NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

Volume 2: Philippine Water Supply and Sanitation Master Plan

Autonomous Region in Muslim Mindanao Water Supply and Sanitation Databook and Regional Roadmap

Table of Contents

List of Tables

List of Figures

Acronyms

AIP	Annual Investment Plan
AM	Assistance to Municipalities
ARMM	Autonomous Region in Muslim Mindanao
BOD	biological oxygen demand
BWSA	Barangay Water and Sanitation Association
CBO	community-based organization
CDP	Comprehensive Development Plan
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DJF	December, January, February
DOH	Department of Health
FA	financial assistance
FHSIS	Field Health Service Information System
FIES	Family Income and Expenditure Survey
GRDP	gross regional domestic product
HH	household
HUC	highly urbanized city
JICA	Japan International Cooperation Agency
JJA	June, July, August
JMP	Joint Monitoring Program
LCE	local chief executive
LFPR	labor force participation rate
LWUA	Local Water Utilities Administration
LGU	local government unit
MAM	March, April, May
MDG	Millennium Development Goal
M&E	monitoring and evaluation
NCR	National Capital Region
NDHS	National Demographic and Health Survey
NEDA	National Economic and Development Authority
NGO	non-governmental organization
NRW	non-revenue water
NSSMP	National Sewerage and Septage Management System
NWRB	National Water Resources Board
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PDP	Philippine Development Plan
PNSDW	Philippine National Standards for Drinking Water
PPP	Public-Private Partnership
PSA	Philippine Statistics Authority
PWSSMP	Philippine Water Supply and Sanitation Master Plan
RBCO	River Basin Control Office
RDC	Regional Development Council
RPME	Regional Project Monitoring Evaluation System
RWSA	Rural Waterworks and Sanitation Association
SDG	Sustainable Development Goal
SON	September, October, November
STP	septage treatment plant
TC	tropical cyclones
UN	United Nations
UNICEF	United Nations Children's Fund
WD	water district
WFR	Watershed Forest Reserve
WHO	World Health Organization
WRR	Water Resources Region
WSP	water service provider
WSS	water supply and sanitation
ZOD	zero open defecation

Symbols and Units

%	percent
°C	degree centigrade
ha	hectare
m	meter
m^2	square meter
m^3	cubic meter
mm	millimeter
km^2	square kilometer
lpcd	liters per capita per day
MCM	million cubic meters
PhP	Philippine peso

15

ARMM - Autonomous Region in Muslim Mindanao

ARMM

Introduction

The Autonomous Region in Muslim Mindanao (ARMM) is situated in mainland Mindanao in the southern part of the Philippines.

It is bounded on the north by the province of Lanao del Norte, on the east by Cotabato and Bukidnon, on the west by Sulu Sea and on the south by the Celebes Sea.

It spans two geographical areas grouped into clusters (PWSSMP setting) and is composed of predominantly Muslim provinces, namely: 1) Cluster 1 in south western Mindanao - Lanao del Sur and Maguindanao (except Cotabato City), and 2) Cluster 2 in the Sulu Archipelago - Basilan (except Isabela City), Sulu and Tawi-Tawi. It is the only open region that has its own government. The regional capital is Cotabato City, although this city is out of its jurisdiction.

The region is replete with diversity in colorful arts and culture, revealing historical legacies and landmarks, natural wonders of exotic panorama.

Land Classification

The region has a total land area of 12,535.79 square kilometers (km^2) accounting for 12.2% of the country's total land area. About 51% of the region's land area is classified as forestland and 49% alienable and disposable land.

Economy

The agriculture, hunting, forestry and fishery sector accounts for the lion's share in the region's Gross Regional Domestic Product (GRDP) followed by the service sector, and the industry sector (see Figure 1).

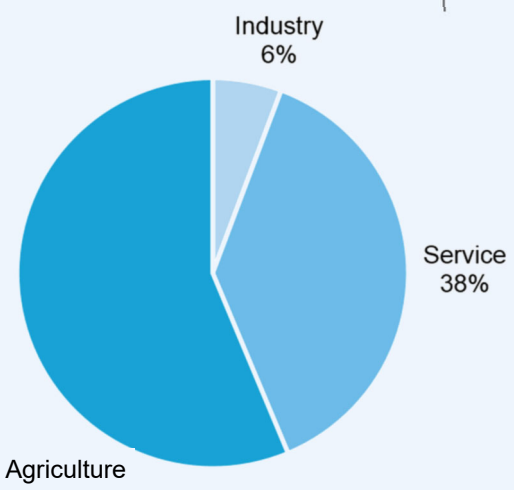


Figure 1: GRDP Contributions per Sector, 2016[1]

The low level of technology in the region limits the productivity of it's agricultural lands. The bulk of agricultural outputs consist merely of fresh farm produce and production costs are high due to expensive transport and production inputs.

In addition, ARMM's agricultural industry has a limited supply of skilled labor, as in agriculture, fishery and forestry and natural resources-related courses are drastically declining. Even so, recent updates have confirmed that the region experienced a rapid economic growth and posted a 7.3% peak in 2017. Although somewhat impossible according to the people, this improved performance of the region's economy was attributed to the recovery of the agriculture, hunting, forestry, and fishing industry, plus the advancement of institutional reforms.

Labor and Employment

As of January 2018, the current total labor force participation rate (LFPR) is estimated at 46.1% of the total population of the region, equivalent to nearly 2.37 million Filipinos. This shows an increase of 0.5% from the October 2017 LFPR. Province-wise, Maguindanao has displayed the highest LFPR among the five provinces with 69%, though the others do not differ by too much. (see Figure 2)

The employment rate in the region is considerably high with 97.4% (from a 96.2% in 2017). Also, unemployment rate is at 2.6% (from a 3.8% in 2017) while underemployment is at 8.1% (from a 5.9% in 2016). On a provincial scale, Sulu has the highest employment rate at 96.6%.

