NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

Volume 2: Philippine Water Supply and Sanitation Master Plan

MIMAROPA Water Supply and Sanitation Databook and Regional Roadmap

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Acronyms

AIP	Annual Investment Plan
AM	Assistance to Municipalities
BOD	Biological Oxygen Demand
BWSA	Barangay Water and Sanitation Association
CapEx	Capital Expenditure
CBO	Community-Based Organization
CNC	Certificate of Noncoverage
DA	Department of Agriculture
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
DTI	Department of Trade and Industry
EMB	Environmental Management Bureau
FAO	Food and Agriculture Organization
FHSIS	Field Health Service Information System
FIES	Family Income and Expenditure Survey
GRDP	Gross Regional Domestic Product
HH	Household
HUC	Highly Urbanized City
IEC	Information, Education and Communication
IP	Indigenous People
IWRM	Integrated Water Resource Management
JICA	Japan International Cooperation Agency
JJA	June, July and August
LCE	Local Chief Executive
LDP	Local Development Plan
LFPR	Labor Force Participation Rate
LGU	Local Government Unit
LHB	Local Housing Board
LSB	Local School Board
LSSP	Local Sustainable Sanitation Plan
LWSSP	Local Water Supply and 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
MIMAROPA	Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon, Palawan
MSME	Micro, Small and Medium Enterprises
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 Septage and Sewerage Master Plan
NWRB	National Water Resources Board
O&M	Operation and Management
OBS	Observed Baseline
OCD	Office of Civil Defense
OD	Open Defecation

PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAWD	Philippine Association of Water Districts
PDP	Philippine Development Plan
PEM	Philippine Environment Monitor
PNSDW	Philippine National Standards for Drinking Water
PSA	Philippine Statistics Authority
PSGC	Philippine Standard Geographic Code
PWSSMP	Philippine Water Supply and Sanitation Master Plan
RBCO	River Basin Control Office
RDC	Regional Development Council
RDP	Regional Development Plan
ROW	Right-of-Way
RWSA	Rural Waterworks and Sanitation Association
RWS	Rural Water System
SALINTUBIG	Sagana at Ligtas na Tubig
SDG	Sustainable Development Goals
SMC	Sepatage Management Committee
SMERA	Small and Medium Enterprise Roving Academy
SMP	Septage Management Program
SON	September, October and November
STP	Septage Treatment Plant
SSF	Shared Service Facilities
SWTP	Surface Water Treatment Plant
TC	Tropical Cyclone
UN	United Nations
UNICEF	United Nations Children's Fund
UTM	Universal Transverse Mercator
WASH	Water, Sanitation and Hygiene
WD	Water District
WGS	World Geodetic System
WHO	World Health Organization
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

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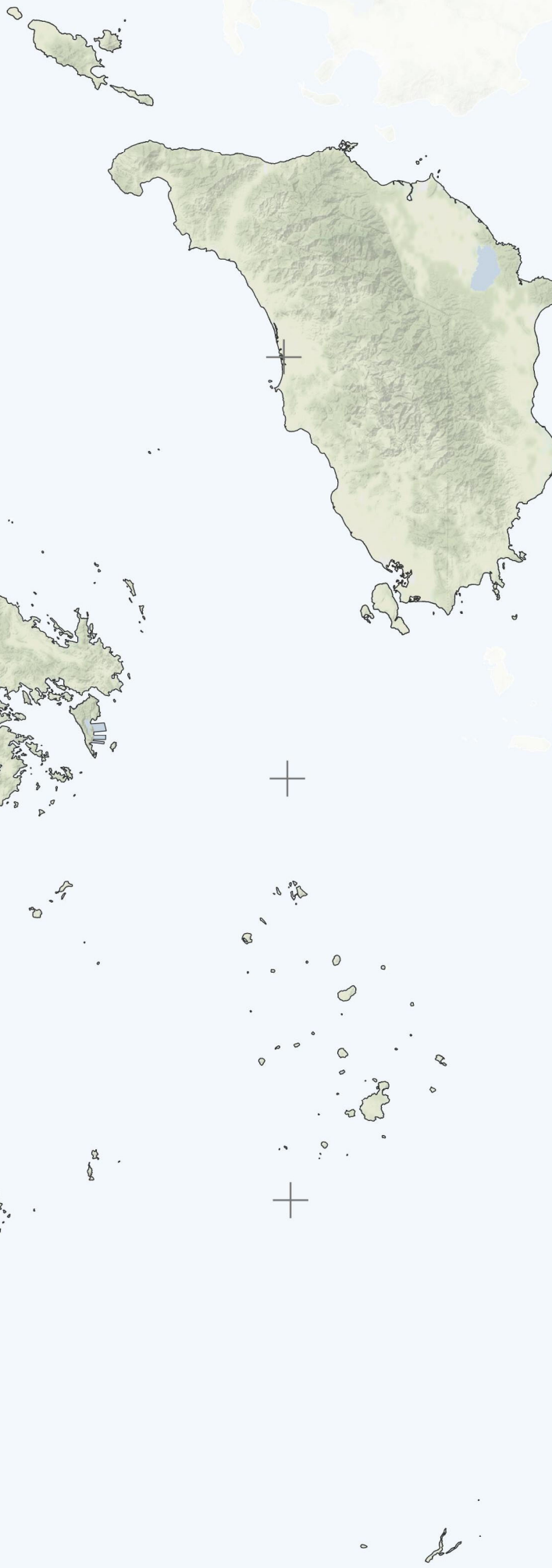

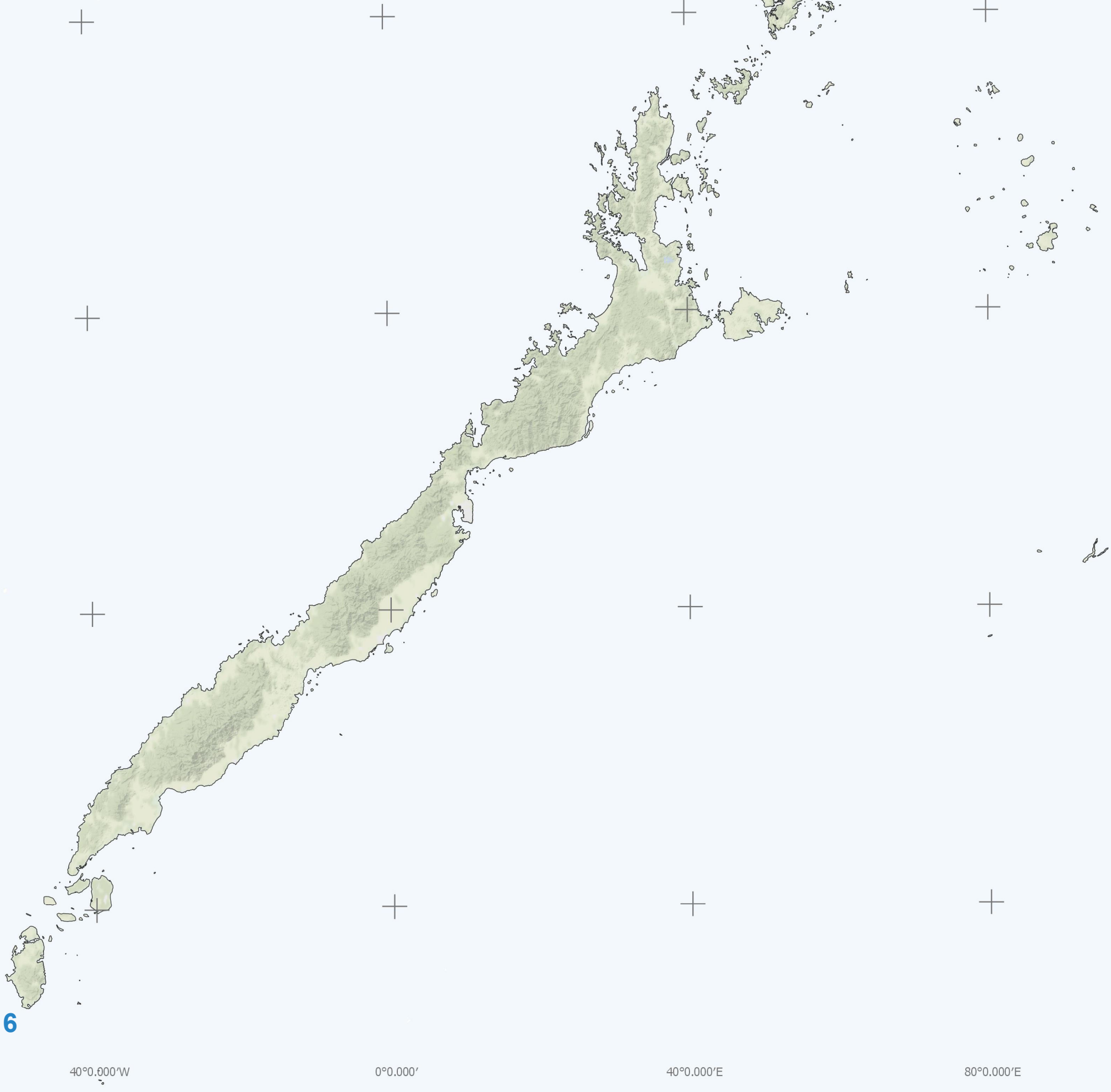

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Region IV-B MIMAROPA
Introduction

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MIMAROPA

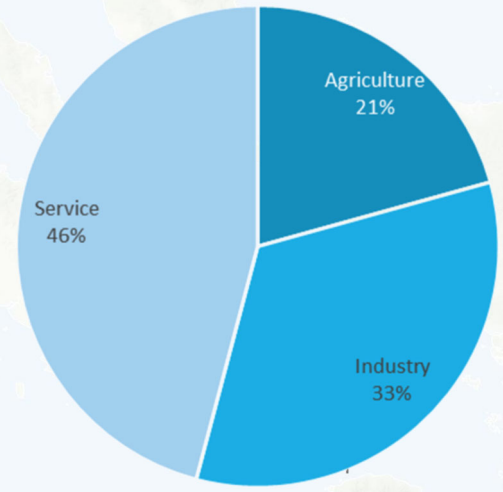

Figure 1: GRDP Contributions per Sector, 2016

MIMAROPA is situated in southwestern Luzon.

Designated as Region IV-B, it is bounded by the Tayabas Bay on the north, Sulu Sea on the south, Sibuyan Sea on the east, and the West Philippine Sea on the west. It is one of the regions with no land boundaries with another region.

MIMAROPA is an acronym for the names of its five provinces, namely: Occidental Mindoro, Oriental Mindoro, Marinduque, Romblon and Palawan. The region is composed of two cities, 71 municipalities and 1,459 barangays.

Land Classification

The region has a land area of 29,620.87 square kilometers (km^2) representing around 9.9% of the country's total land area. Of this figure, 36.37% covers alienable and disposable land while 63.63% covers forestlands.

Economy

MIMAROPA contributes an average of 2% annually to the national economy. In 2016, MIMAROPA's economy grew by 2.7%.

The service sector is the biggest contributor to the region's economy at 45.5% followed by the industry sector, and the agriculture, hunting, forestry and fishing sector.[1]

Contributions to the rise in domestic sales include interventions such as micro, small and medium enterprises (MSMEs) assistance from the Department of Trade and Industry (DTI) through programs such as the Small and Medium Enterprise Roving Academy (SMERA) and Shared Service Facilities (SSF).[2]

Labor and Employment[3]

The Labor Force Participation Rate (LFPR) of MIMAROPA in January 2016 was registered at 1.3 million or 65.6% of the total population.

The employment rate in January 2016 was recorded at 95.9%, lower than last year's 96.7%. This was higher by 1.7% compared to the country's employment rate of 94.2%.

Employment from the agriculture and services sectors posted more than 40% of the region's total. In the agriculture sector, 82% came from agriculture and forestry while 18% from fishing and aquaculture. The service sector shared 43.6% of the total employed population. The industry sector recorded the least share of 12.7%.

The unemployment rate in the region rose from 3.3% in 2015 to 4.1% in January 2016. The latter figure, however, was lower than the national rate.

Figure 2, rather, presents the labor and employment statistics of MIMAROPA in 2017.

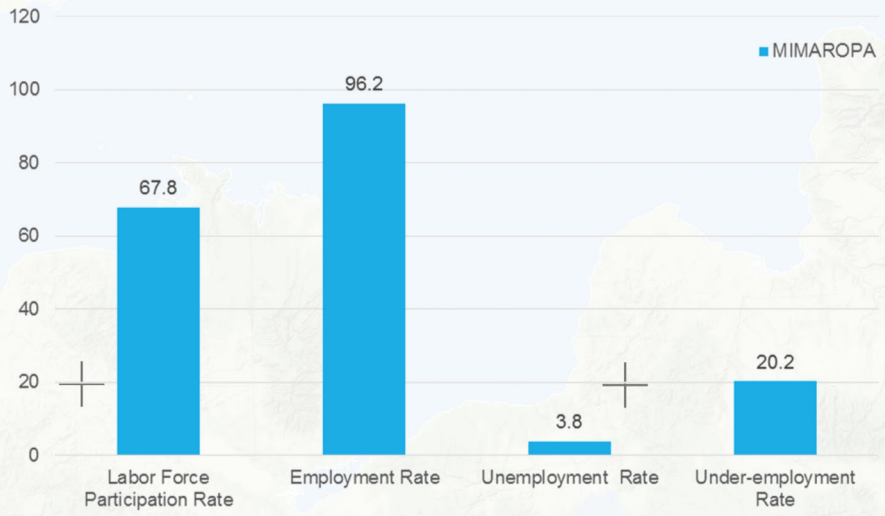

Figure 2: Employment Rate and LFPR, 2017

[1] *Philippine Statistics Authority (PSA), CountryStat Philippines 2016*
[2] *National Economic and Development Authority (NEDA), MIMAROPA, 2015 Regional Economic Situationer*
[3] *Philippine Statistics Authority, Labor Force Survey, 2016*

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Legend

Population Density (person/ha)

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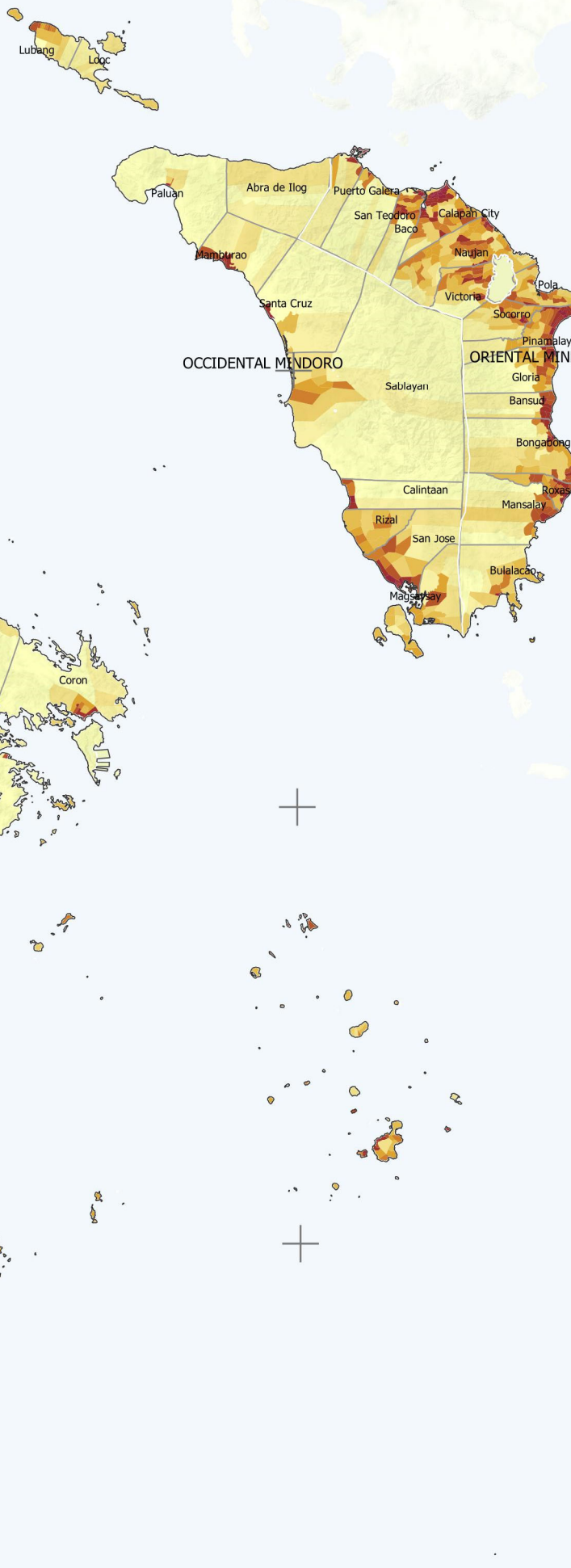
- 0.36 - 0.67
- 0.67 - 1.09
- 1.09 - 1.55
- 1.55 - 2.28
- 2.28 - 3.15
- 3.15 - 4.48
- 4.48 - 7.35
- 7.35 - 18.15
- 18.15 - 15319.67



Population Density

PSA, 2015 Census

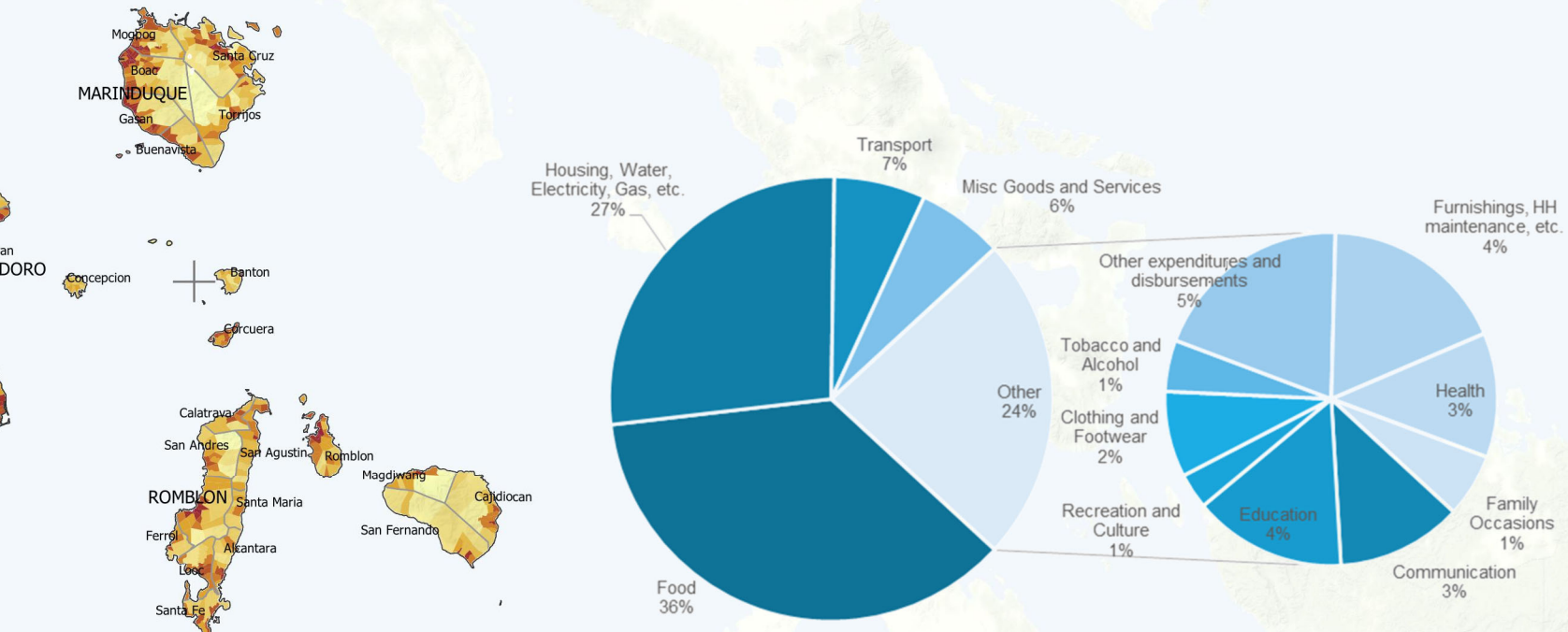


Figure 3: Distribution of Expenditure, 2015

Family Income and Expenditure

There are about 697,000 families in MIMAROPA, with an estimated total average income of PhP222,000 and a total average expenditure of PhP161,000. All income classes exhibited average expenditures lower than the average income. Considering the family size as an indicator, a family of four has the largest income-expenditure difference, while a single-person household has the least income-expenditure difference. This indicates that a family of four has more savings as compared to other family sizes.

With respect to the disbursement patterns of the families in the region and across income levels, the 2015 Family Income and Expenditure Survey (FIES) reveals that food expenditure was the highest among the major expenditure groups at 36%. House rental/rental value, expenditure for water, electricity, gas and other fuels followed at 27%. Figure 3 graphs the expenditure distribution and shows that most families spend more for their basic needs.[4]

Demography

MIMAROPA had a total population of 2,963,360, accounting for 2.9% of the country's total as of 2015. Palawan (excluding Puerto Princesa City) had the biggest population among the five provinces, at 849,469 comprising 28.7% of the region's total population, followed closely by Oriental Mindoro with 844,059. Marinduque had the smallest population at 234,521.

Puerto Princesa City, a highly urbanized city (HUC) in Palawan, posted a population of 255,116. The population growth rate of the region from 2000 to 2015 was registered at 1.68%, lower than the national average of 1.84%.

The population density in 2015 averaged 100 persons per km^2. Marinduque had the highest density at 246 persons per km^2, about more than double the region's density.

The region is predominantly rural with its rural population percentage totaling 73%. Household size averages at 4.32 persons.

Table 1: Population per Province/HUC, 2015

Region/Province/City	2015 Population	Land Area (km^2)	Population Density (Persons/km^2)
MIMAROPA	**2,963,360**	**29,620.87**	**100**
Marinduque	234,521	952.58	246
Occidental Mindoro	487,414	5,865.71	83
Oriental Mindoro	844,059	4,238.38	199
Palawan (excluding Puerto Princesa City)	849,469	14,649.73	58
Puerto Princesa City	255,116	2,381.02	107
Romblon	292,781	1,533.45	191

Table 2: Urban and Rural Population per Province/HUC, 2015[5]

Region/Province/City	Urban Population	Rural Population
MIMAROPA	**27%**	**73%**
Marinduque	1%	99%
Occidental Mindoro	46%	54%
Oriental Mindoro	10%	90%
Palawan (excluding Puerto Princesa City)	25%	75%
Puerto Princesa City	66%	34%
Romblon	1%	99%

[4] Philippine Statistics Authority, Family Income and Expenditure Survey (FIES), 2015

[5] Philippine Statistics Authority, Philippine Standard Geographic Code (PSGC), 2015

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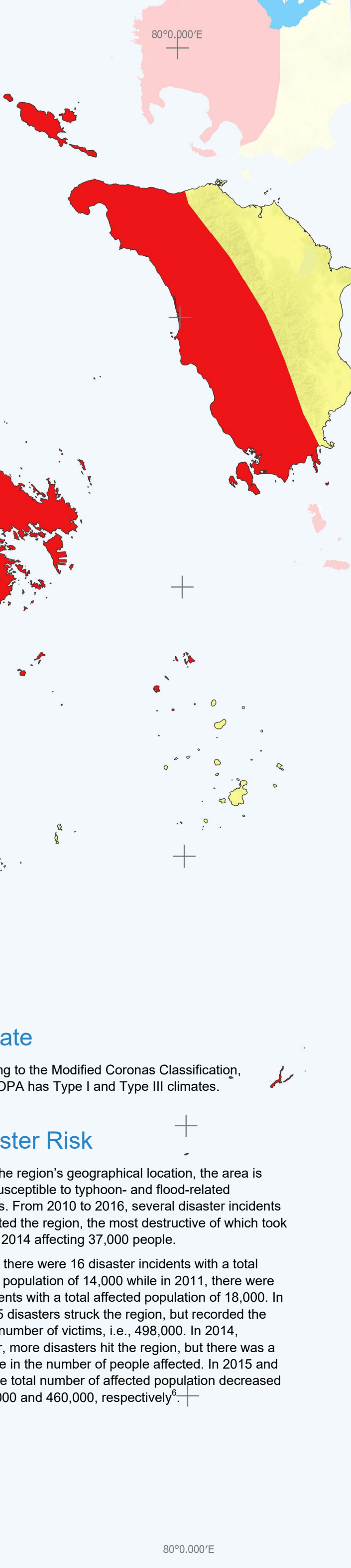
Legend

- Type I - two pronounced season, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September.
- Type II - no dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Minimum monthly rainfall occurs during the period of March to May.
- Type III - no very pronounced maximum rain period with a dry season lasting only from one to three months, either during the period from March to May. This type resembles Type I since it has a short dry season.
- Type IV - rainfall is more or less evenly distributed throughout the year. This type resembles Type 2 since it has no dry season.



