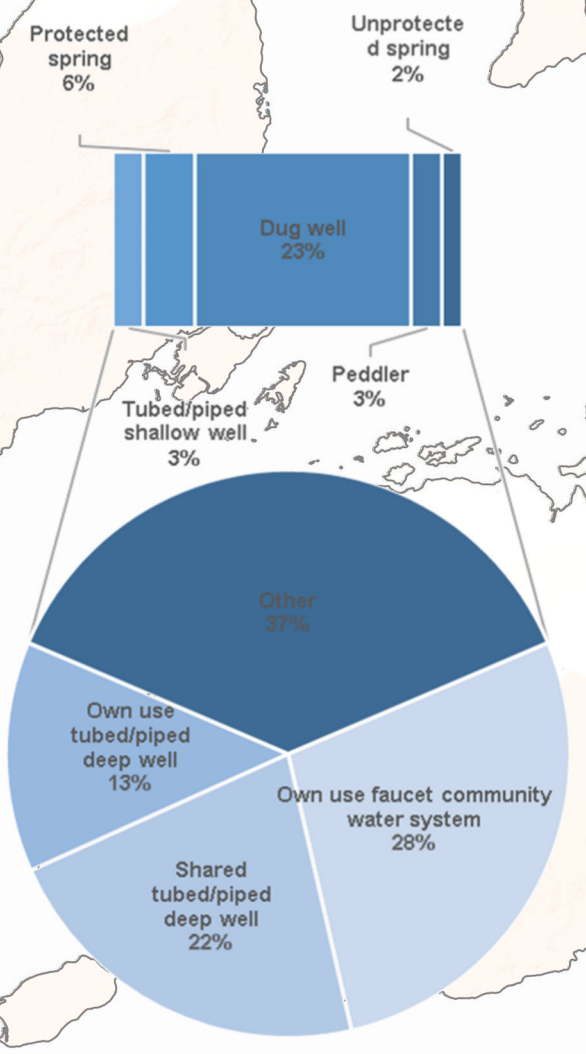


Figure 4: Main Sources of Water Supply, 2015

Table 6 shows safe water access in 2015 at the provincial level.

Table 6: Access to Water Supply per Province/HUC[7]

Region/Province/City	Access to Safe Water Supply
Western Visayas	**80.7%**
Aklan	95.1%
Antique	74.2%
Capiz	100.0%
Guimaras	100.0%
Iloilo	100.0%
Negros Occidental	58.4%
Bacolod City	89.1%
Iloilo City	100.0%

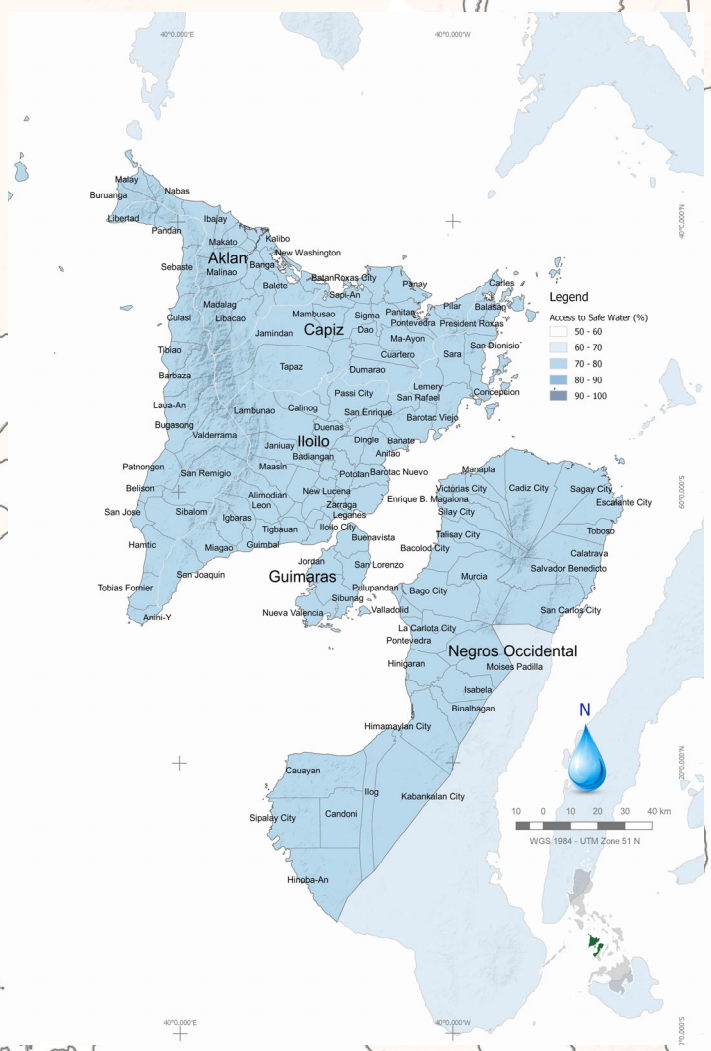


Figure 5: Provincial Access to Safe Water

Drinking Water

The PSA has released data up to the municipal level based on the latest 2015 Census. The classification of sources for drinking water is the same as that for sources of safe water with the addition of bottled water.

The drinking water of approximately 85% of the population in Western Visayas came from improved and safe water sources as of 2015. Approximately 26% of the regional population drinks bottled water.

The map on the left shows the extent of access to safe drinking water at the municipal level.

[5] *Philippine Statistics Authority, Family Income and Expenditure Survey, 2015*
[6] *Ibid.*
[7] *Based on Region VI provinces' firsthand data on access to safe water, (as gathered during the regional planning workshop)*

Access to Sanitation

Western Visayas Regional Workshop and Planning Consultation, 2017 Data

Access to Sanitation

The overall fast-paced growth of the region has, as a matter of course, contributed to the increase in the demand for sanitation services.

Approximately 72% of the region's population has access to improved sanitation.

The 2015 FIES has reported that Region VI is on a par with respect to the national average in terms of coverage for improved sanitation and slightly lags behind the national percentage in basic sanitation (Table 7).

What is alarming, however, is that the region has the third highest open defecation rate, next to the Bicol Region and ARMM. (The open defecation rate is a proxy indicator for the lack of access to toilet facilities.)

Table 7: National and Regional Access to Sanitation[8]

Sanitation Coverage	National	Region VI
Improved Sanitation	73.77%	72.06%
Basic Sanitation	19.96%	16.14%
Unimproved Sanitation	2.04%	3.57%
Open Defecation	4.23%	8.23%
Total	100.0%	100.0%

Guimaras registers the highest access to basic sanitation at 90.14% — this accounts for only 2.32% of the regional population. The two provinces with the highest population base, i.e., Iloilo and Negros Occidental, , however, have lower sanitation access at 82.23% and 66.68% respectively, according to the 2015 Annual Report of the Field Health Services Information System (FHSIS) of the Department of Health (DOH).

Table 8: Access to Sanitation Facilities per Province/HUC[9]

Region/Province/ City	HHs with Sanitary Toilets (2015)	HHs with Complete Basic Sanitation Facilities (2015)
Western Visayas	**79.70%**	**54.56%**
Aklan	86.50%	64.27%
Antique	87.39%	66.27%
Capiz	79.02%	36.23%
Guimaras	90.14%	85.10%
Iloilo	82.23%	55.16%
Negros Occidental	66.68%	38.03%
Bacolod City	*85.17%*	*63.26%*
Iloilo City	*86.82%*	*48.40%*

The minor discrepancy between Tables 7 and 8 regarding totals and averages highlights the difficulty of reconciling the definition of sanitation coverage under the Millenium Development Goals (MDG) with a more stratified and specific definition under the Sustainable Development Goals (SDG). Table 7 reflects the specifics per the SDG's definition. Table 8, on the other hand, reflects the rates of access as defined under the MDG, wherein the percentage of households with complete basic sanitation facilities is a subset of those with sanitary toilets.

Categorization of the facilities as per SDG definitions is as follows:

Improved Sanitation	▪ Water-sealed sewer septic tank (exclusive use)
Basic Sanitation	▪ Water-sealed sewer septic tank (shared) ▪ Water-sealed other depository (exclusive use) ▪ Water-sealed other depository (shared) ▪ Closed Pit
Unimproved Sanitation	▪ Open Pit
Open Defecation	▪ Other Means ▪ None

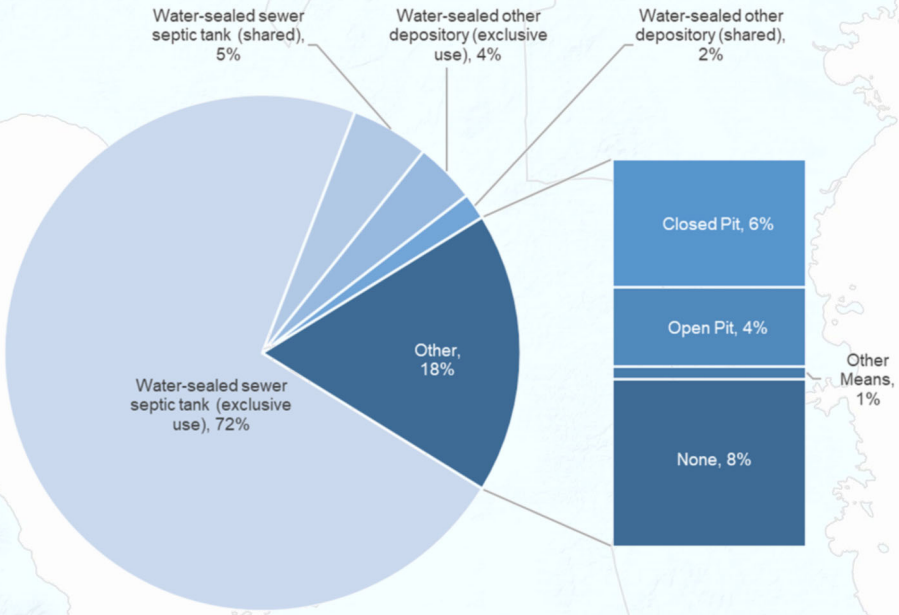


Figure 6: Percentage of Households with Access to Sanitation Facilities, 2015

Figure 6 shows the percentage of households per type of sanitation facilities. It represents the initial stages of the sanitation ladder in the region.

While one of the main objectives of the Philippine Development Plan (PDP) is to achieve universal access to sustainable sanitation by 2030, SDG 6.2 highlights the need to broaden the definition of sanitation access, that is, to include safely managed and improved sanitation through the treatment of wastewater or fecal sludge on-site or off-site.

Data on access to sanitation at the provincial level in Western Visayas were gathered during the regional consultation and planning workshop. The map on the left shows the extent of access to sanitation of the provinces in the region.

Figure 7, on the other hand, shows the two existing septage treatment plants in the region. Only Caticlan and Iloilo City have put up their own septage treatment plants.

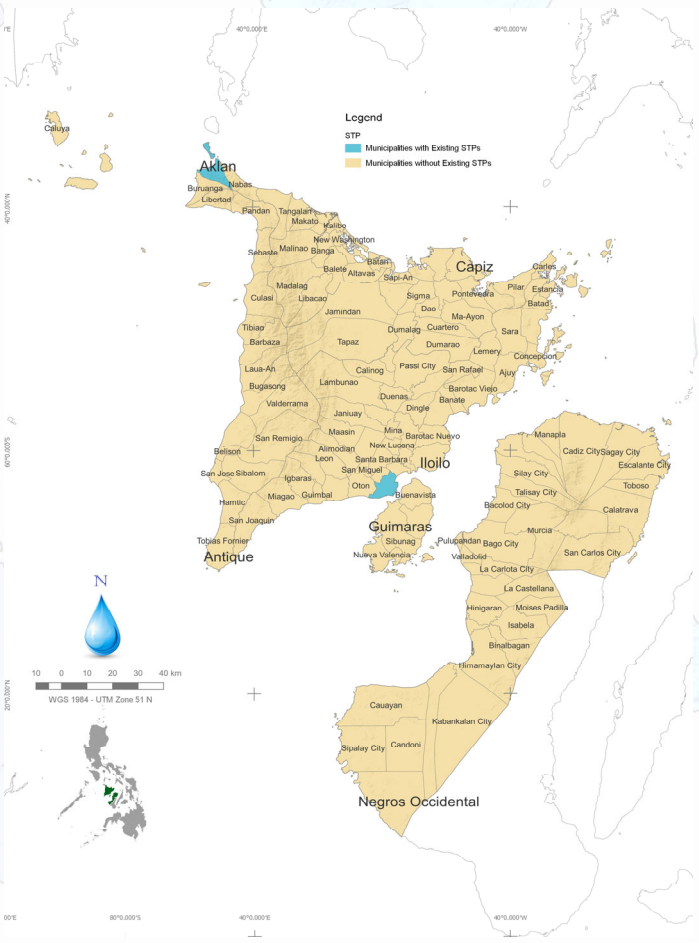


Figure 7: Existing Septage Treatment Plants[10]

[8] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[9] Department of Health, FHSIS Annual Report CY 2015 (r06.doh.gov.ph)
[10] Based on Region VI provinces' firsthand data on access to safe water, (as gathered during the regional planning workshop)

Water Resources

Western Visayas ranks 3rd among the regions with the most water resources potential.

The region's water resources potential totals 15,344 million cubic meters (MCM)/year, accounting for 10.5% of the country's total.

The water resources potential of an area is divided into groundwater and surface water. Groundwater in the region is estimated at 1,144 MCM/year while surface water is estimated at 14,200 MCM/year. Annual rainfall in the region averages 2,375 mm/year.

These figures are based on the estimation of the potential of the country's water resources regions (WRR) (see National Databook). The WRRs do not necessarily coincide with the boundaries of the administrative regions. These hydrological boundaries are defined by their physiographic features and homogeneity in climate.

The region straddles only WRR 6.

Surface Water

Region VI is endowed with an extensive network of rivers and a vast expanse of watersheds. In fact, it has three major river basins — the Panay River Basin (PRB), Jalaur River Basins (JRB) and Ilog-Hilabagan River Basin (IHRB).

The drainage areas of the PRB and the JRB river basins cover portions of Iloilo, Capiz, and small portions of Aklan and Antique.

The IHRB, on the other hand, covers a portion of Negros Occidental and is shared by Region VII (or Central Visayas).

Panay River Basin

The PRB encompasses almost the entire province of Capiz and small parts of Iloilo and Aklan. It has a catchment area of 2,203.76 km^2 and comprises the Badbaran, Maayon, Mambusao and Panay sub-watersheds.

The Panay River flows generally in an easterly direction and serves as the main drainage way of the basin. It originates from the hills near the Aklan-Capiz boundary and traverses the middle region of Capiz and ultimately discharges into the Sibuyan Sea. Principal tributaries of the Panay River are the Mambusao, Maayon, and Badbaran Rivers with headwaters originating from the Capiz-Antique-Aklan border.

Jalaur River Basin

The JRB encompasses almost the entire province of Iloilo and covers small portions of Capiz and Antique. It has a total drainage area of 1,765 km^2.

The Jalaur River has an approximate length of 75 km. It originates from Mount Baloy, and traverses the municipalities of Calinog, Passi City, Duenas, Dingle, Pototan, Dumangas, and Barotac, Nuevo down to its mouth in Barangay Guigui, Leganes, Iloilo. It empties into the Guimaras Strait. Other tributaries include Lamunan River, Suage River and Alibunan River.

Ilog-Hilabangan River Basin

The IHRB straddles two administrative regions and travels across Negros Occidental and Negros Oriental. Its drainage area totals 2,118.17 km^2.

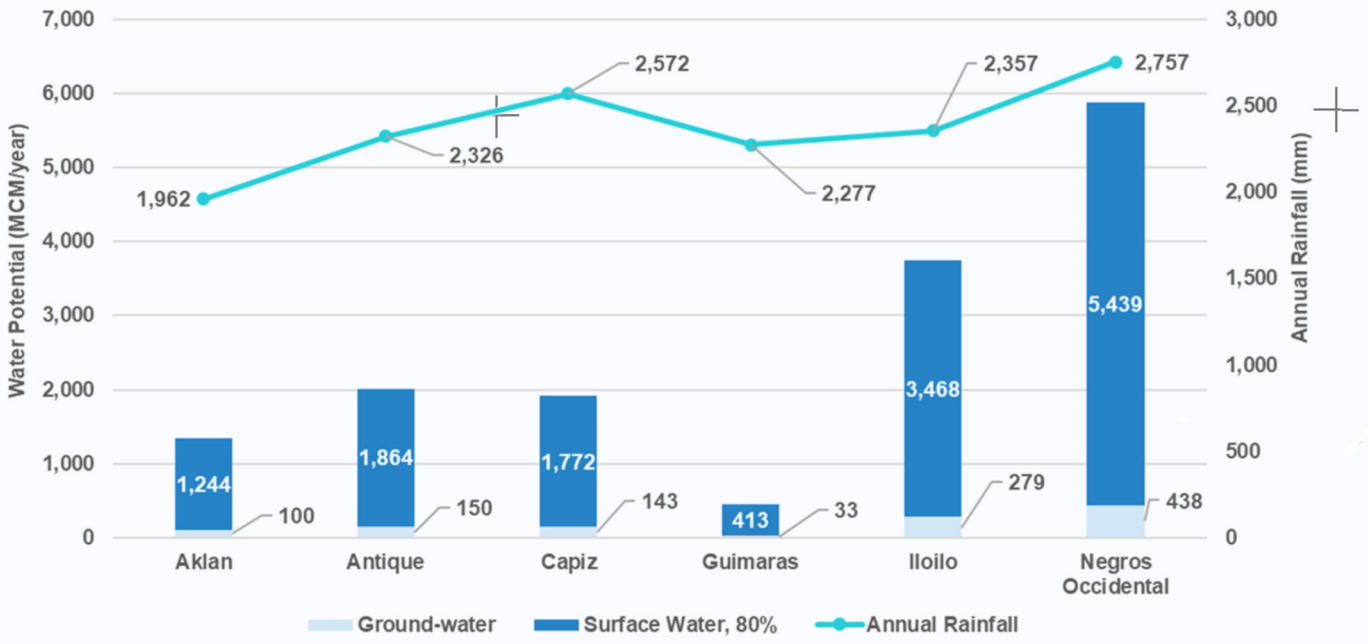


Figure 8: Water Resources Potential and Annual Rainfall[11]

[11] *JICA Master Plan on Water Resources Management in the Philippines, 1998; NWRB; PAGASA rainfall data; FAO*

40°0.000'E

40°0.000'W

40°0.000'N

60°0.000'S

20°0.000'N

40°0.000'S

Legend

Water Bodies

Major River Basin

Pampanga River Basin

Jalaur River Basin

Ilog-Hibangan River Basin

N

10 0 10 20 30 40 km

WGS 1984 - UTM Zone 51 N

Western Visayas Rivers and Tributaries

DENR, NWRB, NAMRIA

Table 9: Aquifer Classes Based on MGB Aquifer Types

Aquifer Class	MGB Aquifer Type	Estimated Yields (boreholes unless stated)
Major Aquifer (Highly permeable)	Intergranular: extensive and highly productive	Mostly 50-100 lps
	Fractured: fairly extensive and productive (aquifers with high potential recharge)	3-50 lps, spring yields up to 1000 lps
Minor Aquifer (Variably permeable)	Intergranular: fairly extensive and productive	About 20 lps
	Intergranular: local and less productive	Mostly 2-20 lps
	Fractured: less extensive and productive	Well yields up to 3 lps
Non-aquifer (Negligibly permeable)	Rocks with limited groundwater potential	Yields mostly less than 1 lps
	Rocks without any significant known groundwater	Yields mostly less than 1 lps

Groundwater

Groundwater conditions are controlled by geology, topography, and the structure of the groundwater basin. The structure of the groundwater basin consists of distribution and hydrogeological conditions such as the aquifer structure and aquicludes, the physical characteristics of the formations as per transmissibility and storage coefficient and chemical characteristics of groundwater. These factors need to be defined in relation to the possible development depth and overall development potential.

The extent of groundwater availability in any given area also depends on its surface area and the amount of precipitation it receives. Furthermore, it is tied to groundwater storage based on the type and class of aquifer present in a study area (see Table 9).

The map on the right shows the extent of groundwater availability of the region. Some parts of Guimaras and Aklan are underlain by major aquifers. About a quarter of Negros Occidental is underlain by minor aquifers, while a large portion of Western Visayas is predominantly underlain by the non-aquifer class (including the local and less productive kind) and impermeable rocks.