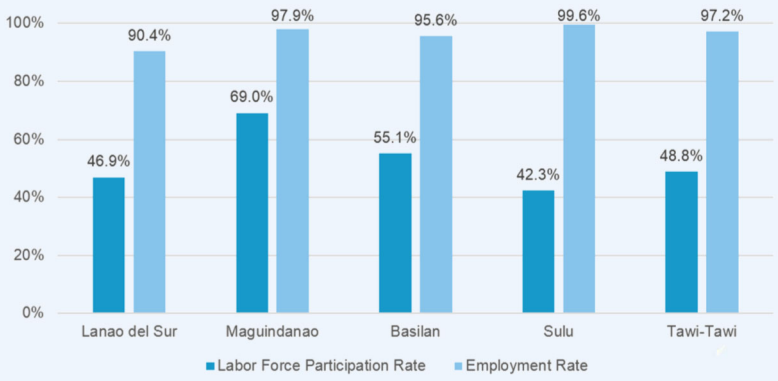


Figure 2: Employment Rates per Province[2]

[1] *Philippine Statistics Authority, CountryStat Philippines, 2016*
[2] *Philippine Statistics Authority, Labor Force Survey, 2017*

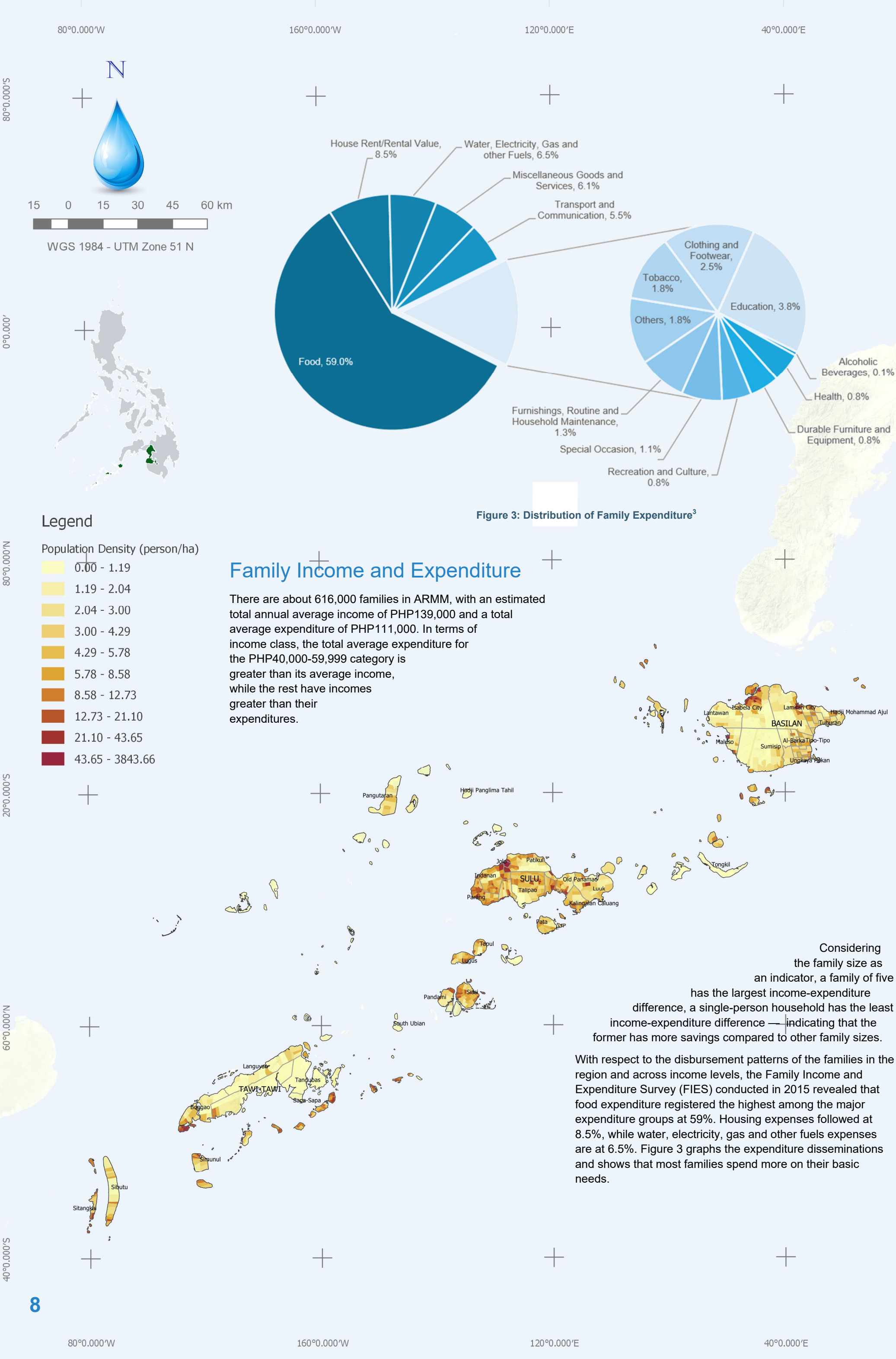


Figure 3: Distribution of Family Expenditure[3]

Family Income and Expenditure

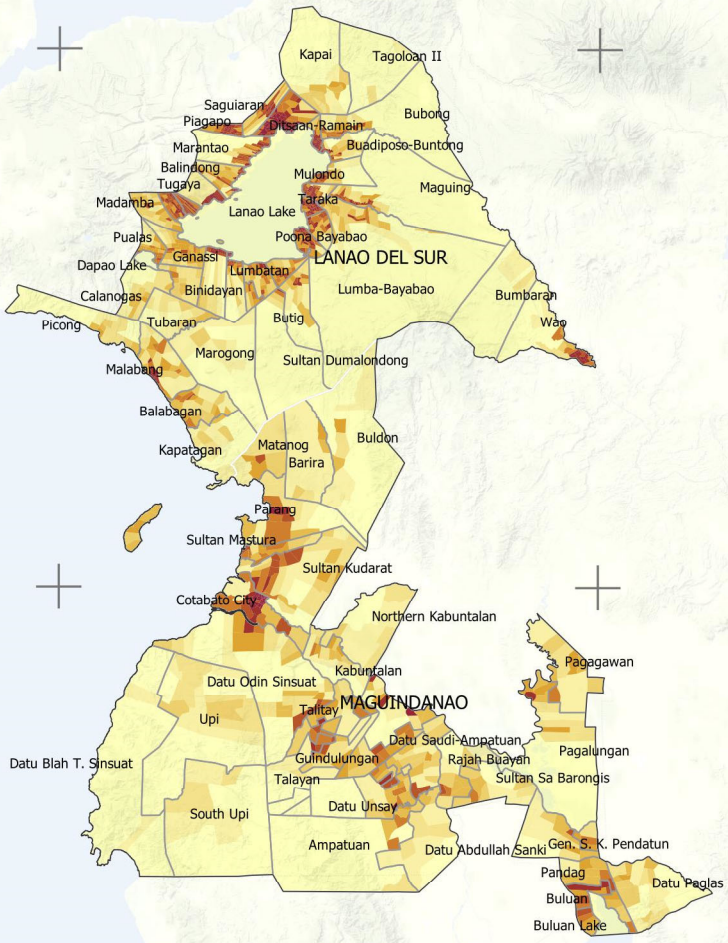
There are about 616,000 families in ARMM, with an estimated total annual average income of PHP139,000 and a total average expenditure of PHP111,000. In terms of income class, the total average expenditure for the PHP40,000-59,999 category is greater than its average income, while the rest have incomes greater than their expenditures.