Climate

PAGASA, 2015 Data

Climate

According to the Modified Coronas Classification, MIMAROPA has Type I and Type III climates.

Disaster Risk

Due to the region's geographical location, the area is highly susceptible to typhoon- and flood-related disasters. From 2010 to 2016, several disaster incidents devastated the region, the most destructive of which took place in 2014 affecting 37,000 people.

In 2010, there were 16 disaster incidents with a total affected population of 14,000 while in 2011, there were 19 incidents with a total affected population of 18,000. In 2013, 25 disasters struck the region, but recorded the highest number of victims, i.e., 498,000. In 2014, however, more disasters hit the region, but there was a decrease in the number of people affected. In 2015 and 2016, the total number of affected population decreased — 250,000 and 460,000, respectively[6].

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Climate Change and Hydrological Hazards

The Philippines is at great risk of climate-related hazards, such as tropical cyclones (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 MIMAROPA 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).

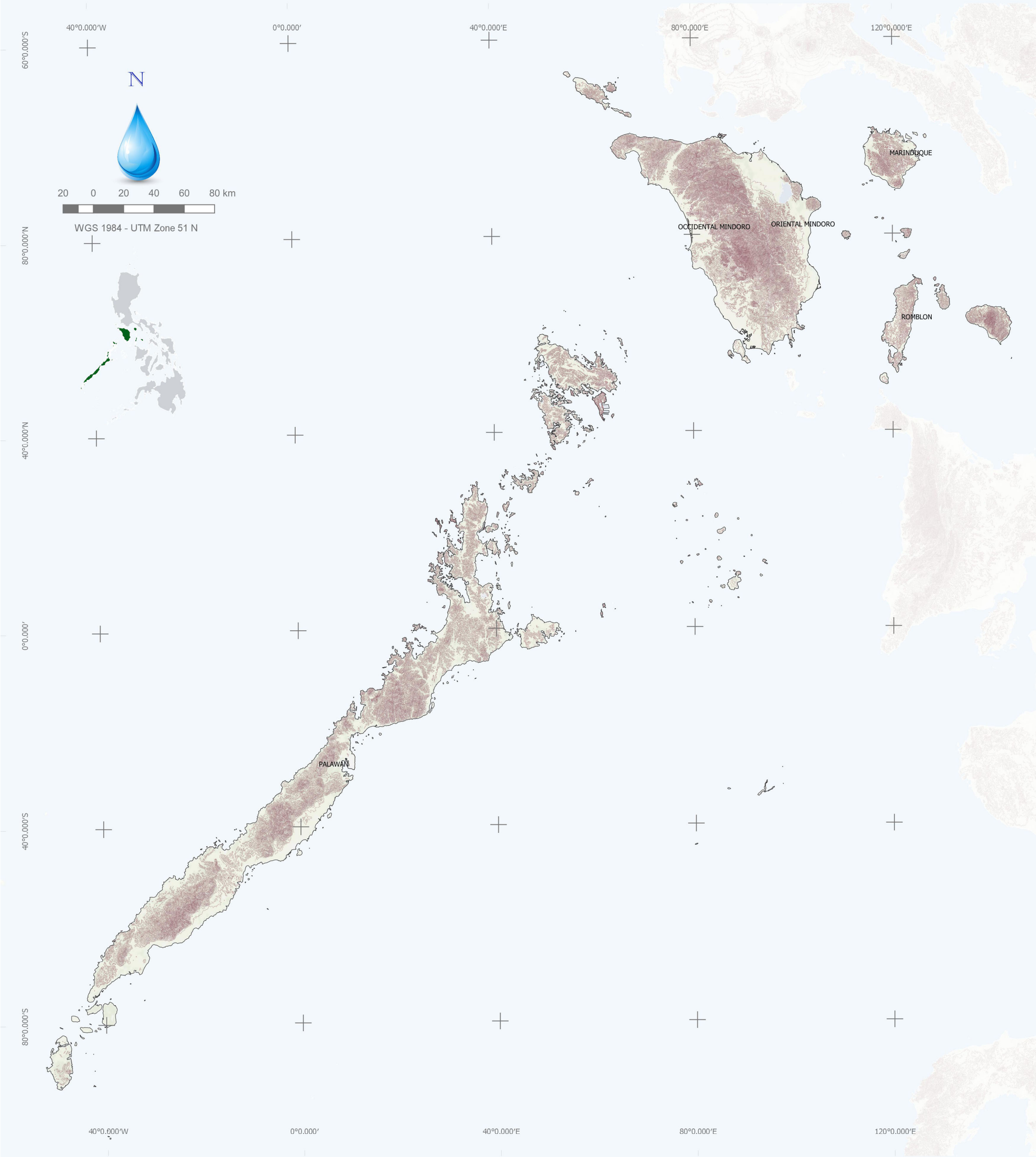
Table 3: Seasonal Projections Under a Medium-Range Emission Scenario

Seasonal Temperature Increases (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
Occidental Mindoro	26.5	28.3	27.3	27.1	0.9	1.1	0.9	1.0	1.9	2.1	1.8	1.9
Oriental Mindoro	26.4	28.3	27.6	27.3	0.8	1.0	1.1	0.9	1.8	2.0	2.2	1.9
Romblon	26.3	28.5	28.1	27.7	0.8	1.1	0.9	0.8	1.8	2.2	1.9	1.7
Palawan	26.9	28.1	27.3	27.4	0.9	1.1	1.0	0.9	1.8	2.1	2.0	1.8
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
Occidental Mindoro	159.5	265.9	1091.2	762.6	-14.3	-15.6	13.6	3.2	15.8	-23.8	26.7	-2.4
Oriental Mindoro	260.3	269.3	894.3	791.2	-3.2	-15.1	0.5	6.2	21.6	-11.5	5.3	2.9
Romblon	357.0	224.0	652.9	778.0	9.0	0.2	27.6	22.6	32.6	26.3	66.2	37.9
Palawan	101.8	189.3	781.7	640.6	15.7	-7.2	-2.6	19.6	7.3	-9.0	1.0	6.9

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

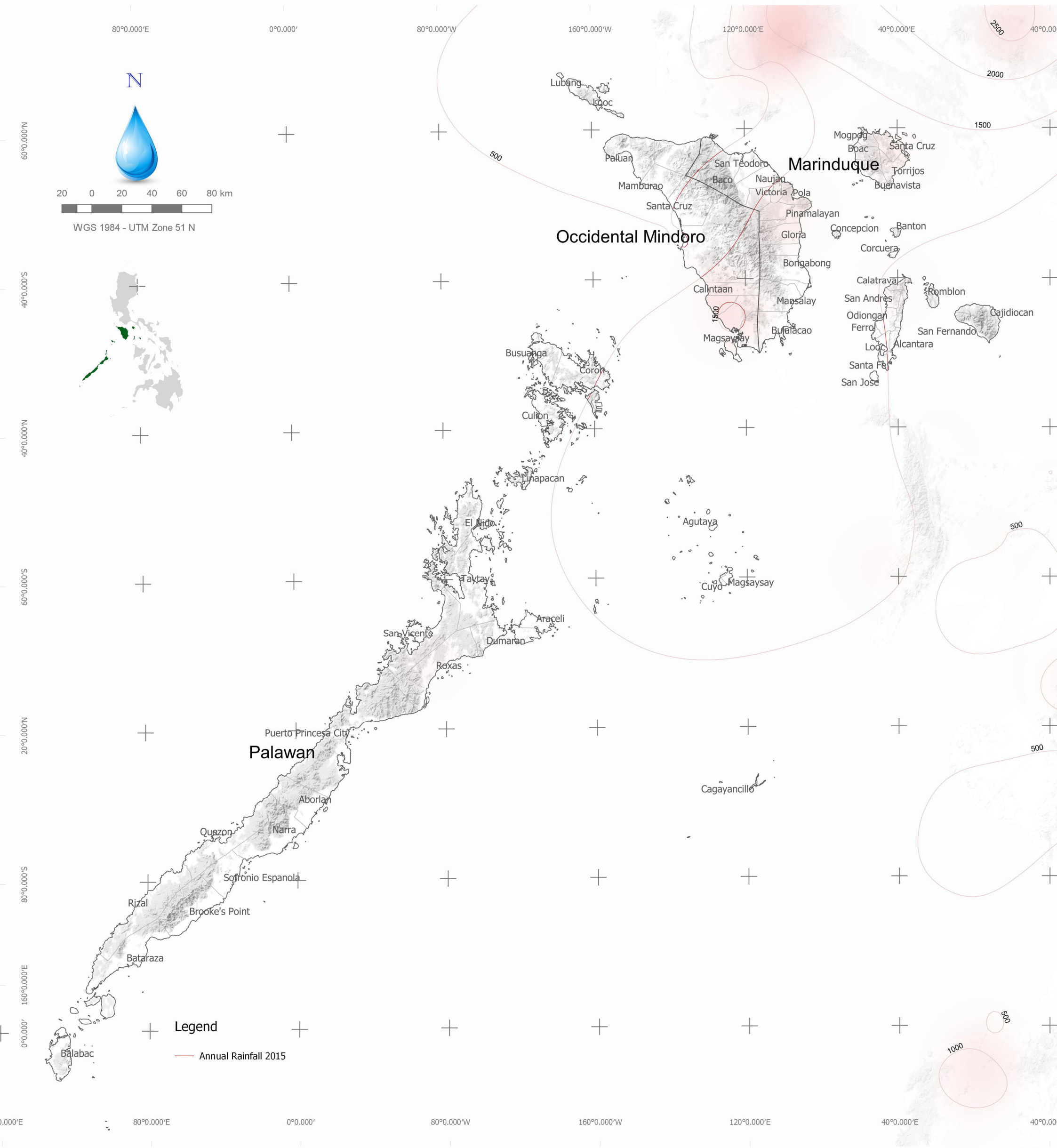
Province	Station	No. of Days w/ T_{max} > 35°C			No. of Dry Days			No. of Days w/ Rainfall > 300mm		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
Occidental Mindoro	San Jose	1075	1773	3410	5437	7010	7128	8	5	14
Oriental Mindoro	Calapan	80	440	1469	7604	7057	6902	3	11	22
Palawan	Puerto Princesa	29	23	297	8348	6457	6455	2	7	7
	Coron	242	739	1988	7726	5542	5561	4	4	3
	Cuyo	59	195	791	7447	5382	5406	5	5	2
Romblon	Romblon	59	235	756	7628	6125	5663	4	11	20

[6] *Office of Civil Defense, National Disaster Risk Reduction Management Council (NDRRMC)*



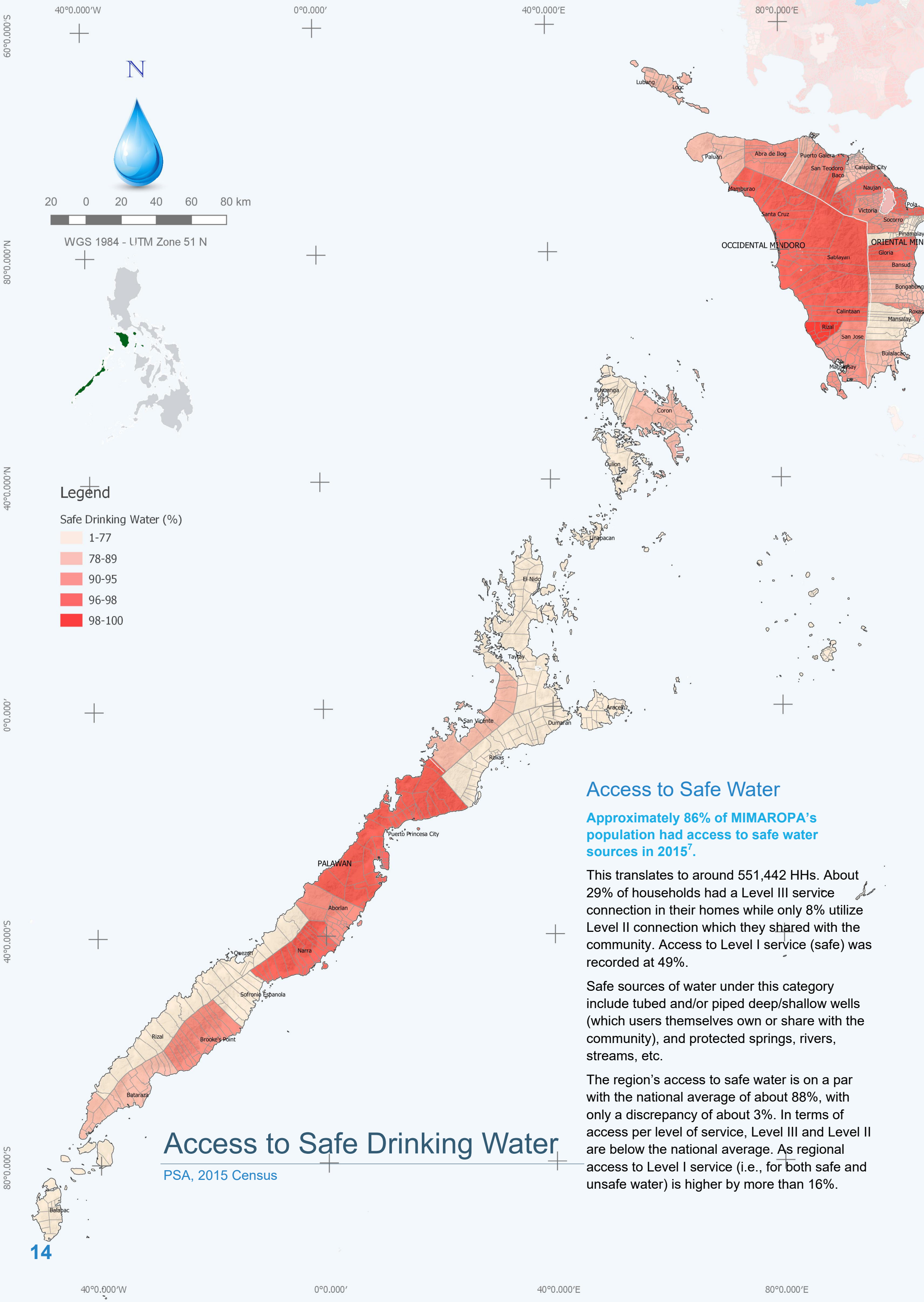
Contour Map

NAMRIA



Average Rainfall

PAGASA, 2015 Data



Access to Safe Drinking Water

PSA, 2015 Census

Access to Safe Water

Approximately 86% of MIMAROPA's population had access to safe water sources in 2015[7].

This translates to around 551,442 HHs. About 29% of households had a Level III service connection in their homes while only 8% utilize Level II connection which they shared with the community. Access to Level I service (safe) was recorded at 49%.

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

The region's access to safe water is on a par with the national average of about 88%, with only a discrepancy of about 3%. In terms of access per level of service, Level III and Level II are below the national average. As regional access to Level I service (i.e., for both safe and unsafe water) is higher by more than 16%.

WSS Sector Status

Table 5: National and Regional Access to Water Supply[8]

Level of Service	National	MIMAROPA
Level III	44.1%	29.0%
Level II	11.2%	7.9%
Level I (Safe Sources)	32.4%	48.7%
Subtotal (Safe Sources)	*87.7%*	*85.6%*
Level I (Unsafe Sources)	12.3%	14.4%
Total	100.0%	100.0%

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

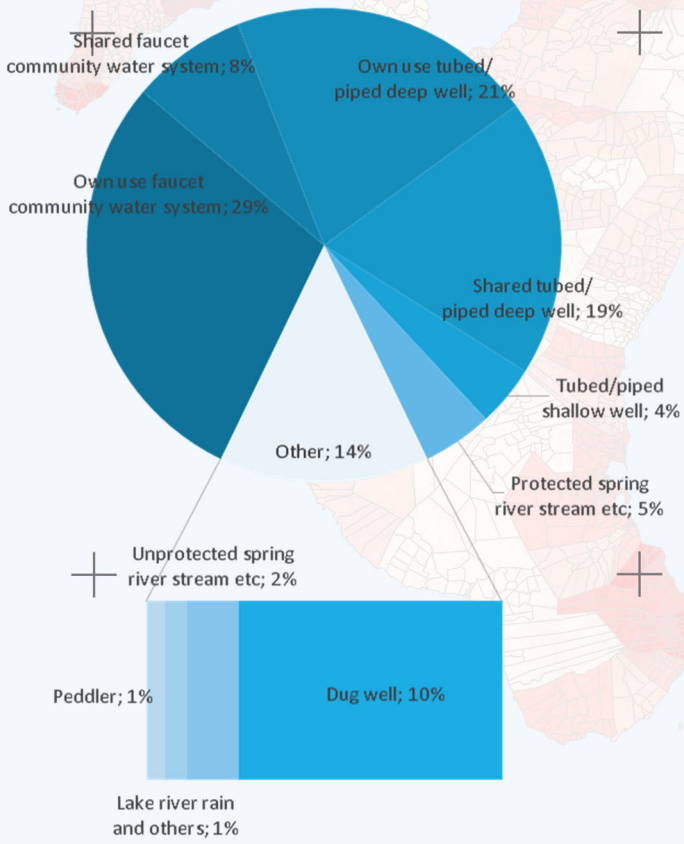


Figure 4: Main Sources of Water Supply, 2015

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

Table 6: Access to Water Supply per Province/HUC[9]

Region/Province/City	Access to Safe Water Supply
MIMAROPA	**77.2%**
Marinduque	92.6%
Occidental Mindoro	71.3%
Oriental Mindoro	98.0%
Palawan	52.4%
Romblon	93.0%
Puerto Princesa City	70.6%

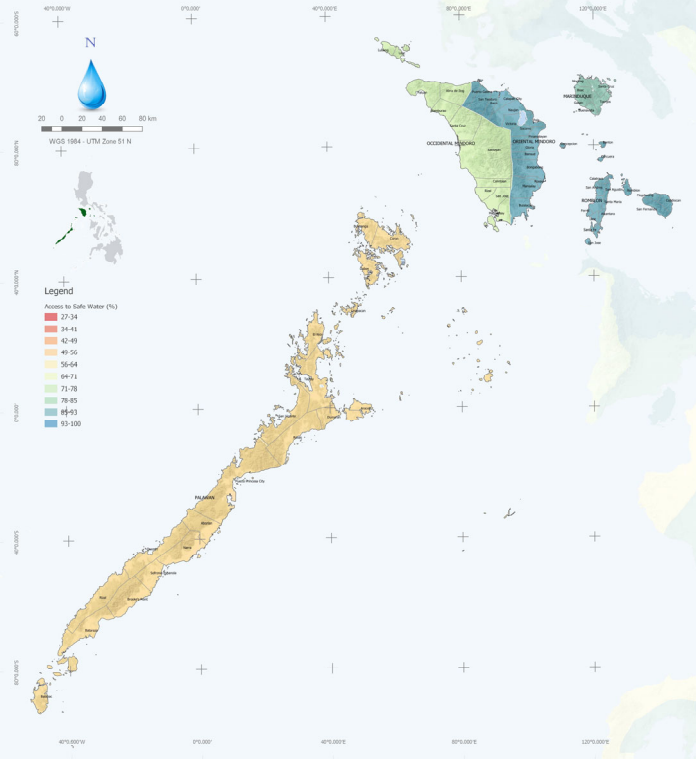


Figure 5: Provincial Access to Safe Water

Drinking Water

In terms of access to safe drinking water, the Philippine Statistics Authority (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.

As of 2015, 84% of the population drank water from improved and safe water sources. Of the region's total population, 14% drank bottled water.

Among the provinces, Palawan had the lowest access to safe drinking water at around 69%.

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

[7] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[8] Ibid.
[9] Based on MIMAROPA provinces' firsthand data on access to safe water as gathered at the regional planning and consultation workshop

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Legend

Sanitation Access (%)

- 16-25
- 25-33
- 33-41
- 41-50
- 50-58
- 58-67
- 67-75
- 75-83
- 83-92
- 92-100

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Paluan
Abra de Ilog
Puerto Galera
San Teodoro
Baco
Calapan City
Naujan
Pola
Victoria
Socorro
Pinamalayan
Mamburao
Santa Cruz
OCCIDENTAL MINDORO
ORIENTAL MIN
Gloria
Sablayan
Bansud
Bongabong
Calintaan
Roxas
Mansalay
Rizal
San Jose
Bulalacao
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Access to Sanitation

MIMAROPA Regional Planning and Consultation Workshop, 2017 Data

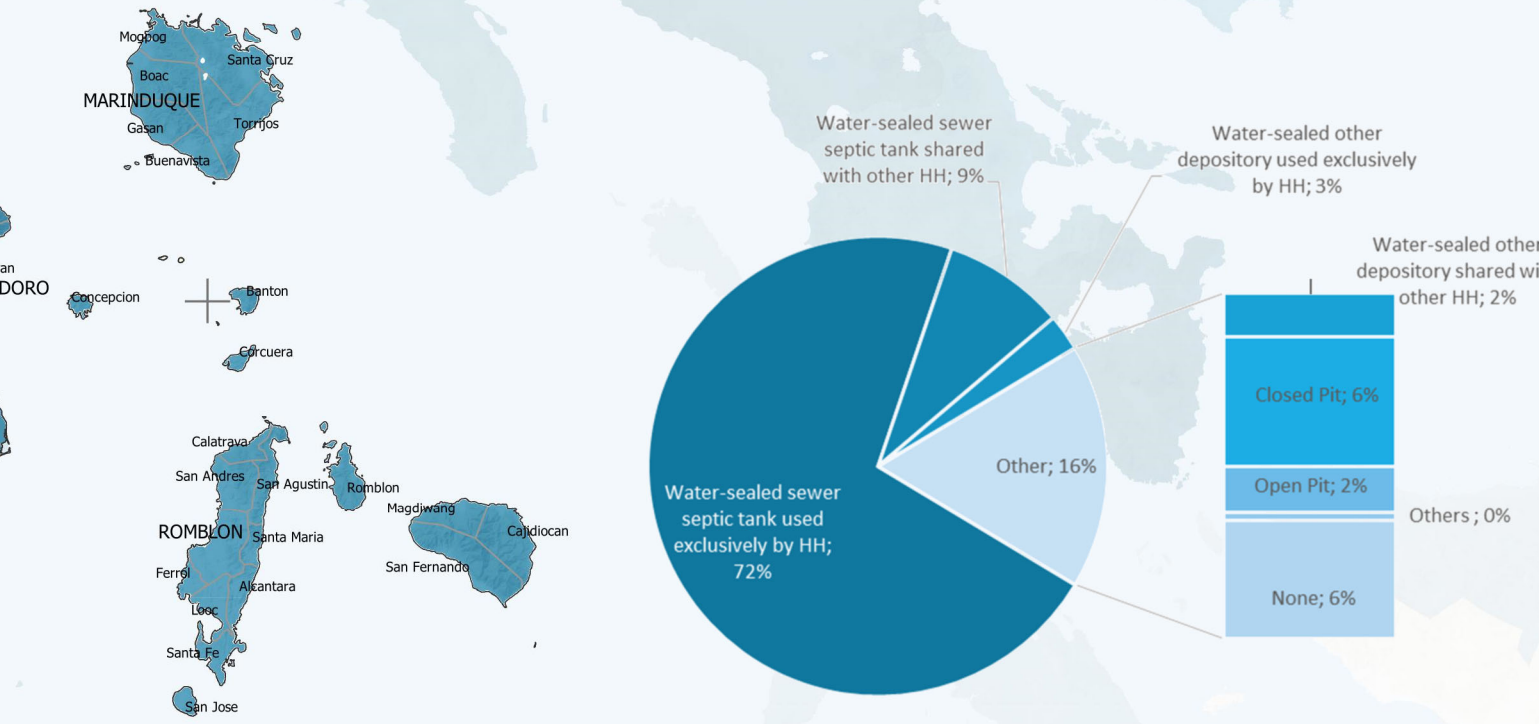

Figure 6: Percentage of Households with Access to Sanitary Facilities

Access to Sanitation

MIMAROPA's rapid growth has been driven mainly by migration to and the increased economic activity taking place in Calapan City, San Jose, Puerto Princesa and surrounding municipalities. The region's economic upturn has undoubtedly increased its demand for sanitation services.