Water Use

Water use in the region was estimated at 8,840 MCM annually based on awarded water permits as of 2017. Approximately 4,310 MCM (49%) is allocated for power generation and recreational use, and categorized as nonconsumptive use. The 4,529 MCM is reserved for consumptive use (Figure 9).

The irrigation sector consumes the greatest volume of water among all sectors with an allocation of 90%. The industrial sector consumes 3.4% and the domestic sector 4%.

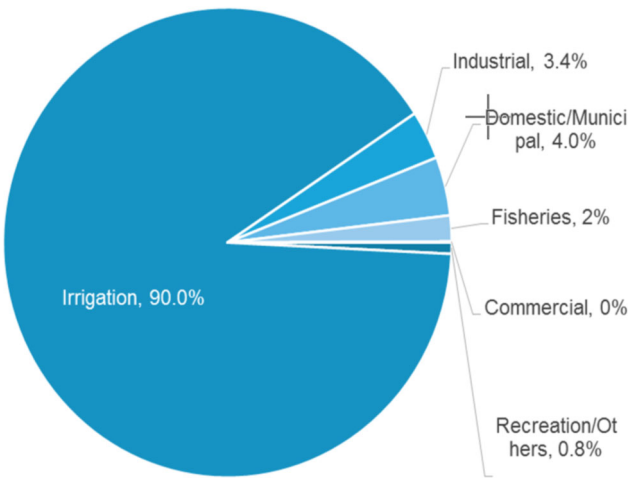


Figure 9: Consumptive Water Use, 2017[12]

Water Availability, Water Stress, and Water Scarcity

Hydrologists typically assess scarcity by looking at the population-water equation. An area is experiencing water stress when annual water supplies drop below 1,700 m^3 per person. When annual water supplies drop below 1,000 m^3 per person, the population faces water scarcity, and below 500 m^3 'absolute scarcity.'" (UN Water, n.d.)[13]

Water availability per capita was computed by comparing the region and provinces' potential against the 2015 population (as shown in Table 10).

Western Visayas has an estimated per capita water availability of 2,036 m^3/year.

Figure 10 presents the computed figures to highlight the provinces' level of water availability, stress, and scarcity.

Table 10: Water Availability per Province

Province/Region	Water Availability (m^3/capita/year)
Aklan	2,338
Antique	3,460
Capiz	2,515
Guimaras	2,555
Iloilo	1,572
Negros Occidental	1,921
Western Visayas	**2,036**

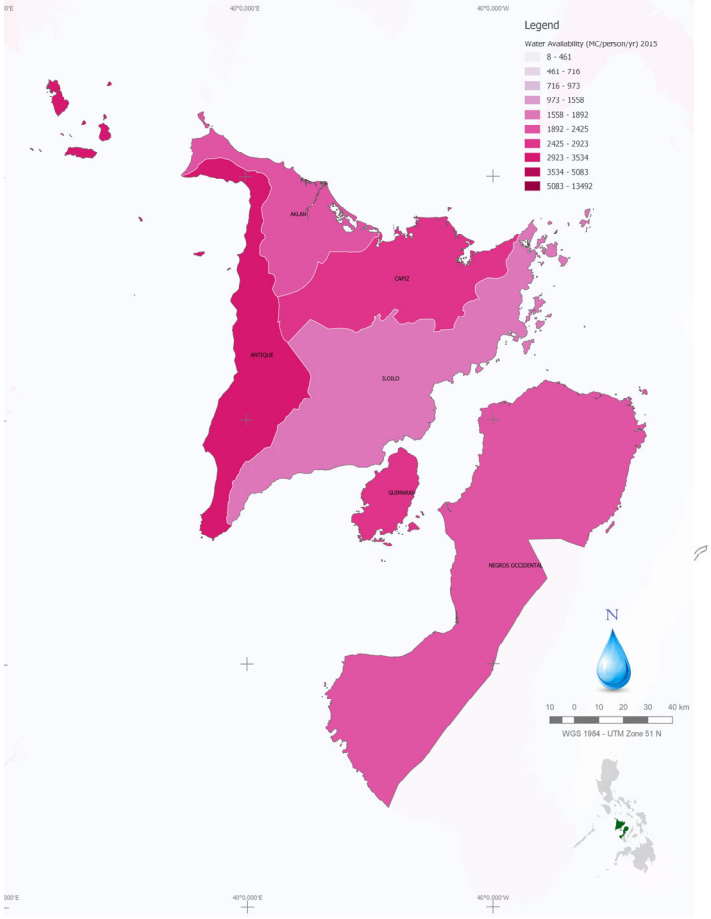
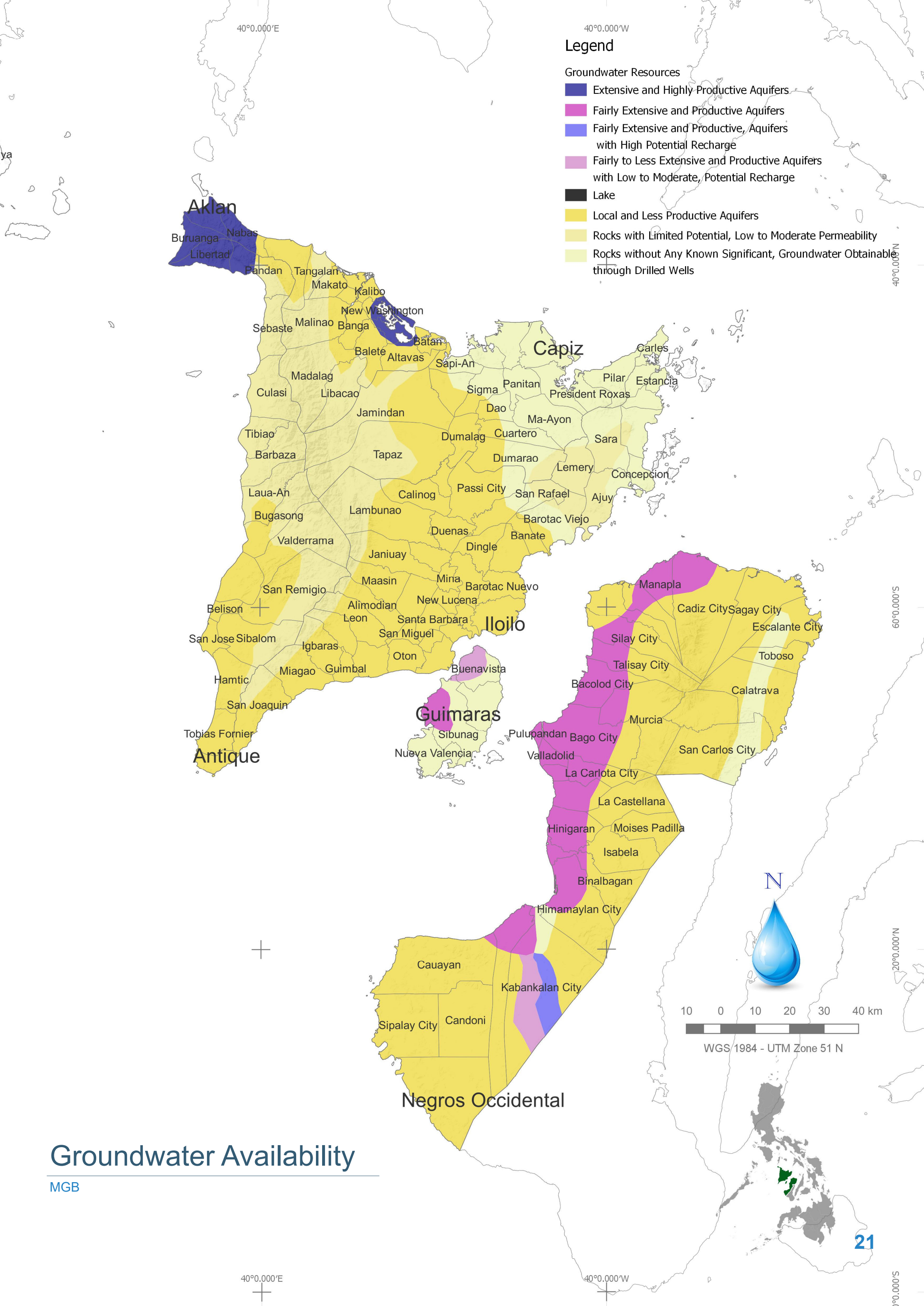


Figure 10: Water Availability Map, 2015

[12] *List of Water Permit Grantees, National Water Resources Board, 2017*
[13] *Managing Water under Uncertainty and Risk, UN World Water Development Report 4 (Volume 1)*

Groundwater Availability

MGB



Demand

Population Projection

Population projection is important in estimating the future water and sanitation demand of a study area. It is a study of a recorded pattern of past population growth to establish future trends.

Employing PSA's 2010-based population projections which were adjusted to conform with the actual 2015 population, the region's population is projected to reach more than 10 million by 2045.

Water Demand

Water demand projection is fundamental to water supply feasibility studies and preliminary engineering design. It is also an important tool in the preparation of master plans, considering the future needs of a growing population. Water demand projections are developed based on the estimated projected population.

In general, the total water demand is equal to the sum of the domestic, commercial, industrial, institutional, and unaccounted-for water. Computation for water demand at the household level, in particular, is primarily based on the degree of urbanization of a barangay.

In projecting water demand, the units of consumption used are 120 liters per capita per day (lpcd) for urban populations, and 60 lpcd for rural populations. In the NCR and other HUCs, 150 lpcd and 80 lpcd are used for urban and rural populations, respectively.

By 2022, 2030, and 2040, the total water demand of the region would have reached 376 MCM/year, 425 MCM/year, and 482 MCM/year, respectively.

Water Demand vs. Water Resources Potential

The water demand of the industrial, business and domestic sectors in Western Visayas is expected to significantly increase in the near future. The efficient use and management of available water resources, therefore, must be ensured to promote universal access to stable and steady water supply.

Comparing the projected water demand (482 MCM/year) to the water resources potential of the region (15,344 MCM/year), the availability of water far exceeds the region's projected water demand up to 2040.

It must be noted, however, that the projected water demand of the region does not include that of its agricultural sector, which consumes the largest volume of water among all industry sectors. What appears to be abundant may be less once the agriculture sector uses its "share". It is estimated that agriculture takes up about 75% to 80% of the total consumptive use of water in the country.

Although no shortage in water supply in the region is forthcoming, proper water management is imperative to control possible demand shifts.

Approaches to water resources management may include utilization and proper use of existing water resources to ensure sustainable and adequate water supply for domestic use.

The issues of small scale mining and continuous watershed degradation/denudation in the region, however, should be immediately addressed to protect its water resources and watersheds and thus make water supply for domestic use adequate and sustainable. These measures will also help the region achieve its full groundwater and surface water potential.

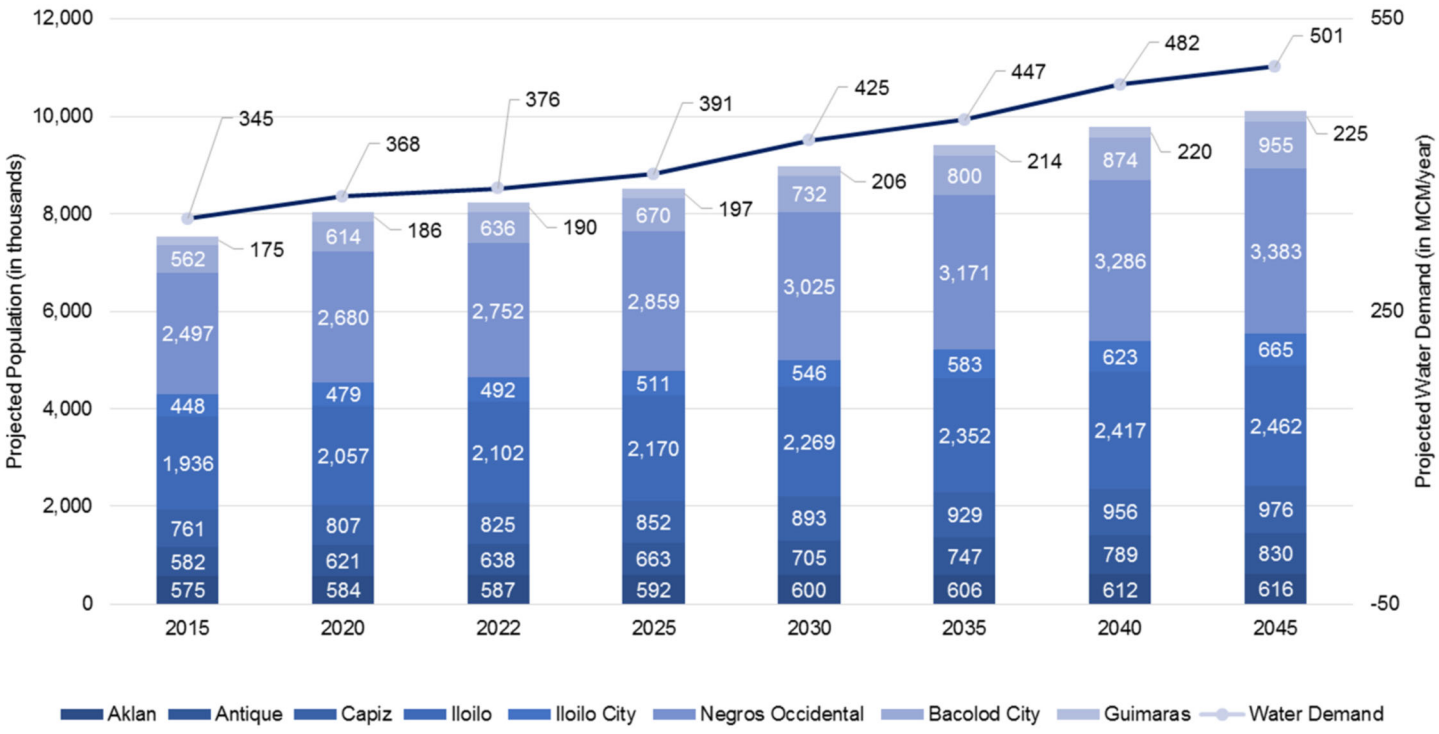
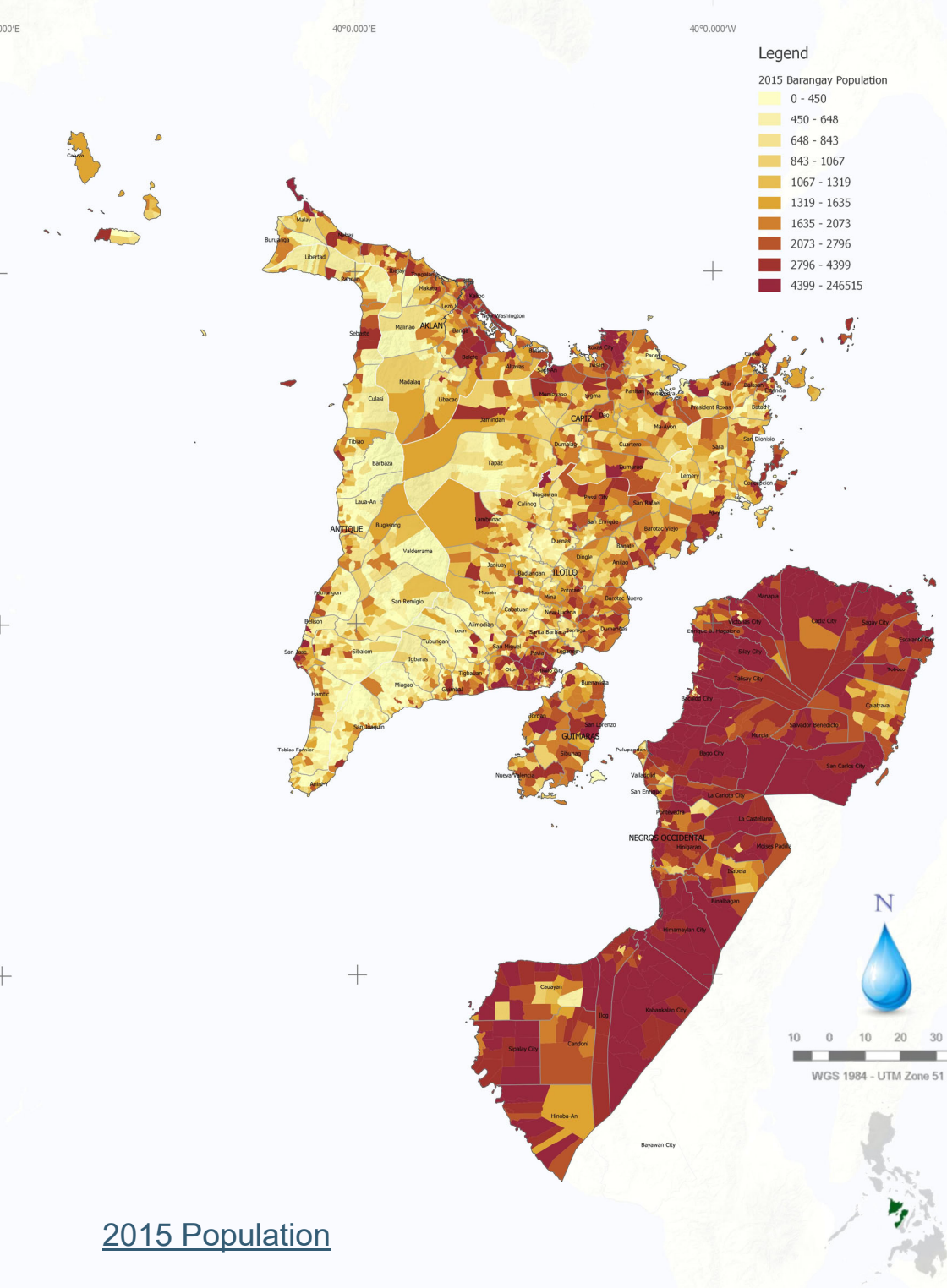
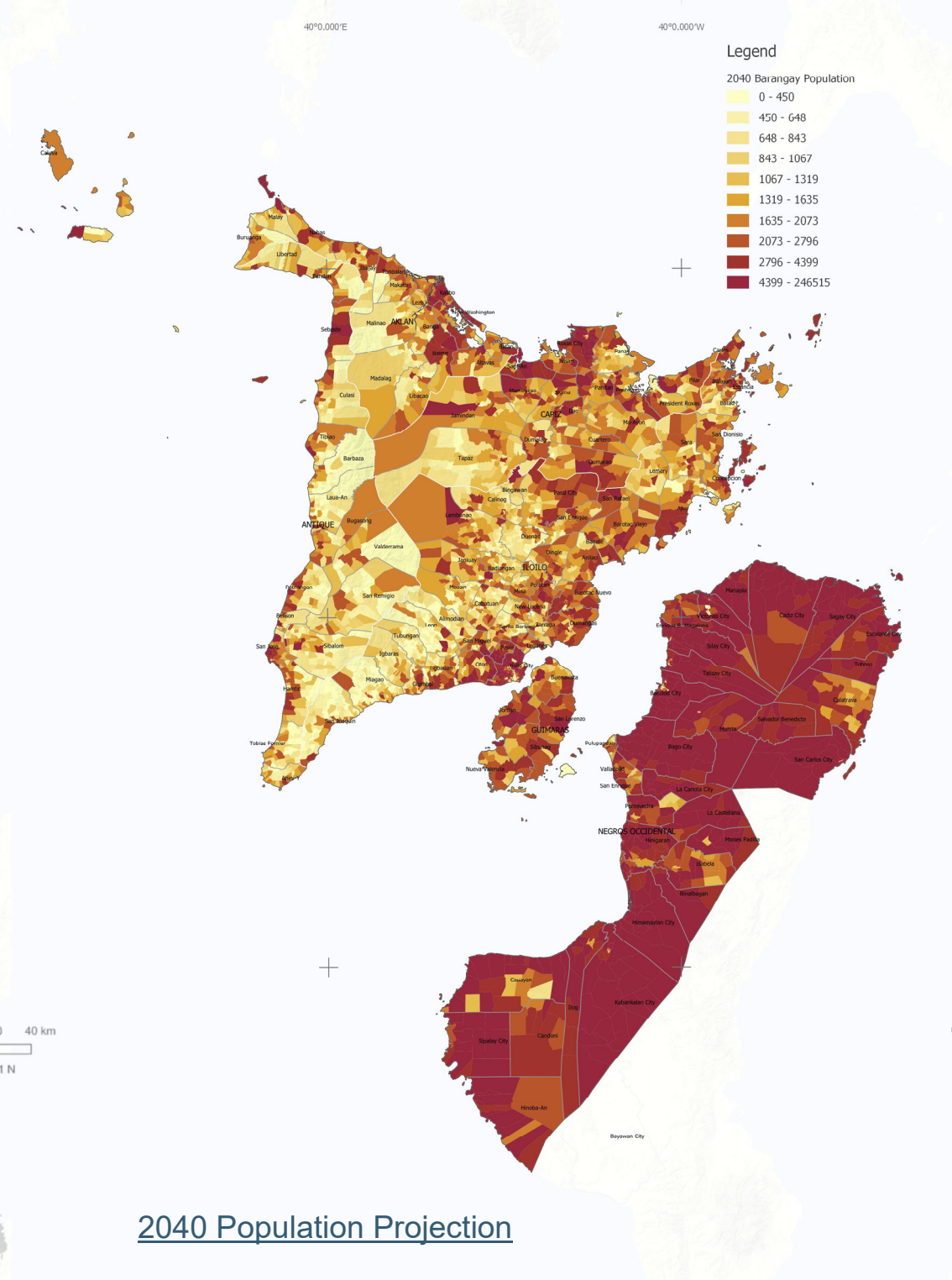


Figure 11: Projected Population and Water Demand



2015 Population



2040 Population Projection

2015 Water Demand

2040 Water Demand Projection

WSS Infrastructure

Water service providers (WSPs) of various management types serve around 34.55% of Western Visayas[14].