Considering the family size as an indicator, a family of five has the largest income-expenditure difference, a single-person household has the least income-expenditure difference — indicating that the former has more savings compared to other family sizes.

With respect to the disbursement patterns of the families in the region and across income levels, the Family Income and Expenditure Survey (FIES) conducted in 2015 revealed that food expenditure registered the highest among the major expenditure groups at 59%. Housing expenses followed at 8.5%, while water, electricity, gas and other fuels expenses are at 6.5%. Figure 3 graphs the expenditure disseminations and shows that most families spend more on their basic needs.

Population Density

PSA, 2015 Census



Demography

As of 2015, ARMM had a total population of 3,781,387, which accounted for 3.7% of the country's population. Maguindanao had the largest population among the five provinces, while Basilan (except City of Isabela) had the smallest population. The population growth of the region from 2000 to 2015 is 1.98, lower than the national average of 1.84.

The population density of ARMM in 2015 averaged at 300 persons per square kilometer. A large percentage of the population is concentrated in the cities as well as along the coastal areas (as show in the map above).

The region is predominantly (96%) rural. Household size in averages 6.03 persons.

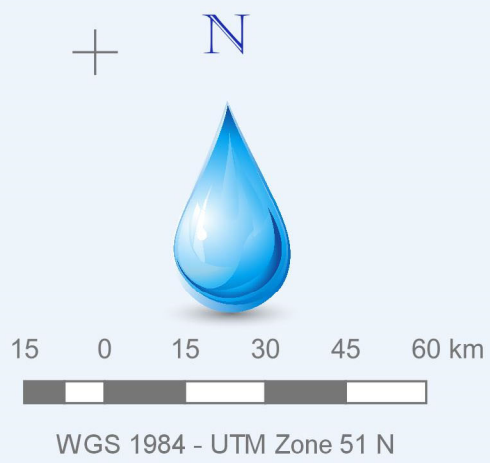
Table 1: Population Density

Region/Province	Population	Land Area (km^2)	Population Density (person/km^2)
ARMM	**3,781,387**	**12,535.79**	**300**
Lanao del Sur	1,045,429	3,872.9	270
Maguindanao (excluding Cotabato City)	1,173,933	4,871.6	240
Basilan (excluding City of Isabela)	346,579	1,103.5	310
Sulu	824,731	1,600.4	520
Tawi-Tawi	390,715	1,087.4	360

Table 2: Urban and Rural Population[4]

Region/Province	Urban Population	Rural Population	HH Size
ARMM	**4%**	**96%**	**6.03**
Lanao del Sur	4%	96%	6.49
Maguindanao (excluding Cotabato City)	16%	84%	6.03
Basilan (excluding City of Isabela)	18%	82%	5.78
Sulu	24%	76%	5.96
Tawi-Tawi	16%	84%	5.77

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



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 from 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

ARMM has two types of climate: Type III and Type IV. Seasons are not very pronounced. It is relatively dry during the months of November to April, and wet during the rest of the year. Some parts of the region experience a more or less evenly distributed rainfall throughout the year.

Disaster Risk

The region's geographical location makes it vulnerable to geohazards as evidenced by several disasters that struck the region resulting in loss of life and damage to properties.

Furthermore, there are faults in the mainland of Mindanao specifically in the provinces of Lanao del Sur and Maguindanao, and off shore faults in the Sulu trench and Cotabato trench. These could generate earthquakes that could cause volcanic eruptions and tsunamis, putting the ARMM provinces, especially Sulu, at high risk.

The Rapid Geo-hazards Assessment identifies the most common geo-hazards in the region (see Table 3).

Table 3: Geological and Climatological Hazards

Category	Specific Hazards
Geological	earthquake, liquefaction, earthquake-induced landslide and tsunami, volcanic eruption, coastal erosion, subsidence
Climatological	tropical cyclones (TCs) , flooding, drought, rain-induced landslide, sea level rise, storm surges

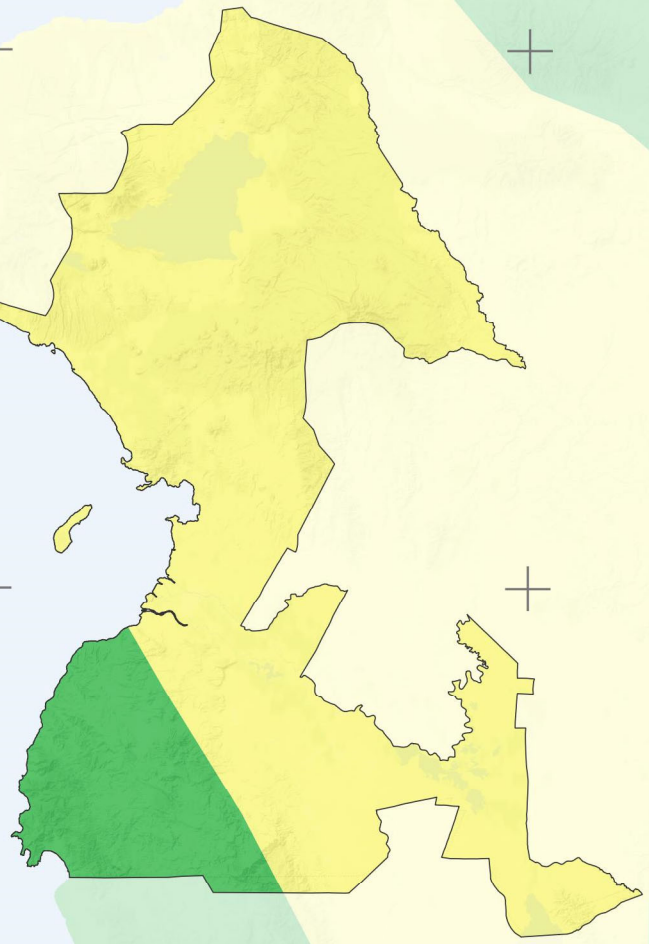
Climate Change and Hydrological Hazards

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

Climate

PAGASA, 2015 Data



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 the ARMM based on the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) downscaled climate projections are shown in Tables 4 and 5. 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 4: Seasonal Projections Under a Medium-Range Emission Scenario

Seasonal Temperature Increase (in °C)	Observed Baseline (1971-2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Lanao del Sur	24.3	25.2	25.0	24.9	1.0	1.2	1.1	1.0	2.0	2.3	2.2	2.0
Maguindanao	27.6	28.3	27.5	27.6	1.0	1.2	1.2	1.1	2.1	2.3	2.4	2.1
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
Lanao del Sur	293.8	369.4	661.5	562.2	7.2	-6.3	-7.2	0.3	-1.1	-4.6	-7.4	-3.6
Maguindanao	225.2	399.1	635.6	553.6	6.3	1.4	-7.4	3.5	5.3	-1.4	-12.6	-1.2