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

The 2015 FIES has reported that MIMAROPA is on a par with the national average in terms of basic and improved sanitation coverage. In terms of area coverage, the two provinces with the lowest access are Occidental Mindoro and Romblon.

Table 7: National and Regional Access to Sanitation[10]

Sanitation Coverage	National	MIMAROPA
Improved Sanitation	73.77%	71.56%
Basic Sanitation	19.96%	19.82%
Unimproved Sanitation	2.04%	2.23%
Open Defecation	4.23%	6.39%
Total	100.0%	100.0%

Marinduque, which represents 7.91% of the region's population, had the highest access to basic sanitation at 87.86%. The two provinces with the highest population, Oriental Mindoro and Palawan, ranked second and third in relation to basic sanitation access at 80.24% and 82.80%, respectively.

Table 8: Access to Sanitary Facilities per Province[11]

Region/Province/City	HHs with Sanitary Toilets	HHs with Complete Basic Sanitation Facilities
MIMAROPA	**81.76%**	**74.10%**
Marinduque	87.86%	79.71%
Occidental Mindoro	76.44%	68.62%
Oriental Mindoro	80.24%	79.69%
Palawan	82.80%	58.19%
Puerto Princesa City	93.98%	95.81%
Romblon	79.52%	74.37%

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 depository (exclusive use) ▪ Water-sealed depository (shared) ▪ Closed Pit
Unimproved Sanitation	▪ Open Pit
Open Defecation	▪ Other Means ▪ None

Figure 6 shows the percentage per type of sanitation facility coverage.

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 MIMAROPA 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.

On the other hand, there are currently no septage treatment plants (STPs) operating in the region.[12]

[10] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[11] Department of Health, FHSIS Annual Report, 2015
[12] Based on MIMAROPA provinces' firsthand data on access to safe water as gathered at the regional planning and consultation workshop

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N

20 0 20 40 60 80 km

WGS 1984 - UTM Zone 51 N

Legend

Water Bodies

Water Bodies

Lubang
Looc
Paluan
Abra de Ilog
Puerto Galera
San Teodoro
Baco
Calapan City
Naujan
Victoria
Pola
Socorro
Pinamalayan
ORIENTAL MIN
OCCIDENTAL MINDORO
Santa Cruz
Sablayan
Gloria
Bansud
Bongabong
Calintaan
Roxas
Mansalay
Rizal
San Jose
Bulalacao
Mangsalay
Busuanga
Coron
Culion
Linapacan
El Nido
Taytay
Araceli
San Vicente
Dumaran
Roxas
Puerto Princesa City
PALAWAN
Aborlan
Narra
Quezon
Sofronio Espanola
Rizal
Brooke's Point
Bataraza
Balabac

MIMAROPA Rivers and Tributaries

DENR, NWRB, NAMRIA

Water Resources

MIMAROPA ranks 6th among all administrative regions with the least water resources potential.

The region's water resources potential total to 4,584 million cubic meters (MCM)/year, taking up only about 3.1% of the country's total.

The water resources potential of an area is divided into groundwater and surface water. Groundwater is estimated at 831 MCM/year while surface water is estimated at 3,753 MCM/year. Annual rainfall in the region averages 1,620 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.

MIMAROPA is included in WRR 4 along with CALABARZON and one province in Region III.

Surface Water

Although not one of the 18 major river basins of the country are not found in MIMAROPA, its provinces have had access to certain rivers to sustain its water supply.

Table 9 shows some of the major rivers tapped as surface water source.

Table 9: Surface Water Sources

Province	Surface Water Source
Occidental Mindoro	Caguray
	Lumintao
	Magbando
	Mamburao
	Lawaan
Oriental Mindoro	Mag-asawang Tubig
	Malaylay-Baco
Palawan	Malatgao
	Montible
	Nasaguipi
	Iwahig
	Irawan
	Malinao
	Bacungan
	Balsahan
	Calategas
Romblon	Binayaan
	Cabitangahan

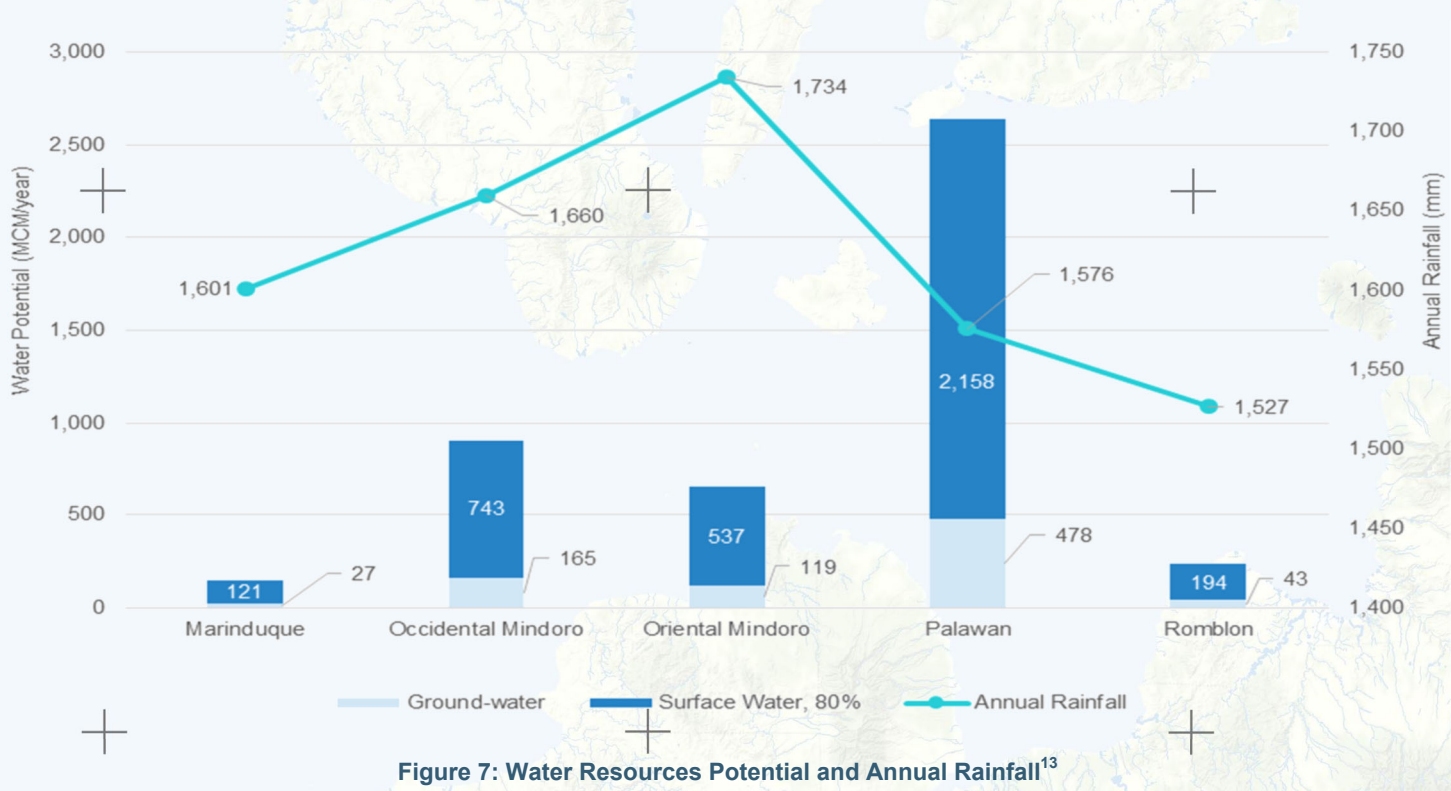

Figure 7: Water Resources Potential and Annual Rainfall[13]

[13] *JICA Master Plan on Water Resources Management in the Philippines, 1998; NWRB; PAGASA Rainfall Data; FAO*

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N

20 0 20 40 60 80 km

WGS 1984 - UTM Zone 51 N

Lubang
Looc
Paluan
Abra de Ilog
Puerto Galera
San Teodoro
Baco
Calapan City
Naujan
Mamburao
Pola
Victoria
Santa Cruz
Socorro
Pinamalayan
OCCIDENTAL MINDORO
ORIENTAL MIN
Gloria
Sablayan
Bansud
Bongabong
Calintaan
Roxas
Mansalay
Rizal
San Jose
Bulalacao
Magsaysay
Busuanga
Coron
Culion
Linapacan
El Nido
Taytay
Araceli
San Vicente
Dumaran
Roxas
Puerto Princesa City
PALAWAN
Aborlan
Narra
Quezon
Sofronio Espanola
Rizal
Brooke's Point
Bataraza
Balabac

Legend

- Extensive and Highly Productive Aquifers
- Fairly Extensive and Productive Aquifers
- Fairly Extensive and Productive, Aquifers with Hig Potential Recharge
- Fairly to Less Extensive and Productive Aquifers with Low to Moderate, Potential Recharge
- Local and Less Productive Aquifers
- Rocks with Limited Potential, Low to Moderate Permeability
- Rocks with Limited Potential, Low to Moderated Permeability
- Rocks without Any Known Significant, Groundwater Obtainable through Drilled Wells
- Lake

Groundwater Availability

MGB

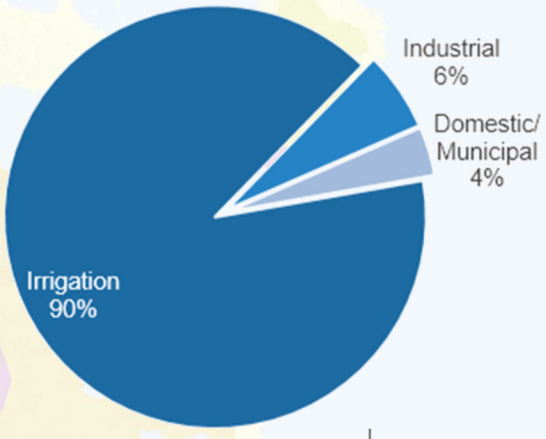


Figure 8: Water Use, 2017[14]

Water Use

As of 2017, water use in the region based on awarded water permits was roughly 1,814.08 MCM annually. About 46% (or 832.45 MCM) was allocated for power generation and was categorized under non-consumptive use. The remaining total of 981.63 MCM was categorized under consumptive use (see Figure 8).

The irrigation sector consumes the largest volume of water among all sectors with 90% allocation. The industrial sector consumes 6%. Domestic water supply accounts for only 4%.

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 be defined in relation to the possible development depth and overall development potential.

In addition, 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 also tied to groundwater storage which is estimated based on the type and class of aquifer present in a study area (see Table 10).

Table 10: 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

No major aquifers are found in Marinduque — these are found only in some parts of the other provinces. A large part of Palawan is underlain by non-aquifers while major and non-aquifers are found in Occidental and Oriental Mindoro.

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.).[15]

Water availability per capita is computed by comparing the region and provinces' water potential against the 2015 population (see Table 11).

The region's per capita water availability of 1,300 m^3/year is considered nearing scarcity.

Table 11: Water Availability per Province

Region/Province	Water Availability (m^3/capita/year) 2015 Population
Marinduque	628.53
Occidental Mindoro	1,862.21
Oriental Mindoro	777.02
Palawan	2,385.84
Romblon	810.46
MIMAROPA	**1,292.81**

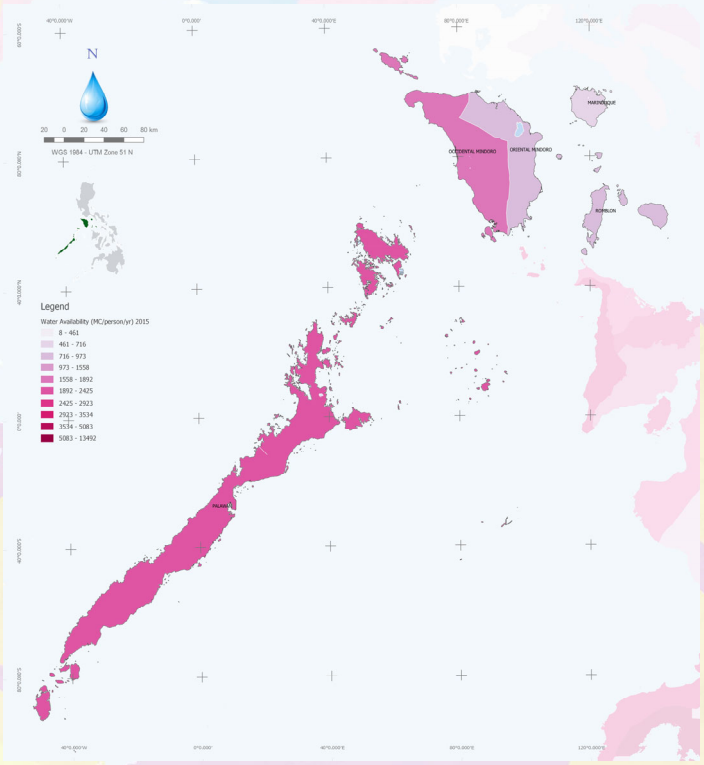


Figure 9: Water Availability Map, 2015

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

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 4,361,882 by 2045.

Water Supply 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 128.1 MCM/year, 147.9 MCM/year, and 172.2 MCM/year, respectively.

Water Demand vs. Water Resources Potential

The water demand of the industrial, business and domestic sectors in MIMAROPA 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 (172.2 MCM/year) to the water resources potential of the region (4,584 MCM/year), the availability of water far exceeds the region's projected water demand up to 2045.

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.

Though there is no foreseeable water shortage in the region in the coming years, it is necessary to efficiently manage and use its water resources to control possible demand shifts.

To fully make use of its groundwater and surface water potential, however, the issue regarding mining activities in the region has to be immediately addressed.

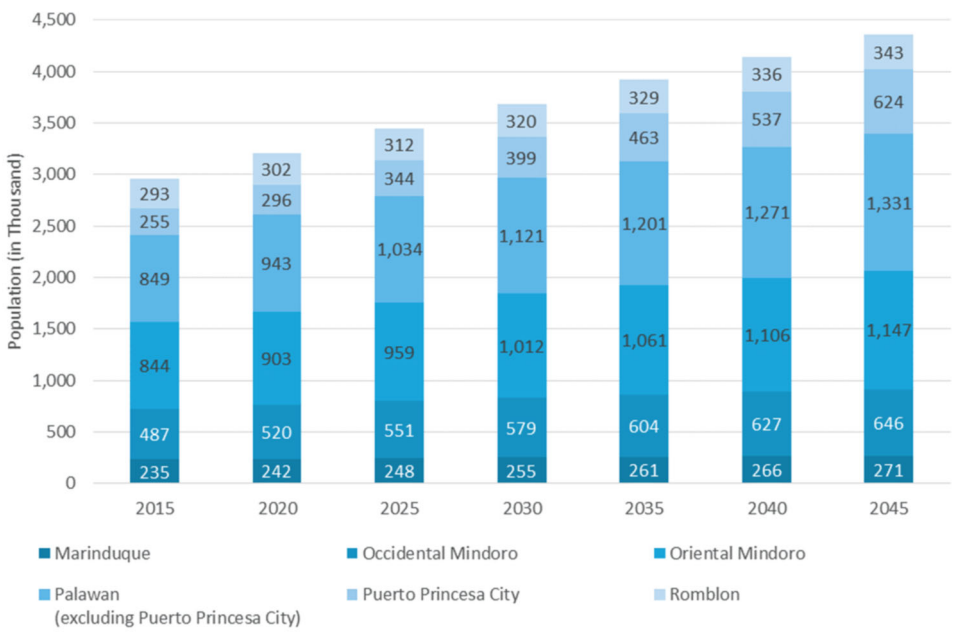


Figure 10: Projected Population

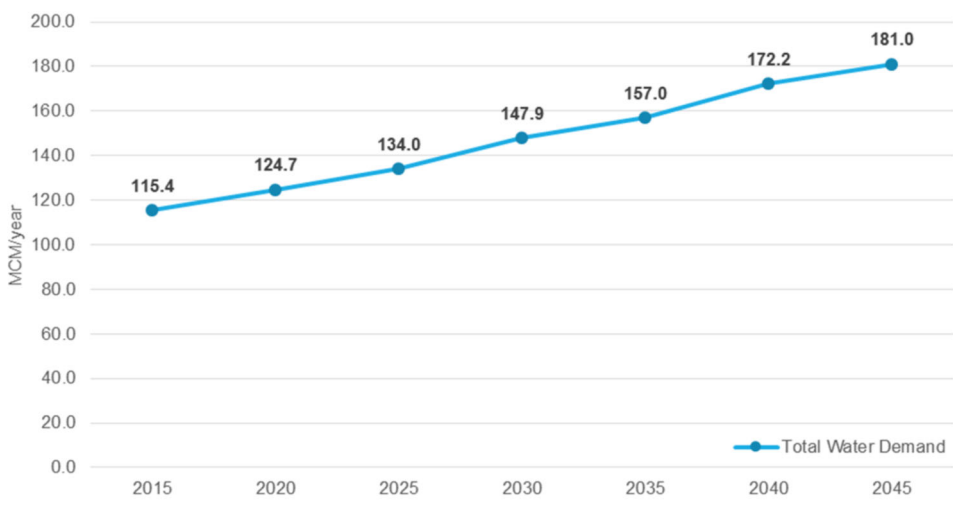
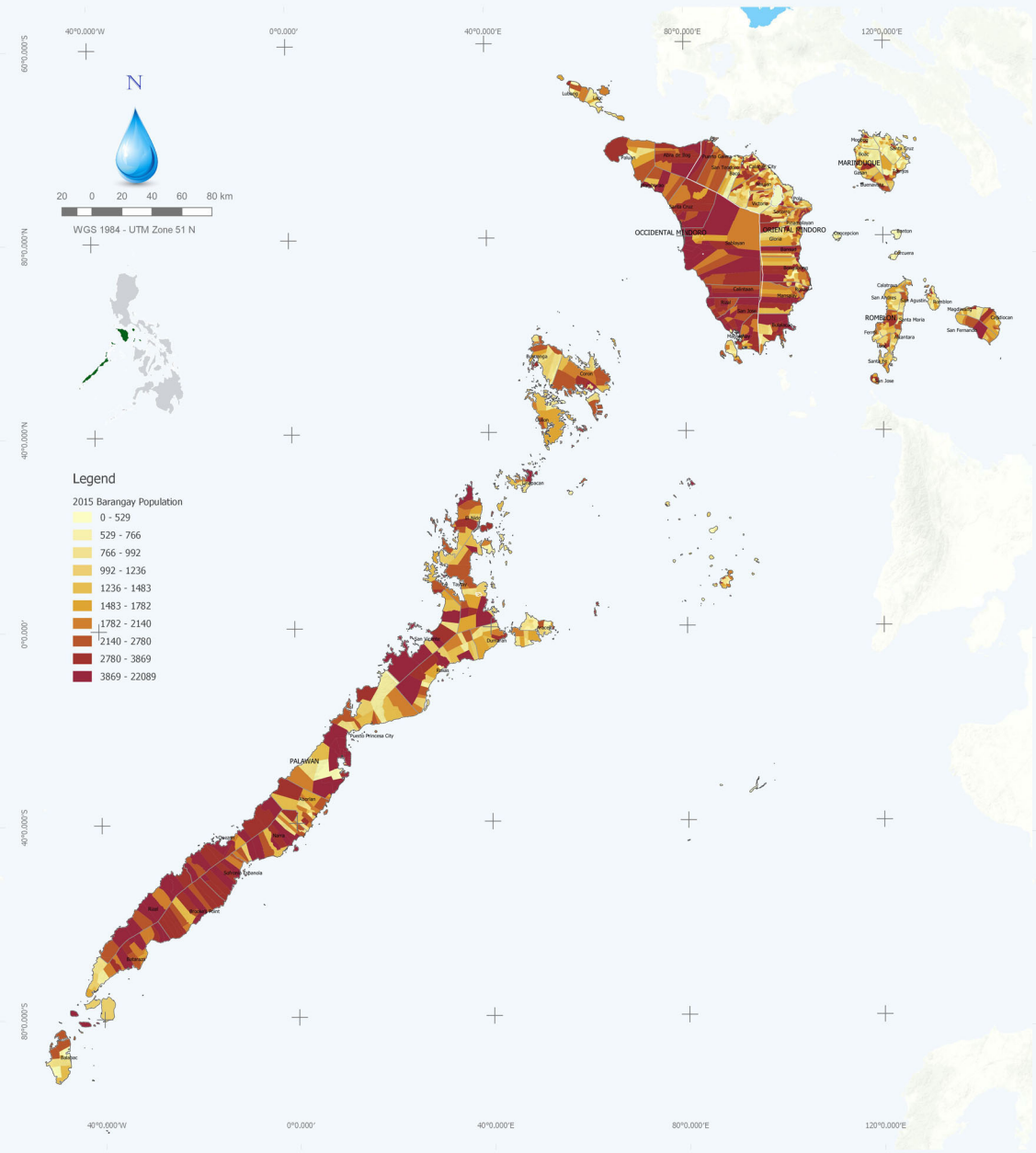
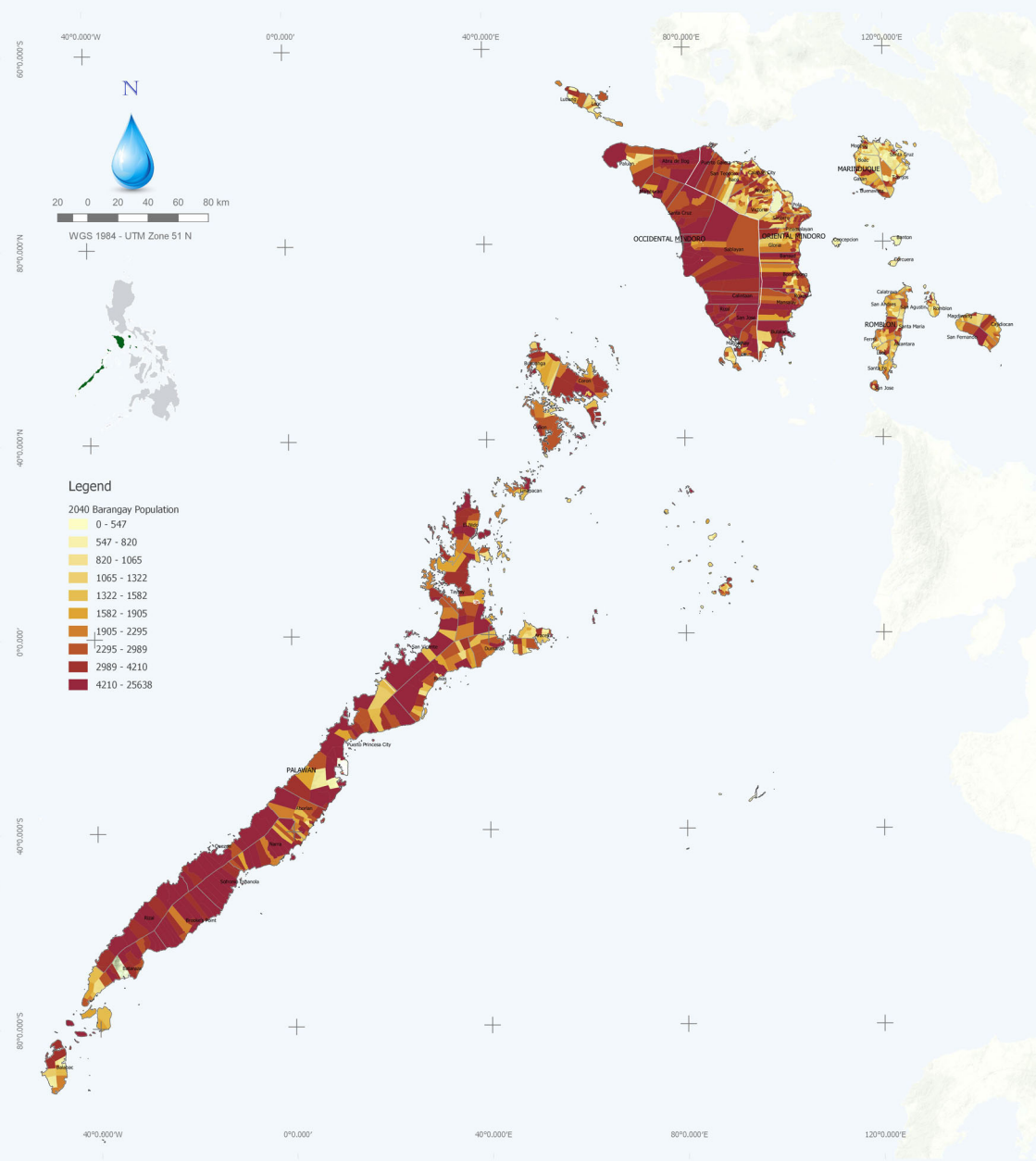