These management types depend on the service areas (urban and rural), the number of potential water connections, and the level of service given.

For small urban towns and rural areas, community-based organizations (CBOs) – which include rural waterworks and sanitation associations (RWSA), barangay water and sanitation associations (BWSA), and water cooperatives – operate supply systems offering services at Level II (and in some cases, Level I). As the area grows and becomes more urbanized or more densely populated, water service providers mostly comprise water districts (WDs) and LGU-run utilities providing Level III service.

Areas that do not have access to any formal level of service rely on point sources, such as shallow and deep wells.

Water Supply Service Providers

The percentage of the population having access to or being served by these WSPs is not in accord with the figures in PSA's 2015 FIES mainly because the former came from various sources[15], with the bulk of the data coming from the National Water Resources Board's (NWRB) Listahang Tubig.

Furthermore, it cannot be ascertained that all WSPs in the region have already registered under Listahang Tubig or are continually updating their operations data.

Water Districts

Per Listahang Tubig, approximately 93 WDs in Western Visayas were serving only 1.6 million users (34.9% of the region's total population) as of 2015 although these WDs covered a population of around 4.6 million.

LGU-Run Water Utilities

The region has 260 LGU-run water utilities serving 275,110 users or 3.65% of the total population of Western Visayas.

BWSA

The region has 671 BWSA utilities serving 2.64% of the region's population.

RWSA

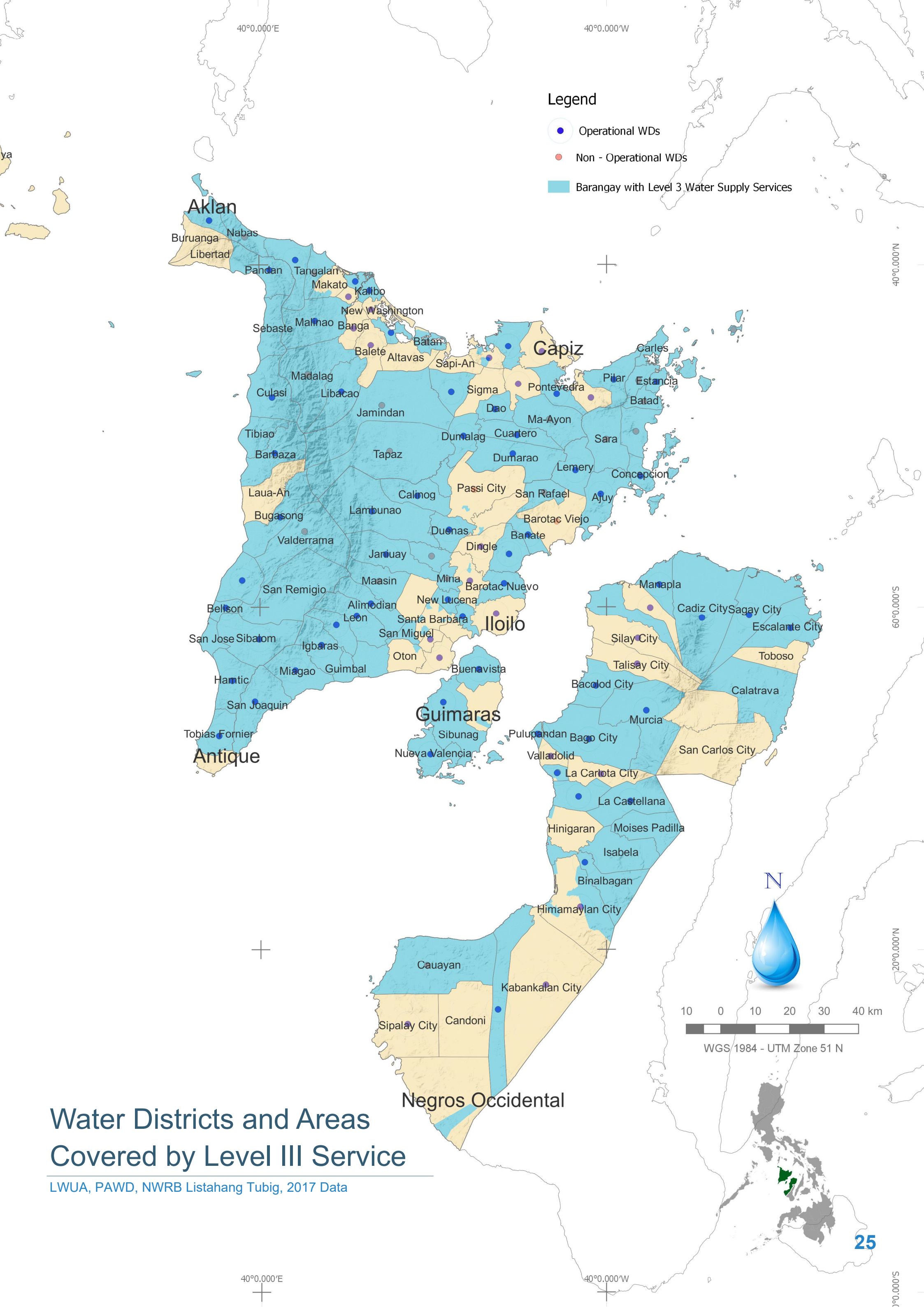
The region has 88 RWSA utilities serving 0.60% of the region's population.

The map on the right shows the location of operational and nonoperational WDs in the region as well as barangays provided with Level III water service by various WSPs (except WDs).

Table 11: Water Service Providers per Province

Province/ Region	No. of LGUs	Type and No. of WSPs		Population Coverage	Population Served	
					Total	%
Aklan	17	WD	10	266,511	146,725	55.05%
		LGU	29		12,325	2.14%
		BWSA	48		9,165	1.59%
		RWSA	4		1,605	0.28%
		Others (coop/private/etc)	243		69,830	12.15%
		Subtotal	**334**	**574,823**	**239,650**	**41.69%**
Capiz	17	WD	12	431,069	171,751	39.84%
		LGU	10		2,360	0.31%
		BWSA	12		5,495	0.72%
		RWSA	1		200	0.03%
		Others (coop/private/etc)	194		30355	3.99%
		Subtotal	**229**	**761,384**	**210,161**	**27.60%**
Antique	18	WD	10	312,235	64,594	20.69%
		LGU	71		55,925	9.61%
		BWSA	57		25930	4.46%
		RWSA	4		1935	0.33%
		Others (coop/private/etc)	110		39960	6.87%
		Subtotal	**252**	**582,012**	**188,344**	**32.36%**
Iloilo	44	WD	35	1,341,713	356,106	26.54%
		LGU	35		10,490	0.44%
		BWSA	346		72565	3.04%
		RWSA	57		18930	0.79%
		Others (coop/private/etc)	505		148260	6.22%
		Subtotal	**978**	**2,384,415**	**606,351**	**25.43%**
Guimaras	5	WD	4	86,533	27,720	32.03%
		LGU	28		4,965	2.84%
		BWSA	95		16,030	9.18%
		RWSA	8		1,765	1.01%
		Others (coop/private/etc)	112		20,960	12.00%
		Subtotal	**247**	**174,613**	**71,440**	**40.91%**
Negros Occidental	32	WD	22	2,204,031	852,201	38.67%
		LGU	87		189,045	6.18%
		BWSA	113		69,705	2.28%
		RWSA	14		20,640	0.67%
		Others (coop/private/etc)	127		156,176	5.11%
		Subtotal	**363**	**3,059,136**	**1,287,767**	**42.10%**
Western Visayas	133	WD	93	4,642,092	1,619,097	34.88%
		LGU	260	-	275,110	3.65%
		BWSA	671	-	198,890	2.64%
		RWSA	88	-	45,075	0.60%
		Others (coop/private/etc)	1,291	-	465,541	6.18%
		Grand Total	**2,403**	**7,536,383**	**2,603,713**	**34.55%**

[14] Based on registered WSPs in Listahang Tubig (as of 2017)
[15] LWUA, PAWD, NWRB Listahang Tubig



Water Districts and Areas Covered by Level III Service

LWUA, PAWD, NWRB Listahang Tubig, 2017 Data

Sanitation

Sanitation is the provision of facilities and services for the safe management and disposal of human waste. Without sanitation, water quality degrades, health is compromised and the environment is adversely affected.

This section discusses the link between growing water demand and its detrimental effects on water quality and public health.

Open Defecation

As defined by the Joint Monitoring Program (JMP) for Water Supply, Sanitation and Hygiene of the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), open defecation is the practice whereby people go out into the fields, bushes, forests, open bodies of water, or other open spaces rather than use the toilet to defecate. This can pollute the environment and cause various health-related problems.

Western Visayas has the third highest open defecation rate at 8.23% (almost double the national average) among all regions. Approximately 620,244 people were reported practicing open defecation in 2015.

The map on the right shows the areas in the region where open defecation is most prevalent.

Wastewater and Domestic Biological Oxygen Demand

A measure of the organic strength of wastes in water is biological oxygen demand (BOD), which is the rate at which organisms use the oxygen in water or wastewater while stabilizing decomposable organic matter under aerobic conditions. The greater the BOD, the greater the degree of organic pollution.

The map below shows the current BOD in Western Visayas.

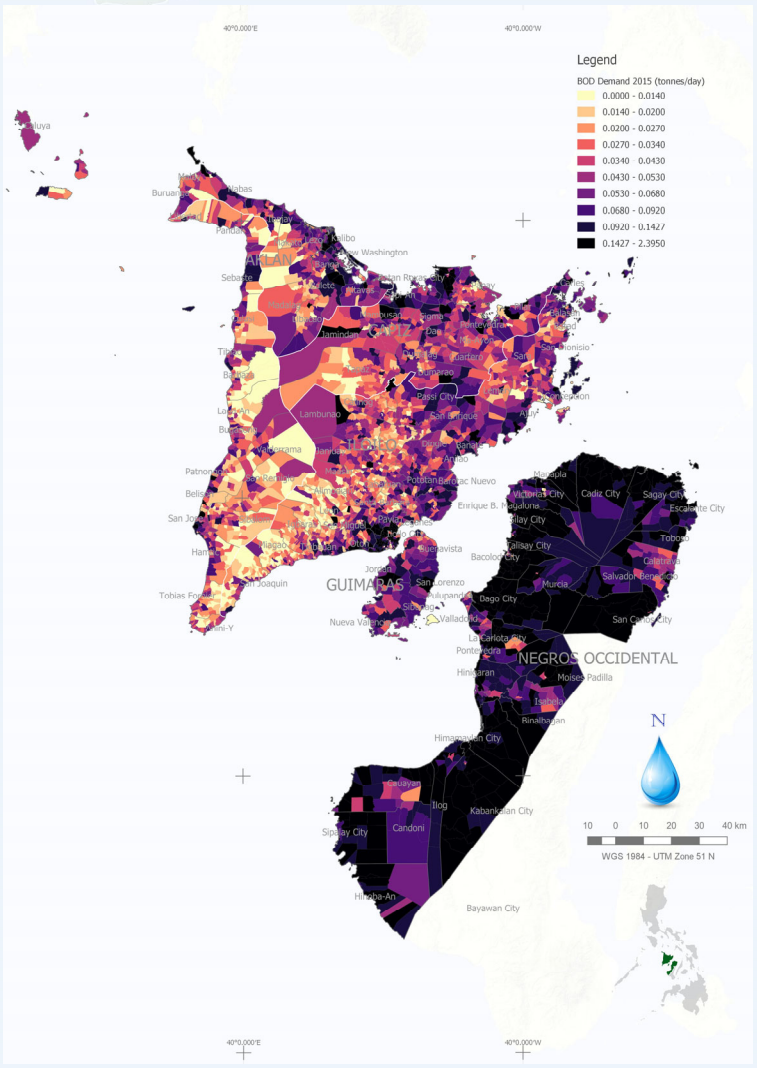


Figure 12: Biological Oxygen Demand, 2015

Industrial and agricultural wastewater generation may be estimated using guidelines provided by the WHO Rapid Assessment of Sources of Air, Water, and Land Pollution. Estimations, however, heavily depend on sectoral data not currently available to the Consulting Team.

Industrial wastewater generated is computed by industry type and depends on the present and future annual volume of production output per type. Agricultural wastewater generation and BOD estimation, on the other hand, are based on the present and future annual number of heads of livestock and poultry produced.

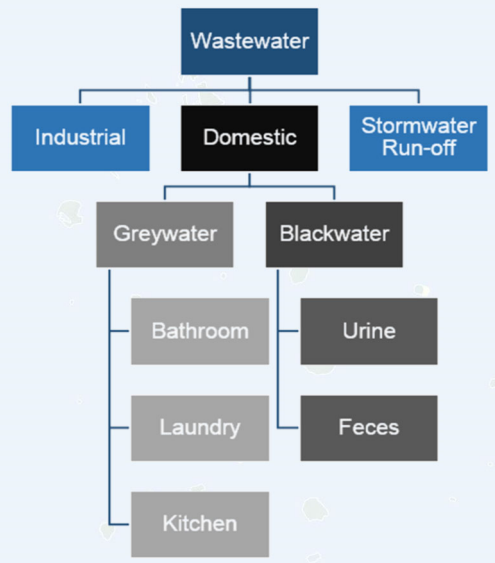


Figure 13: Categories of Wastewater

In the absence of other data, only domestic BOD can be estimated. A BOD factor of 37 grams per person per day (unit pollution load) is assumed; for highly urbanized areas, 53 grams[16] per person per day is used.

The wastewater[17] produced by each province is directly proportional to its water demand as well as its population. It is assumed that wastewater generated is 80% of the total water demand. The current wastewater in the region is shown in Figure 14.

BOD and wastewater projections until 2040 are shown in the succeeding pages.

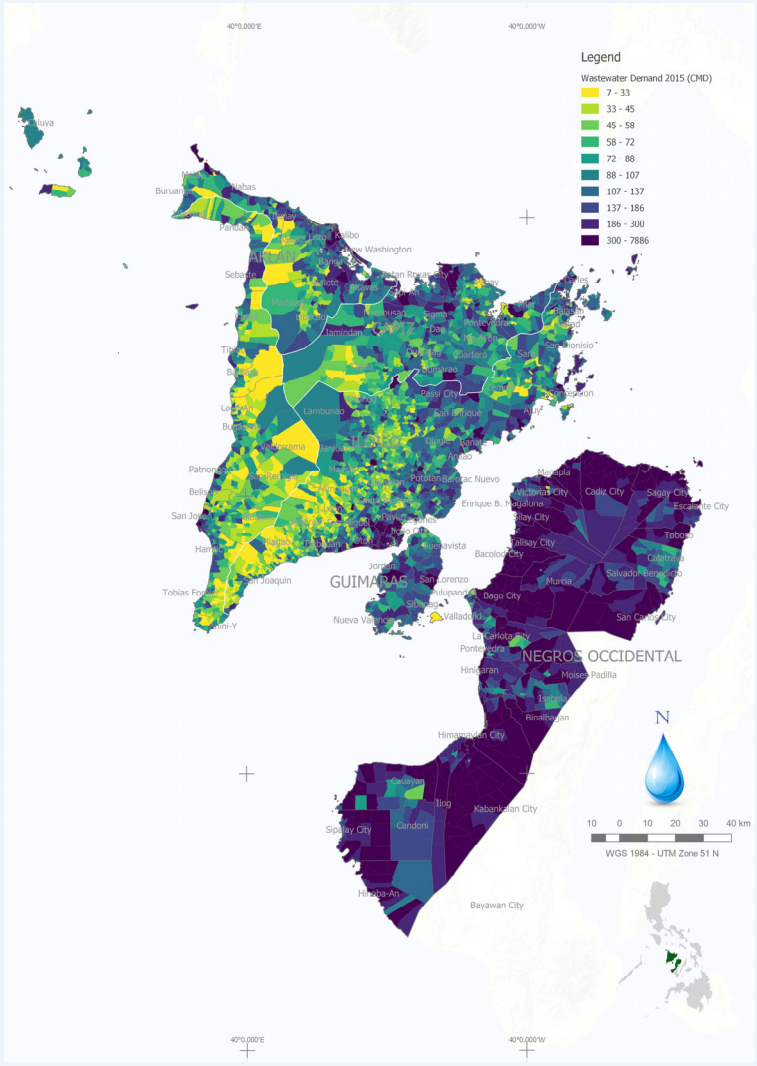
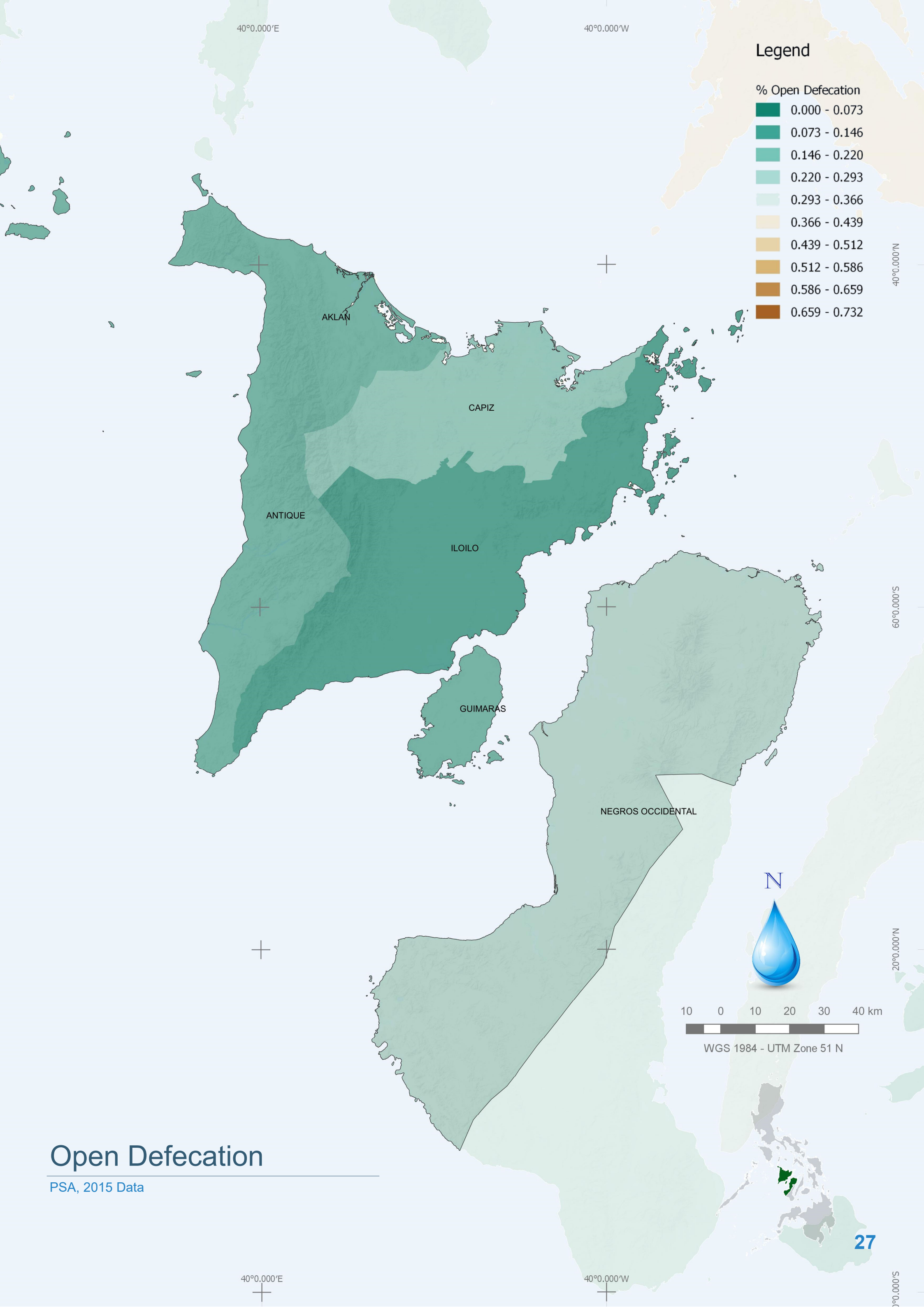