Table 5: Frequency of Extreme Events Under a Medium-Range Emission Scenario

Province	Station	No. of Days w/ T_{max} > 35°C			No. of Dry Days			No. of Days w/ Rainfall > 300 mm		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
Maguindanao	Cotaboto	384	3382	5994	3516	5471	5788	0	3	1

80°0.000'W
160°0.000'W
120°0.000'E
40°0.000'E
80°0.000'S
0°0.000'
80°0.000'N
20°0.000'S
60°0.000'N
40°0.000'S

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Lantawan
Isabela City
Lamitan City
Hadji Mohammad Ajul
BASILAN
Tuburan
Maluso
Al-Barka
Tipo-Tipo
Sumisip
Ungkaya Pukan
Hadji Panglima Tahil
Pangutaran
Jolo
Patikul
Indanan
SULU
Old Panamao
Tongkil
Tallipao
Luuk
Parang
Kalingalan Caluang
Pata
Tapul
Lugus
Pandami
Siasi
South Ubian
Languyan
Tandubas
TAWI-TAWI
Sapa-Sapa
Bongao
Simunul
Sibutu
Sitangkai

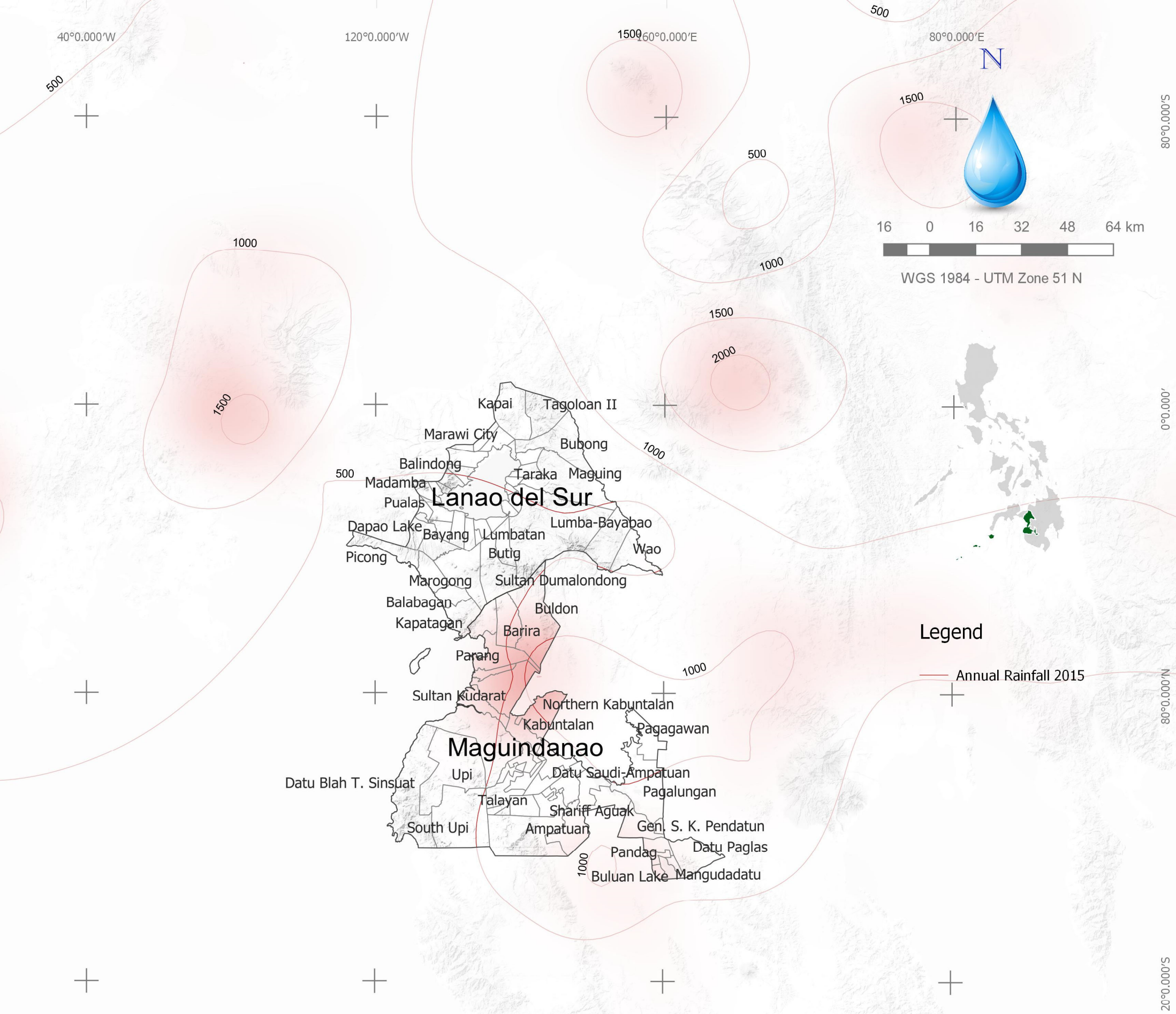
40°0.000′W
120°0.000′W
160°0.000′E
80°0.000′E
80°0.000′S
0°0.000′
80°0.000′N
20°0.000′S
60°0.000′N
40°0.000′S

Contour Map

NAMIRA

80°0.000'W
160°0.000'W
120°0.000'E
40°0.000'E
80°0.000'S
0°0.000'
500
1000
80°0.000'N
20°0.000'S
Lantawan
Basilan
Hadji Mohammad Ajul
Tuburan
Al-Barka
Tipo-Tipo
Maluso
Sumisip
Ungkaya Pukan
Pangutaran
Hadji Panglima Tahil
Tongkil
Indanan
Sulu
Old Panamao
Talipao
Luuk
Parang
Pata
Tapul
Lugus
Pandami
Siasi
South Ubian
60°0.000'N
Tawi-Tawi
Bongao
Sapa-Sapa
Simunul
Sitangkai
Sibutu
40°0.000'S