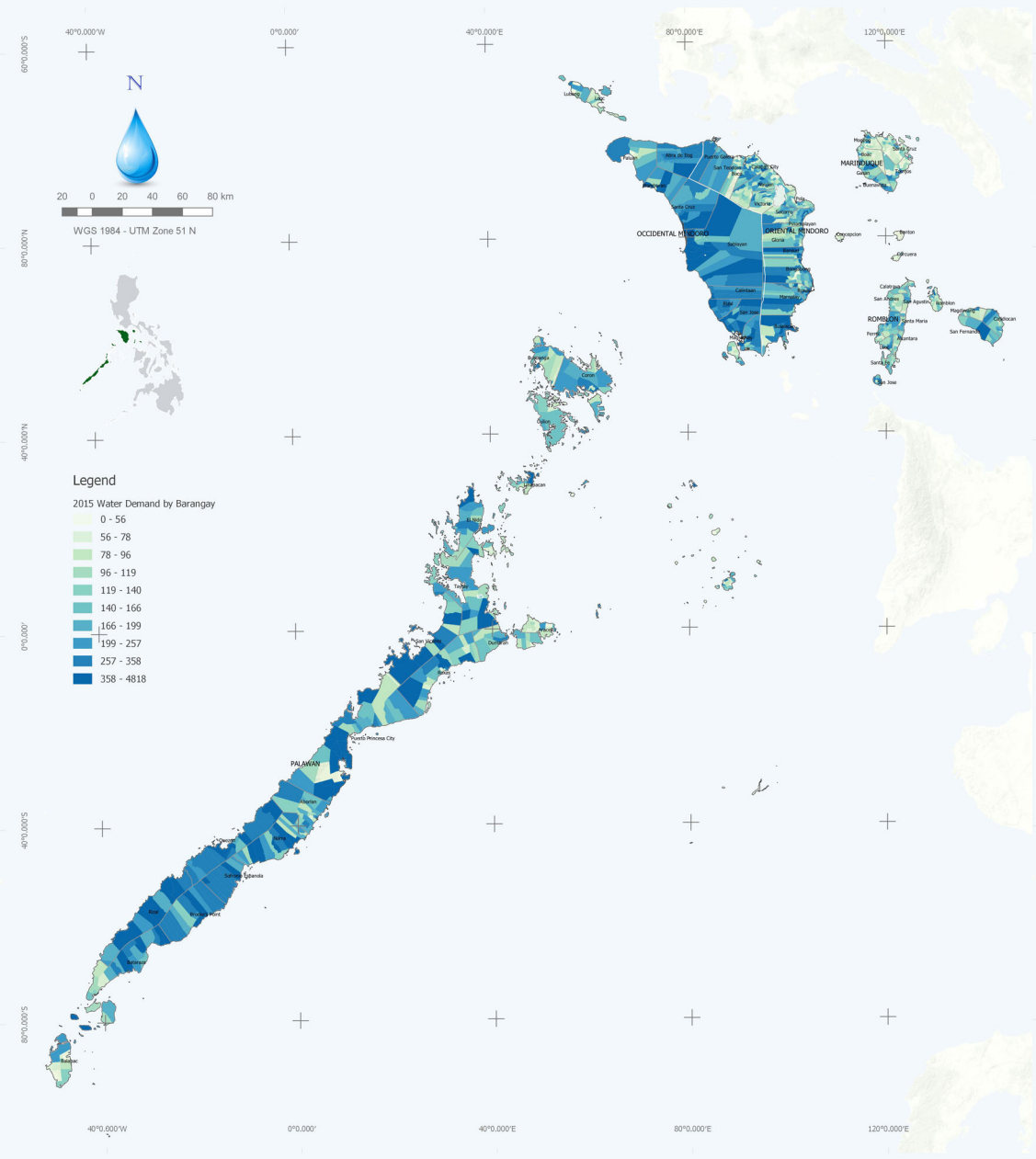
Figure 11: Projected Water Demand



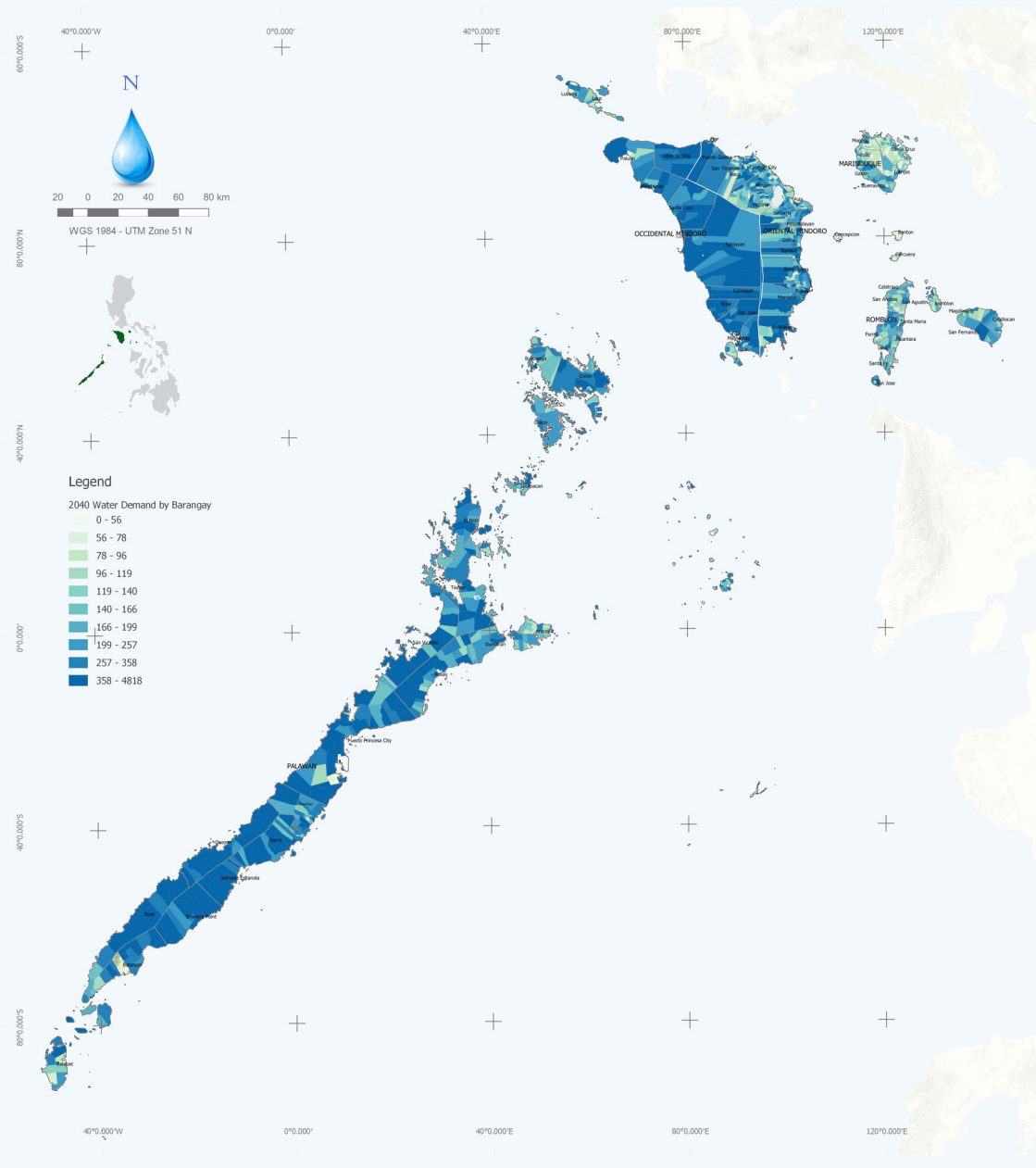
2015 Population



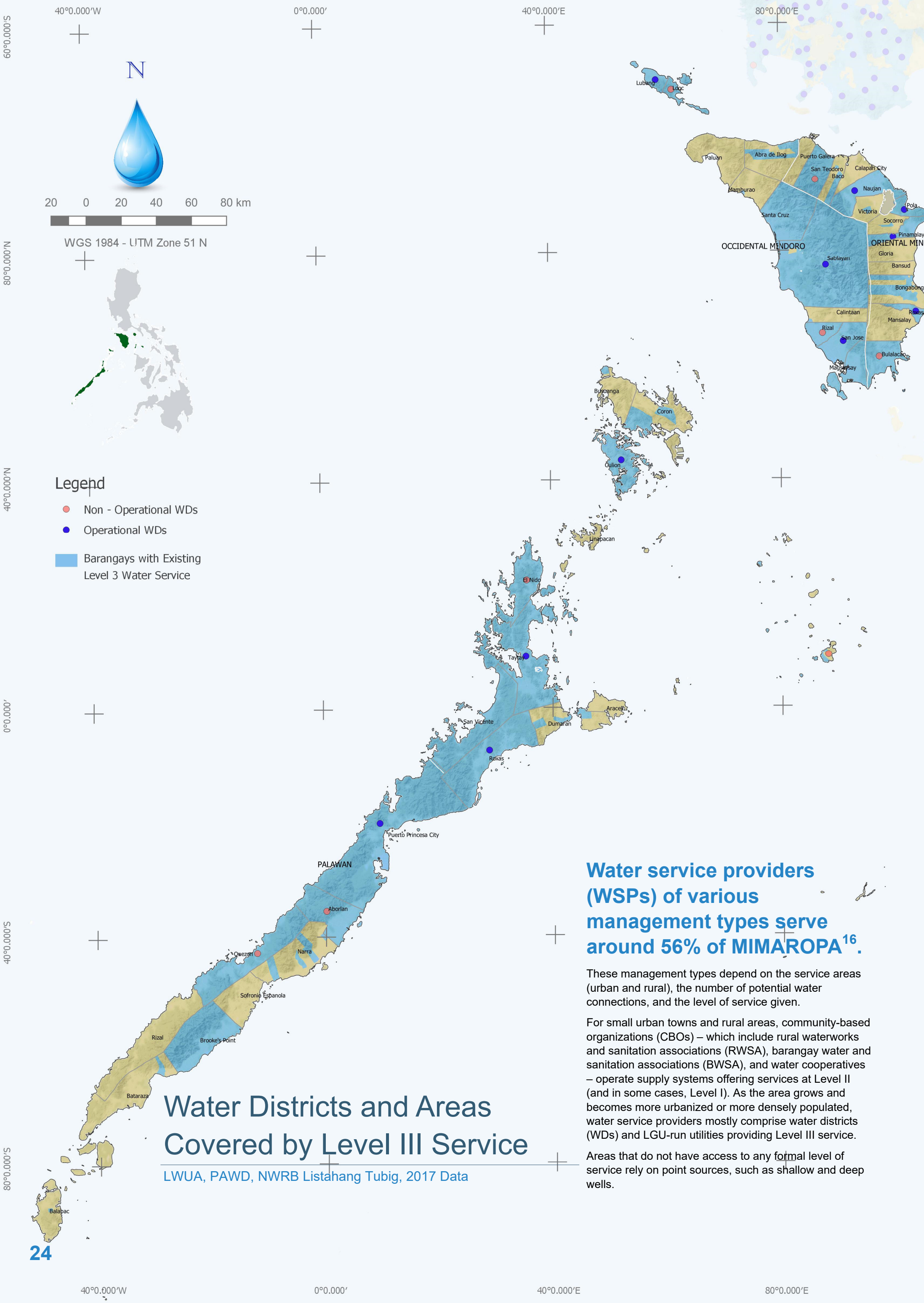
2045 Population Projection



2015 Water Demand



2045 Water Demand Projection



Water Districts and Areas Covered by Level III Service

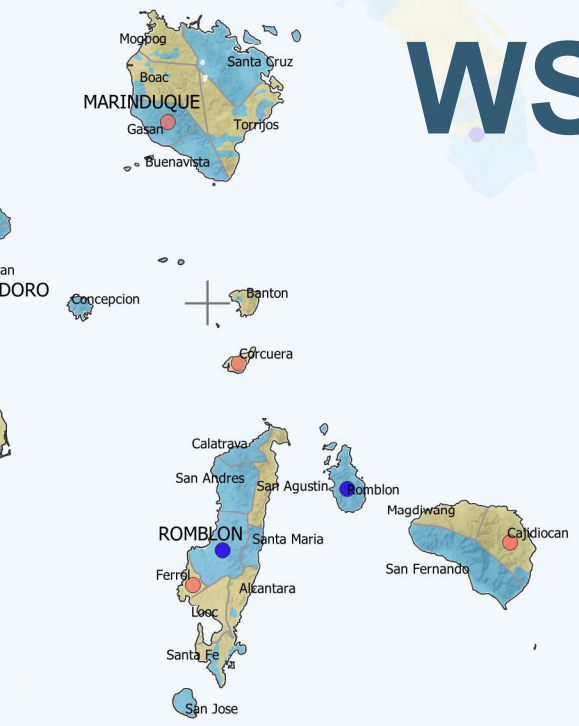
LWUA, PAWD, NWRB Listahang Tubig, 2017 Data

Water service providers (WSPs) of various management types serve around 56% of MIMAROPA[16].

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.



WSS Infrastructure

Water Districts

As of 2015, there were 25 WDs serving MIMAROPA, 13 of which were operational and 12 nonfunctional. Operational WDs cover more than 1 million users or roughly 34% of the region's total population. The served population by the WDs was about 298,098.

LGU-Led Water Utilities

A total of 243 LGU-led water utilities in the region serve 40 areas with 230,968 users or 8% of the population. Marinduque has the most number of LGU-led facilities that cover 36% of its population. On the other hand, Occidental Mindoro has the lowest service coverage recorded at about 3% of its population.

BWSA

There are 316 BWSA utilities within the region serving 40 areas with 238,752 users or 8% of its total population. Palawan has the highest number of BWSA utilities (totaling 137) and the highest number of users — about 101,670.

RWSA

Only 21 RWSA utilities within the region are tapped by 12 LGUs covering 50,855 users or roughly 2% of the total population. Palawan also has the most number of RWSA utilities serving 3% of its population.

The map on the left 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).

Water 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[17], 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. Nevertheless, these data help economic experts and engineers gain insights into the region's situation in relation to its existing water utilities.

Table 12: Water Service Providers per Province

Province/Region	No. of LGUs	Type & No. of WSPs		Service Area Population	Population Served	
					Total	%
Marinduque	6	WDs	1	-	-	-
		LGU-led	88		85,247	36.3%
		BWSA	19		20,120	8.6%
		RWSA	-		-	-
		Private/Others	8		7,965	3.4%
		Subtotal	**116**	**234,521**	**113,332**	**48.3%**
Occidental Mindoro	11	WDs	5	226,599	48,825	21.5%
		LGU-led	13		13,300	2.7%
		BWSA	24		16,470	3.4%
		RWSA	5		14,865	3.0%
		Private/Others	59		20,384	4.2%
		Subtotal	**101**	**487,414**	**113,844**	**23.36%**
Oriental Mindoro	15	WDs	6	277,072	31,691	11.4%
		LGU-led	31		59,925	7.1%
		BWSA	66		65,715	7.8%
		RWSA	4		4,960	0.6%
		Private/Others	107		39,285	4.7%
		Subtotal	**208**	**844,059**	**201,576**	**23.88%**
Palawan	24	WDs	8	415,778	194,424	46.8%
		LGU-led	70		53,645	4.9%
		BWSA	137		101,670	9.2%
		RWSA	11		30,485	2.8%
		Private/Others	72		30,960	2.8%
		Subtotal	**290**	**1,104,585**	**411,184**	**37.23%**
Romblon	17	WDs	5	84,125	23,155	27.5%
		LGU-led	41		18,851	6.4%
		BWSA	70		34,777	11.9%
		RWSA	1		545	0.2%
		Private/Others	25		37,146	12.7%
		Subtotal	**137**	**292,781**	**114,474**	**39.10%**
MIMAROPA	73	WDs	25	1,003,574	298,095	29.7%
		LGU-led	243		230,968	7.8%
		BWSA	316		238,752	8.1%
		RWSA	21		50,855	1.7%
		Private/Others	271		135,740	4.6%
		Grand Total	**851**	**2,963,360**	**954,410**	**32.21%**

[16] Water district data were based on LWUA and PAWD; data on other WSPs were based on Listahang Tubig (as of 2017).
[17] LWUA, PAWD, NWRB Listahang Tubig

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WGS 1984 - UTM Zone 51 N

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San Teodoro
Baco
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Victoria
Mamburao
Santa Cruz
Occidental Mindoro
Sablayan
Gloria
Calintaan
San Jose
Magsaysay
Busuanga
Coron
Culion
Linapacan
El Nido
Taytay
Agutaya
Cuyo
Magsaysay
Araceli
San Vicente
Dumaran
Roxas
Puerto Princesa City
Palawan
Aborlan
Quezon
Narra
Sofronio Espanola
Rizal
Brooke's Point
Bataraza
Balabac
Cagayancillo

Legend

% Open Defecation

- 0.000 - 0.073
- 0.073 - 0.146
- 0.146 - 0.220
- 0.220 - 0.293
- 0.293 - 0.366
- 0.366 - 0.439
- 0.439 - 0.512
- 0.512 - 0.586
- 0.586 - 0.659
- 0.659 - 0.732

Open Defecation

PSA, 2015 Data

Sanitation

Figure 12: Categories of Wastewater

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 by which 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 a host of health problems.

MIMAROPA's open defecation rate of 6.4% is almost 1.5 times greater than that of the national average.

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

Wastewater and Domestic Biological 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.

Figure 13 shows the BOD in MIMAROPA in 2015

The industrial and agricultural wastewater generation may be estimated using the 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.

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[18] per person per day is used.

The wastewater[19] 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 wastewater produced in the region in 2015 is shown in Figure 14.