Figure 14: Wastewater Produced, 2015

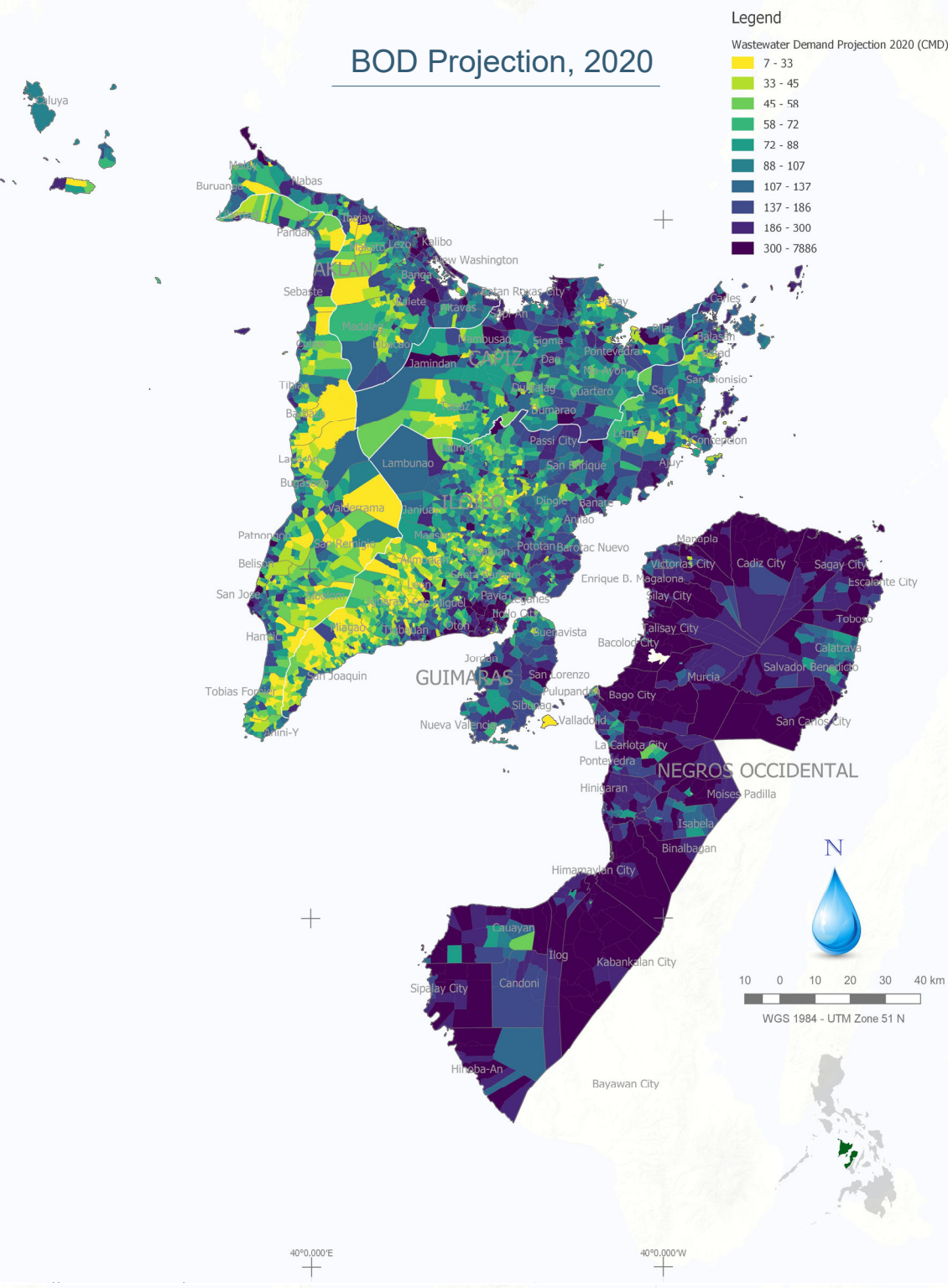
[16] *Philippine Environment Monitor (PEM), 2003*
[17] *Ibid.*