80°0.000'W
160°0.000'W
120°0.000'E
40°0.000'E



Average Rainfall

PAGASA, 2015 Data

WSS Sector Status

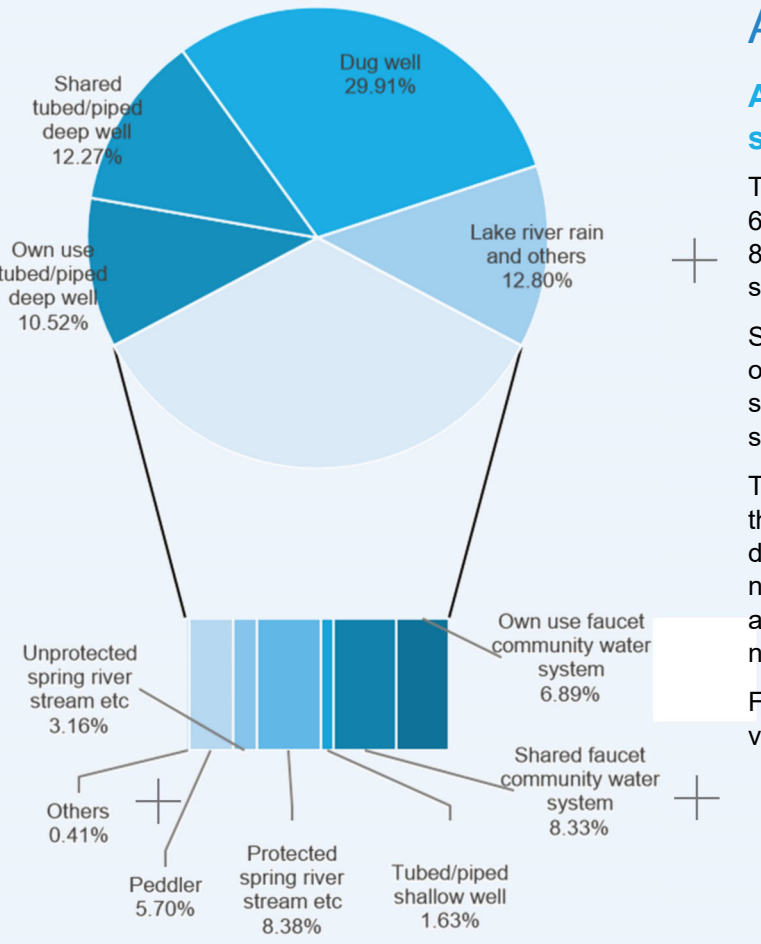


Figure 4: Main Sources of Water Supply

Access to Safe Water

About 48% of ARMM's population had access to safe water sources in 2015[5].

This translates to around 295,000 households (HHs). About 6.89% of the population has Level III home connection in while 8.33% has Level II connections and which the households share with the community. Access to Level I comprises 32.8%.

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 just a little above half of the national average of about 88%, with about 45% discrepancy. In terms of access per level of service, ARMM's numbers differ greatly with the national figures. Level III access which was registered at 6.89% is way below the national figure (44.1%). (see Table 6)

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

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

Level of Service	National	ARMM
Level III	44.1%	6.89%
Level II	11.2%	8.33%
Level I (Safe Sources)	32.4%	32.8%
Subtotal (Safe Sources)	*87.7%*	*48.02%*
Level I (Unsafe Sources)	12.3%	51.98%
Total	100.0%	100.0%

Access to Safe Drinking Water

2015 Census, PSA NDHS

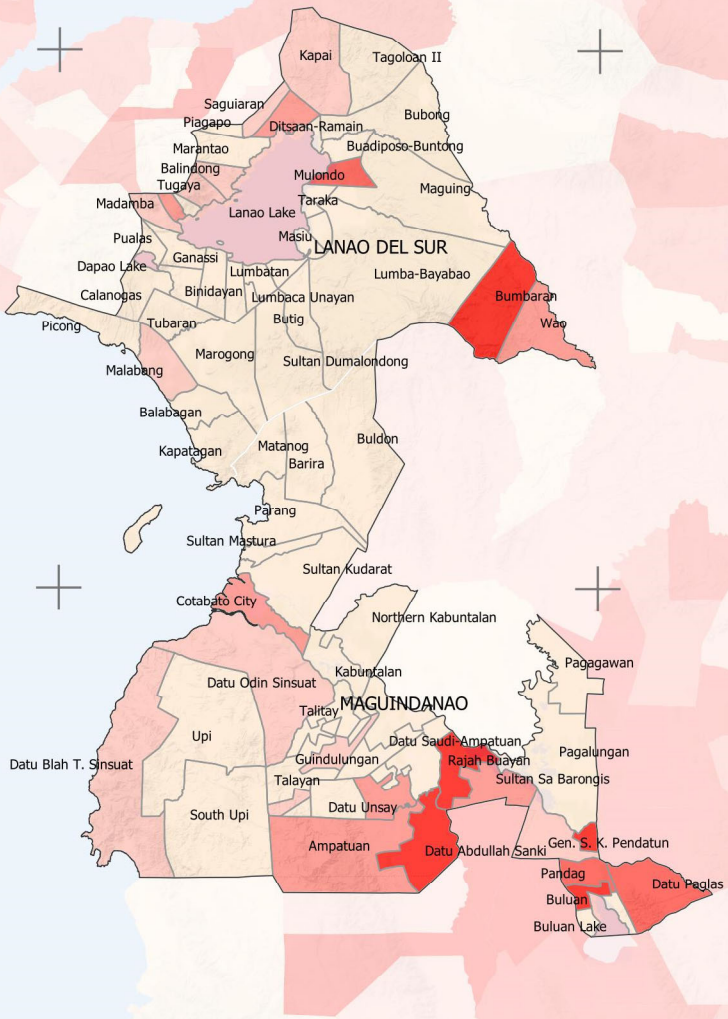


Table 7 shows safe water access in 2015 at the provincial level.

Table 7: Access to Water Supply per Province[7]

Region/Province	Access to Safe Water Supply
ARMM	**53.4%**
Lanao del Sur	80.0%
Maguindanao (excluding Cotabato City)	27.0%
Basilan (excluding City of Isabela)	74.4%
Sulu	36.0%
Tawi-Tawi	80.0%

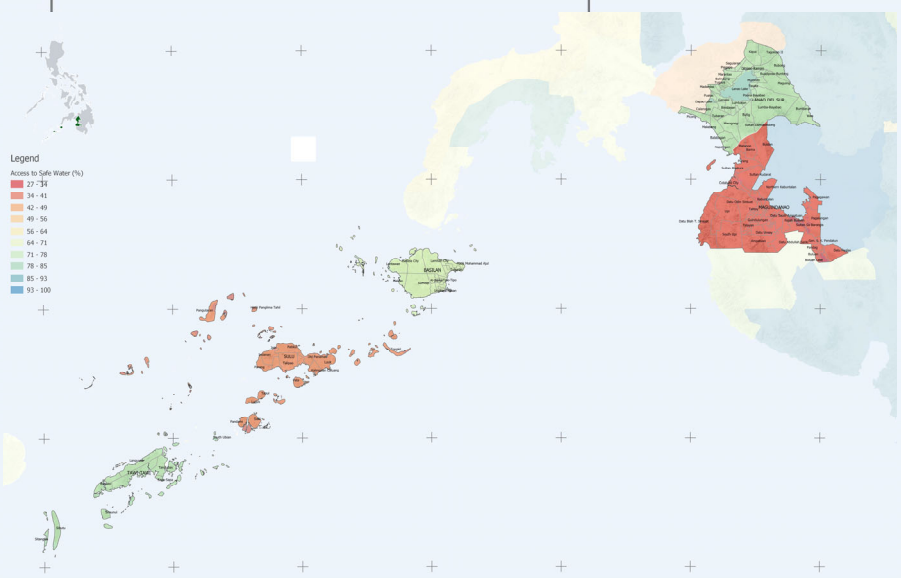


Figure 5: Access to Safe Water

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.