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

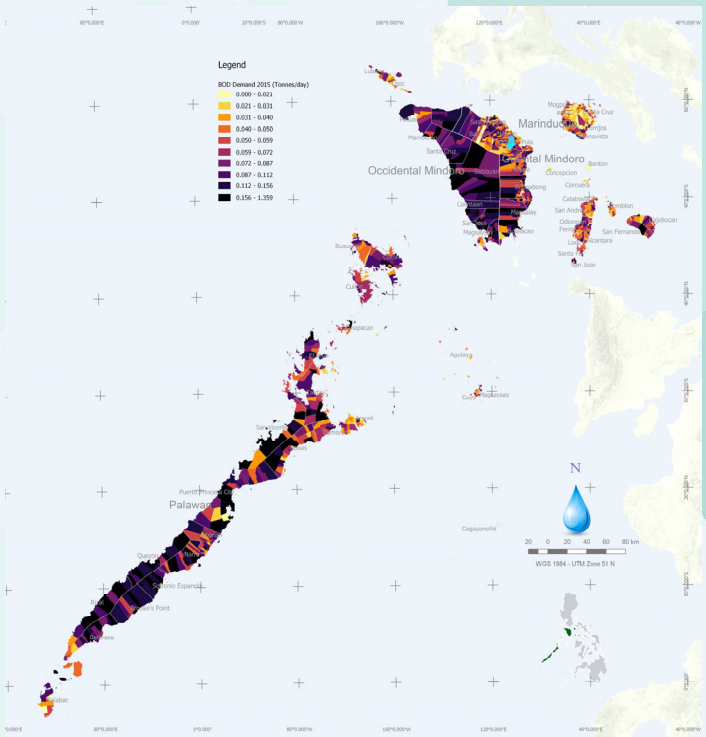


Figure 13: Biological Oxygen Demand, 2015

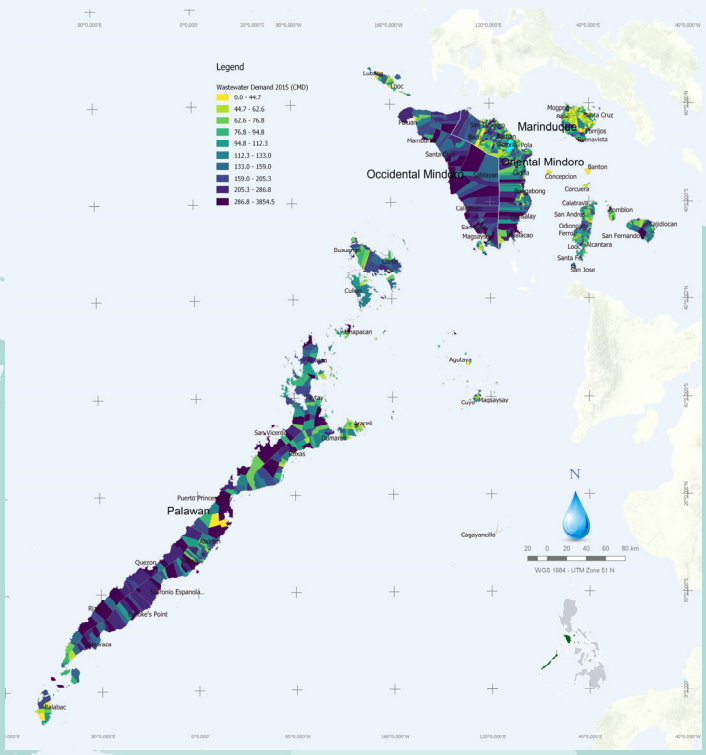
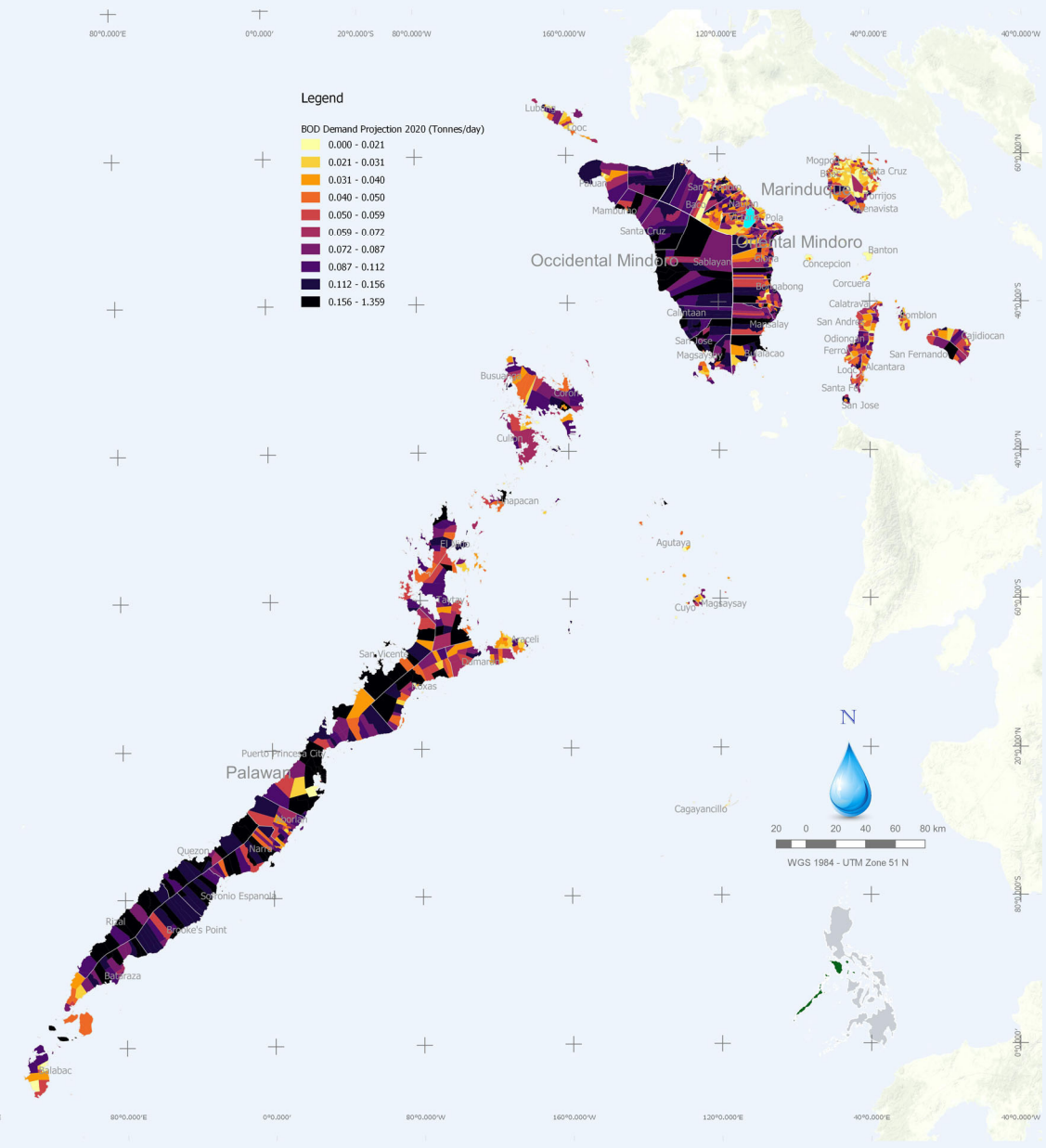
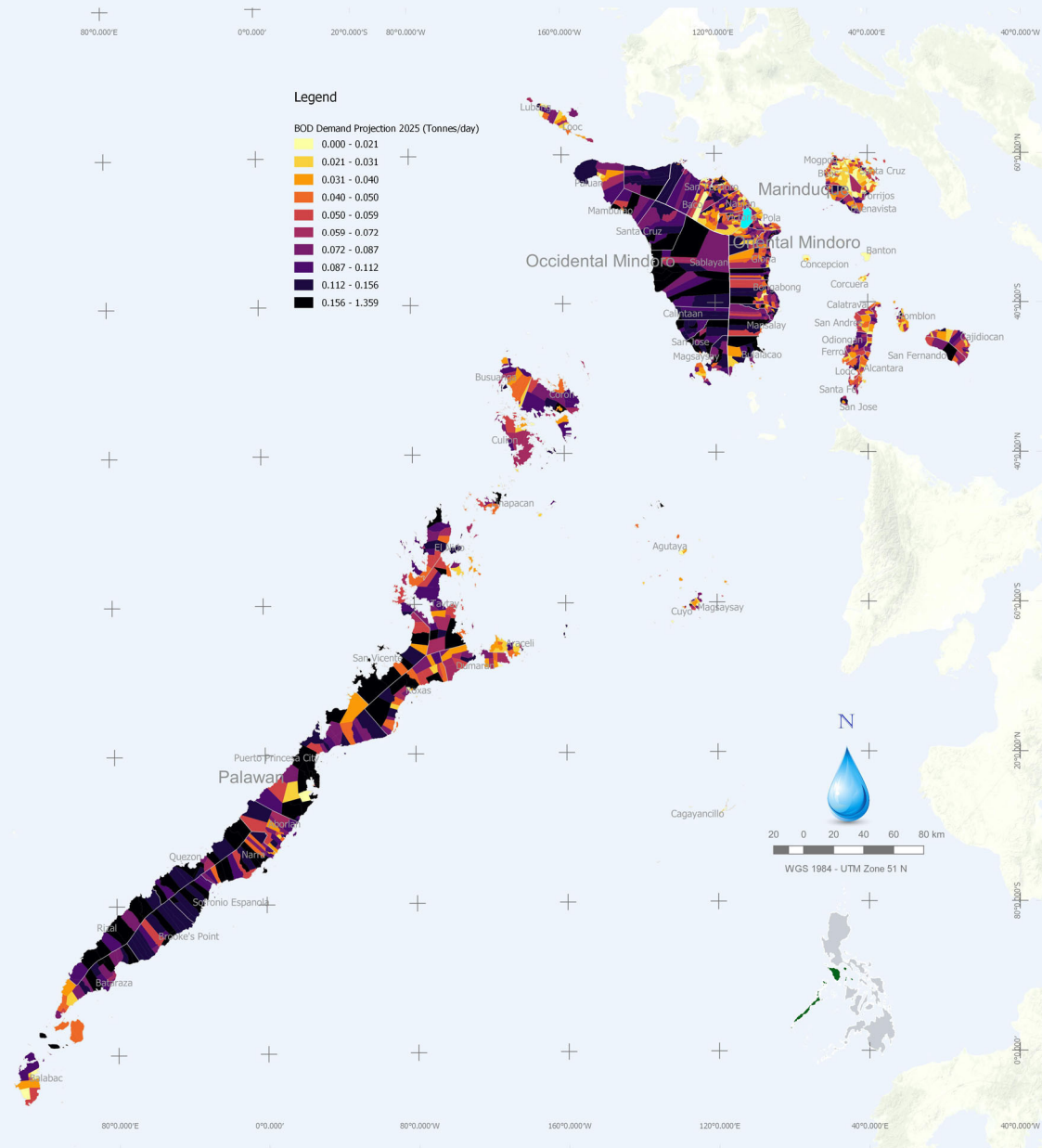


Figure 14: Wastewater Produced, 2015

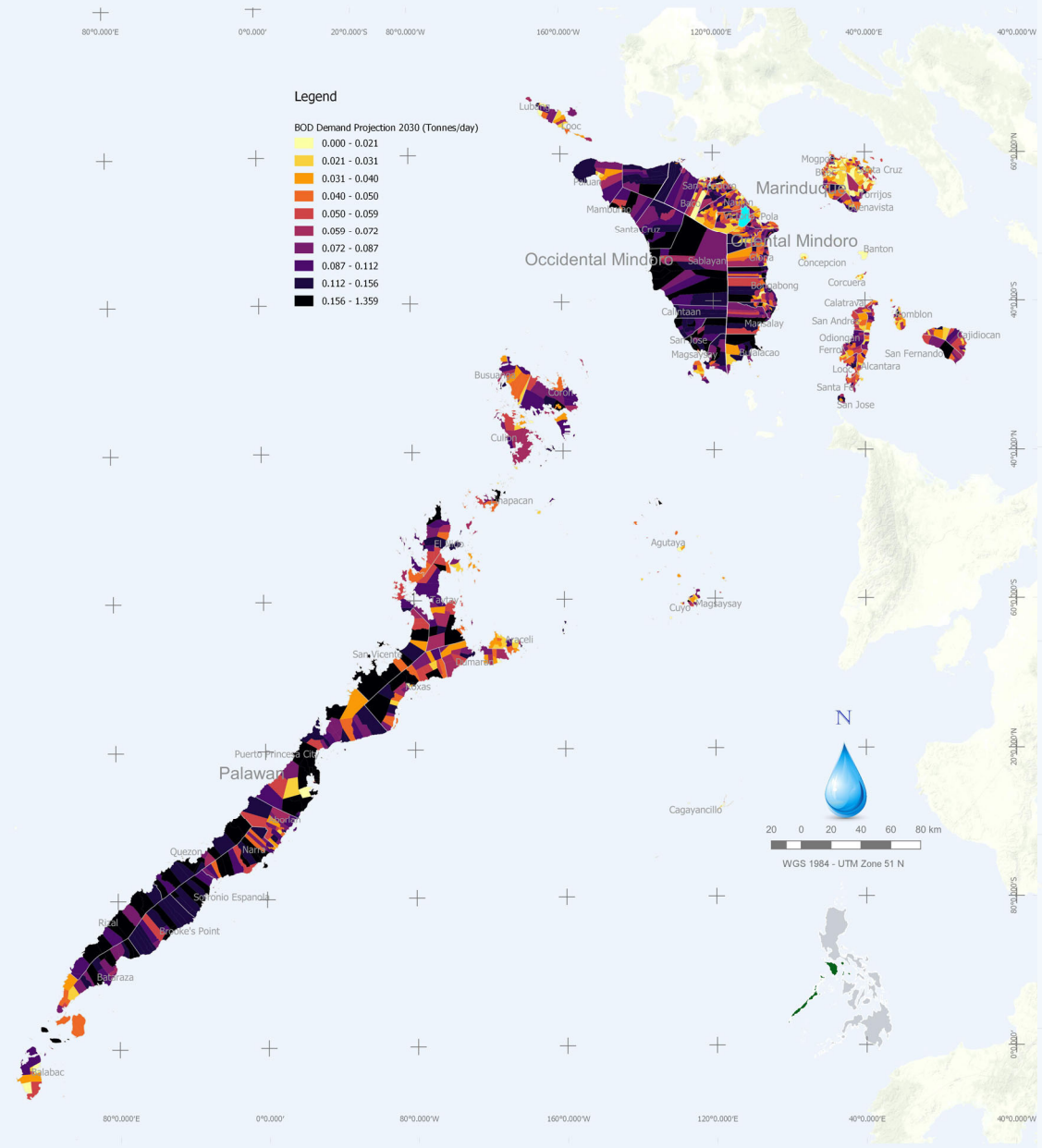
[18] *Philippine Environment Monitor (PEM), 2003*
[19] *Ibid*