Open Defecation

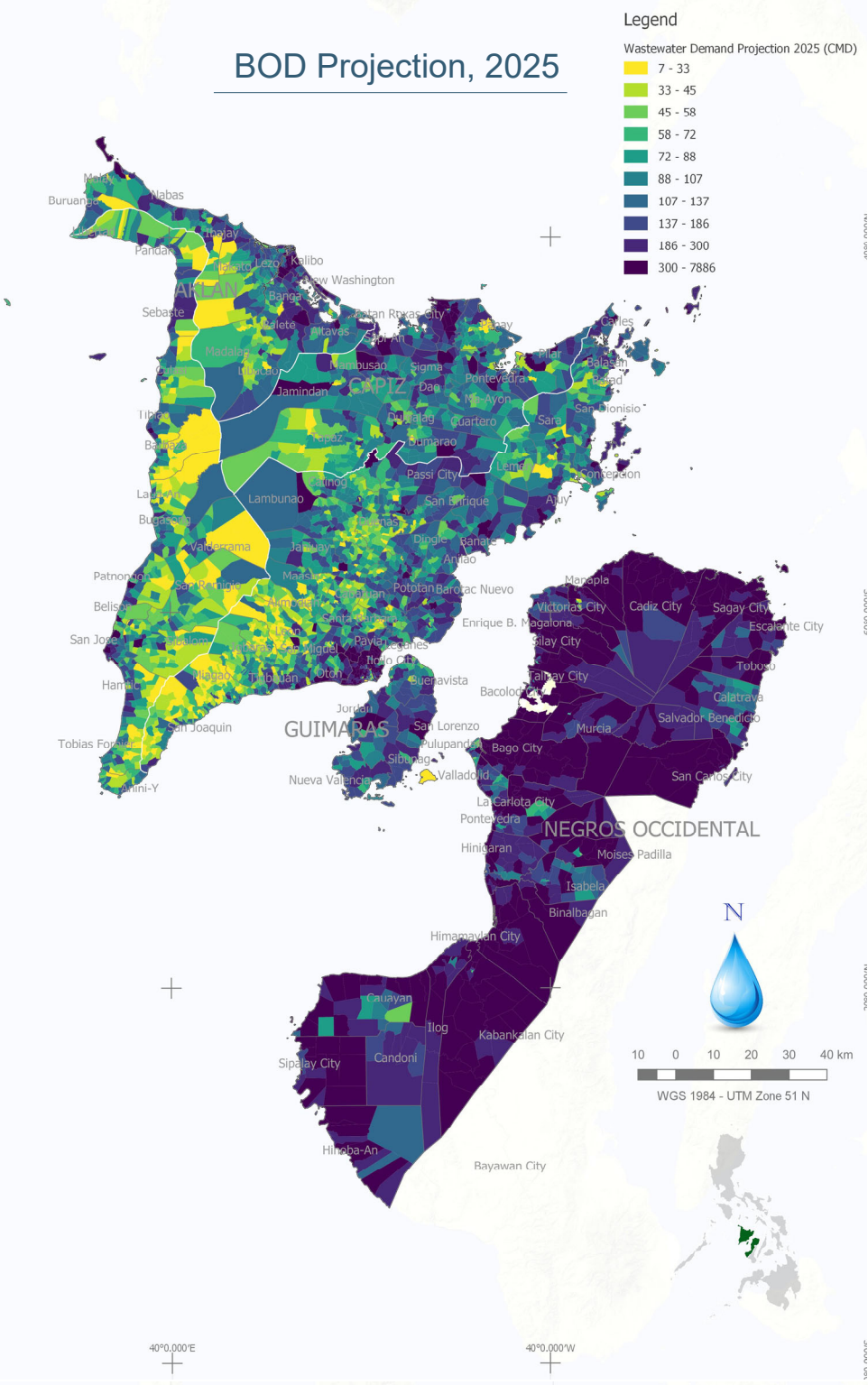
PSA, 2015 Data



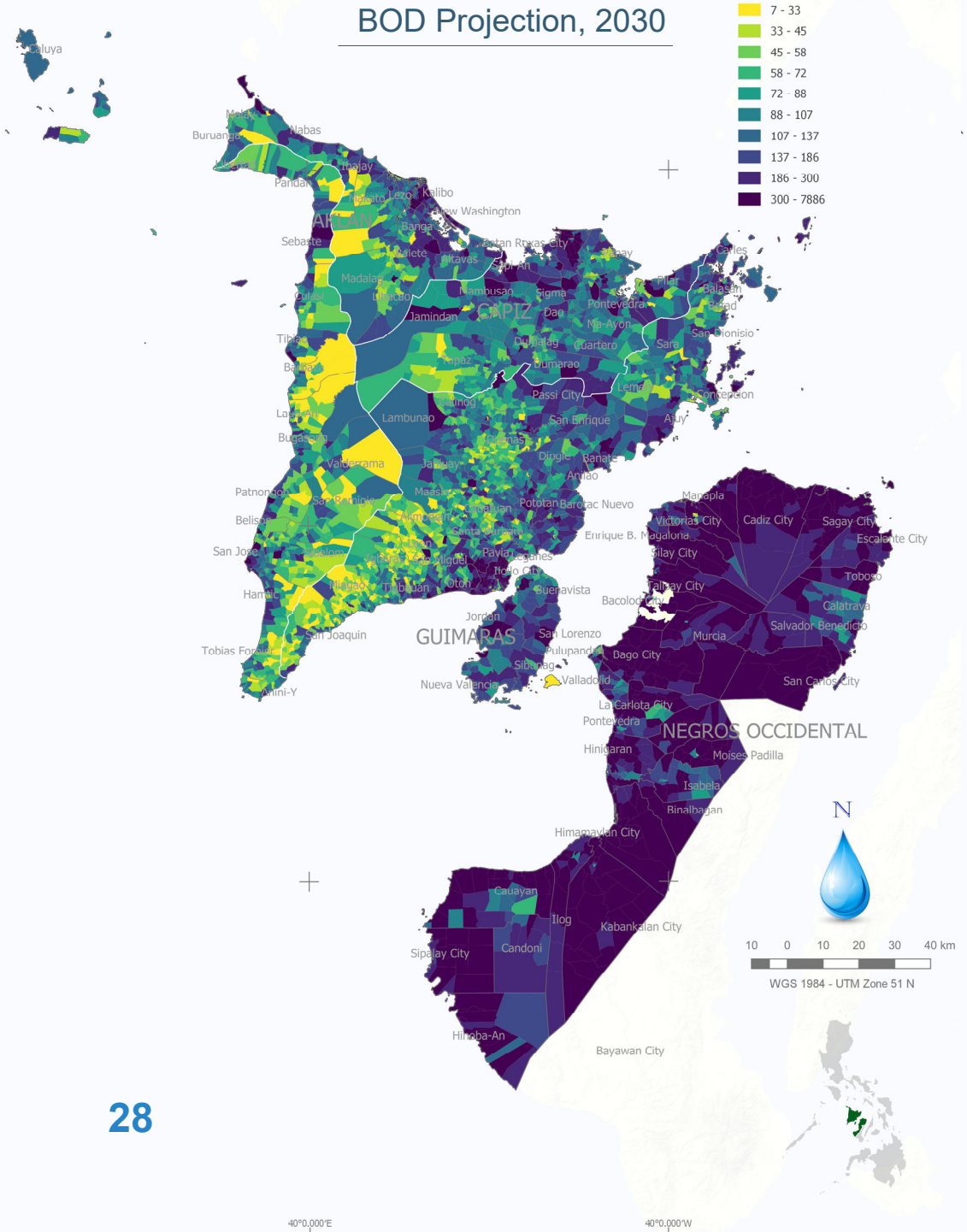
BOD Projection, 2020



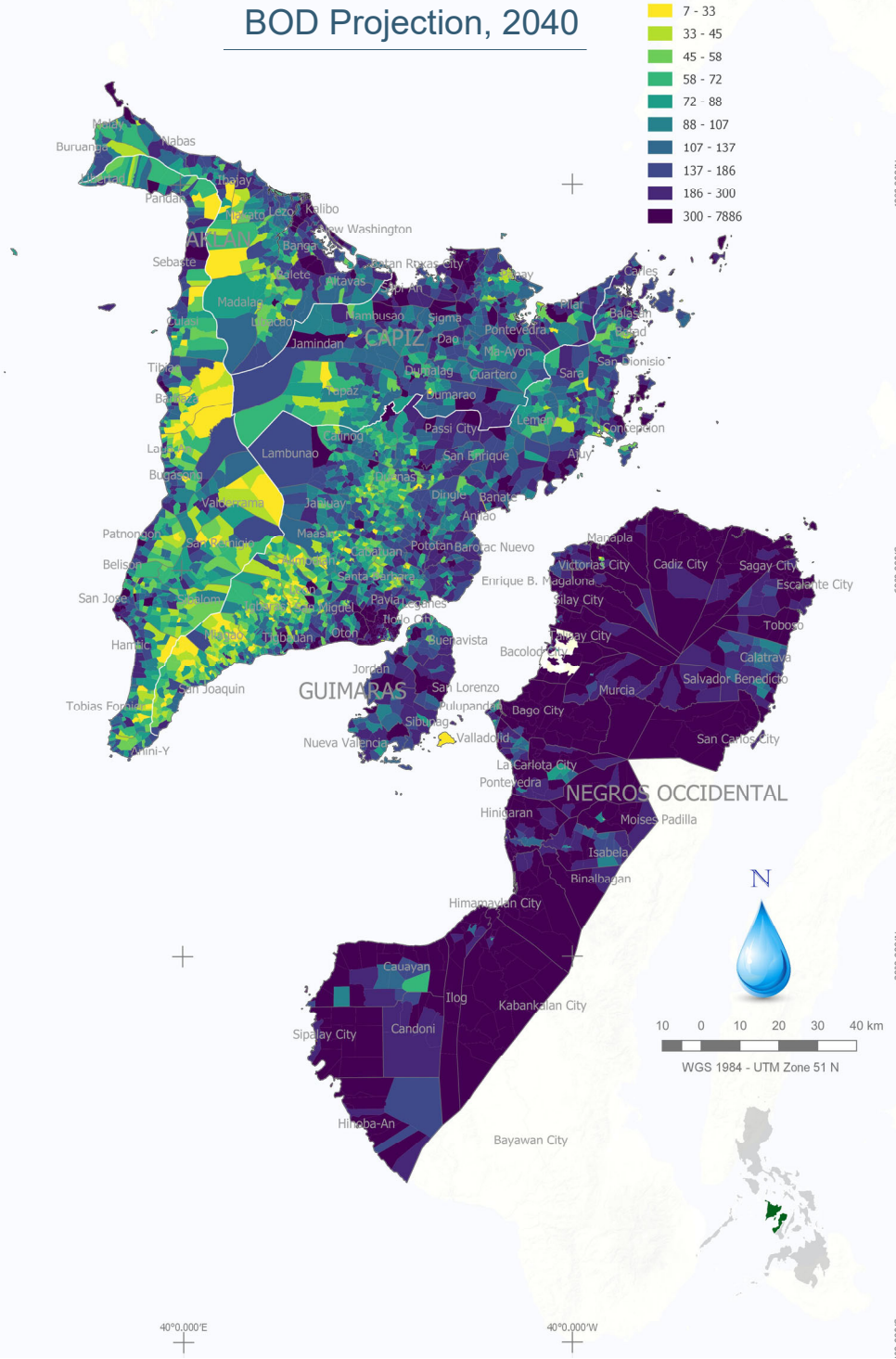
BOD Projection, 2025



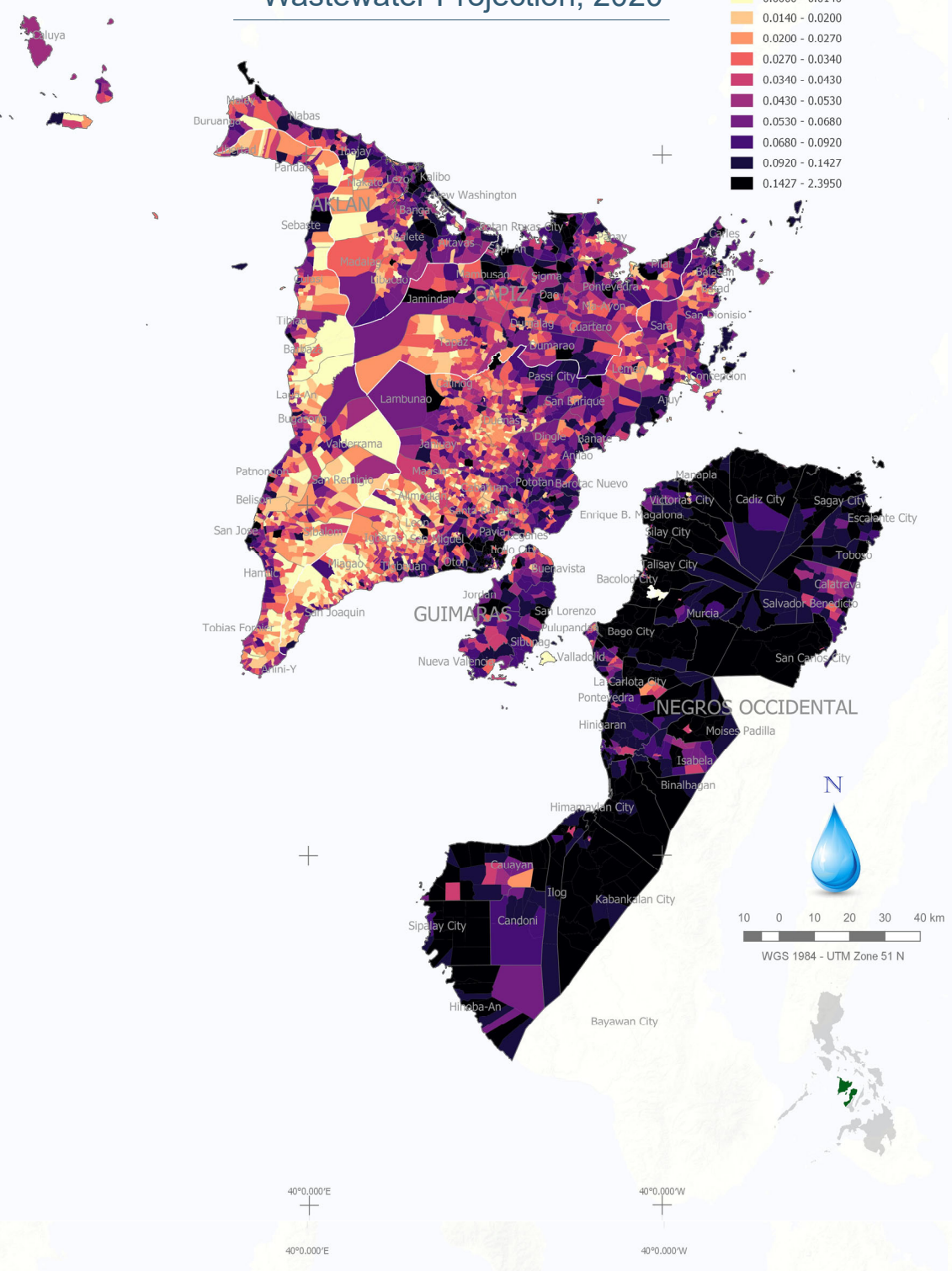
BOD Projection, 2030



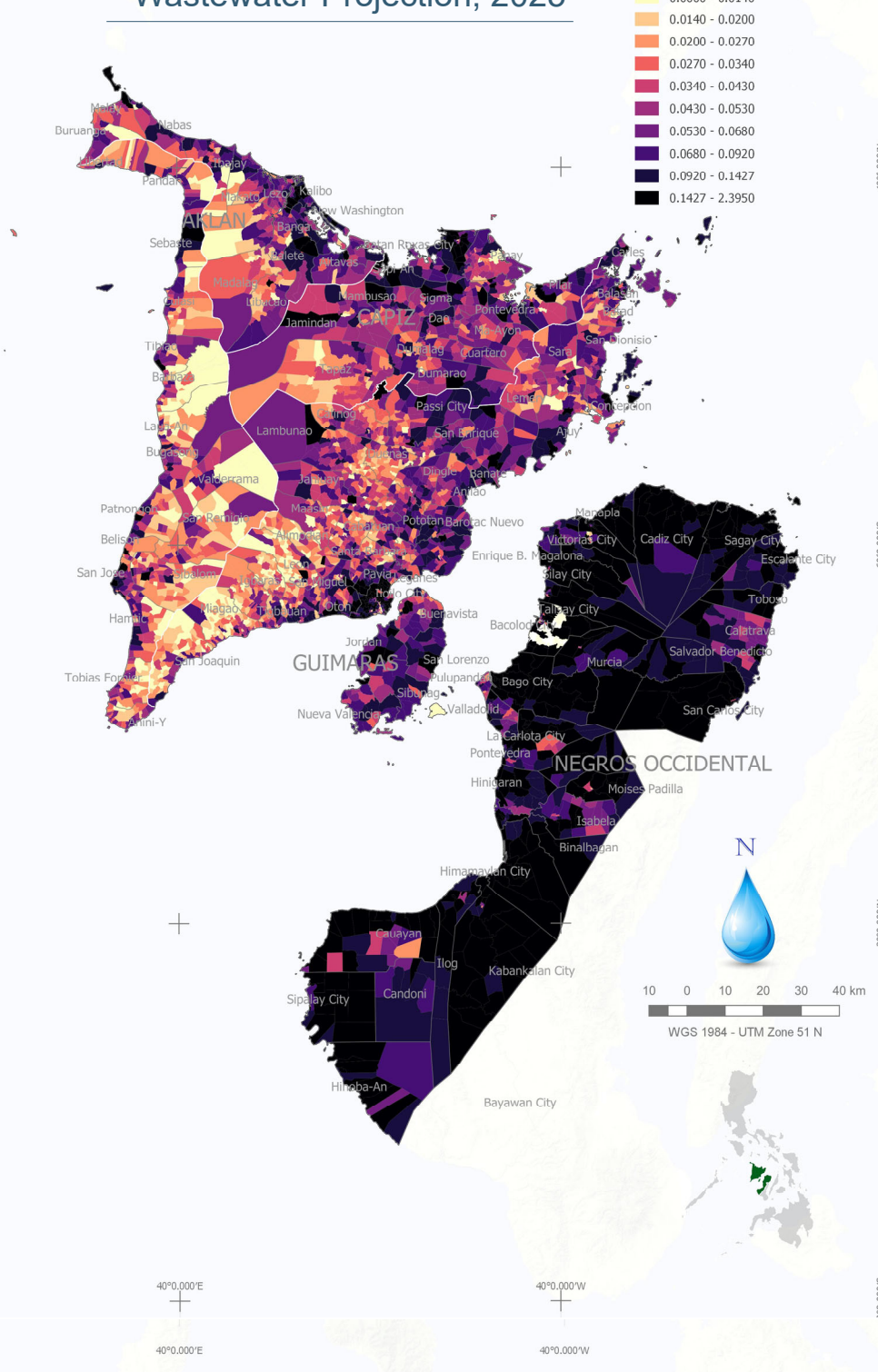
BOD Projection, 2040



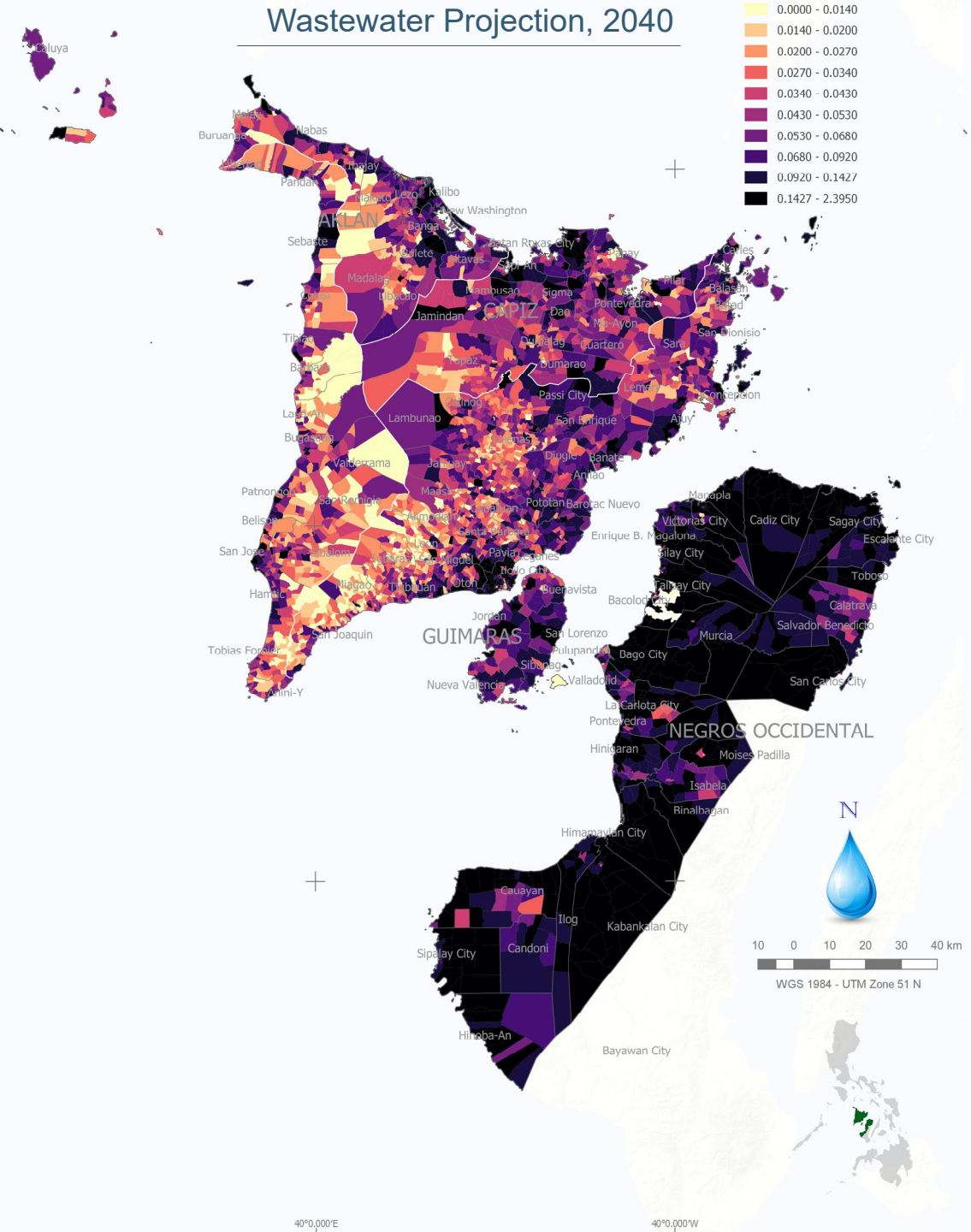
Wastewater Projection, 2020



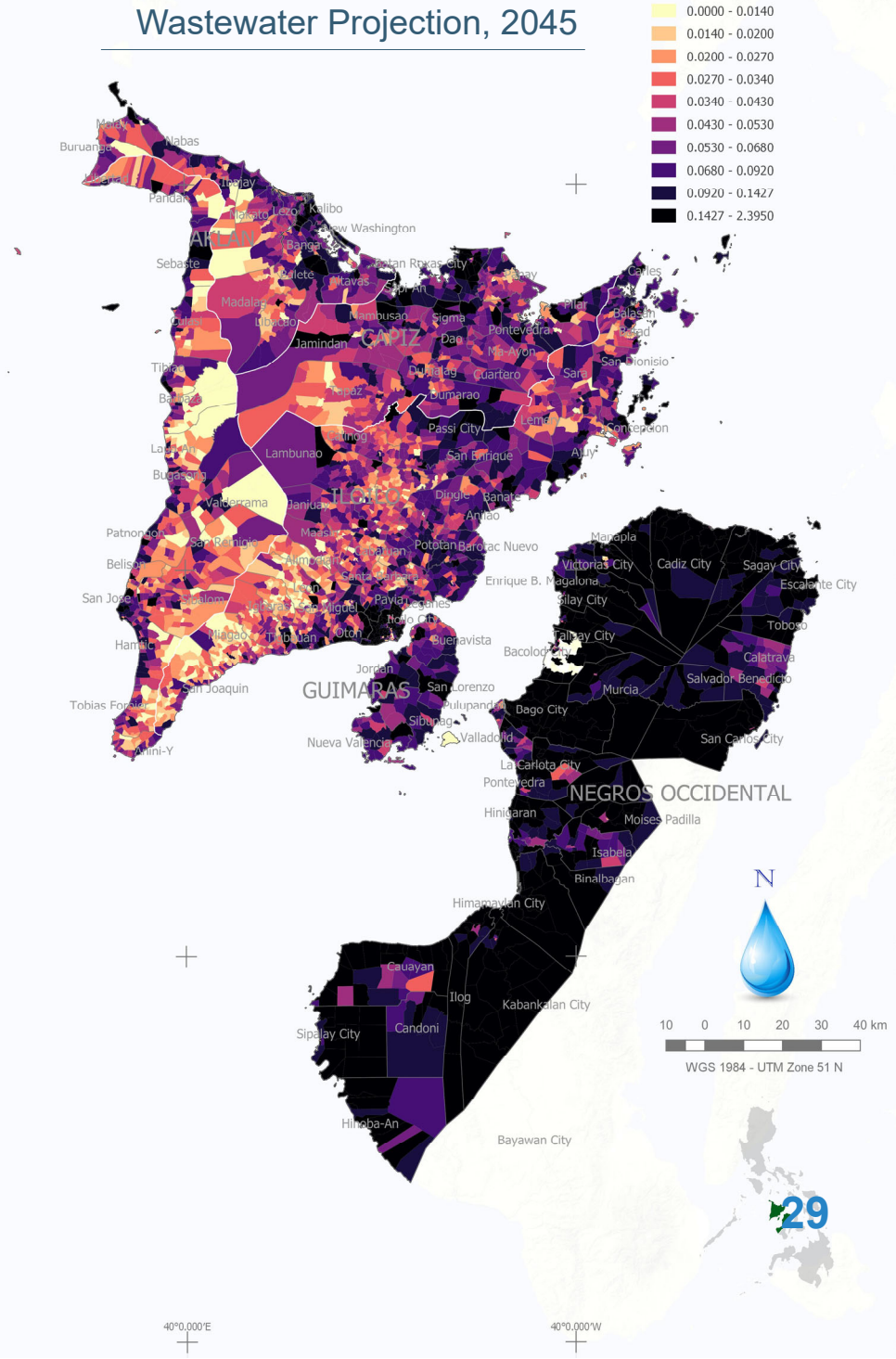
Wastewater Projection, 2025



Wastewater Projection, 2040



Wastewater Projection, 2045



Water Quality

Water quality measures how good water is in terms of its beneficial use and environmental value. It is water relative to its use and measured in terms of its physical, chemical, biological and radiological characteristics. It is most frequently used in reference to a set of standards against which compliance can be assessed.

The upstream section of the Panay River is classified as Class A while its downstream section is categorized as Class C.

Panay River is where industrial and domestic wastes are dumped by populated areas it traverses. It is a conveyor of agricultural runoff originating from rice, corn and sugarcane fields as well as effluents from the public market in Panitan, Capiz and domestic wastes from households along the riverbanks.

Panay River is likewise affected by prevalent soil erosion, rampant *kaingin* farming and illegal cutting of trees in the watershed.

The Ilog and Hilabangan Rivers are classified as follows: Ilog River Upper Reach, Class A; Lower Reach, Class C; Hilabangan River Upper Reach, Class A; and Lower Reach, Class B/C.

Activities in the rivers that have further degraded the water quality of existing water resources include mineral resources exploitation, small-scale mining *(*which is highly extractive and damaging to the environment as it involves vegetation removal resulting in topographic alteration and the loss of natural habitats and biodiversity), and soil degradation.

In the same breath, open defecation, the improper disposal of domestic wastewater and the lack of treatment facilities contribute to the further degradation of water bodies.

Based on the wastewater projection maps, most of the region's cities and growing municipalities have higher demand compared to that in other areas. These areas generate more wastewater and wastes that, if left untreated and unmanaged, would pollute existing and future water sources, and increase the incidence of waterborne diseases.

The map on the right shows the areas whose water sources have exhibited signs of poor water quality. The data are based on the water quality reports submitted by WDs to the Local Water Utilities Administration (LWUA). Data on water supply sources that are not covered or owned by WDs are not reflected on this map.

Waterborne Diseases

Waterborne diseases are generally transmitted through water in which pathogenic microorganisms live. These diseases can be spread while bathing, washing, or drinking water, or by eating food exposed to contaminated water[18].

Approximately 5,681 cases of acute watery diarrhea, 10 cases of schistosomiasis, and 93 cases of typhoid and paratyphoid were reported in Region VI in 2015, per the 2015 FHSIS.

The region's high open defecation percentage, which is double the national average, is considered one of the primary causes of waterborne diseases. But the lack of or limited access to safe water sources also contributes to the high incidence thereof.

As of 2017, the Department of the Interior and Local Government (DILG) reported 40 waterless[19] municipalities in Western Visayas (see Figure 15).

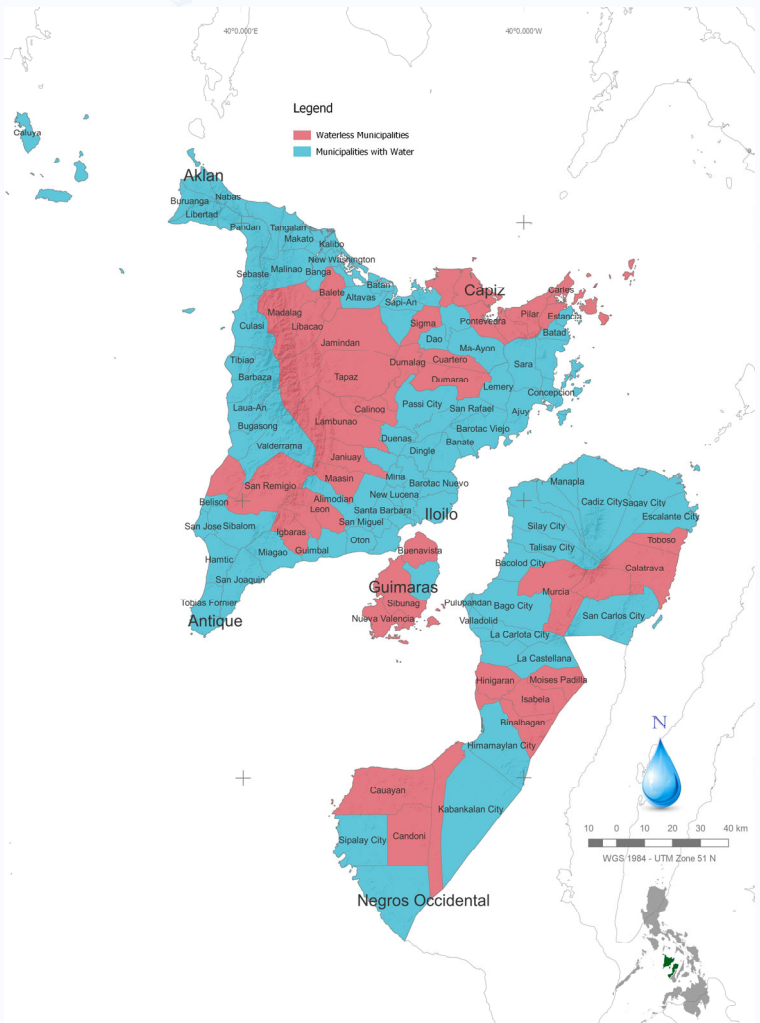
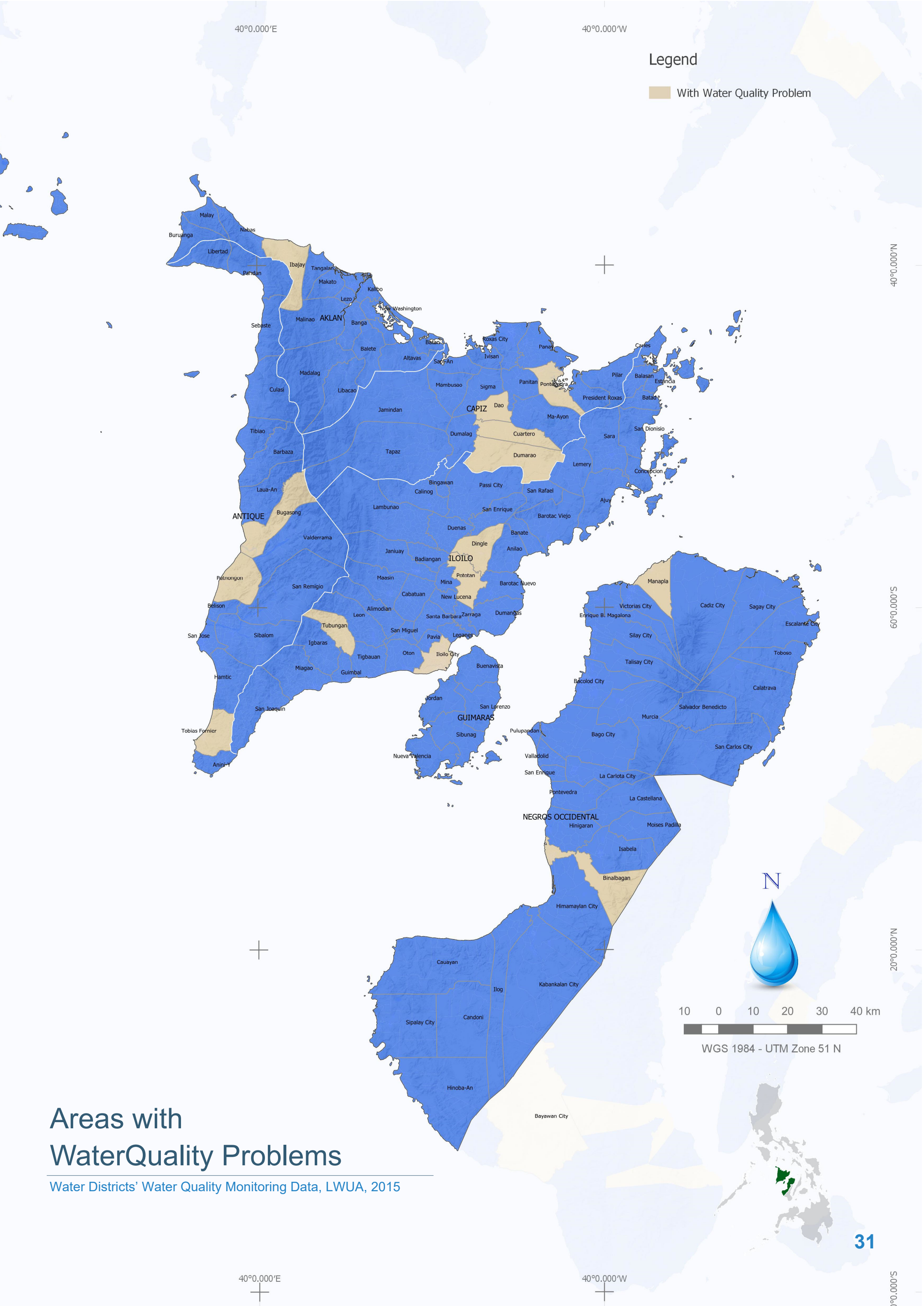


Figure 15: Waterless Municipalities

[18] *World Health Organization*
[19] *Municipalities with less than 50% service coverage, National Anti-Poverty Commission, 2010*



Areas with WaterQuality Problems

Water Districts' Water Quality Monitoring Data, LWUA, 2015

WSS Sector Gaps

In assessing the current state of the WSS sector in Western Visayas, areas that require upgraded facilities, improved water supply and sanitation systems as well as regular and extensive monitoring protocols were brainstormed and identified at the regional consultation and planning workshop.