60.12% of the population in ARMM got its drinking water from what are improved and safe water sources. Of the region's total population, approximately 1.98% drank bottled water.

Among the provinces, Tawi-Tawi has lower access to safe drinking water at around 30%-32%.

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

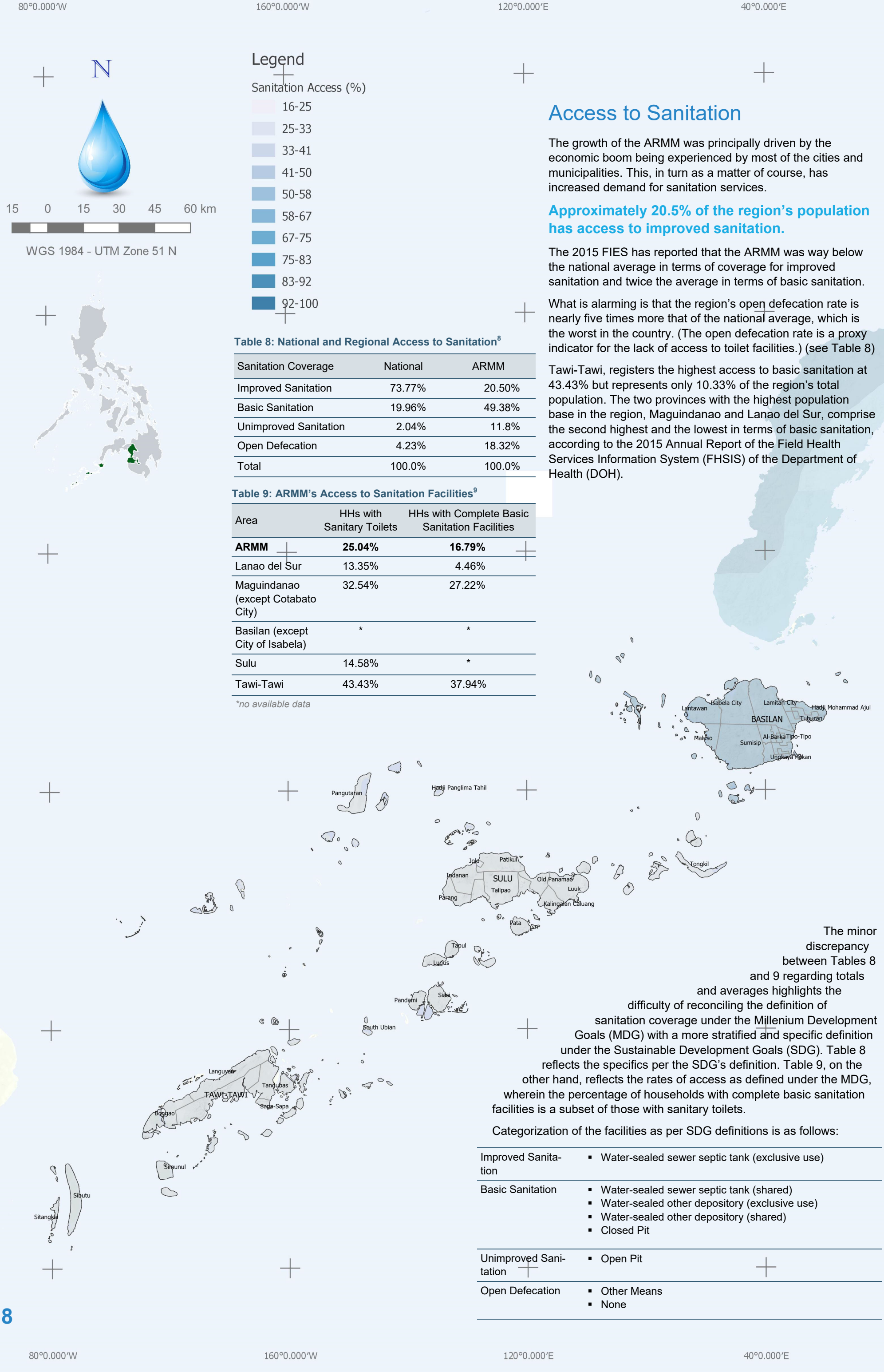


Table 8: National and Regional Access to Sanitation[8]

Sanitation Coverage	National	ARMM
Improved Sanitation	73.77%	20.50%
Basic Sanitation	19.96%	49.38%
Unimproved Sanitation	2.04%	11.8%
Open Defecation	4.23%	18.32%
Total	100.0%	100.0%

Table 9: ARMM's Access to Sanitation Facilities[9]

Area	HHs with Sanitary Toilets	HHs with Complete Basic Sanitation Facilities
ARMM	**25.04%**	**16.79%**
Lanao del Sur	13.35%	4.46%
Maguindanao (except Cotabato City)	32.54%	27.22%
Basilan (except City of Isabela)	*	*
Sulu	14.58%	*
Tawi-Tawi	43.43%	37.94%

**no available data*

Access to Sanitation

The growth of the ARMM was principally driven by the economic boom being experienced by most of the cities and municipalities. This, in turn as a matter of course, has increased demand for sanitation services.

Approximately 20.5% of the region's population has access to improved sanitation.

The 2015 FIES has reported that the ARMM was way below the national average in terms of coverage for improved sanitation and twice the average in terms of basic sanitation.

What is alarming is that the region's open defecation rate is nearly five times more that of the national average, which is the worst in the country. (The open defecation rate is a proxy indicator for the lack of access to toilet facilities.) (see Table 8)

Tawi-Tawi, registers the highest access to basic sanitation at 43.43% but represents only 10.33% of the region's total population. The two provinces with the highest population base in the region, Maguindanao and Lanao del Sur, comprise the second highest and the lowest in terms of basic sanitation, according to the 2015 Annual Report of the Field Health Services Information System (FHSIS) of the Department of Health (DOH).