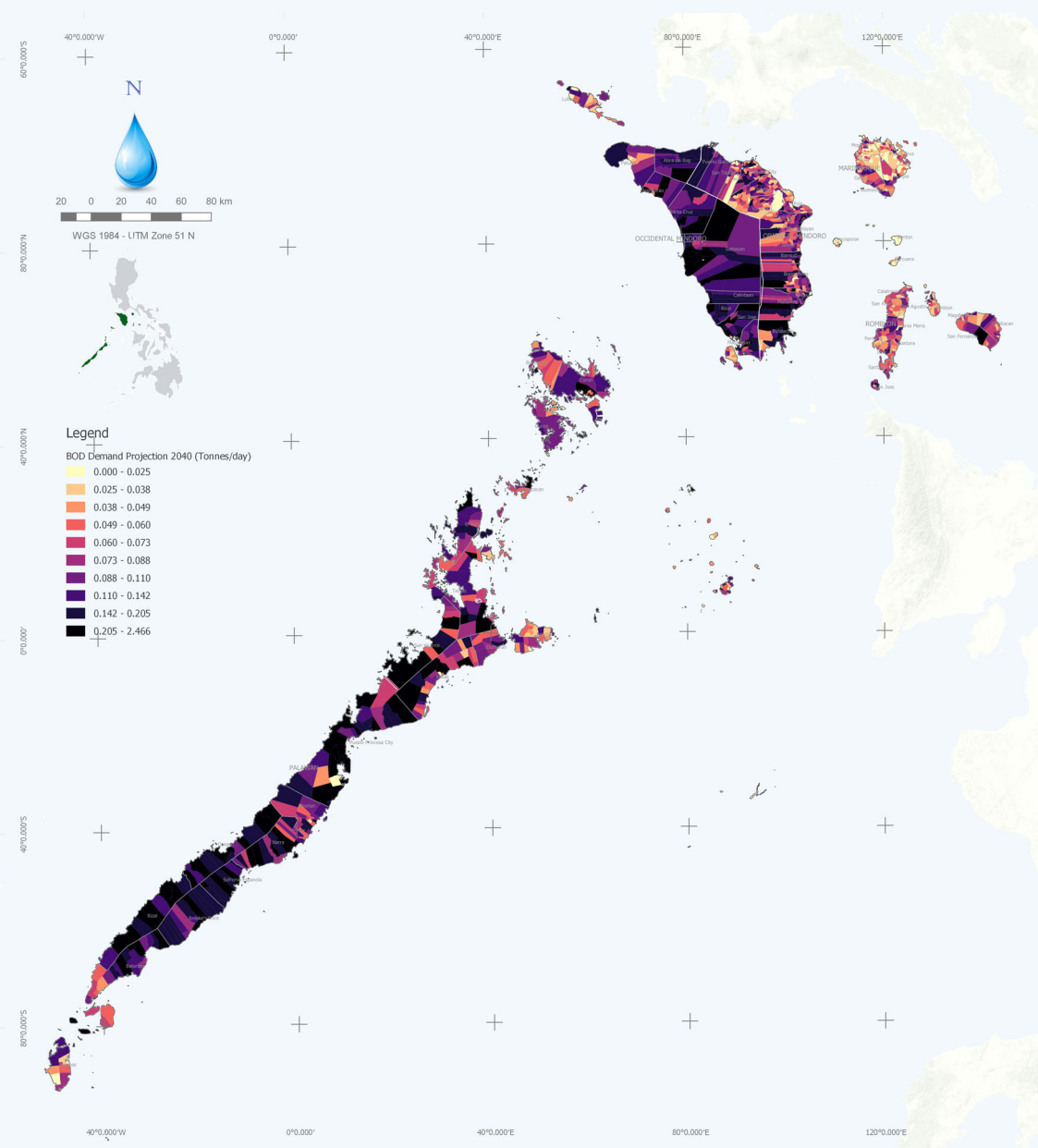
BOD Projection, 2020



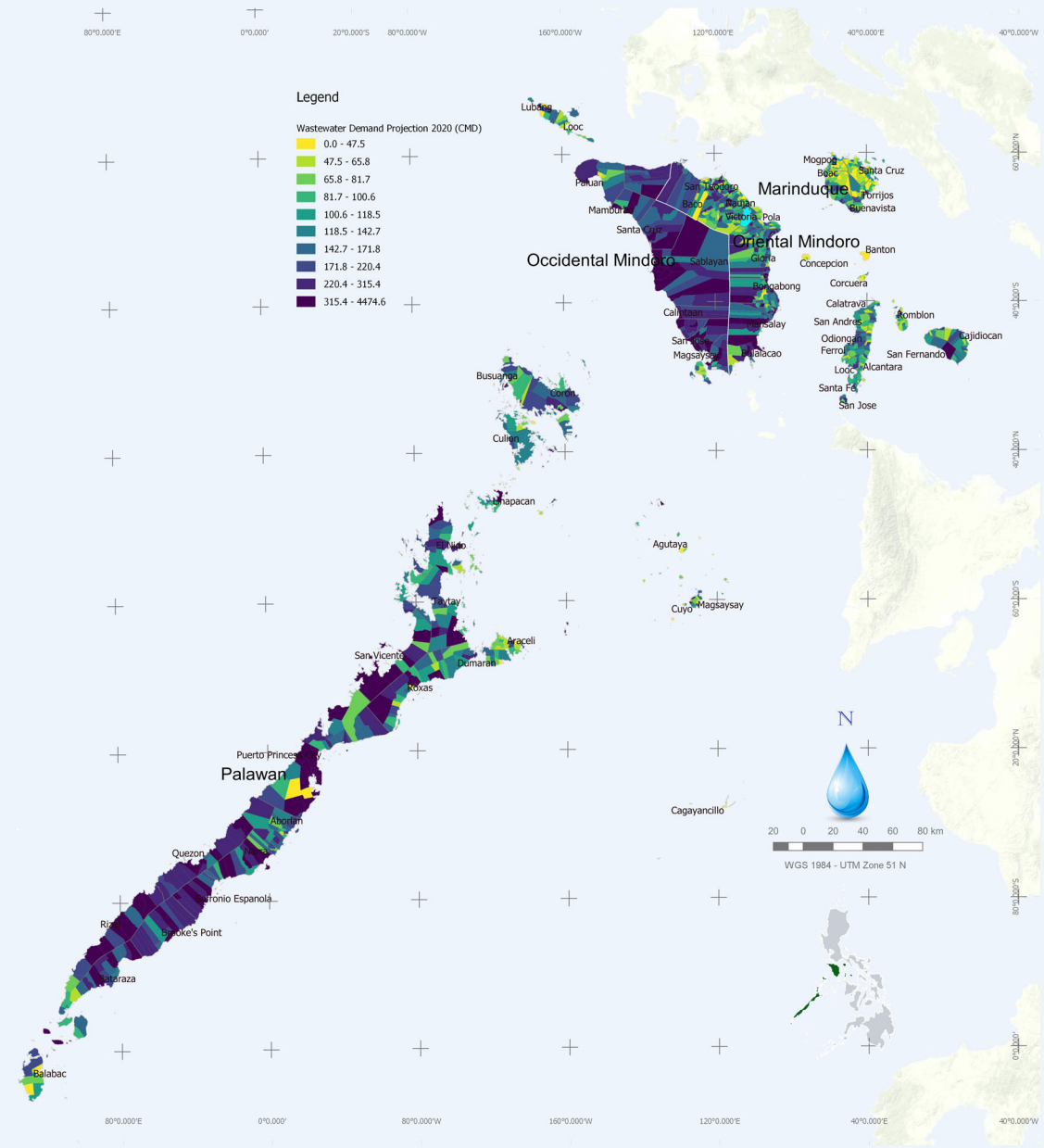
BOD Projection, 2025



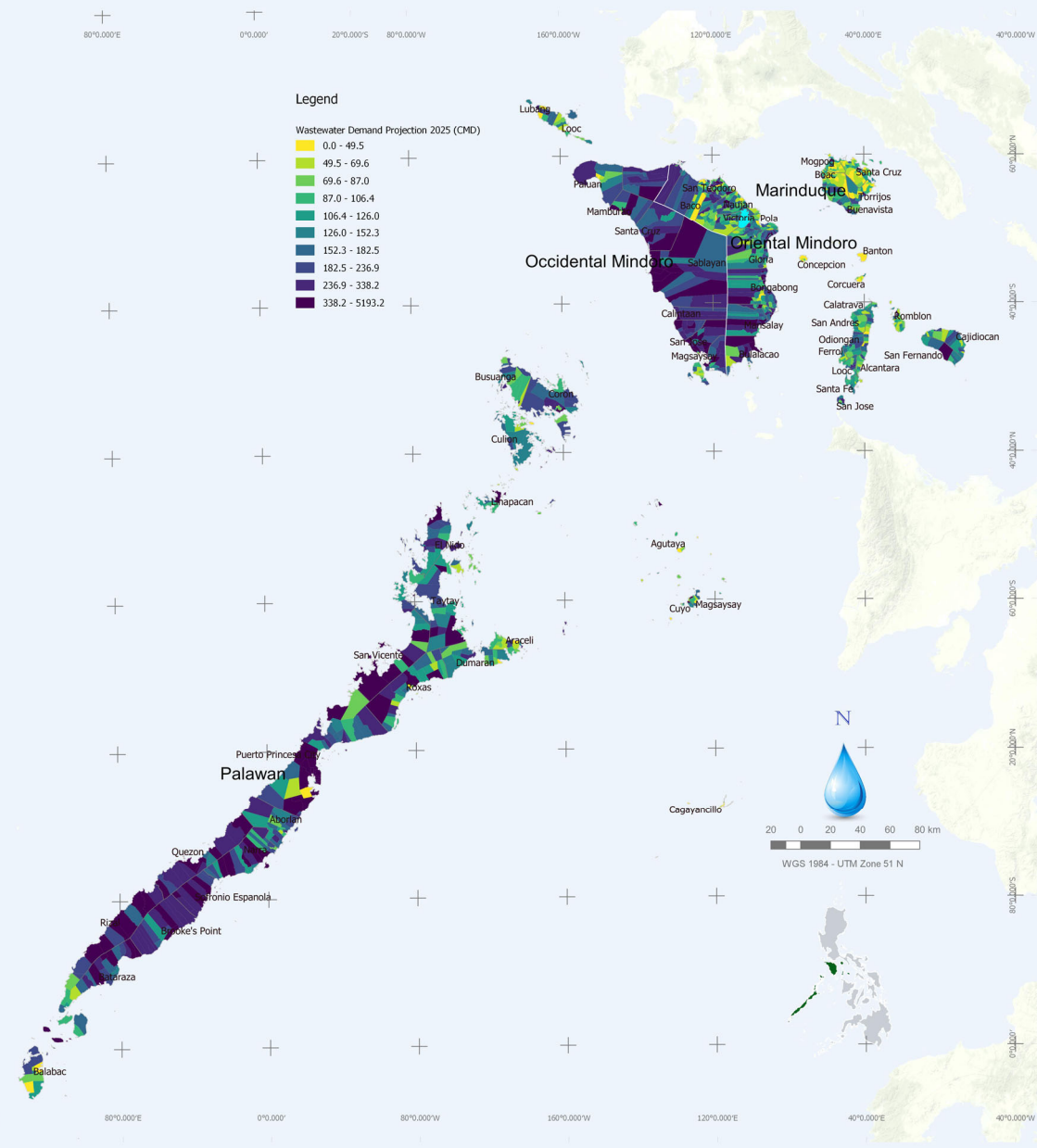
BOD Projection, 2030



BOD Projection, 2040



Wastewater Projection, 2020



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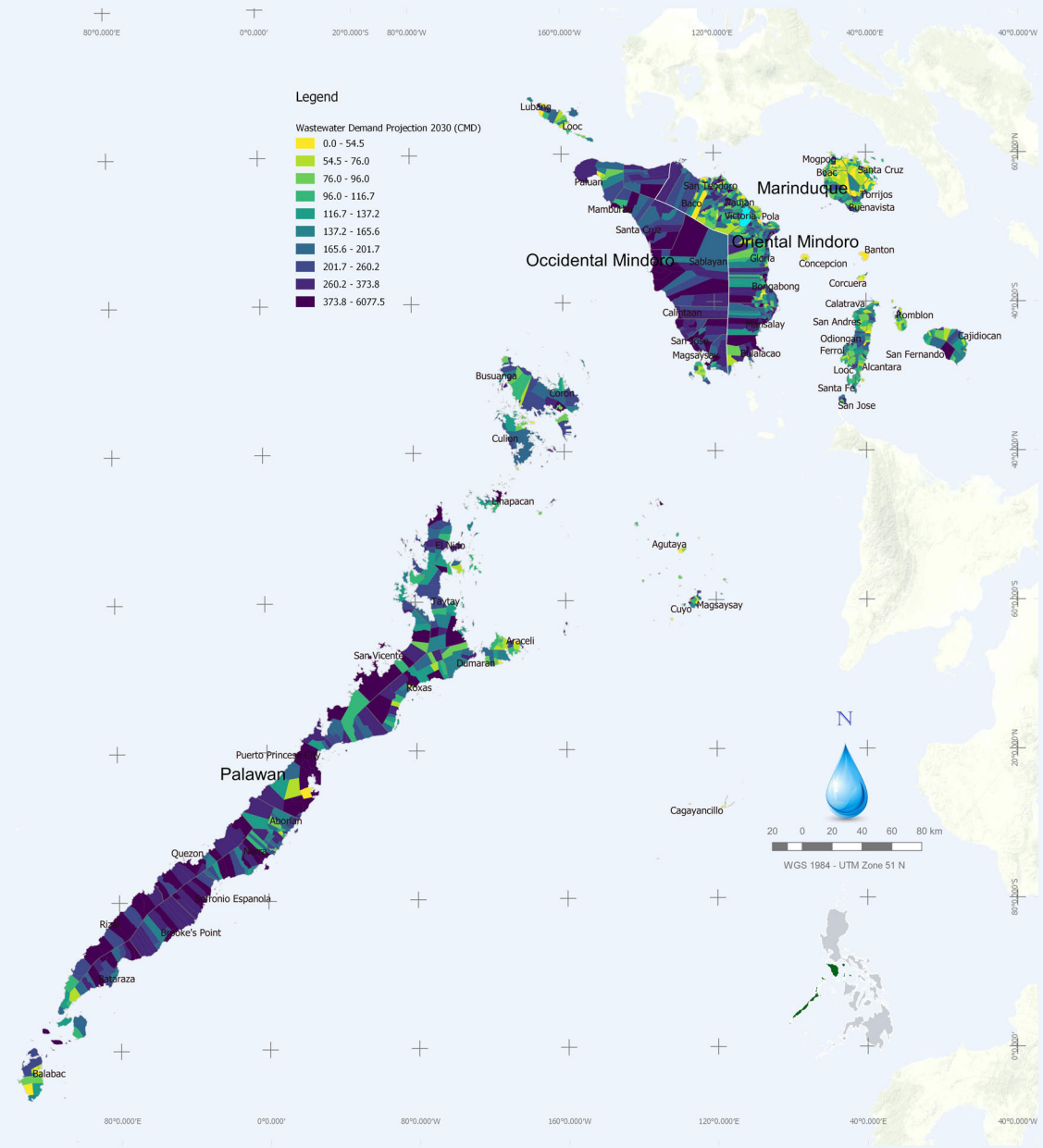
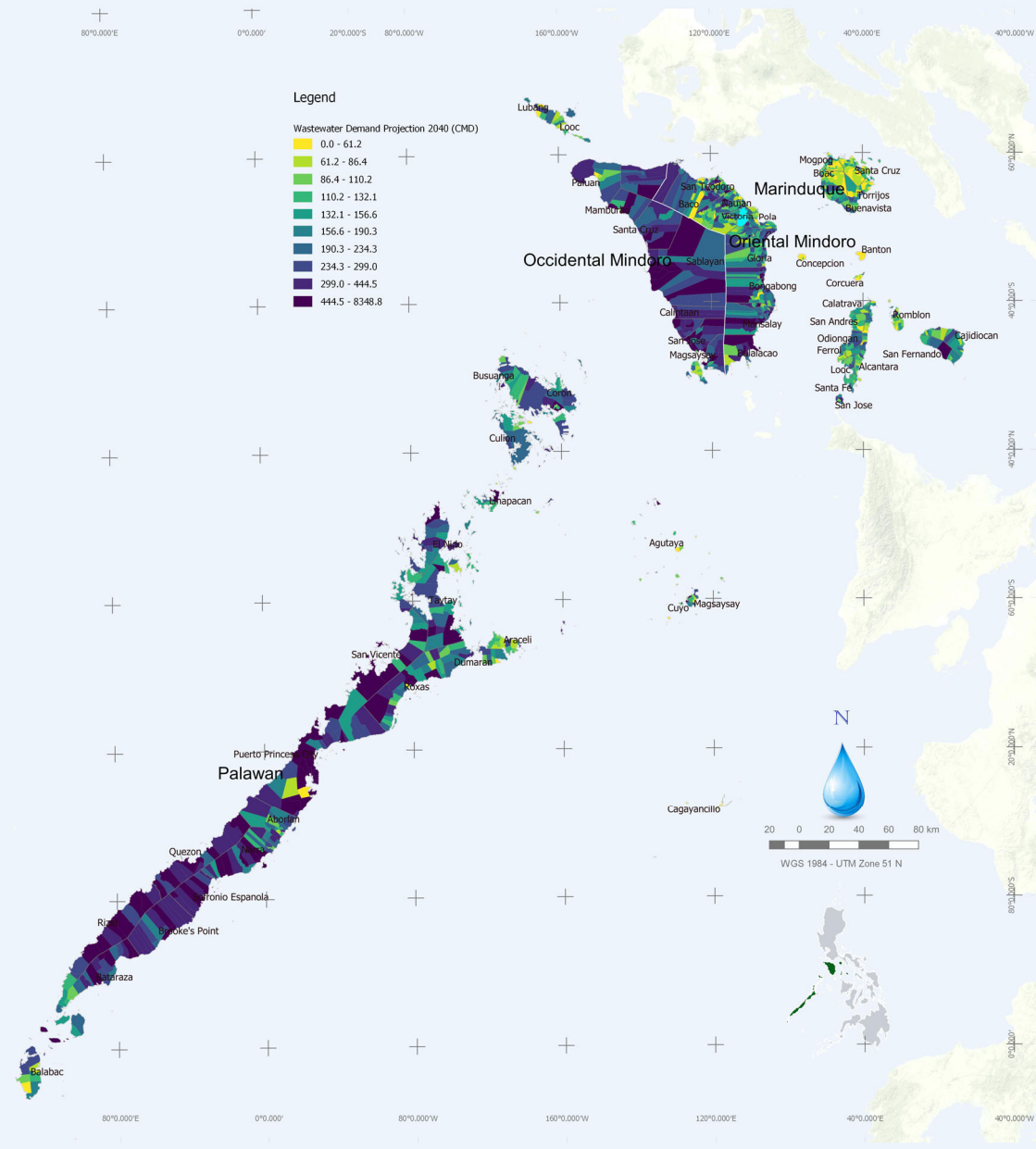
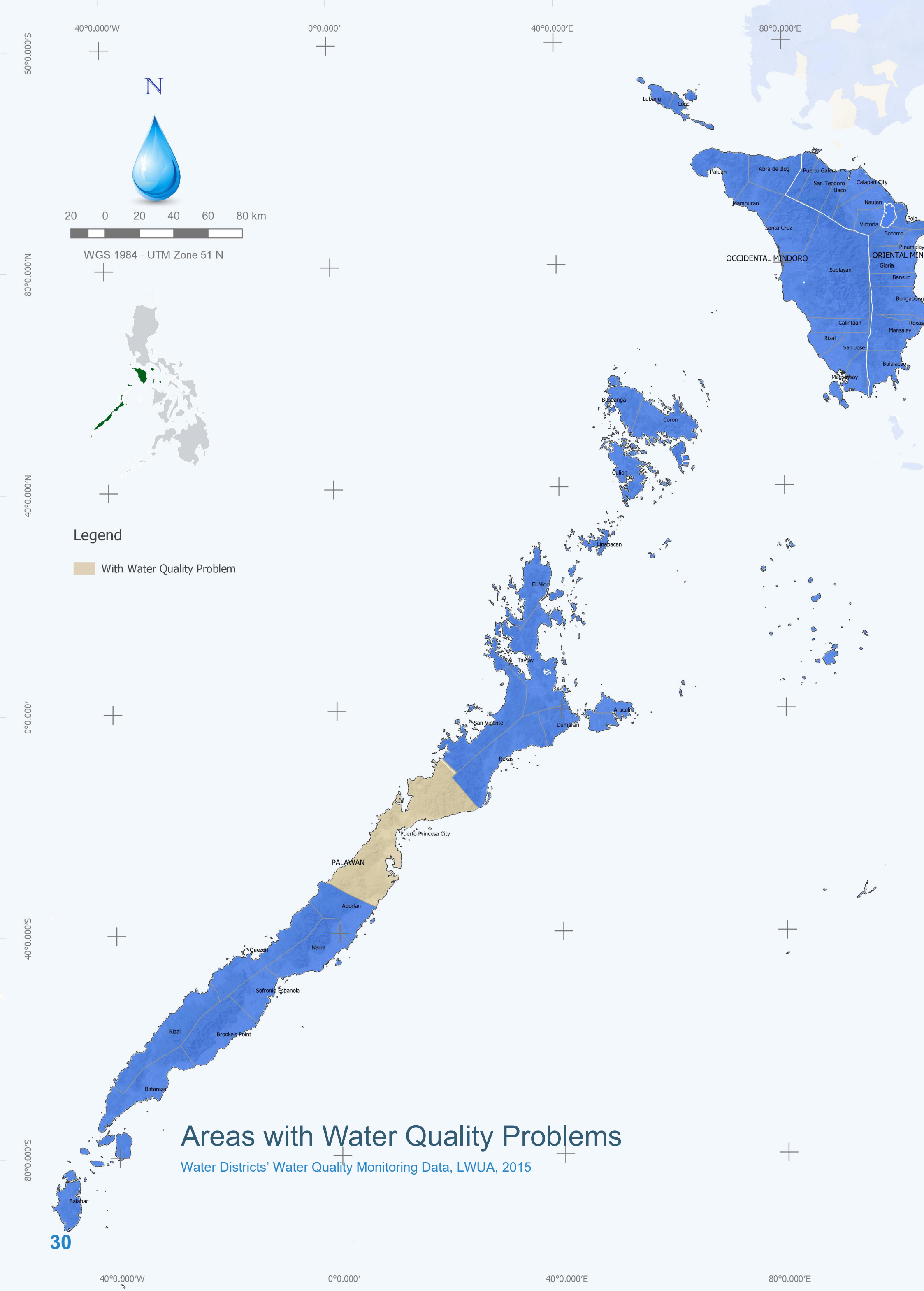


Wastewater Projection, 2030



Wastewater Projection, 2040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N
20 0 20 40 60 80 km
WGS 1984 - UTM Zone 51 N
Legend
With Water Quality Problem
Lubang
Looc
Paluan
Abra de Ilog
Puerto Galera
San Teodoro
Baco
Calapan City
Mamburao
Naujan
Pola
Victoria
Santa Cruz
Socorro
Pinamalayan
OCCIDENTAL MINDORO
ORIENTAL MIN
Gloria
Sablayan
Bansud
Bongabong
Calintaan
Roxas
Mansalay
Rizal
San Jose
Bulalacao
Magsaysay
Busuanga
Coron
Culion
Linapacan
El Nido
Taytay
Araceli
San Vicente
Dumaran
Roxas
Puerto Princesa City
PALAWAN
Aborlan
Quezon
Narra
Sofronio Espanola
Rizal
Brooke's Point
Bataraza
Balabac
Areas with Water Quality Problems
Water Districts' Water Quality Monitoring Data, LWUA, 2015
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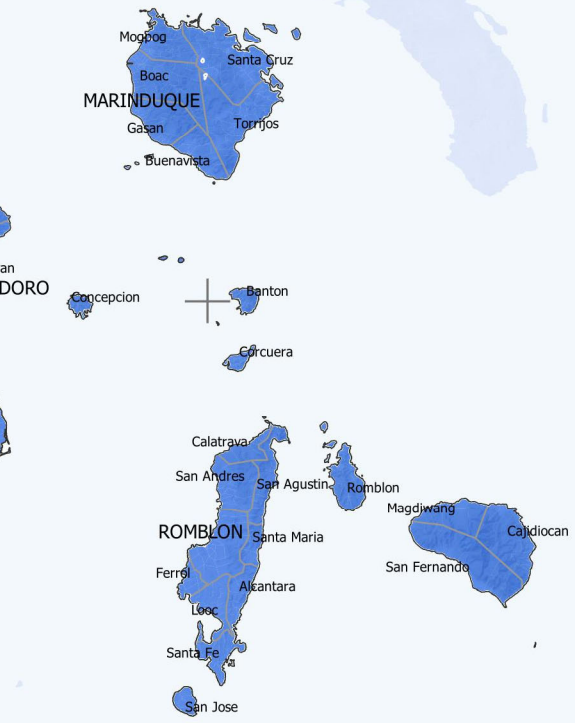


Water Quality

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.

As discussed in the water resources section of this report, MIMAROPA has several major rivers. Table 13 shows the list of rivers in the region and their corresponding classification.

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 left 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.

Table 13: Classification of Rivers[20]

Province	River	Classification
Marinduque	Boac*	C
	Calancan Bay	SB
	Maniwaya Coastal Waters	SB
	Mogpog	C
Occidental Mindoro	Busuanga*	C
	Caguray*	A
	Cambaog	C
	Labangan*	C
	Lawaan	AA
	Lumintao*	A
	Mangarin Bay	SB/SC
	Magbando*	A
	Mamburao*	A
	Pagbahan*	C
Oriental Mindoro	Balete*	C
	Bansud*	C
	Baroc*	C
	Bongabong*	D
	Bulalacao*	C
	Bulalacao Bay	SA
	Butas*	C
	Calapan	C
	Calapan Bay	SA/SB
	Mag-asawang Tubig*	A
	Malaylay-Baco*	A
	Naujan Lake	B
Palawan	Babuyan	B
	Bacuit Bay	SB
	Bacungan*	A/B/C
	Balitien	D
	Balsahan	A/B/C
	Calategas	A/C
	Coral Bay	SC
	Coron Bay	SB
	Green Island Bay	SB
	Imuruan Bay	SB
	Inagauan	C
	Iwahig*	A/B
	Ipilan	C
	Irawan	A/B
	Katubusan	C
	Langogan	B
	Maasin	B/C
	Malampaya Shallow Water	SC
	Malatgao	A
	Malinao	A/B
	Mambalot	C
	Montible	A
	Nasaguipi	A
	Ocayan *	C
	Panacan	C
	Pandanan*	C
Romblon	Binayaan	A
	Cabitangahan	A
	Cajimos Bay	SC

**Principal rivers*

Waterborne Diseases

Waterborne diseases are generally transmitted through water where pathogenic microorganisms live. These diseases can be spread while bathing, washing, or drinking water, or by eating food exposed to contaminated water[21].

Based on the 2015 Food and Waterborne Diseases Report of the Department of Health (DOH), there were 58 reported cases of typhoid and paratyphoid, two of which were in Marinduque and 56 in Palawan. These figures indicate that many residents in the region still have no access to safe drinking water and sanitation facilities.

As of 2017, the Department of the Interior and Local Government (DILG) reported 11 waterless[22] municipalities in MIMAROPA (see Figure 15).

Residents in these areas have limited access to safe (drinking) water, and thus, are forced to resort to unsafe sources of water. Doing so increases their exposure to a host of waterborne diseases.

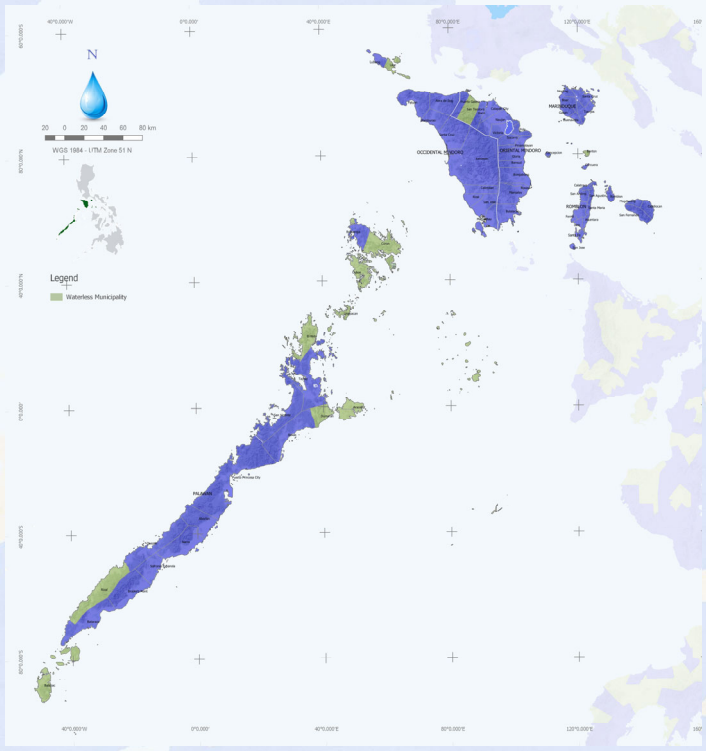


Figure 15: Waterless Municipalities

[20] *Environmental Management Bureau (EMB)*
[21] *World Health Organization*
[22] *Municipalities with less than 50% service coverage, National Anti-Poverty Commission, 2010*

WSS Sector Gaps

In assessing the current state of the water supply and sanitation (WSS) sector in Region IV-B, 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 planning workshop participated in by concerned provincial officers from Region IV-B and representatives from regional line agencies have produced a working document that identified the “hindering” issues, constraints, and challenges being encountered by the WSS sector in three areas of concern: (a) Planning and Development, (b) Service Provision, and (c) Regulation.

Cross-cutting topics and interlinked thematic issues such as policy and institutional issues, leadership, and cultural/behavioral/attitudinal concerns were also tackled. Classified as (i) unorganized/undeveloped/underdeveloped, (ii) developing, and (iii) developed, the WSS sector in each locality was analyzed in terms of interventions needed and “facilitating factors” required to overcome specific constraints in the management of WSS services.

Planning and Development

In regard to planning and development, three (3) major hindering issues were discussed: absence of sewage and sewerage systems; non-prioritization by local chief executives (LCEs); and the absence of comprehensive local water supply and sanitation plans.

One of the major constraints identified by the Regional Development Council (RDC) was the mix of difficult challenges imposed by the island characteristics of the region.

As regards to the sanitation sector, LGUs lack financial and technical capabilities to establish and operate a reliable, functioning and sustainable solid waste management system.

Service Provision

Three identified major hindering factors include (a) the weak implementation of the required regulation due to leadership, behavioral, policy and institutional issues; (b) lack of access by rural households to Level III water supply service; and (c) serious challenges in the mitigation of hindering factors. One of the major issues was that a large percentage of households in rural areas have no access to Level III service. The prevalence of open defecation in some areas is also a hindering factor.

Regulation

The limited number of service providers in the region with regard to water supply and sanitation was identified as one of the hindering factors in regard to regulatory norms.

The RDC emphasized the need to identify other potential sources of water for domestic and industrial use to minimize dependence on groundwater extraction.

Table 14 summarizes the hindering and facilitating factors impacting the WSS sector in MIMAROPA.

Table 14: Hindering and Facilitating Factors

Pillar: Planning and Development		
Issue 1: Absence of a Sewage and Sewerage System		
	Hindering Factors	Facilitating Factors
Policy and Institutional Issues	Absence of a local ordinance institutionalizing the installation of a sewage and sewerage system	Crafting, or revising/updating and enactment of needed city/ municipal ordinances
	Lack of financial viability to set up a sewage and sewerage system	Identification of funding source/s and ways to access said funds
Leadership	Conflict of interest between the local chief executives (LCEs) and private proponents	Leaders' support of the initiatives of local implementers
	Fear of political interference	
Behavioral Issues	Lack of community awareness of the importance of a sewage and sewerage system	Engagement of frontline community volunteer health workers
		Partnership with nongovernmental organizations (NGOs) and other stakeholders
Issue 2: WSS Projects not a Priority of LCEs		
	Hindering Factors	Mitigating Factors
Policy and Institutional Issues	Water and sanitation projects not regarded as a viable option for income generation	Presentation of project proposals with feasibility studies
Leadership	Limited understanding of how the absence of water and sanitation programs and projects adversely impact the quality of life in the communities	Formal dialogue with LCEs regarding the benefits and importance of water and sanitation
Behavioral Issues	Interpersonal relationships with constituents and heads and staff of departments concerned being affected or influenced by relatives and friends.	Establishing rapport with stakeholders
Issue 3: Absence of a Comprehensive Local Water Supply and Sanitation Plan (LWSSP) with Operational Policies		
	Hindering Factors	Facilitating Factors
Policy and Institutional Issues	Absence of LWSS champions	Creation of pertinent local committees (LHB, CAMB, Septage Management Committee, CNC, LSB and others)
	Absence of an existing mandate to create/establish LWSSP	Identification of existing policies/regulations that are not focused on LWSSP but which may serve as points of reference to facilitate the crafting of a comprehensive LWSSP
Leadership	Political interference	Presence of possible leaders
	Lack of committed full-time advocates	Local implementation experts committed to the development of LWSSP
Behavioral Issues	Absence of the WASH program that responds to the needs and aspirations of indigenous people (IP)	Engagement/Involvement of IPs in the development of LWSSP
Capacities/ Competencies	Lack of technical expertise in the development/crafting of LWSSP	Engagement of competent local technical implementers to provide inputs regarding LSSP
Pillar: Regulation		
Issue 1: Weak implementation of water supply and sanitation standards due to lack of facilities/laboratories for water and wastewater testing and designated areas for wastewater disposal		
	Hindering Factors	Facilitating Factors
Policy and institutional Issues	Poor dissemination of information regarding water supply and sanitation standards	New policies formulated to disseminate information on WSS
Leadership	Absence of a regulatory body	Provision of trained personnel
Behavioral Issues	Lack of cultural sensitivity and responsibility	Dissemination of information in partnership with mainstream media practitioners, social media influencers, etc.
Capacities/ Competencies	Lack of awareness of the importance of proper sanitation and safe water sources	Generating public awareness through community-based/ grassroots level seminars
Issue 2: No definite regulatory body for pricing		
	Hindering Factors	Facilitating Factors
Policy and Institutional Issues	Too many agencies tasked to regulate water supply pricing	Generating public awareness of the need to create and activate a professionally run regulatory body
	Too many conflicting policies on water pricing	
Leadership	Political interference	
Issue 3: Implementation of the Water and Sanitation Code		
	Hindering Factors	Facilitating Factors
Policy and Institutional Issues	Absence of local ordinances	Adoption and enforcement of existing laws
Leadership	Political interference that hinders the implementation of laws/ policies	Lobbying with government agencies/institutions concerned
Behavioral Issues	Lack of understanding of the law	Consultation with experts/resource persons
	Poor sanitation practices	Implementation of policies regarding best sanitation practices and proper hygiene habits
Capacities/ Competencies	Lack of knowledge of the law	Capability building through seminars/training programs/workshops
Pillar: Service Provision		
Issue 1: Limited Service Providers		
	Hindering Factors	Facilitating Factors
Policy and Institutional Issues	Weak implementation of policies	Amendment of national laws to include strict enforcement
	Weak coordination with concerned agencies and stakeholders	Adoption of and adherence to national laws by LGUs
Leadership	Low priority given to the most pressing needs concerning WSS	Raising public awareness through IEC campaigns
	Lack of political will among local leaders	Continuous lobbying of WSS concerns
Capacities / Competencies	Promoting personal and vested interests	Intensive IEC campaigns
	Lack of community involvement	Social preparation
Others	Lack of technical knowledge	Capacity building
	Lack of initiative among community residents to address important issues pertaining to water service	Social preparation

Regional Vision

"We envision productive, responsive, and satisfied communities in MIMAROPA living in a healthy and sound environment with 100% of the households having access to adequate, safe, sustainable, and affordable water supply and sanitation services".

The MIMAROPA WSS vision was developed by the visioning group with the objective of enabling the entire region to achieve universal access to safe and sustainable water by 2030.

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 MIMAROPA highlighting the provinces' individual plans. Priority areas include planning and development, facilities development, capacity building, water resources protection, and program monitoring. 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 15.

Table 15: 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

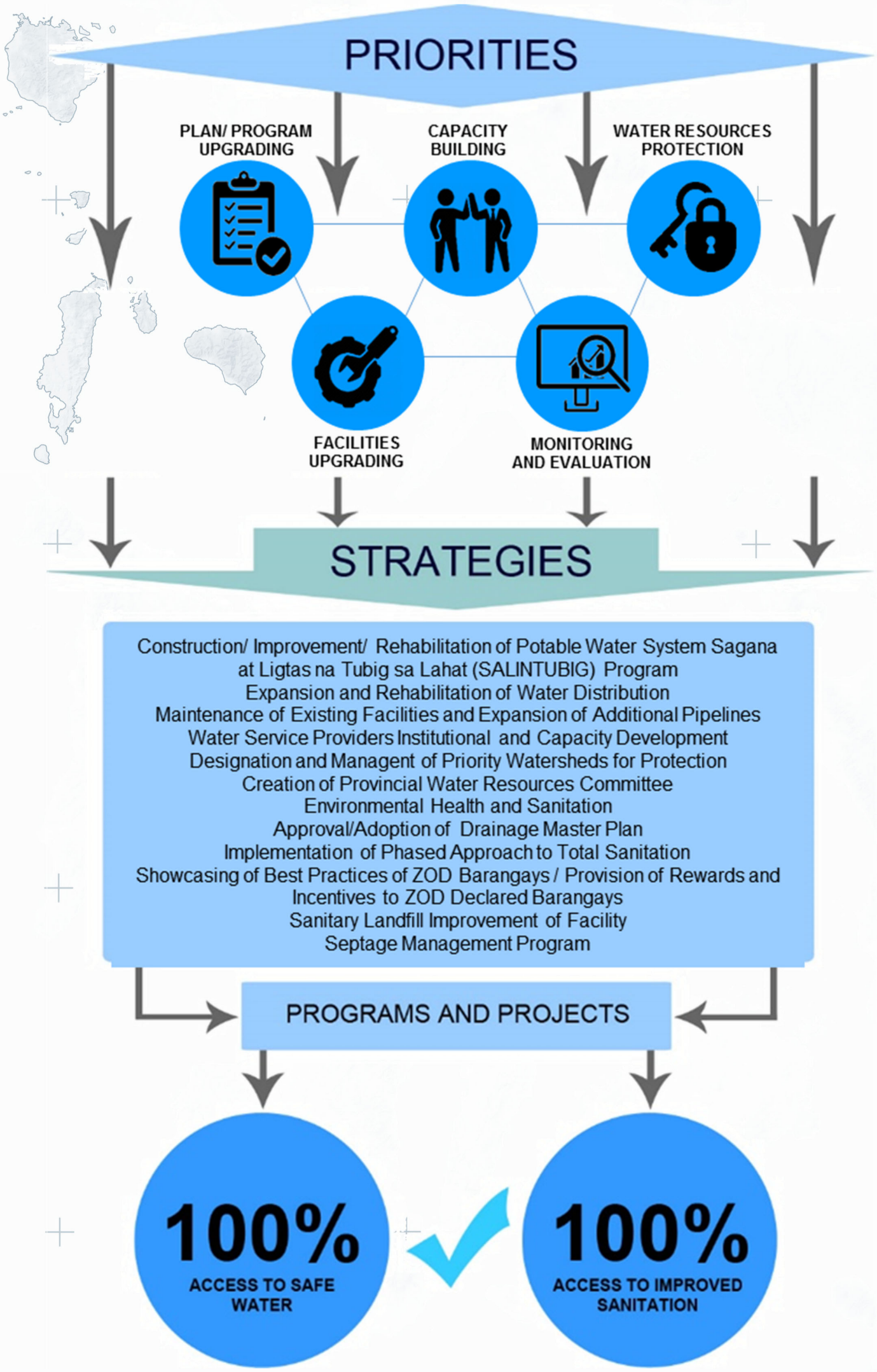


Figure 16: MIMAROPA Water Supply and Sanitation Strategic Framework

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.