Issues, Constraints and Challenges

The workshop on water supply and sanitation in Region VI produced a clear picture of realities on the ground, based on personal experiences, local knowledge and insights shared by key stakeholders and resource persons from the academe, nongovernment organizations (NGOs) and other concerned institutions.

The focused discussions resulted in the identification of weaknesses, inadequacies and other complications that have hindered the growth and development of the WSS sector in Region VI. More importantly, the exchange of ideas also led to the adoption of specific recommendations on how to put an end to the sector's stagnation and facilitate the creation of momentum toward its accelerated development.

The workshop brought to light the critical issues that impact the WSS sector in five areas of concern: (a) leadership and politics, (b) capacity, and (c) policy and institutional development, (d) funding and financing, (e) cultural, behavioral, and attitudinal issues.

Service Provision

Service provision in the region could be considered fragmented since there are several service providers operating independently and pursuing different goals. There are 64 operational WDs and 21 nonoperational WDs as of February 2018. The operational WDs service only about 35% of their franchise area. The WD performance is measured based on the criteria set by LWUA. The performance of other service providers could not be ascertained owing to limited information.

Most of the WDs (about 72%) have service connections in the range of 3,000 and below indicating very low service coverage. Most of the WDs are unable to expand for a variety of reasons, foremost of which is their failure to access funds to finance expansion.

Quality of Service Delivery

The quality of service delivery of WDs in terms of water quality, reliability and availability is monitored by LWUA, which has regulatory jurisdiction over WDs. The quality of service they deliver to consumer homes is one consideration in the grant of performance-based bonuses to WD officials and employees. The WDs are required to maintain a residual chlorine of 0.3 mg/l at the farthest point of the service area, provide round-the-clock supply of water, and adequate source capacity.

In addition, the WDs are directed to meet the expanded mandatory requirement for potable water as spelled out in the DOH Administrative Order No. 2017-0010 known as the Philippine National Standards for Drinking Water (PNSDW) of 2017.

WSPs, including WDs and LGU-run water utilities, are mandated by law to comply with the requirements of PNSDW. The water quality from service providers, other than WDs, is not closely monitored since LGUs have a limited number of sanitary engineers and technicians to do the monitoring work.

In addition, there are very few DOH-accredited laboratories to test the required parameters to ensure water potability. Most of these laboratories are located in urban centers and charge a fee for water testing services, which small water providers find "exorbitant".

Most small water utilities in the region provide intermittent service to their customers, and most of the facilities are ill maintained; sources of supply could not cope with the needs of the increasing population.

One of the findings of the Asian Development Bank (ADB) in its Water Supply and Sanitation Sector Study in 2013 holds true for small water utilities operating in the region. The study noted that "sustainability is often a challenge for these mainly small-scale systems, especially those run by LGUs, because capacity is weak and water tariffs are often too low to recover costs or are not collected at all, resulting in poor utility performance."

Water Resources

Water resources in the region could either be surface water or groundwater. The major water sources of big WDs, such as those in Metro Iloilo and Metro Roxas, consist of surface water. Metro Iloilo WD sources its water from Tigum River and Jalaur River; Metro Roxas WD sources its water from Panay River.

Surface water needs to be completely treated to make it potable. This process requires high capital expenditures, which is affordable only to medium or big water utilities, like those in Metro Iloilo and Metro Roxas.

Most WDs in the region source their supply from groundwater through wells. One of them is Bacolod City WD, the largest WD in the region. Most groundwater has good quality and only needs simple disinfection to make it fit for domestic use. However, groundwater in some areas is characterized by the presence of iron, manganese, color, total dissolved solids, as well as some degree of salinity, which need expensive treatment similar to that of surface water to meet PNSDW (2017).

Water resources in the region are subject to degradation owing to natural phenomena and man-made activities. Many rivers have increased pollution levels due to the unabated dumping of solid and domestic liquid wastes. Groundwater level has dropped over the years because of overpumping or extended summers brought about by climate change.

A rapidly growing population, fast-paced urbanization and increased agricultural and industrial activities in the region are expected to dramatically raise water demand, hence the need to manage and protect its water resources.

Table 12 summarizes the hindering and facilitating factors impacting the WSS sector in Western Visayas.

Table 12: Hindering and Facilitating Factors

Hindering Factors	Facilitating Factors
Leadership & Politics ▪ Existing policies not enough to sustain WSS projects ▪ Personal interest prioritized over public interest ▪ Lack funds especially for small-scale water providers ▪ Lack of cooperation among leaders ▪ Lack of knowledge and technical skills among some stakeholders re: various sanitation approaches	▪ Availability of funds ▪ Requiring some LCEs to build adequate knowledge of water supply and sanitation ▪ Support from the government re: the strict implementation of existing policies and programs in water supply and sanitation
Capacity Building ▪ Limited capability building activities ▪ Lack of skilled technical workers ▪ Absence of information and education campaigns	▪ Data gathering based on annual survey (monthly data sheets submitted by WDs) ▪ Skills training ▪ Barangay and LGU support re: rollout of IEC campaigns
Policy and Institutional Development ▪ National policies not adopted in the local code ▪ Absence of municipal LGU-based watchers ▪ Absence of an Environment and Natural Resources Office ▪ Poor water quality monitoring ▪ An overload of national laws/policies but inadequate specific policies governing the region's WSS sector ▪ Lack of policy on setting waterlines on road bridges ▪ Lack of policy on grant of incentives for best practices in water demand management ▪ WD management not institutionalized ▪ Lack of research studies on WSS	▪ Strong interagency collaboration in the region re: initiatives in water, sanitation and hygiene (iWash) ▪ Strong collaboration with the Iloilo Watershed Council ▪ Development of a master plan for Jalaur River Basin ▪ LGUs deputized by the Department of Environment and Natural Resources (DENR) to check and monitor compliance of water extraction applicants with government-mandated requirements and best practices standards ▪ Institutional climate change data ▪ Institutional fund support
Funding and Financing ▪ Lack of financial planning	▪ Grants from DILG (e.g., Performance Challenge Fund, *Salintubig*) ▪ Loan grants from financing institutions
Cultural, Behavioral, and Attitudinal Issues ▪ Low level of education of residents especially in far-flung barangays; wrong sense of values and poor personal hygiene habits ▪ Lack of participation among community members (in WSS plans) who would rather "wait and see" ▪ No sense of ownership ▪ Resistance of LGUs and constituents to learning and accepting new approaches and ideas	▪ Massive education campaign and raising awareness level through social media/dialogues/seminars re WASH, especially among indigenous people ▪ Community engagement (e.g., sense of ownership and stewardship, *bayanihan* system) ▪ Plans that are sensitive to cultural nuances (those that involve ethnic and local communities)

Regional Vision

"By 2030, water supply and sanitation in Region VI should be universally and equitably accessible, safe and affordable, sustainably and responsibly managed, through good environment and governance for a healthy and productive community."

With SDG targets as the primary guide, the Western Visayas WSS vision was crafted by the visioning group with the goal of achieving universal and equitable access to safe and affordable water supply and sanitation. In essence, it articulated the outcomes and targets the sector wants to achieve without losing sight of the challenges that lie ahead, especially those related to sufficiency, accessibility, affordability, governance and sustainability.

In keeping with this vision, key strategies and corresponding success indicators contributing towards the achievement of the overall sector vision were adopted, and key projects and programs were identified, including WSS targets which will adhere to the national WSS targets that are in accord with the PDP and SDGs.

Strategic Framework

The creation of the strategic framework begins with the determination of the issues, constraints and challenges of the water supply and sanitation sector. The diagram on the right shows specific highlights and contrasts, pertaining to areas displaying best practices and those needing improvement.

The figure shows strategic priorities for Eastern Visayas highlighting the provinces' individual plans. Priority areas include plan/program updating, capacity building, resource mobilization, water supply system expansion, facilities upgrading, database management, and water resources protection. These priorities have been observed to be the major areas of concern in relation to the provincial plans (as discussed in "Issues, Constraints and Challenges").

Corresponding strategies were formulated to translate the regional vision into specific approaches to get the best results and achieve the region's WSS targets. These are the region's general approaches applicable to urban and rural contexts of ensuring access to safe water and sanitation.

A more detailed discussion with respect to achieving increased access to potable water considering the various segments comprising the water utilities (categorized as undeveloped/underdeveloped, developing and developed) is shown in Table 13.

Table 13: Strategies in Achieving Increased Access to Potable Water

Segment	Target	Strategic Statement
Undeveloped/Underdeveloped		
Level I	▪ Zero waterless barangays ▪ Reduction to 5% of unsafe sources of water supply (2022) and universal access to safe water (2030)	▪ Government investment in the development of water supply systems (WSS) to upgrade unsafe sources to safe sources ▪ Promoting water harvesting in far-flung areas
Level II	▪ Upgrade of Level II systems to Level III	▪ Establishing WDs or LGU-led water utilities that can operate commercially ▪ Upgrading Level II systems to Level III ▪ Creation of a body that provides technical and financial assistance to barangay water associations and rural waterworks to upgrade their level of service
Developing		
Water Districts (Categories C and D)	▪ Zero nonoperational WDs	▪ Prioritizing conversion of nonoperational to operational WDs ▪ Assisting low performing WDs in rehabilitation and expansion works ▪ Providing a window for low cost funds that can be accessed by low performing WDs to expand coverage
Non-WDs (financially struggling water utilities)	▪ Organizing water utilities and allowing them to operate commercially ▪ 100% recovery of O&M cost	▪ Allowing the commercialization of water utility operations; encouraging LGUs to establish WDs or similar local government corporations or economic enterprises
Developed		
Level III	▪ 100% coverage of franchise area ▪ Ensuring the sustainability of operations of Level III systems ▪ Continuing expansion programs to ensure 100% coverage	▪ Increasing private sector participation ▪ Ensuring a robust regulatory framework to balance the interest of consumers and operators/WSPs ▪ Encouraging business establishments and residential communities to embark on rainwater harvesting programs

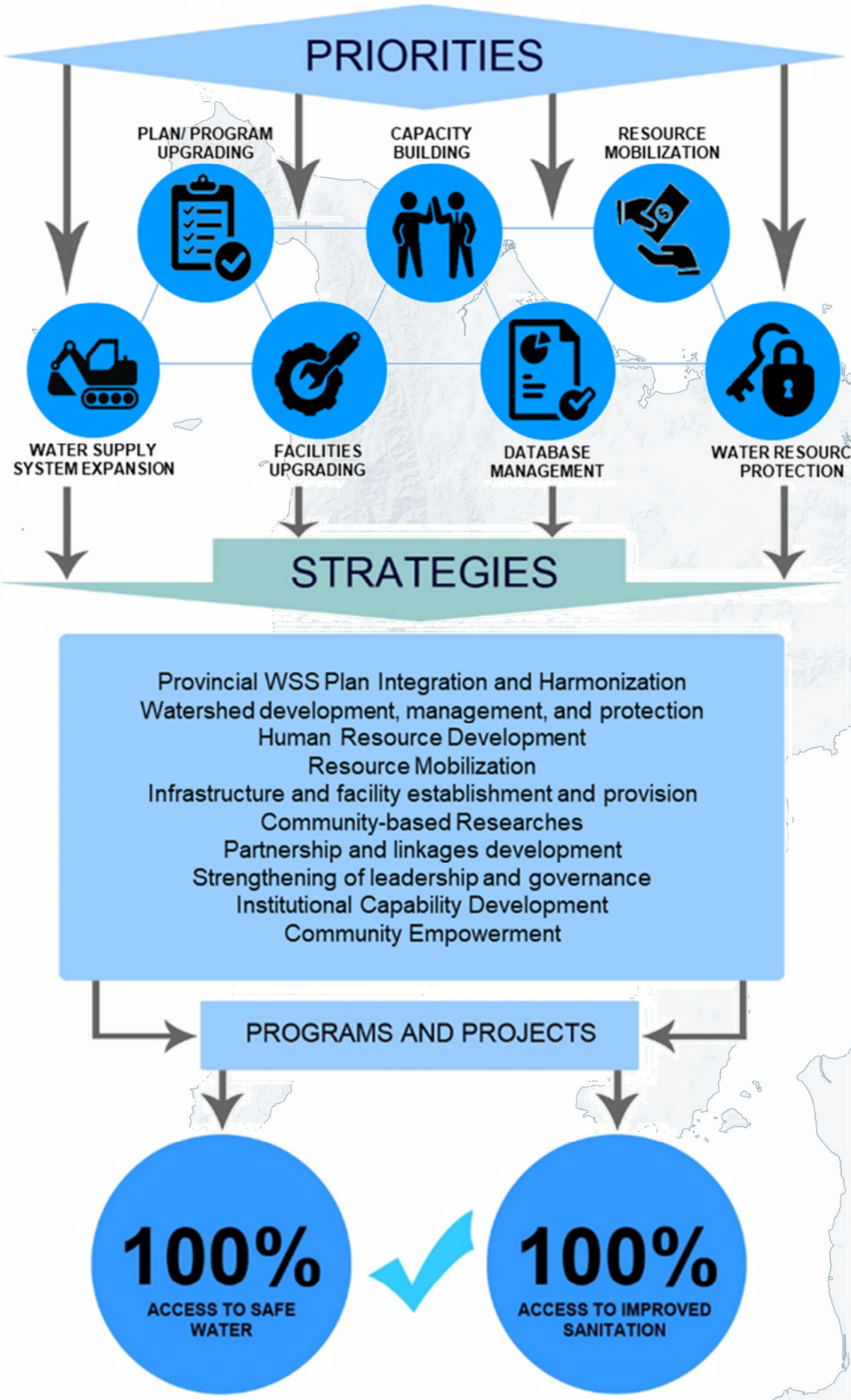


Figure 16: Western Visayas WSS Strategic Framework

Access Targets for Water Supply and Sanitation

As experts knowledgeable in and thoroughly familiar with the social and environmental conditions in their respective provinces, the workshop participants were given free rein in setting targets concerning water supply and sanitation access (even as they were guided by the prescribed goals).

Their targets were based on current and baseline data (i.e., population growth rates, water resources availability, topographical and geographical setting, etc.), the status quo (funding constraints, political and cultural challenges, etc.), and the realistic attainability of set targets.

Western Visayas strives to achieve 99.6% access to safe water by 2022 and 100% access by 2030. Universal access by 2030 means more than 1,880,000 HHs will benefit. Improved access to sanitation is set at 84% by 2022 and universal access by 2030.

Figures 17 and 18 graph the WSS targets in terms of households for 2022 and 2030.

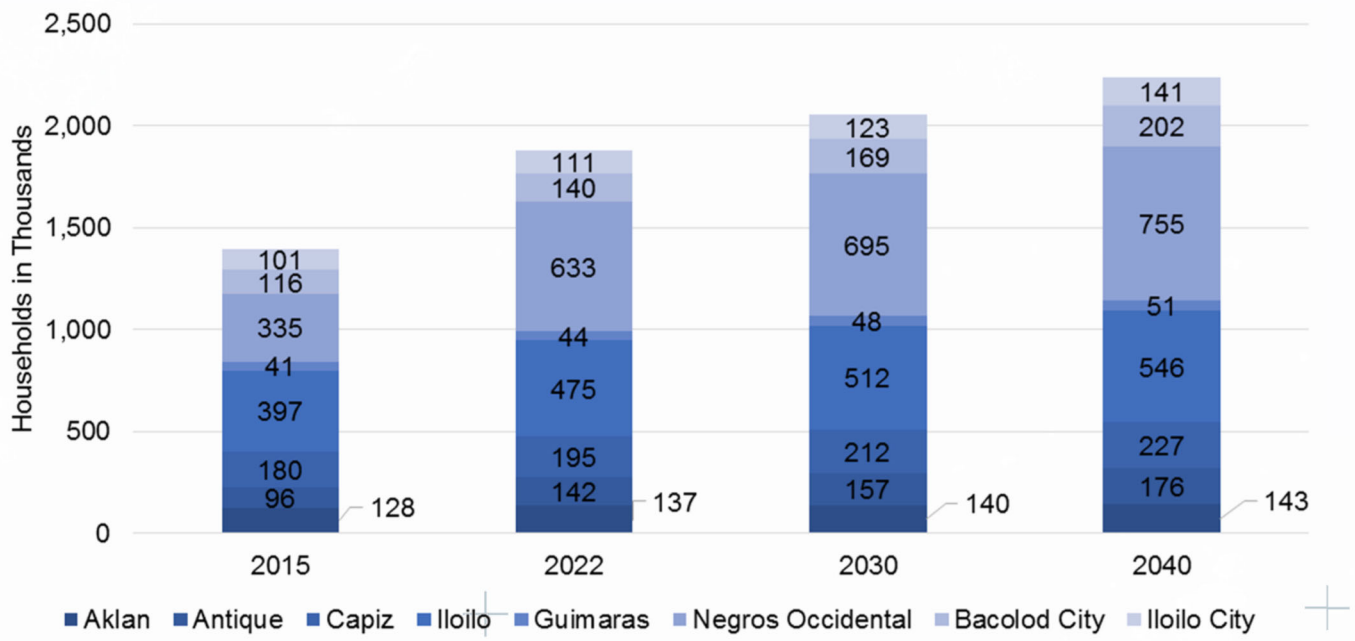


Figure 17: Targeted Households with Access to Safe Water

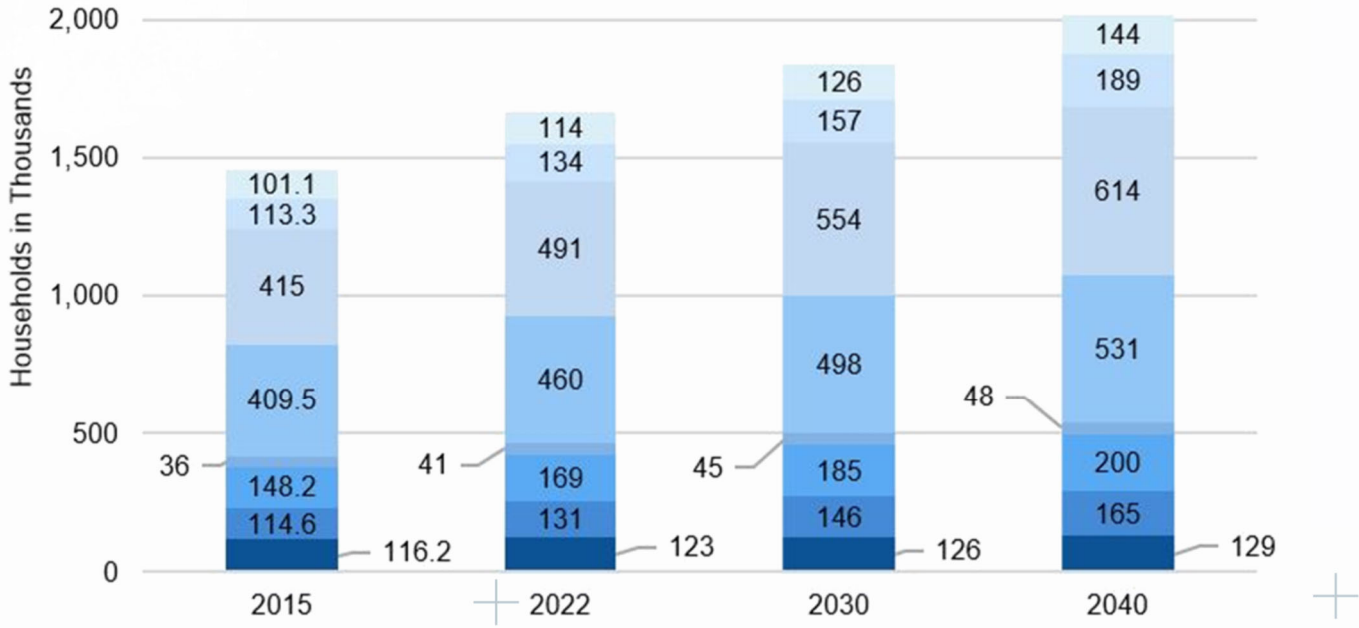


Figure 18: Targeted Households with Access to Sanitation

Water Supply Targets

AKLAN			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	47.5%	100.0%	100.0%
Level II	52.5%	0.0%	0.0%
Level I	0.0%	0.0%	0.0%
No Access*	0.0%	0.0%	0.0%

ANTIQUE			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	40.0%	50.0%	100.0%
Level II	53.5%	50.0%	0.0%
Level I	6.5%	0.0%	0.0%
No Access*	0.0%	0.0%	0.0%

CAPIZ			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	80.0%	90.0%	100.0%
Level II	0.0%	0.0%	0.0%
Level I	20.0%	10.0%	0.0%
No Access*	0.0%	0.0%	0.0%

ILOILO (excluding ILOILO CITY)			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	25.0%	30.0%	100.0%
Level II	20.0%	25.0%	0.0%
Level I	55.0%	45.0%	0.0%
No Access*	0.0%	0.0%	0.0%

GUIMARAS			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	70.0%	80.0%	100.0%
Level II	0.0%	0.0%	0.0%
Level I	30.0%	20.0%	0.0%
No Access*	0.0%	0.0%	0.0%

NEGROS OCCIDENTAL (excluding BACOLOD CITY)			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	56.0%	75.0%	100.0%
Level II	36.0%	25.0%	0.0%
Level I	8.0%	0.0%	0.0%
No Access*	0.0%	0.0%	0.0%

BACOLOD CITY			
	2022	2030	2040
With Access	95.0%	100.0%	100.0%
Level III	90.0%	100.0%	100.0%
Level II	4.0%	0.0%	0.0%
Level I	1.0%	0.0%	0.0%
No Access*	5.0%	0.0%	0.0%

ILOILO CITY			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	75.0%	100.0%	100.0%
Level II	10.0%	0.0%	0.0%
Level I	15.0%	0.0%	0.0%
No Access*	0.0%	0.0%	0.0%

WESTERN VISAYAS			
	2022	2030	2040
With Access	99.6%	100.0%	100.0%
Level III	52.7%	68.5%	100.0%
Level II	26.0%	18.7%	0.0%
Level I	20.9%	12.8%	0.0%
No Access*	0.4%	0.0%	0.0%

Sanitation Targets

AKLAN			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

ANTIQUE			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

CAPIZ			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

ILOILO (excluding ILOILO CITY)			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%		0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

GUIMARAS			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

NEGROS OCCIDENTAL (excluding BACOLOD CITY)			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

BACOLOD CITY			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

ILOILO CITY			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

WESTERN VISAYAS			
	2022	2030	2040
Improved	84.2%	100.0%	100.0%
Basic	1.4%	0.0%	0.0%
Shared/Communal/Limited	14.4%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

Strategic Interventions

After the regional planning and consultation workshop, a working document detailing specific strategic interventions to improve water supply and sanitation access in Region VI was formulated. The participants deliberated on these proposed interventions to make them adaptable to actual local conditions. (These are discussed more thoroughly in the National Master Plan and may be adopted accordingly at the local level.)