The minor discrepancy between Tables 8 and 9 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 8 reflects the specifics per the SDG's definition. Table 9, on the other hand, reflects the rates of access as defined under the MDG, wherein the percentage of households with complete basic sanitation facilities is a subset of those with sanitary toilets.

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

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

Access to Basic Sanitation

ARMM Regional Planning and Consultation Workshop, 2017 Data

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

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

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

Figure 7, on the other hand, shows the locations of the two septage treatment plants (STPs) in the region — Cities of Isabela and Cotabato, even though, these cities are not under the jurisdiction of ARMM.

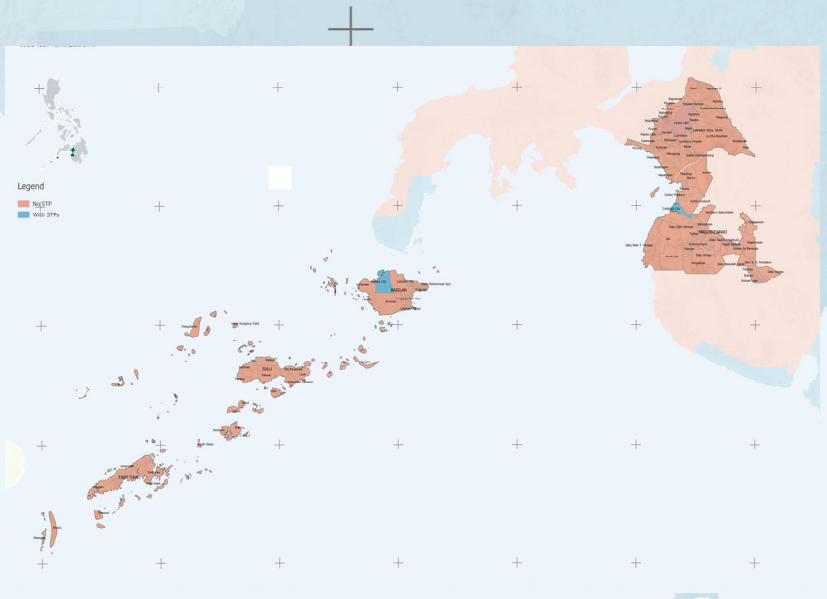


Figure 7: Existing Septage Treatment Plants[10]