MIMAROPA strives to achieve 96% access to safe water by 2022 and 100% access by 2030. Universal access by 2030 means more than 1 million HHs will benefit. Improved access to sanitation is set at 80% by 2022 and universal access by 2030.

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

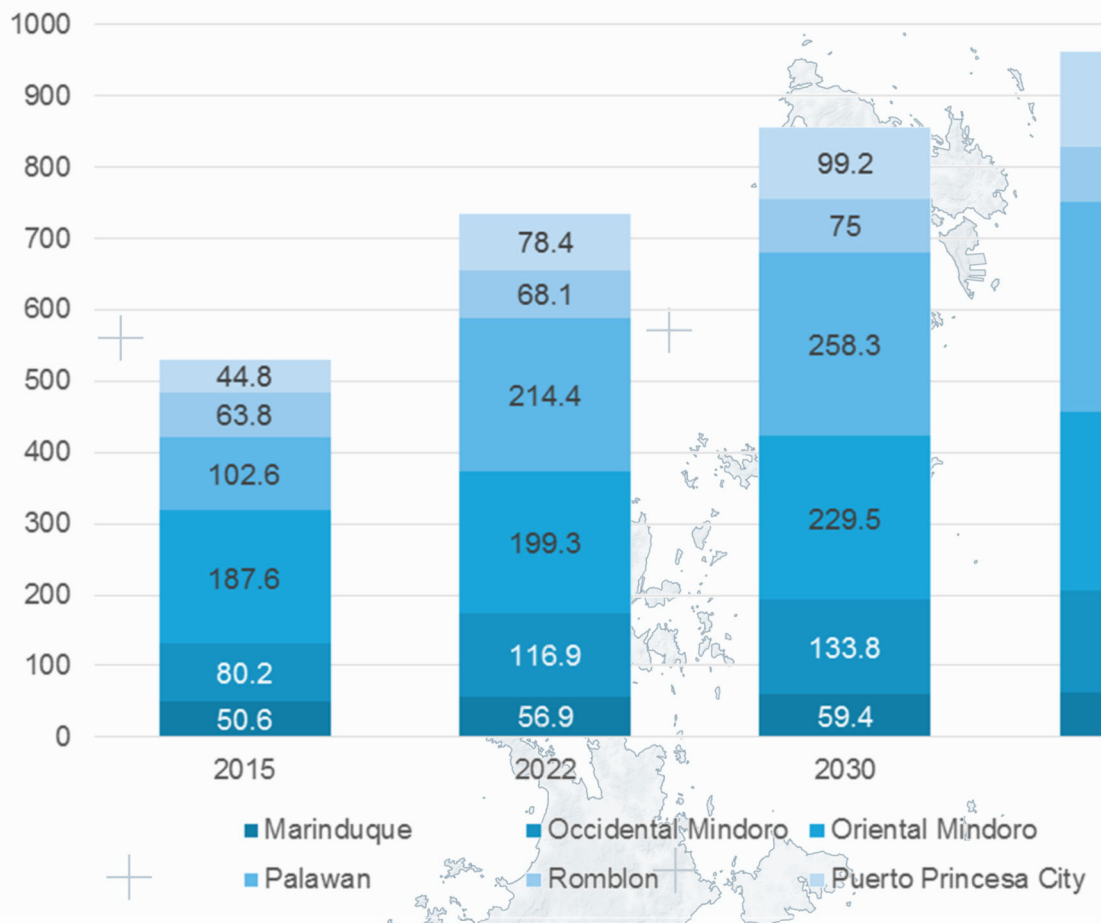


Figure 17: Targeted Households with Access to Safe Water

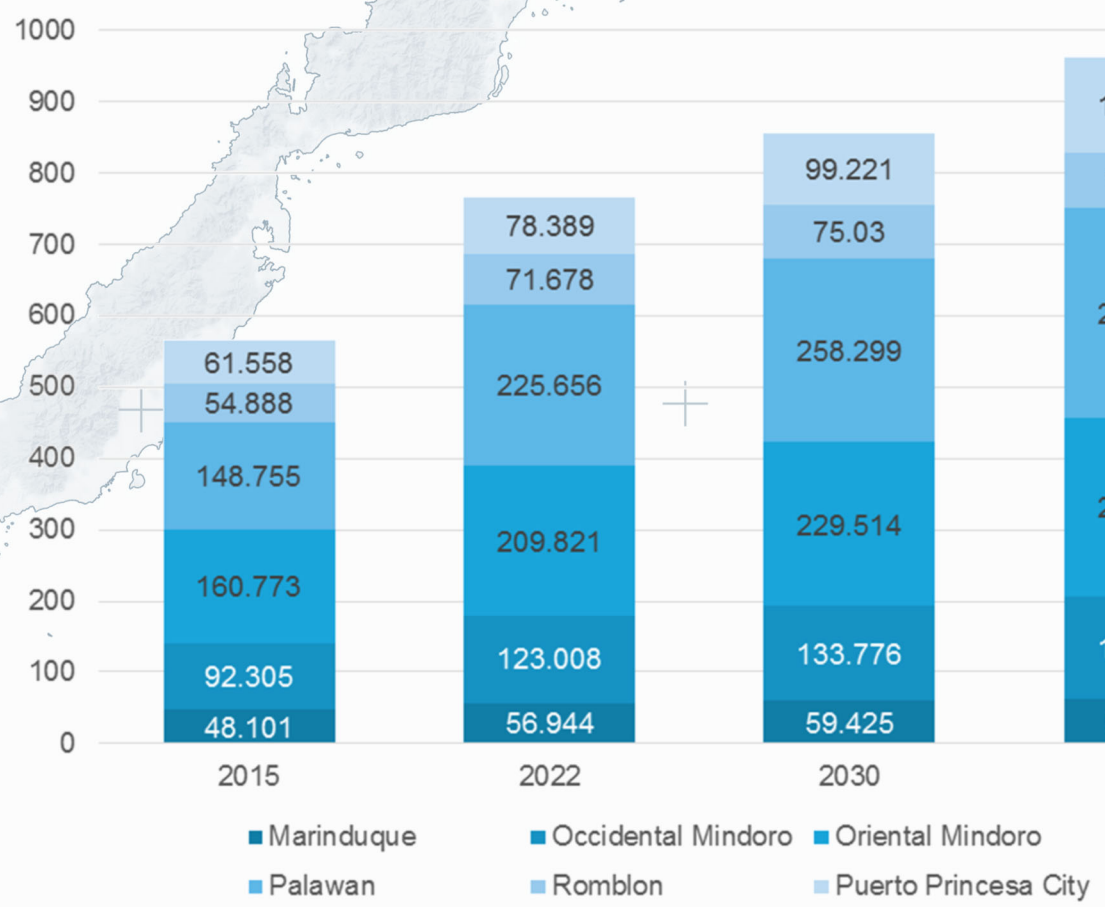


Figure 18: Targeted Households with Access to Sanitation Facilities

Water Supply Targets

MARINDUQUE			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	42.8%	60.5%	100.0%
Level II	35.0%	37.2%	0.0%
Level I	22.2%	2.2%	0.0%
No Access	0.0%	0.0%	0.0%

OCCIDENTAL MINDORO			
	2022	2030	2040
With Access	95.0%	100.0%	100.0%
Level III	55.0%	78.8%	100.0%
Level II	26.3%	13.8%	0.0%
Level I	13.8%	7.5%	0.0%
No Access	5.0%	0.0%	0.0%

ORIENTAL MINDORO			
	2022	2030	2040
With Access	95.0%	100.0%	100.0%
Level III	31.0%	38.0%	100.0%
Level II	21.5%	25.0%	0.0%
Level I	42.5%	37.0%	0.0%
No Access	5.0%	0.0%	0.0%

PALAWAN (excluding PUERTO PRINCESA CITY)			
	2022	2030	2040
With Access	95.0%	100.0%	100.0%
Level III	35.0%	46.0%	100.0%
Level II	33.0%	28.0%	0.0%
Level I	27.0%	26.0%	0.0%
No Access	5.0%	0.0%	0.0%

ROMBLON			
	2022	2030	2040
With Access	95.0%	100.0%	100.0%
Level III	30.0%	65.0%	100.0%
Level II	40.0%	25.0%	0.0%
Level I	25.0%	10.0%	0.0%
No Access	5.0%	0.0%	0.0%

PUERTO PRINCESA CITY			
	2022	2030	2040
With Access	100.0%	100.0%	100.0%
Level III	100.0%	100.0%	100.0%
Level II	0.0%	0.0%	0.0%
Level I	0.0%	0.0%	0.0%
No Access	0.0%	0.0%	0.0%

MIMAROPA			
	2022	2030	2040
With Access	95.8%	100.0%	100.0%
Level III	43.4%	57.4%	100.0%
Level II	26.3%	22.3%	0.0%
Level I	26.1%	20.3%	0.0%
No Access	4.2%	0.0%	0.0%

Sanitation Targets

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

OCCIDENTAL MINDORO			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	2.0%	0.0%	0.0%
Shared/Communal/Limited	0.0%	0.0%	0.0%
Open Defecation	1.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

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

PALAWAN (excluding PUERTO PRINCESA CITY)			
	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	1.0%	0.0%	0.0%
Shared/Communal/Limited	1.0%	0.0%	0.0%
Open Defecation	1.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

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

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

MIMAROPA			
	2022	2030	2040
Improved	79.7%	100.0%	100.0%
Basic	4.6%	0.0%	0.0%
Shared/Communal/Limited	15.8%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

Strategic Interventions

After the planning and consultation workshops, a working document detailing specific strategic interventions to improve water supply and sanitation access in MIMAROPA was formulated. Based on their consensus during the workshops, these proposed interventions were deliberated on 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 16 and 17 show the specific strategic interventions for water supply and sanitation, respectively.

Table 16: 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 17: 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 18.

Table 18: 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.

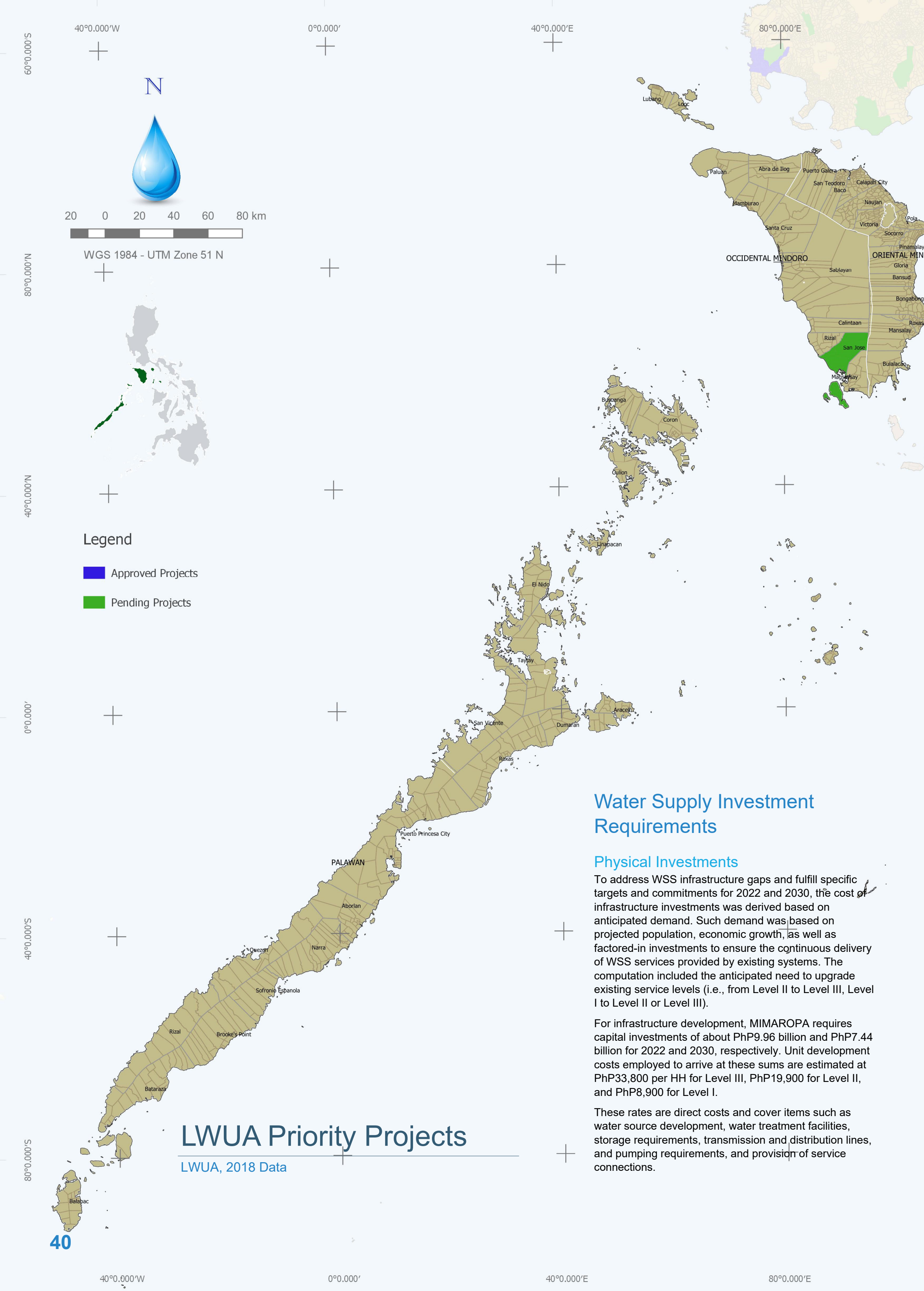
Targets for 2022 will mainly focus on basic sanitation. The septage and sewerage management programs are to be undertaken to achieve 2030 targets, although these programs may be implemented as early as 2022.

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 19).

Table 19: Institutional and Regulatory Reforms Required to Meet 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 the 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 the province. WDs will continue to be regulated by the LWUA. The monitoring group could later be made part of a regulatory body.		



LWUA Priority Projects

LWUA, 2018 Data

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).

For infrastructure development, MIMAROPA requires capital investments of about PhP9.96 billion and PhP7.44 billion for 2022 and 2030, respectively. Unit development costs employed to arrive at these sums are estimated at PhP33,800 per HH for Level III, PhP19,900 for Level II, and PhP8,900 for Level I.

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

Addressing the Gaps

Furthermore, these unit costs (determined to suit local conditions in MIMAROPA) 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/ HH, PhP18,700/HH, and PhP8,400/HH for Levels III, II, and I, respectively.

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 also 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 20.

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 20: Indirect Costs Employed[23]

	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 Costs/Permits	2.0%	Percentage of Total Direct Cost
Capacity Development	33,350	1 Staff Employee per 100 HH (LWUA)

Table 21: Total Investment Costs for Water Supply Sector

Province/City	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Marinduque	336.20	565.93
Occidental Mindoro	1,913.47	1,654.47
Oriental Mindoro	1,388.83	1,289.97
Palawan (excluding Puerto Princesa City)	3,549.79	1,820.34
Puerto Princesa	2,302.01	915.39
Romblon	469.01	1,197.46
Total	**9,959.32**	**7,443.55**

Table 21 shows a summary of the total investment requirements of the region. The detailed methodology on how the regional costs at MIMAROPA 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 left shows the only municipality (in Occidental Mindoro) for which approval of financial assistance from the Local Water Utilities Administration (LWUA) remains pending (as of this writing).

[23] *Based on industry standards*

Septage Treatment Plant Clustering

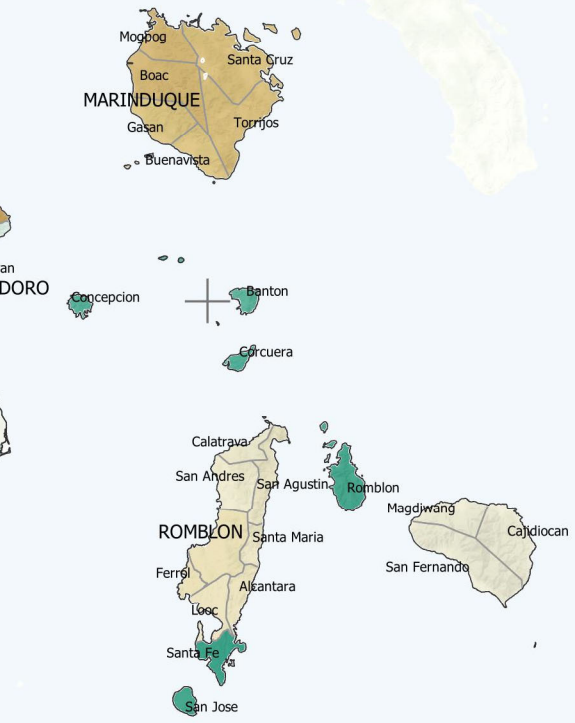


Table 22: Total Investment Costs for Sanitation Sector

Province/City	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Marinduque	495.33	80.13
Occidental Mindoro	2,780.36	348.50
Oriental Mindoro	1,723.16	647.79
Palawan (excluding Puerto Princesa City)	5,204.87	1,057.43
Puerto Princesa City	2,005.62	992.15
Romblon	565.82	107.53
Total	**12,775.16**	**3,233.53**

Sanitation Investment Requirements

Physical Investments

Basic Sanitation Program. The Department of Health (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).

MIMAROPA will need about PhP3 billion for basic sanitation from 2016 to 2022 to reach its target of 80%.

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 needs about PhP1.7 billion and PhP200 million for 2022 and 2030, respectively, for its septage management program.

Sewerage System Program. Only Puerto Princesa City will be required at this time to plan and implement a sewerage system for its 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, Puerto Princesa City will require PhP1.4 billion by 2022 and an additional PhP360 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.

Candidate HUCs in Oriental Mindoro (e.g., Calapan City and Naujan) and in Occidental Mindoro (e.g., San Jose) may be initially reviewed as the pace of urbanization may set in rapidly in these places followed by the capital towns of the other provinces.

Nonphysical Investments

MIMAROPA, 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.

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, Department of Environment and Natural Resources (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. Figure 19 shows the distribution of the investment requirement per province and HUC. Based on the proposed projects and programs, the region needs PhP13.8 billion boost its WSS sector.

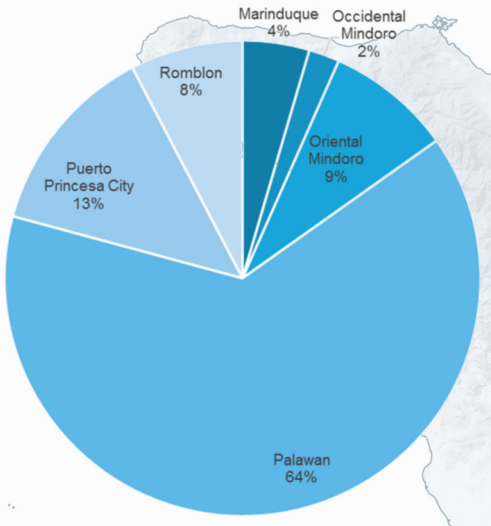


Figure 19: Distribution of Investment Requirement per Province/HUC

Marinduque									
	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Expansion of Sta. Cruz Municipal Waterworks System	Short Term	5.00	22	Construction of Bayakbakin Water Treatment Plant	Short Term	13.00		
2	Establishment of complete water testing laboratory	Short Term	20.00	23	Construction of Bangwayin Water Treatment Plant	Short Term	13.00		
3	Construction of 4 production wells, installation of pumps and transmission pipelines in Lapu-Lapu, Napo, Taytay, Tawiran	Short Term	6.00	24	Construction of Cabuyo Water Treatment Plant	Short Term	13.00		
4	Construction of water filtration facilities complete with auxiliary components in Makulapnit, Banogbog, Libjo, Kinyaman, Bangcuangan	Short Term	9.60	25	Construction of Tigwi Water Treatment Plant	Short Term	13.00		
5	Construction of Barangay Mongpong Waterworks-Level II	Short Term	2.00	26	Construction of Malibago Water Treatment Plant	Short Term	13.00		
6	Upgrading of Kawa-Kawa Waterworks System	Short Term	8.55	27	Construction of Marlanga Water Treatment Plant	Short Term	13.00		
7	Rehabilitation of Siloan Waterworks System	Short Term	3.00	28	Construction of Nangka Water Treatment Plant	Short Term	13.00		
8	Improvement of Katigawan Waterworks System	Short Term	5.00	29	Construction of Payanas Water Treatment Plant	Short Term	13.00		
9	Rehabilitation of Guinaras Waterworks System	Short Term	3.00	30	Construction of Bolo Water Treatment Plant	Short Term	13.00		
10	Rehabilitation of Tamban Waterworks System	Short Term	3.00	31	Construction of Sibuyao Water Treatment Plant	Short Term	13.00		
11	Development of New Bagtingon Waterworks System	Short Term	8.00	32	Construction of Water Supply System with Spring Development, Tiguion, Gasan	Short Term	6.00	**602.68**	**56,944**
12	Rehabilitation of Malinao Waterworks System	Short Term	3.00	33	Redevelopment of Boac Waterworks System in Poblacion, Boac	Medium Term	327.06		
13	Rehabilitation of Poblacion Waterworks System-Brgy. Uno to Quatro	Short Term	5.00	34	Rehab/Improvement of Poblacion Waterworks System in Torrijos	Short Term	7.83		
14	Rehabilitation of Bicas-Bicas Waterworks System	Short Term	3.00	35	Rehab/Improvement of Waterworks System in Brgy. Argao, Pili, Silanagan, Hinaggayon, Paye, Ino	Short Term	3.47		
15	Rehabilitation of Bagacay Waterworks System	Short Term	3.00	36	Repair of various deep wells (Brgy. Ipil, Sta. Cruz)	Short Term	0.37		
16	Improvement of Daykitin Waterworks System	Short Term	3.00			**Total**	**601.88**		
17	Improvement of Libas Waterworks System	Short Term	3.00						
18	Improvement of Caigangan Waterworks System	Short Term	3.00						
19	Improvement of Tungib-Lipata Waterworks System	Short Term	5.00		Water Supply and Sanitation	Period	Budget Requirement (PhP Million)		
20	Construction of Pakaskasan Water Treatment Plant	Short Term	13.00	1	Water Supply Safety Plan and Sanitation Workshop/ Summit/Conference	Short Term	0.80		
21	Construction of Talawan Water Treatment Plant	Short Term	13.00			**Total**	**0.80**		