Tables 14 and 15 show the specific strategic interventions for water supply and sanitation, respectively.

Table 14: Proposed Strategic Interventions for Water Supply

Access to Safe Water	Planning and Development	Service Provision	Regulation	Promotion
95% Access to Safe Water in 2022 Universal Access in 2030	▪ Planning, program or project design ▪ Establishing labs and water quality testing centers ▪ Lobbying for the Regional WSS Masterplan	▪ M&E expansion ▪ Rehabilitation/Non-revenue water (NRW) reduction maintained at 20% of total production ▪ Integration/ Amalgamation ▪ Automation ▪ Residuals management ▪ Mitigation ▪ Water potability maintained at all times ▪ Providing 24/7 water supply service ▪ Achieving 100% coverage ▪ Residuals management	▪ Water resources protection ▪ Arbitration ▪ Environmental and social safeguards ▪ Compliance with PNSDW 2017 ▪ Close monitoring of Joint Agreement ▪ Compliance training from DOH ▪ Resource studies	▪ Willingness to connect and pay ▪ Demand creation

Table 15: Proposed Strategic Interventions for Sanitation

Access to Improved Sanitation	Planning & Development *Planning* *Program or Project Design* *Institution Building* *Training* *Financing* *Climate/Disaster Resiliency* *Policy*	Service Provision *Operations* *M&E* *Expansion* *Amalgamation* *Automation*	Regulation *Tariff/Pricing* *Resource* *Arbitration* *Registration, Permits, Rights*	Promotions *Social Preparation* *Advocacy* *Demand Creation* *Behavior Change*
High Access Areas with 60% to 100% Improved Sanitation Coverage	▪ Local Sustainable Sanitation Plan (LSSP) should be incorporated into the WSS Sector Plan, local development plan (LDP), annual investment program (AIP), and local health plan. ▪ A sewerage system program should be developed to provide service in the urban core coordinating with those in charge of the septage management program; project urban sprawl ▪ A National Sewerage and Septage Management Program (NSSMP) subsidy grant for sewerage and septage management programs (SMP) should be in place. ▪ Capacity development in regard to sewerage systems should be planned and integrated with other infrastructure. ▪ A sanitation ordinance covering sewerage system and septage management services should be passed, possibly integrating it into the environment code and Water Quality Management Areas (WQMA) action plan.	▪ Sanitation programs should focus on implementing sewerage systems and completing septage management programs. ▪ Expansion of urbanized and urbanizing barangays should be pursued. ▪ M&E system should conform to PSA/ Census (covered by sewerage system, households desludged, and on-site systems).	▪ Tariff should be computed using full cost recovery with infusion of capex subsidy for sewerage projects. ▪ LGU implementers have undergone compliance training given by DOH and DENR (particularly in sewerage systems), and the Dept. of Agriculture (DA) with respect to regulations/guidelines governing disposal of by-products. ▪ Penalties should be strictly imposed on those not complying with certain requirements, including LGUs/WDs by filing cases with the environmental ombudsman.	▪ Promotions should focus on enjoining the public to connect to the sewerage system when made available stressing the importance of compliance and the benefits therefrom. ▪ Promotional efforts regarding water demand management should be supported to minimize wastage and unnecessary use of water. ▪ Building buy-in for paying for sanitation services should be promoted.

Physical Interventions

To meet the targets for access and coverage as well as the normative content of water (service standards), capital investments are necessary. The details of these investments in 2022 and 2030 are listed in Table 16.

Table 16: Capital Investments Required to Meet Water Supply Targets

Service Level	2022	2030
Level III	▪ Water source assessment and development ▪ Construction of water treatment facilities ▪ Distribution network expansion ▪ Provision of service connections ▪ NRW reduction program ▪ Watershed and water resources protection, management and development ▪ Development of a Water Safety Program ▪ Adoption of a rainwater harvesting program ▪ Establishment of adequately equipped laboratory testing centers in strategic areas to serve all service levels clientele	▪ Water source assessment and development ▪ Construction of water treatment facilities ▪ Distribution network expansion ▪ Provision of service connections ▪ NRW reduction program ▪ Watershed and water resources protection, management and development ▪ Development of a Water Safety Program ▪ Adoption of a rain water harvesting program ▪ Automation of operations and major services
Level II	▪ Rehabilitation of existing water supply system to upgrade it to Level III	▪ Rehabilitation of water supply system to upgrade it to Level III
Level I	▪ Upgrading to “safe level” those water sources found “unsafe”	▪ Adoption of a rain water harvesting program in areas not reached by Levels II and III services

Capital investments for the sanitation targets will include basic sanitation programs, septage management programs, and sewerage management programs.

Targets for 2022 will mainly focus on basic sanitation. The septage and sewerage management programs are to be undertaken to achieve 2030 targets, although these programs may be implemented as early as 2022.

Nonphysical Interventions

To support the CapEx programs and ensure the efficient operation of the newly constructed facilities, institutional and regulatory reforms are to be undertaken (as shown in Table 17).

Table 17: Institutional and Regulatory Reforms Required to Achieve Water Supply and Sanitation Goals

Items	Undeveloped/Underdeveloped	Developing	Developed
Water Service Provision	▪ LGUs will organize/establish water utilities as commercial enterprises in their jurisdictions or form a WD. ▪ LGUs will create offices to handle Level II and Level I services.	▪ WDs and LGU-run utilities will be motivated to improve their performance by offering them incentives/rewards.	▪ A system for independent evaluation and due diligence regarding public-private partnership projects will be set up.
Planning and Development	▪ An agency will be created to spearhead efforts to improve the WSS sector at the provincial level. The provincial office shall coordinate development plans for water and sanitation of all municipalities in each province, pursue efforts (in coordination with the DENR) in watershed rehabilitation, and provide training programs to LGUs in water supply development and management.		
Regulation	▪ Service standards for water supply and sanitation will be defined. ▪ An independent group will be formed to monitor the performance of water and sanitation service providers, other than the WDs, within each province. WDs will continue to be regulated by the LWUA. The monitoring group could later be made part of a regulatory body.		

Addressing the Gaps

Water Supply Investment Requirements

Physical Investments

To address WSS infrastructure gaps and fulfill specific targets and commitments for 2022 and 2030, the cost of infrastructure investments was derived based on anticipated demand. Such demand was based on projected population, economic growth, as well as factored-in investments to ensure the continuous delivery of WSS services provided by existing systems. The computation included the anticipated need to upgrade existing service levels (i.e., from Level II to Level III, Level I to Level II or Level III).

Western Visayas requires capital investments for infrastructure development of about PhP27.13 billion and PhP28.34 billion to achieve 2022 and 2030 targets, respectively. Unit development costs used to arrive at these sums are estimated at PhP34,300 per household for Level III, PhP20,100 for Level II, and PhP9,000 for Level I.

These rates are direct costs and cover water source development, water treatment facilities, storage requirements, transmission and distribution lines, and pumping requirements, and provision of service connections.

Furthermore, these unit costs (determined to suit local conditions in Western Visayas) were derived by applying regional cost factors (with respect to labor, material, and equipment costs) to the computed development base costs for NCR. NCR values are pegged at PhP31,800 per household for Level III, PhP18,700 for Level II, and PhP8,400 for Level I.

The cost deviations (from the NCR base rates) were taken into account considering the region's distinct geographical, economical, and accessibility characteristics, and labor, material, and equipment costs, which are bound to affect the implementation costs of any project. The regionalization of costs ensures that computed regional investment requirements for the Master Plan and the Regional Roadmaps are as realistic as possible befitting each locale.

Aside from the direct costs, indirect costs were considered in estimating the total investment requirements. These items include project preparation activities (which may affect budget considerations) before actual construction work begins. Items considered and percentage values used in relation to the total direct costs computed are shown in Table 18.

Total expenses for establishing water quality testing laboratories have also been taken into account. It is assumed that one laboratory per province will be constructed.

Table 19 shows a summary of the total investment requirements of the region. (The detailed methodology of how the regional costs for Western Visayas were derived is referenced in Annex D of the main volume of the Philippine WSS Master Plan.)

Nonphysical Investments

Institutional and regulatory reforms have to be pursued to complement infrastructure development and ensure that water supply systems constructed will operate efficiently. Costs of reform implementation have not been estimated at the regional level and are projected to be not substantial compared to the infrastructure investments.

LGUs, WDs, and other stakeholders are obligated to influence decision makers to pursue relevant reforms in the water sector. These reforms serve as non-infrastructure investments and typically include organization/institutional development, regulatory strengthening, capacity building, and project management.

Proposed interventions include the following:

- The model of existing water utilities should be identified in areas where there are no water districts. The establishment of WDs should be proposed in municipalities with a population of at least 20,000, subject to an agreement with the local chief executives. If LGUs are not amenable to forming a WD, water utilities that can operate commercially (e.g., a similar local government water corporation or economic enterprise) should be set up.
- Priority should be given to operationalizing nonfunctional WDs, particularly those in municipalities categorized as 3rd class and higher.
- The target expansion of service coverage shall be conducted at the municipal level. Municipalities with lower than 50% coverage will be given priority in the investment program.

The map on the right shows the Western Visayas cities/ municipalities where priority WD projects have been approved and those pending approval for LWUA's financial assistance (FA). The WDs of Bacolod City and La Carlota City have requested LWUA's financial assistance (FA). As of this writing, their requests are being evaluated. WDs in Aklan, which include those in Malay, Numancia, and Ibajay, have been eyed as potential recipients of FA.

Table 18: Indirect Costs Employed[20]

Water Supply		
Contingency	10.0%	Percentage of Total Direct Cost
Feasibility Study	3.0%	Percentage of Total Direct Cost
Detailed Engineering Design	6.0%	Percentage of Total Direct Cost
Construction Supervision	5.0%	Percentage of Total Direct Cost
ROW/Land Acquisition	3.0%	Percentage of Total Direct Cost
Organizational Cost/Permits	2.0%	Percentage of Total Direct Cost
Capacity Development	33,350	1 Staff Employee per 100 HH (LWUA)

Table 19: Total Investment Costs for Water Supply Sector

Province	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Aklan	2,097.76	3,342.53
Antique	1,697.79	1,035.45
Iloilo (including Iloilo City)	4,085.67	4,205.62
Negros Occidental (including Bacolod City)	17,907.39	7,457.47
Capiz	1,097.34	1,518.88
Guimaras	239.58	328.59
Total	**27,125.52**	**17,888.55**

[20] *Based on industry standards*

LWUA Priority Projects

LWUA, 2018 Data

Septage Treatment Plant Clustering

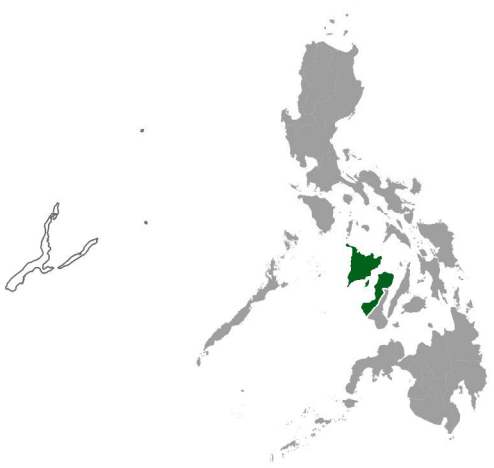
Caluya

Aklan
Buruanga
Nabas
Libertad
Pandan
Tangalan
Makato
Kalibo
New Washington
Malinao
Banga
Sebaste
Batan
Balete
Altavas
Capiz
Sapi-An
Carles
Pilar
Estancia
Sigma
Pontevedra
Batad
Dao
Ma-Ayon
Jamindan
Tibiao
Cuartero
Dumalag
Sara
Barbaza
Tapaz
Dumarao
Lemery
Concepcion
Laua-An
Calinog
Passi City
San Rafael
Ajuy
Bugasong
Lambunao
Barotac Viejo
Duenas
Banate
Valderrama
Dingle
Janiuay
Maasin
Mina
Barotac Nuevo
San Remigio
New Lucena
Alimodian
Belison
Leon
Santa Barbara
Iloilo
San Miguel
San Jose
Sibalom
Igbaras
Oton
Buenavista
Miagao
Guimbal
Hamtic
San Joaquin
Guimaras
Tobias Fornier
Sibunag
Pulupandan
Bago City
Antique
Nueva Valencia
Valladolid
La Carlota City
La Castellana
Manapla
Cadiz City
Sagay City
Escalante City
Silay City
Toboso
Talisay City
Bacolod City
Calatrava
Murcia
San Carlos City
Hinigaran
Moises Padilla
Isabela
Binalbagan
Himamaylan City
Cauayan
Kabankalan City
Sipalay City
Candoni
Negros Occidental

N

10 0 10 20 30 40 km

WGS 1984 - UTM Zone 51 N



Legend
FutureSTP
R6-IN1
R6-IN2
R6-IN3
R6-IN4
R6-IN5
R6-IN6
R6-IN7
R6-IN8
R6-IN9
R6-IN10
R6-IN11
R6-IN12
R6-IN13
R6-IN14
R6-IN15
R6-IN16
R6-IN17

Sanitation Investment Requirements

Physical Investments

Basic Sanitation Program. The DOH plans to prescribe a national basic sanitation program for the entire country – looking into a combination of microfinance and behavior change communication. A Department Administrative Order on standard septic tank use and design will also be released by the DOH soon after planned consultation activities have been rolled out in the country's three major island groups (Luzon, Visayas and Mindanao).

Western Visayas will need about PhP7.6 billion for basic sanitation from 2016 to 2022 to reach a target of 97%.

This was derived by multiplying the unserved population by the unit development costs with regard to establishing specific on-site sanitation facilities. (An annex to this report and the National Master Plan explains the unit costs and derived costs for specific sanitation interventions.)

Septage Management Program. A clustering approach will be recommended to reduce capital costs and attain economies of scale. The proposed clustering per province is shown on the map on the left.

The region will need about PhP4.2 billion and PhP381 million for 2022 and 2030, respectively, for its septage management program.

Sewerage System Program. Only Iloilo City and Bacolod City have been required to plan and implement a sewerage system for their urban core. However, rapidly urbanizing cities (i.e., candidate HUCs) should also consider planning for sewerage services in the interim.

The indicative cost for sewerage was computed based on the 50% coverage of the HUCs' urban population only. The unit cost was derived per the procedure applied to septage management, wherein the unit cost was based on the National Septage and Sewerage Master Plan (NSSMP) estimations and later adjusted considering other factors.

For sewerage services, Iloilo City will require PhP1.55 billion by 2022 and an additional PhP171 million by 2030. Bacolod City, on the other hand, will require PhP3.81 billion by 2022 and an additional PhP575 million by 2030. The computational template provided for a 25% coverage of sewerage services by 2022 and an additional 25% coverage by 2030. This includes the city's incremental population from 2015 to 2022 and from 2023 to 2030.

Nonphysical Investments

Region VI, like other regions in the country, will require substantial assistance from the national government, or where technical and financial assistance can be funneled. This will include an inventory or survey and assessment of existing sanitation facilities, capacity development for implementing local agencies (local health office, environment and natural resources office, office of the building official, and general services office), institutional, policy and regulatory environment development (which would require the involvement of capacitance support offices like the budget and treasurer's office, bids and awards committee, commission on audit office, engineering office, office of legal services/affairs, barangay affairs office, office of the local chief executive, and the local legislative council).

Other nonstructural interventions that may require a budget include developing a monitoring and evaluation (M&E) system to monitor progress, support planning, and guide development training programs, promotional campaigns and other legislative advocacies, and initiate hygiene promotion programs.

Table 20: Total Investment Costs for Sanitation Sector

Province/City	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Aklan	1,548.34	94.83
Antique	1,654.60	507.68
Capiz	3,832.37	515.04
Iloilo (excluding Iloilo City)	4,085.75	1,258.79
Guimaras	307.15	120.06
Negros Occidental (excluding Bacolod City)	7,181.47	2,059.94
Bacolod City	7,950.65	1 ,298.81
Iloilo City	3,680.90	581.29
Total	**30,241.23**	**6,436.42**

Proposed Projects and Programs

A list of projects and investment programs has been developed during the regional planning workshop to assess the current state of the WSS sector and propose projects to increase access to and upgrade water supply and sanitation facilities at the provincial or regional level.

The DILG, DENR River Basin Control Office (RBCO) and LWUA have proposed projects in the WSS sector in addition to those discussed and agreed on at the regional workshop.

This list of projects does not cover only infrastructure projects, but also nonphysical investment requirements, such as capacity development programs, information dissemination campaigns, and watershed management plans. These projects run the gamut from conception, proposal, pre-feasibility and feasibility study stages, detailed engineering design, to pre-procurement and procurement.