Occidental Mindoro									
	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Mamburao Water Supply Expansion of Level III WSS	Medium Term	5.00	12	So. Tuburan Extension Project (well development)	Short Term	2.00		
2	Brgy. Manoot Water Supply System	Medium Term	5.00	13	Brgy. Sta. Lucia II Extension Project (distribution line)	Short Term	2.65		
3	Brgy. Central Pumping Station & Distribution Line Development	Medium Term	5.00	14	Brgy. Batong- Buhay Extension Project (well development)	Short Term	2.70		
4	Brgy. Malisbong Level III Water Supply Development	Medium Term	2.15			**Total**	**51.80**		
5	Expansion of Level III Water Supply Development at Abra de Ilog	Long Term	6.00						
6	So. Palbong Expansion of Level III WSS (spring)	Long Term	2.60					**277.70**	**123,008**
7	Sablayan Town Proper Level III Expansion Project	Long Term	2.00		Sanitation	Period	Budget Requirement (PhP Million)		
8	San Francisco expansion of Level III WSS	Long Term	1.50	1	Distribution of toilet facilities	Long Term	70.20		
9	Rehab of old pipelines at Sablayan Town Proper	Long Term	5.00	2	Construction of septic tanks	Long Term	1.67		
10	Pipeline extension in Central barangays	Long Term	2.40	3	Water treatment system	Long Term	154.02		
11	Sablayan Expansion project for other requesting barangays - Level III	Long Term	7.80			**Total**	**225.90**		

Oriental Mindoro

	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Integrated Water Resource Management (IWRM)	Long Term	-	12	CW construction of 2 reservoirs	Short Term	120.00		
2	Institutional and capacity development of water service providers	Long Term	-	13	CW NRW reduction	Medium Term	364.50		
3	Designation and management of priority watersheds for protection	Long Term	-	14	CW additional transmission & distribution lines	Long Term	100.00		
4	Creation/Strengthening of water districts/LGU-operated water systems in 14 municipalities	Long Term	100.00	15	Various reforestation projects within watershed areas	Medium Term	-		
5	Creation of Provincial Water Resources Committee		-	16	Calapan River water quality management	Long Term	-		
6	Sagana at Ligtas na Tubig sa Lahat (SALINTUBIG) Program	Long Term	80.00			**Total**	**1,134.63**	**1,135.48**	**209,821**
7	Assistance to Municipalities	Medium Term	20.00						
8	Construction/Improvement/Rehabilitation of potable water system - Level II and III	Long Term	350.00		Sanitation	Period	Budget Requirement (PhP Million)		
9	Installation of communal drinking fountain, San Aquilino, Roxas	Short Term	0.05	1	Environmental health and sanitation	Long Term	0.85		
10	Improvement of water system (MINsCAT Calapan and Victoria campuses)	Short Term	-	2	Approval/Adoption of Calapan City Drainage Master Plan	Long Term	-		
11	Calapan Water (CW) additional 2 water sources	Short Term	0.08			**Total**	**0.85**		

Palawan

	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Quezon WS Level III, Quezon	Short Term	120.00	34	Culandanum WS Level III, Aborlan	Short Term	2.00		
2	Araceli WS Level , Araceli	Short Term	59.50	35	Sandoval WS Level II, Roxas	Short Term	5.00		
3	Busuanga WS Level III, Busuanga	Short Term	89.00	36	Roxas WS Level III, Roxas	Short Term	346.70		
4	El Nido WS Level III, El Nido	Short Term	72.20	37	Pamatolon WS Level III, Taytay	Short Term	29.39		
5	Culion WS Level III, Culion	Short Term	92.00	38	Busybees WS Level II, Taytay	Short Term	4.20		
6	Linapacan WS Level III, Linapacan	Short Term	55.44	39	Bantulan WS Level II, Taytay	Short Term	8.90		
7	Dumaran WS Level III, Dumaran	Short Term	72.34	40	El Nido WS Level III, El Nido	Short Term	48.89		
8	Coron WS Level III, Coron	Short Term	150.80	41	Quezon WS Level III, Quezon	Short Term	120.00		
9	Cagayancillo WS Level II, Cagayancillo	Short Term	18.00			**Total**	**2,647.09**		
10	Cuyo WS Level III, Cuyo	Short Term	105.60						
11	Magsaysay WS Level III, Magsaysay	Short Term	76.71		Sanitation	Period	Budget Requirement (PhP Million)		
12	Balabac WS Level III, Balabac	Short Term	116.05	1	Coron Sewage and SWTP	Short Term	250.00		
13	Agutaya WS Level II, Agutaya	Short Term	58.10	2	San Vicente Sewage and SWTP	Short Term	267.00		
14	San Vicente WS Level III, San Vicente	Short Term	350.00	3	Aborlan Sewage and SWTP	Short Term	300.00		
15	Bataraza WS Level III(Kennedy & Kapanagan Phase I)	Short Term	100.00	4	Agutaya Sewage and SWTP	Short Term	125.00		
16	Punta Baja WS Level III, Rizal	Short Term	15.60	5	Araceli Sewage and SWTP	Short Term	178.00	**8,504.09**	**225,656**
17	Buer Buer WS Level III, Rizal	Short Term	17.00	6	Balabac Sewage and SWTP	Short Term	228.00		
18	Filantropia WS Level III, Brooke's Point	Short Term	35.80	7	Bataraza Sewage and SWTP	Short Term	300.00		
19	Cabinbin WS Level III, Brooke's Point	Short Term	54.00	8	Brooke's Point Sewage and SWTP	Short Term	389.00		
20	Saraza WS Level III, Brooke's Point	Short Term	35.10	9	Busuanga Sewage and SWTP	Short Term	267.00		
21	El Salvador WS Level III, Española	Short Term	120.00	10	Cagayancillo Sewage and SWTP	Short Term	63.00		
22	Calategas WS Phase I Level II, Narra	Short Term	22.86	11	Culion Sewage and SWTP	Short Term	276.00		
23	Princess Urduja WS Level II, Narra	Short Term	17.18	12	Cuyo Sewage and SWTP	Short Term	223.00		
24	Aramaywan WS Level II, Narra	Short Term	3.46	13	Dumaran Sewage and SWTP	Short Term	217.00		
25	Estrella WS Level III, Narra	Short Term	30.50	14	Linapacan Sewage and SWTP	Short Term	166.00		
26	Caraniogan WS Level III, Narra	Short Term	58.80	15	Magsaysay Sewage and SWTP	Short Term	122.00		
27	Manaili WS Level III, Narra	Short Term	15.60	16	Narra Sewage and SWTP	Short Term	506.00		
28	Calategas WS Phase II Level II, Narra	Short Term	20.30	17	Quezon Sewage and SWTP	Short Term	360.00		
29	Bubusawin WS Level II, Aborlan	Short Term	4.00	18	Rizal Sewage and SWTP	Short Term	500.00		
30	Inungsuran WS Level II, Aborlan	Short Term	4.80	19	Roxas Sewage and SWTP	Short Term	633.00		
31	Yale WS Level III, Aborlan	Short Term	3.25	20	Española Sewage and SWTP	Short Term	360.00		
32	Talakaigan WS Level III, Aborlan	Short Term	66.57	21	Taytay Sewage and SWTP	Short Term	127.00		
33	Manaili WS Level III, Aborlan	Short Term	21.45			**Total**	**5,857.00**		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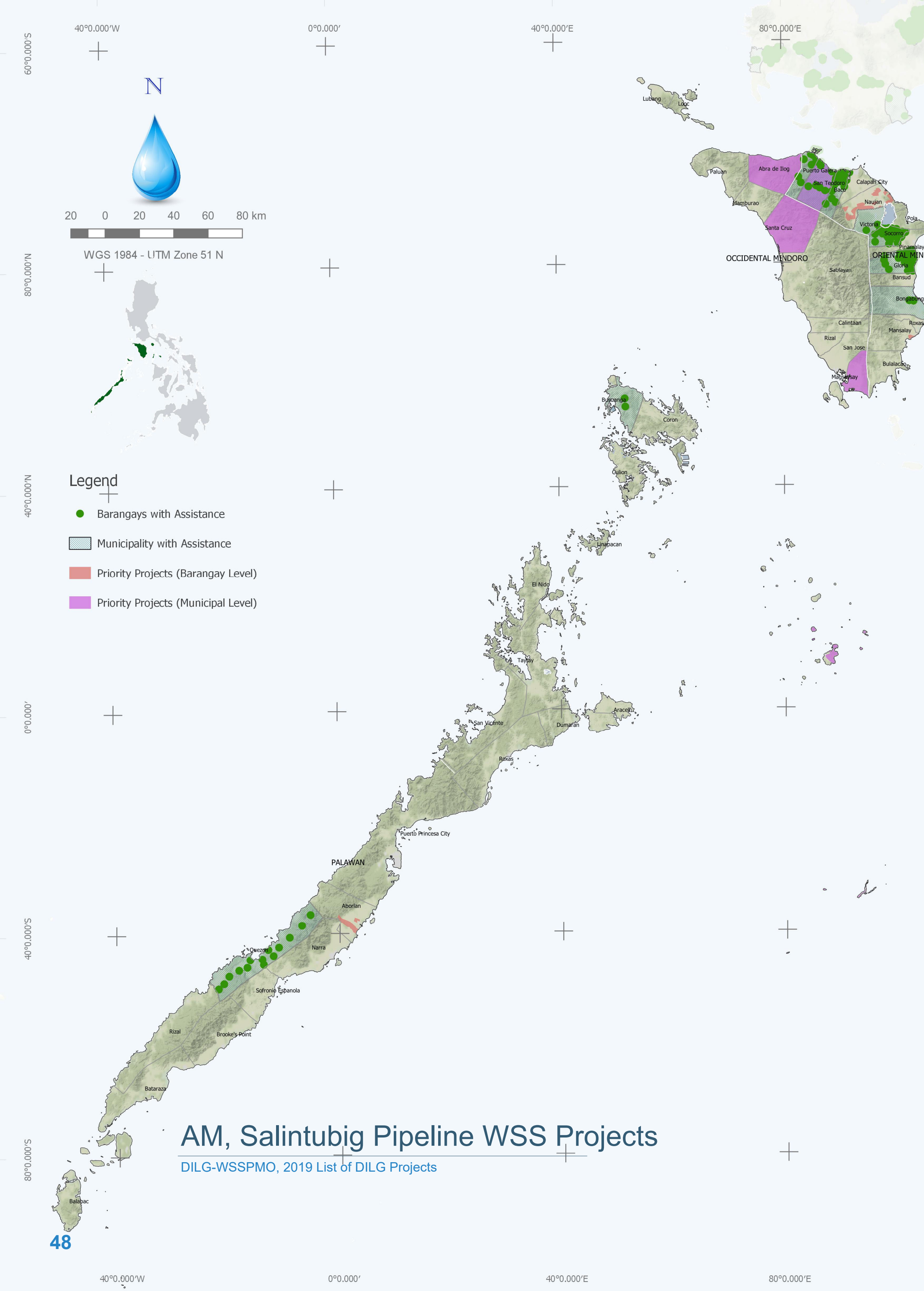
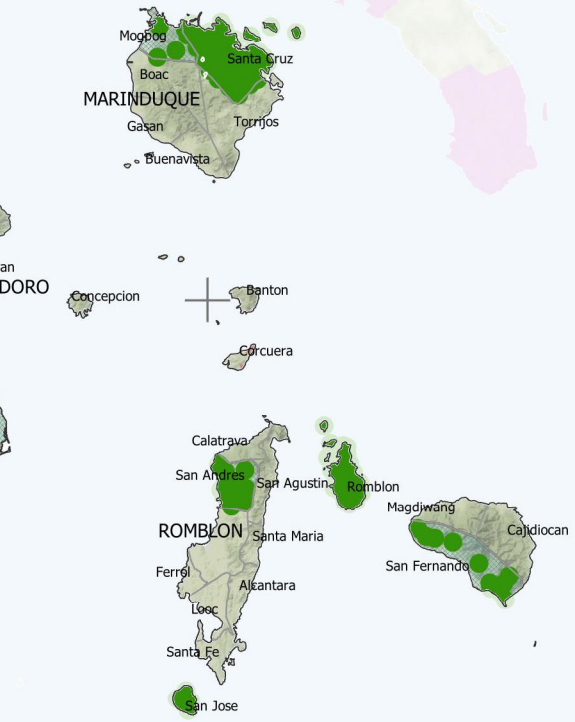
Puerto Princesa City									
	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply and Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Water Supply Impounding Project		721.00	1	Septage management program - construction of septage treatment facility and installation of equipment with 60 m³/day capacity [?]	Short Term	120.00		
2	Rural water system (7 barangays)	Long Term	42.00	2	El Nido sewage and SWTP		-		
3	Rural water system (5 barangays) - construction of RWS facilities	Long Term	35.00	3	Implementation of phased approach to total sanitation		-		
4	Lot acquisition	Long Term	-	4	Showcasing of best practices of ZOD barangays/ provision of rewards and incentives to barangays declared ZOD		-		
5	Expansion and rehabilitation of water distribution	Long Term	-	5	Translation of IEC materials in local IP dialects and distribution of said materials		-	**1,744.00**	**78,389**
6	Maintenance of existing facilities and expansion of additional pipelines	Long Term	50.00	6	Development and adoption of Local Sustainable Water and Sanitation Plan		-		
7	Advocacy of responsible consumerism	Long Term	5.00	7	Oplan Linis Program		-		
8	Water source exploration/well drilling	Long Term	50.00	8	Sanitary landfill facility improvement		-		
9	Water Supply Impounding Project	Short Term	721.00	9	Septage Management Program — construction of septage treatment facility and installation of equipment with 60 m³/day capacity		-		
		Total	**1,624.00**			**Total**	**120.00**		

Romblon									
	Water Supply	Period	Budget Requirement (PhP Million)		Water Supply and Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Well drilling, pipe laying projects and provision of Level III service connections	Medium Term	100.00	1	Improved toilet facilities with septic tanks	Medium Term	150,730,000.00		
2	Well drilling, pipe laying projects and provision of Level III service connections	Medium Term	150.00	2	Septage Management Program	Long Term	85,050,000.00		
3	Rehabilitation and pipe laying projects (Level III)	Short	100.00	3	Leach/drain field/soak pit	Long Term	6,410,000.00		
4	Well drilling, pipe laying projects and provision of Level III service connections	Medium Term	50.00			**Total**	**242.19**		
5	Upgrading of water system from Level I to Level II	Long Term	19.00					**1,018.19**	**71,678**
6	Upgrading of water system from Level I to Level II	Long Term	50.00						
7	Well drilling, pipe laying projects and provision of Level III service connections	Long Term	150.00						
8	Well drilling, pipe laying projects and provision of Level III service connections	Long Term	157.00						
		Total	**776.00**						



AM, Salintubig Pipeline WSS Projects

DILG-WSSPMO, 2019 List of DILG Projects



Identified Priority Projects (2019-2020)

The tables below show the priority projects identified by LWUA and DILG for 2019-2020. The map on the left 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	Amount (in PhP Million)
Marinduque	Mogpog	Rehabilitation/Improvement Of Level III Water System In Balanacan	2.47
Marinduque	Mogpog	Rehabilitation/Improvement Of Level III Water System In Butansapa	1.50
Marinduque	Mogpog	Rehabilitation/Improvement Of Level II Water System In Danao	2.50
Marinduque	Sta. Cruz	Rehabilitation/Improvement Of Level III Water System	5.77
Oriental Mindoro	Baco	Rehabilitation/Improvement Of Level II/Level III Water System	5.37
Oriental Mindoro	Bongabong	Rehabilitation/Improvement Of Level II Water System In Barangay Bukal	1.09
Oriental Mindoro	Bongabong	New Construction Of Level II Potable Water Supply System In Barangay Sagana	5.00
Oriental Mindoro	Gloria	Rehabilitation/Improvement Of Level II Water System	1.00
Oriental Mindoro	Puerto Galera	Upgrading Of Water System	3.02
Oriental Mindoro	San Teodoro	Expansion Of Level III Water System	4.97
Oriental Mindoro	Socorro	New Construction Of Level II Potable Water Supply System	6.58
Oriental Mindoro	Victoria	Construction Of Water Supply System In Barangay Concepcion	5.00
Oriental Mindoro	Victoria	Rehabilitation/Improvement Of Level II Water System In Brgy. Leido	1.81
Palawan	Busuanga	New Construction Of Level II Potable Water Supply System In Barangay Sagrada	3.00
Palawan	Busuanga	New Construction Of Level II Potable Water Supply System In Barangay Old Busuanga	2.50
Palawan	Kalayaan	Construction Of Sanitary Toilets With Hygiene Facilities For Public Places	2.00
Palawan	Quezon	Rehabilitation/Improvement/Upgrading Of Existing Sanitary Toilets And Hygiene Facilities For Public Places	1.86
Romblon	Romblon	New Construction Of Level II Potable Water Supply System	2.00
Romblon	San Andres	Upgrading Of Water System	9.61
Romblon	San Fernando	Rehabilitation/Improvement Of Level II Potable Water System	5.50
Romblon	San Jose	Construction Of Sanitary Toilets With Hygiene Facilities For Public Places In Poblacion	2.50
Romblon	San Jose	Construction Of Sanitary Toilets With Hygiene Facilities For Public Places In San Jose Public Market	2.32
		Total	**77.38**

SALINTUBIG (2019)			
Province	Municipality	Project	Amount (in PhP Million)
Occidental Mindoro	Abra de Ilog	Provision Of Potable Water Supply	3.90
Occidental Mindoro	Magsaysay	Construction Of Water Tanks and Installation Of Pipelines	10.00
Occidental Mindoro	Sta. Cruz	Expansion Of Water System (So. Cuarenta)	17.00
Oriental Mindoro	Mansalay	Rehabilitation And Expansion Of Existing Water System Source #2 (B. Del Mundo)	10.00
Oriental Mindoro	Naujan	Potable Water Supply (Antipolo, Apitong, Bagong Buhay, Bayani, Mahabang Parang, Malvar, Masagana, Sitio Macapili, Melgar B.Montelago, Motoderazo, Pagkakaisa, San Pedro, Santiago And Tagumpay)	15.00
Oriental Mindoro	San Teodoro	Potable Water Supply (Construction Of Level II Water System)	2.00
Palawan	Aborlan	Mabini Water System (Mabini, Magsaysay And Apoc-Apoc)	11.70
Palawan	Cagayancillo	Potable Water System	7.00
Palawan	Magsaysay	Construction Of Water System	15.00
Romblon	Corcuera	Upgrading Of The Mainit Spring Potable Water Supply Project (Ambulong)	3.00
Romblon	Corcuera	Construction Of Potable Water Supply Project In Barangay Alegria	3.00
		Total	**97.60**

LWUA (2017-2018)			
Province	Municipality	Project Status	Amount (in PhP Million)
Occidental Mindoro	San Jose	Undergoing expansion - Awaiting documents from WD	40.00
		Total	**40.00**

Annex A: Provincial and HUC Profiles

MARINDUQUE	6 municipalities	Boac, Buenavista, Gasan, Mogpog, Santa Cruz, Torrijos
	218 barangays	2 urban, 216 rural
Land Area	952.58 sq. km.	
Demographics* (2015)	Population (2015) – 234,521 Population Growth Rate (2000 to 2015) – 0.50 Population Density – 250 per sq. km.	
Economy	• Major industries - agriculture, fishery, handicrafts and tourism • Major crops - rice, corn, coconuts, mangoes, bananas • Major products - fish, coconut wine (tuba), handicrafts • It hosts the world-famous Moriones festival held every year during the Holy Week.	
Poverty Incidence (2015)	On Families – 11.7% On Population – 16.2%	

OCCIDENTAL MINDORO	11 municipalities	Abra de Ilog, Calintaan, Looc, Lubang, Magsaysay, Mamburao, Paluan, Rizal, Sablayan, San Jose, Santa Cruz
	162 barangays	32 urban, 130 rural
Land Area	5,865.7 sq. km.	
Demographics* (2015)	Population (2015) – 487,414 Population Growth Rate (2000 to 2015) – 1.64 Population Density – 83 per sq. km.	
Economy	• Major industries - agriculture, fishery, salt production, forestry • Major crops - rice, corn, onions, garlic, fruits, and nuts (cashew and peanuts) • Major products - timber and minerals such as gold, copper, silver, and chrome, and nonmetallic minerals such as lime for making cement, and greenstones used in ornaments	
Poverty Incidence (2015)	On Families – 30.0% On Population – 41.2%	

ORIENTAL MINDORO	14 municipalities	Baco, Bansud, Bongabong, Bulalacao, Gloria, Mansalay, Naujan, Pinamalayan, Pola, Puerto Galera, Roxas, San Teodoro, Socorro, Victoria
	one (1) component cities	Calapan
	426 barangays	405 urban, 21 rural
Land Area	4,238.4 sq. km.	
Demographics (2015)	Population (2015) – 844,059 Population Growth Rate (2000 to 2015) – 1.41 Population Density – 200 per sq. km.	
Economy	• Major industries - agriculture, hog and carabao raising, eco-toursim • Major crops - rice, corn, coconut, vegetables and fruits like calamansi, banana, rambutan, marang or uloy, lanzones and durian. • Known as the "Rice Granary and Fruit Basket of Southern Tagalog", Oriental Mindoro is the country's largest producer of calamansi. • It is home to the most diverse marine ecosystem in the world. • UNESCO has declared Puerto Galera, a popular tourist destination, a biosphere reserve. Other travel destinations include Mt. Halcon, Lake Naujan, and the Mangyan Crafts Village.	
Poverty Incidence (2015)	On Families – 15.0% On Population – 21.6%	

PALAWAN	23 municipalities	Aborlan, Agutaya, Araceli, Balabac, Bataraza, Brooke's Point, Busuanga, Cagayancillo, Coron, Culion, Cuyo, Dumaran, El Nido Kalayaan, Linapacan, Magsaysay, Narra, Quezon, Rizal, Roxas, San Vicente, Sofronio Española, Taytay
	one (1) independent city	Puerto Princesa City
	433 barangays	52 urban, 381 rural
Land Area	17,030.8 sq. km.	
Demographics (2015)	Population (2015) – 849,469 Population Growth Rate (2000 to 2015) – 2.38 Population Density – 58 per sq. km.	
Economy	• Major industries - agriculture, energy, livestock raising, fishery, tourism, transportation, mining and logging • Major crops - palay, corn, coconuts, cashew, seaweeds • About 45% of Manila's fish supply comes from Palawan. • The province is the only producer of natural gas in the country. • Known as the country's "Last Frontier", its three major tourist destinations include Puerto Princesa, El Nido and Coron. The underground river in Puerto Princesa has been declared a World Heritage Site by UNESCO.	
Poverty Incidence (2015)	On Families – 11.9% On Population – 17.0%	

Annex A: Provincial and HUC Profiles

ROMBLON	17 municipalities	Alcantara, Banton, Cajidiocan, Calatrava, Concepcion, Corcuera, Ferrol, Looc, Magdiwang, Odiongan, Romblon, San Agustin, San Andres, San Fernando, San Jose, Santa Fe, Santa Maria
	219 barangays	1 urban, 218 rural
Land Area	1,533.5 sq. km.	
Demographics (2015)	Population (2015) – 292,781 Population Growth Rate (2000 to 2015) – 0.67 Population Density – 190 per sq. km.	
Economy	• Major industries - agriculture, fishery, quarrying, weaving, basketry • Major crops - coconut, rice, root crops, vegetables and fruits • Major products – marble, abaca, handicrafts • Each municipality has its own fish sanctuary. • Romblon is one of the biggest marble producers in the country, giving itself the title, "Marble Capital of the Philippines".	
Poverty Incidence (2015)	On Families – 28.1% On Population – 36.6%	

PUERTO PRINCESA CITY	Puerto Princesa City is the Eco-Tourism Center of the Philippines	
	66 barangays	66 urban, 0 rural
Land Area	2,381.0 sq. km.	
Demographics (2015)	Population (2015) – 255,116 Population Growth Rate (2000 to 2015) – 3.02 Population Density – 110 per sq. km.	
Economy	• Eco-tourism is a major industry in Puerto Princesa. • Aside from its underground river and breathtaking beaches, travelers can take side trips to Honda Bay, Cowrie Island, Luli Island, Baker's Hill, Irawan River, a limestone formation called Ugong Rock, the Palawan Rescue and Wildlife Conservation Center, and Plaza Cuartel (a war museum).	
Poverty Incidence (2015)	On Families – 28.1% On Population – 36.6%	

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