Aklan							
	Water Supply	Period	Budget Requirement (PhP)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Training and workshops on WSSP mapping		-	1	Monitoring and evaluation		-	
				2	Microbiological testing		-	
				3	Campaign for the expansion of ZOD barangays		-	
				4	Barangays promoting best sanitation practices		-	
				5	Procurement of toilet bowls		-	
				6	Water containers and Jerry cans		-	-
		Total	-			Total	-	

	Water and Sanitation	Period	Budget Requirement (PhP Million)
1	Creation of a Provincial Water Supply and Sanitation Sector Technical Working Group	Short Term	-
		Total	-

Negros Occidental							
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Formation of a study team		-	1	Orientation at the local level		-	
2	Restoration of the Waterworks Division (under the Provincial Engineer's Office) to oversee the study and address other water-related concerns		-	2	Reproduction of IEC materials		-	
3	Adoption of EPANET software as a standard in the design and analysis of water systems		-	3	Training in community-led sanitation programs		-	
4	Development of a Provincial Water, Sewerage & Sanitation Plan		-	4	Program implementation review		-	
5	Reforestation of watershed areas		-	5	Consultation with sanitation inspectors and stakeholders		-	
6	Creation of a Local Water Sources Monitoring Committee		-	6	Planning workshops at the barangay level		-	
7	Human resources and capacity development re: service providers' projects		-	7	Provision of incentives		-	-
8	Retrofitting of existing water facilities & construction of new ones considering disaster risk reduction & climate change adaptation		-			Total	-	
9	Establishment and licensing of water analysis laboratories		-					
10	Regular water quality monitoring		-					
11	Planning workshops at the barangay level		-					
12	Provision of incentives		-					
		Total	-					

Iloilo							
	Water Supply	Period	Budget Requirement (PhP)		Water	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Organizing WSPs		-	23	Water demand management		-	
2	Capacity building programs for community-based WSPs		-	24	Water source protection		-	
3	Development of water and sanitation knowledge information systems		-	25	ZOD		-	
4	Regular monitoring and evaluation of WSPs		-	26	PEWS or WSPs, WDs		-	
5	Linkage between WSPs and fund sources		-	27	Forest protection		-	
6	Forming a federation of community-based WSPs		-	28	Watershed planning, development and protection		-	
7	Provision of technical, infrastructure, and funding support to community-based WSPs		-	29	Mapping and geographical information system (GIS) data banking		-	
8	Construction of RWSA projects in barangays		-	30	Streambank reforestation		-	
9	Capacity building		-	31	Incorporating climate change projections into water source management plans		-	
10	PPP planning		-	32	Training programs for WMB/C		-	
11	Incorporating service areas in provincial WSS map/ databank		-	33	Watershed mapping/data banking		-	
12	Identification, site validation and IEC campaigns on project impact and importance (climate change, protecting watersheds, rainwater harvesting)		-	34	Inter-watershed MB visits		-	
13	Installation of rainwater harvesting systems in evacuation centers		-	35	Regular watershed monitoring & assessment (esp. water quality and quantity)		-	
14	Installation of rainwater harvesting ferrocement tanks		-	36	Institutionalized watershed assessment		-	90
15	Zero Open Defecation movement		-	37	Holding of Governor's Prize on Blue Waters Competition		-	
16	IEC, advocacy, environmental sanitation programs		-	38	Institutionalized use of watershed score cards (forest, water quality, quantity, consumption, biodiversity, waste management, land use and conversion, watershed governance)		-	
17	Administering Colilert test and reagents for bacterial test		-	39	IEC campaign on BICs		-	
18	Treatment of water sources		-	40	Setup of BIC centers		-	
19	IEC program		-	41	Conduct of biannual BIC Congress		-	
20	Establishment of water bacteriological examination facility		-	42	Barangay-based water source protection		-	
21	Identification of urban/special areas and relocation sites for sewerage planning		-	43	Engaging women residents in activities related to watershed protection		-	
22	Sewerage planning ordinance		-	44	Setting up a WD in Lucena	Medium Term	10	
						Total	**10**	

	Sanitation	Period	Budget Requirement (PhP Million)
1	Iloilo Cluster Septage Management Project (Ajuy, Barotac Viejo, Concepcion, San Rafael, Sara)	Medium Term	80
		Total	**80**

Antique							
	Water Supply	Period	Budget Requirement (PhP)		Water Supply	Period	Budget Requirement (PhP)	Total Budget Requirement (PhP Million)
1	Barangay consultation/meetings		-	19	Sustainability of national greening project		-	
2	WASH project orientation and management		-	20	Establishment of forest tree nurseries		-	
3	Seminar on basic organizational mechanics		-	21	Micro-watershed rehabilitation		-	
4	Organizing and strengthening an interim BWSA		-	22	Tree planting and maintenance		-	
5	Training in operation and management		-	23	Printing, packaging and distribution of appropriate IEC materials to communities		-	
6	Assisting BWASA or water and sanitation associations re: registration requirements		-	24	Holding of barangay assemblies, orientation seminars and consultations		-	
7	Creation of a WSS Planning and Technical Working Group through the issuance of an Executive Order		-	25	Partnership/coordination with members of the print and broadcast media		-	
8	Training in WASH and Community-Led Total Sanitation Program		-	26	Water quality sampling and testing		-	
9	Training in project operation and management		-	27	Establishment and maintenance of provincial water laboratory		-	
10	Training in sewerage and septage management		-	28	Procurement of Collilerts, 18 reagents and laboratory equipment needed in water analysis		-	
11	Familiarization tour of sites of successful WASH projects		-	29	Construction of safe water supply systems (Levels I, II, and III)		-	-
12	Training on project identification and prioritization for LGUs		-	30	Lot procurement for waste disposal		-	
13	Training in the preparation of feasibility studies, and project development and business plans		-	31	Procurement or provision of vacuum truck lorry per municipality (LGU economic enterprise)		-	
14	Preparation and packaging of FS/project proposal and business plan		-	32	Construction of complete toilet facilities with septic tanks		-	
15	Coordination and lobbying with different funding agencies re: project/FS/business plan		-	33	Inventory and updating of WSS data		-	
16	Adoption of the WSS Plan and incorporating it into the Local Comprehensive Development Plan and Investment Program by the Local Development Council and approved by the Local Sanggunian		-	34	Geotagging of existing and potential water sources		-	
17	Training in WSS results-based monitoring and evaluation system		-	35	Mapping of water and sanitation facilities throughout the province		-	
18	Training in community- and results-based monitoring and evaluation of WSS projects		-	36	Inventory of existing water systems and service levels and institutions/agencies extending technical assistance		-	
				37	Data monitoring		-	
					Total		-	


40°0.000′E
40°0.000′W
40°0.000′N
60°0.000′S
20°0.000′N
40°0.000′E
40°0.000′W

Identified Priority Projects (2019-2020)

The table below show the priority projects identified by LWUA and DILG for 2019-2020. The map on the right shows the various barangays and municipalities to be covered by DILG's Assistance to Municipalities (AM) and Salintubig Projects in 2019.

Assistance To Municipalities (2019)				
Province	Municipality	Project Type	Project Title	Amount (PhP)
Aklan	Batan	Potable water supply system	New Construction Of Level II Potable Water Supply System	5,262,000
Antique	Sebaste	Potable water supply system	Improvement Of Level III Water System	6,137,000
Iloilo	Concepcion	Health and sanitation	Construction Of Sanitary Toilets With Hygiene Facilities For Public Places	1,500,000
Iloilo	Guimbal	Potable water supply system	Rehabilitation/ Improvement Of Level II Potable Water System	1,000,000
Negros Occidental	Calatrava	Potable water supply system	Expansion Of Level III Water System	6,268,000
			Total	**20,167,000**

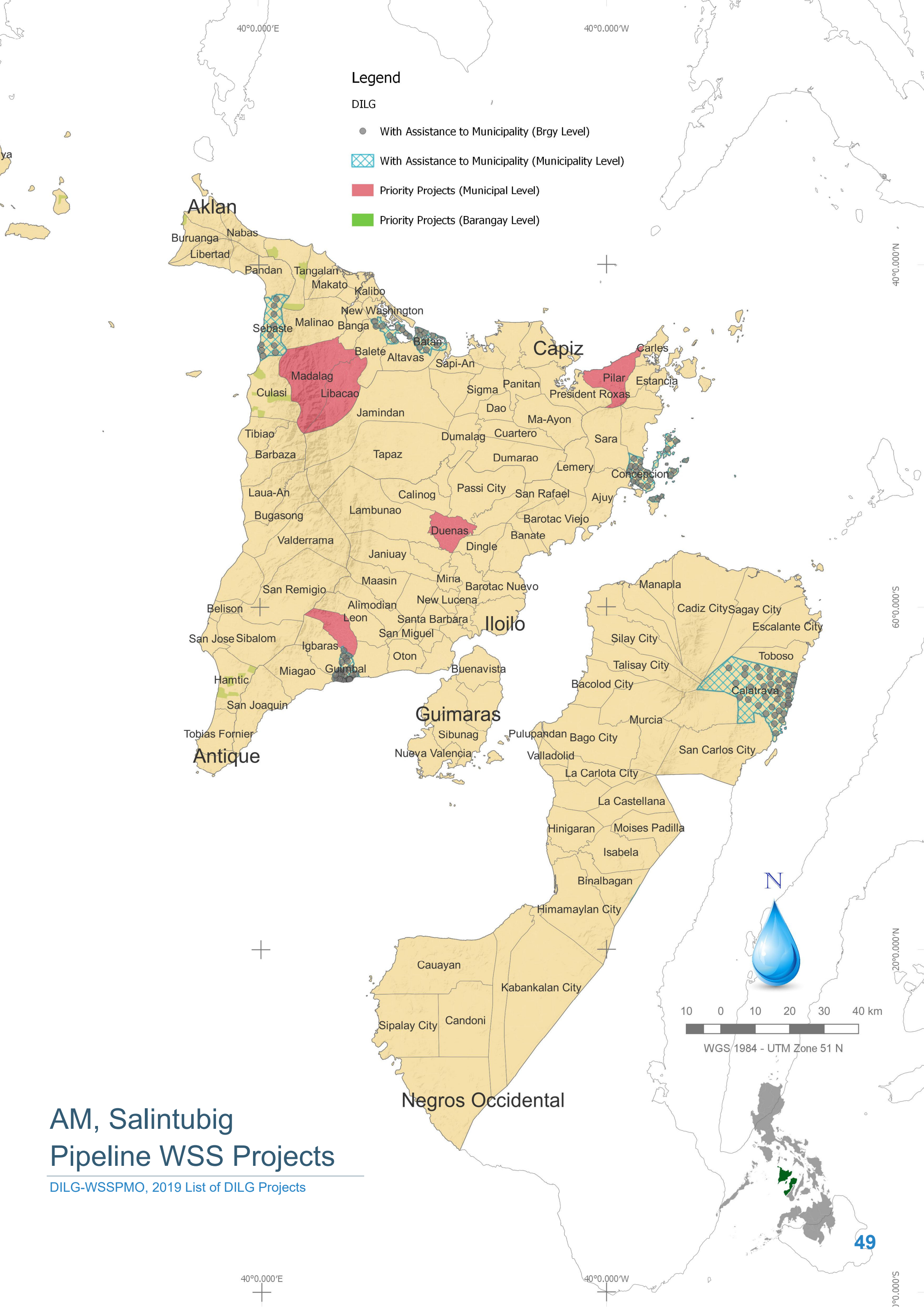
SALINTUBIG (2019) - Waterless Municipalities			
Province	Municipality	Project Name	Amount (PhP)
Aklan	Libacao	Provision Of Potable Water Supply in 24 Barangays	5,000,000
Aklan	Madalag	Provision Of Potable Water System	20,000,000
Capiz	Pilar	Provision Of Potable Water Supply at Barangay Santa Fe	5,500,000
Iloilo	Dueñas	Construction Of Level II Water Supply System	19,000,000
Iloilo	Tubungan	Construction Of Level III Water Supply System	20,000,000
		Total	**69,500,000**

SALINTUBIG (2019) - Waterless Barangays				
Province	Municipality	Project Name	Barangay	Amount (PhP)
Aklan	Buruanga	Installation Of Pumping Station at Hinugtan Beach	Hinugtan, Bel-Is	5,000,000
Aklan	Ibajay	Potable Water And Sanitation	Antipolo, Cabugao, Rivera And Yawan	10,000,000
Antique	Caluya	Water System/Rehabilitation Of Water Supply/ Drilling	Banago, Harigue And Masanag	8,000,000
Antique	Culasi	Construction Of Level III Water System	Naba, Magsaysay, Alojipan, Batonan Norte, San Pascual And Camancijan	10,000,000
Antique	Hamtic	Hot Spring Development	Apdo	1,500,000
Antique	Hamtic	Water Supply System (Spring Development)	Asluman	3,000,000
Antique	Hamtic	Construction Of Water System	Sulok	1,000,000
Antique	Hamtic	Improvement Of Water System	Linaban	1,000,000
Antique	Hamtic	Rehabilitation Of Water System	Pili 1,2,3	5,000,000
Antique	Hamtic	Level II Water Supply	Villabert-Jimenez	2,000,000
			Total	**46,500,000**

LWUA (2017-2018)				
Province	Municipality	Project Type	Status	Amount (PhP)
Negros Occidental	Bacolod City	Expansion/Improvement	Awaiting CAF & docs from WD	500,000,000
Negros Occidental	La Carlota City	Expansion	Awaiting review of cost estimates from AO	20,000,000
Aklan	Malay	Expansion/Improvement	Awaiting CAF & docs from WD	22,000,000
Aklan	Ibajay	Expansion/Improvement	Pending approval	100,000,000
Aklan	Numancia	Expansion/Improvement	Pending approval	50,000,000
			Total	**692,000,000**

AM, Salintubig Pipeline WSS Projects

DILG-WSSPMO, 2019 List of DILG Projects



Appendix A: Provincial and HUC Profiles

Aklan	17 municipalities	Altavas, Balete, Banga, Batan, Buruanga, Ibajay, Kalibo, Lezo, Libacao, Madalag, Makato, Malay, Malinao, Nabas, New Washington, Numancia, Tangalan
	327 barangays	12 urban, 315 rural
Land Area	1,821.42 square kilometers	
Demographics (2015)	Population (2015) – 574,823 Population Growth Rate (2000 to 2015) – 1.60 Population Density – 320 per sq. km	
Economy	• Major industries - agriculture, fishery, *piña* cloth weaving, pottery, *ampay* making, handicraft • Major product - abaca • Major crops - rice, rice, corn, coconuts • Aklan's claim to fame is the island of Boracay, one of the best beaches well-known globally for its fine white sand and crystal clear waters.	
Poverty Incidence (2015)	On Families – 10.9% On Population – 14.9%	

Antique	18 municipalities	Anini-y, Barbaza, Belison, Bugasong, Caluya, Culasi, Hamtic, Laua-an, Libertad, Pandan, Patnongon, San Jose de Buenavista, San Remigio, Sebaste, Sibalom, Tibiao, Tobias Fornier, Valderama
	590 barangays	11 urban, 579 rural
Land Area	1,426.06 square kilometers	
Demographics (2015)	Population (2015) – 582,012 Population Growth Rate (2000 to 2015) – 1.37 Population Density – 210 per sq. km	
Economy	• Major industries - agriculture, fishery, livestock raising, mining, manufacturing • Major product - coal, marble, silica, copper, gemstone, muscovado sugar, houseware • Major crops - rice, fruits, vegetables, legumes, seaweeds • The Sira-an Hot Spring, claimed to be a medical spring, is found in Antique.	
Poverty Incidence (2015)	On Families – 18.4% On Population – 26.0%	

Capiz	16 municipalities	Cuartero, Dao, Dumalag, Dumarao, Ivisan, Jamindan, Maayon, Panay, Panitan, Pilar, Pontevedra, President Roxas, Sapian, Sigma, Tapaz
	one (1) component city	Roxas City
	473 barangays	28 urban, 445 rural
Land Area	2,594.64 square kilometers	
Demographics (2015)	Population (2015) – 761,384 Population Growth Rate (2000 to 2015) – 1.00 Population Density – 290 per sq. km	
Economy	• Major industries - agriculture; aquaculture; raising of cattle, swine, goats, and poultry; cut-flower industry; handicraft; shellcraft; ceramics; lime processing; garments; farm tool fabrication; furniture making; boat building • Major product - novelty export items made of *kapis* shells • Major crops - rice, yellow corn • Capiz's rich fishing grounds are the reason why it is dubbed as the 'seafood capital' of the country.	
Poverty Incidence (2015)	On Families – 7.8% On Population – 12.9%	

Guimaras	5 municipalities	Buenavista, Jordan, Nueva Valencia, San Lorenzo, Sibunag
	98 barangays	2 urban, 96 rural
Land Area	604.57 square kilometers	
Demographics (2015)	Population (2015) – 174,613 Population Growth Rate (2000 to 2015) – 1.39 Population Density – 290 per sq. km	
Economy	• Major industries - agriculture, fishery, tourism, handicraft, food processing, mining, fruit processing, lime making • Major product - *buri* mats, hats and baskets • Major crops - rice, mangoes, calamansi, cashew, vegetables, fruits, root crops • Guimaras is a popular travel destination noted for its white sand beaches, island coves and coral reefs.	
Poverty Incidence (2015)	On Families – 4.8% On Population – 5.2%	

Appendix A: Provincial and HUC Profiles

Iloilo	42 municipalities	Ajuy, Alimodian, Anilao, Badiangan, Balasan, Banate, Barotac Nuevo, Batad, Bingawan, Cabatuan, Calinog, Carles, Concepcion, Dingle, Dueñas, Dumangas, Estancia, Guimbal, Igbaras, Janiuay, Lambunao, Leganes, Lemery, Leon, Maasin, Miagao, Mina, New Lucena, Oton, Pavia, Pototan, San Dionisio, San Enrique, San Joaquin, San Miguel, San Rafael, Santa Barbara, Sara, Tigbauan, Tubungan, Zarraga
	one (1) component city	Passi City
	one (1) highly urbanized city	Iloilo City
	1,721 barangays (excluding Iloilo City)	19 urban, 1702 rural
Land Area	5,000.83 square kilometers	
Demographics (2015)	Population (2015) – 1,936,423 Population Growth Rate (2000 to 2015) – 1.43 Population Density – 390 per sq. km	
Economy	• Major industries - agriculture, fishery, furniture making • Major product - processed food, sugar, coconut oil, lime products • Major crops - rice, sugarcane, fruits, vegetables • Well-known beaches are scattered across the seafood rich waters of Northern Iloilo where the islands of Gigantes, Concepcion, Ajuy, and Sicogon beckon.	
Poverty Incidence (2015)	On Families – 14.9% On Population – 20.0%	

Negros Occidental	19 municipalities	Binalbagan, Calatrava, Candoni, Cauyan, Enrique B. Magalona, Hinigaran, Hinoba- an, Ilog, Isabela, La Castellana, Manapla, Moises Padilla, Murcia, Pontevedra, Pulupandan, Salvador Benedicto, San Enrique, Toboso, Valladolid
	twelve (12) component cities	Bago, Cadiz, Escalante, Himamaylan, Kabankalan, La Carlota, Sagay, San Carlos, Silay, Sipalay, Talisay, Victorias
	one (1) highly urbanized city	Bacolod City
	601 barangays (excluding Bacolod City)	192 urban, 409 rural
Land Area	7,802.54 square kilometers	
Demographics (2015)	Population (2015) – 2,497,261 Population Growth Rate (2000 to 2015) – 1.03 Population Density – 320 per sq. km	
Economy	• Major industries - agriculture, aquaculture, agribusiness, steel fabrication, beer brewery • Major crops – sugarcane • Negros Occidental is known as the “sugar bowl of the Philippines.” In 2017, it accounted for 59% of the country’s total sugarcane production. Of the 27 operational mills in the country, 12 are found in Negros Occidental, which produced 63% of the country’s total raw sugar in 2018.	
Poverty Incidence (2015)	On Families – 21.9% On Population – 29.0%	

City of Bacolod	61 barangays	52 urban, 9 rural
Land Area	162.67 square kilometers	
Demographics (2015)	Population (2015) – 561,875 Population Growth Rate (2000 to 2015) – 1.78 Population Density – 3,500 per sq. km	
Economy	• Major industries - agriculture, livestock raising • Major crops – sugarcane • A diversification of Bacolod City's economy has led to the emergence of thriving businesses and new industries such as in power generation, BPO, construction, dairy production, light manufacturing, and real estate development.	

City of Iloilo	180 barangays	77 urban, 103 rural
Land Area	78.34 square kilometers	
Demographics (2015)	Population (2015) – 447,992 Population Growth Rate (2000 to 2015) – 1.33 Population Density – 5,7000 per sq. km	
Economy	• Major industries - agriculture, fishery, handicraft, tourism • Major crops - rice, corn, legumes, mangoes, bananas, pineapples, other high-end crops • Booming industries - BPO, banking, retail • The Iloilo International Airport has become a gateway to local and national trade and commerce. • Iloilo City is Western Visayas' center of trade, education, finance, technology, medical tourism, and the real estate industry.	

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

12 St. Josemaria Escriva Drive, Ortigas Center, Pasig City
Trunkline: (+632) 86310945 to 56
Email: info@neda.gov.ph

www.neda.gov.ph
NEDAhq