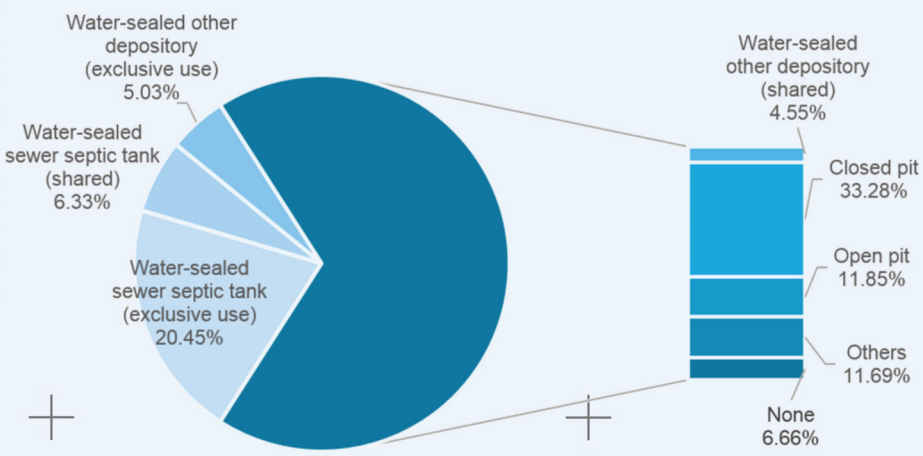


Figure 6: Percentage of Households with Access to Sanitation Facilities

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Legend

Water Bodies

Major River Basin

Water Resources

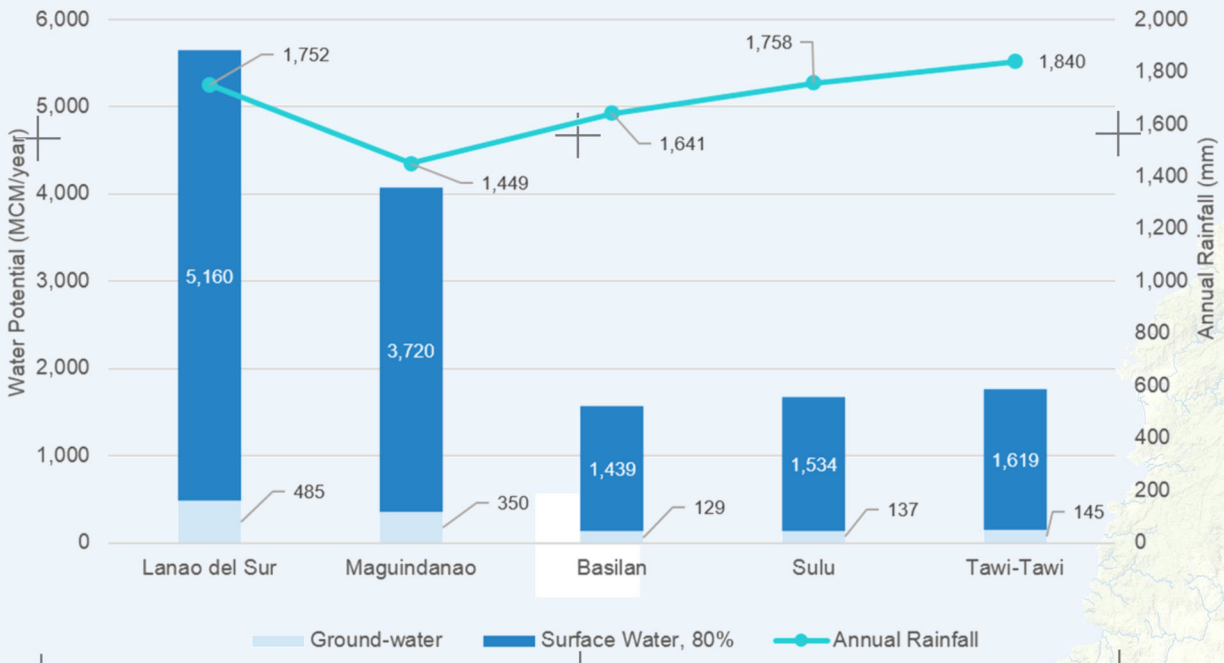


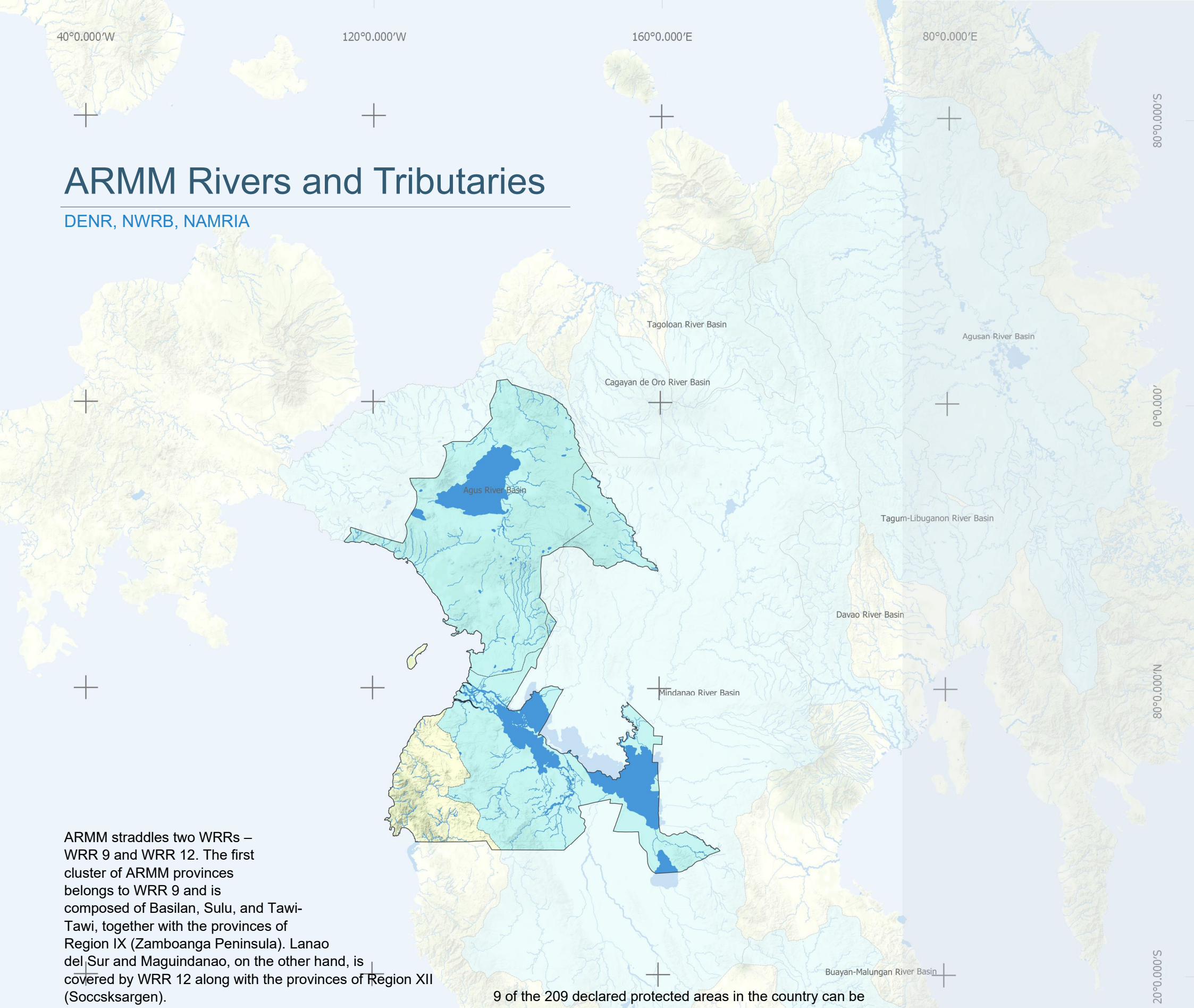
Figure 8: Water Resources Potential and Annual Rainfall[11]

The Autonomous Region in Muslim Mindanao ranks fourth among the regions with the most water resources.

The region's water resources potential totals to 14,717 MCM/year, taking up 10.1% of the country's total.

The water resources potential of an area is divided into groundwater and surface water. Groundwater in the region is estimated at 1,246 MCM/year while surface water is estimated at 13,471 MCM/year. Annual rainfall in the region averages 1,688 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.



ARMM Rivers and Tributaries

DENR, NWRB, NAMRIA

ARMM straddles two WRRs – WRR 9 and WRR 12. The first cluster of ARMM provinces belongs to WRR 9 and is composed of Basilan, Sulu, and Tawi-Tawi, together with the provinces of Region IX (Zamboanga Peninsula). Lanao del Sur and Maguindanao, on the other hand, is covered by WRR 12 along with the provinces of Region XII (Soccsksargen).

Surface Water

ARMM is endowed with abundant water resources. Two major water bodies found in the region are the Lake Lanao, which is the second largest freshwater body in the Philippines, and the Rio Grande de Mindanao, which is the biggest and longest river in Mindanao.

The region is also home to one of the 18 major river basins in the country — the Mindanao River Basin.

Minadanao River Basin

The Mindanao River Basin (MRB) has a total area of 2,085,491 hectares, making it the second largest river basin next to Cagayan River Basin in Luzon. It encompasses five regions: Regions X, XI, XII, XIII and ARMM. From the north and northeast, its ridge stretches out from the mountains of Bukidnon crossing Agusan and Davao, from the west, it covers the mountains and plateaus of Lanao del Sur extending to Daguma Range in the south going to Matutum Range in the east; thus, it covers a total of nine provinces including Maguindanao, North and South Cotabato, and Sultan Kudarat which serve as its water outlets.

The MRB covers a total 412,057.4 hectares in two provinces in ARMM — Lanao del Sur (57,700.6 hectares) and Maguindanao (354,356.8 hectares).

9 of the 209 declared protected areas in the country can be found in Mindanao River Basin. Table 10 shows the list of these protected areas and their area of coverage.

Table 10: Protected Areas in Maguindanao River Basin within ARMM

Protected Area	Municipalities Covered	Area (in ha)
Kabulnan WFR	Esperanza, Isulan, Bagumbayan, Ninoy Aquino in Sultan Kudarat; Ampatuan in Maguindanao; Lake Sebu in South Cotabato	116,452
South Upi WFR	South Upi, ARMM	1,894

Of the nine protected areas in the river basin, six fall under the category of watershed forest reserve. Others fall under protected landscape, natural park and wildlife sanctuary. However, these 9 protected areas only cover about 13% of the total area of the whole river basin; wherein Allah Watershed Forest Reserve (WFR) is the largest covering about 4% of the total area of MRB. Allah WFR covers the municipalities of Lake Sebu, T'boli, Surallah, Sto. Nino, Banga, and Norala in the province of South Cotabato; City of Tacurong and municipalities of Isulan, Esperanza, Lambayong, Bagumbayan in the province of Sultan Kudarat.

Kabulnan WFR and South Upi WFR are two of the protected areas in MRB that are within ARMM.

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

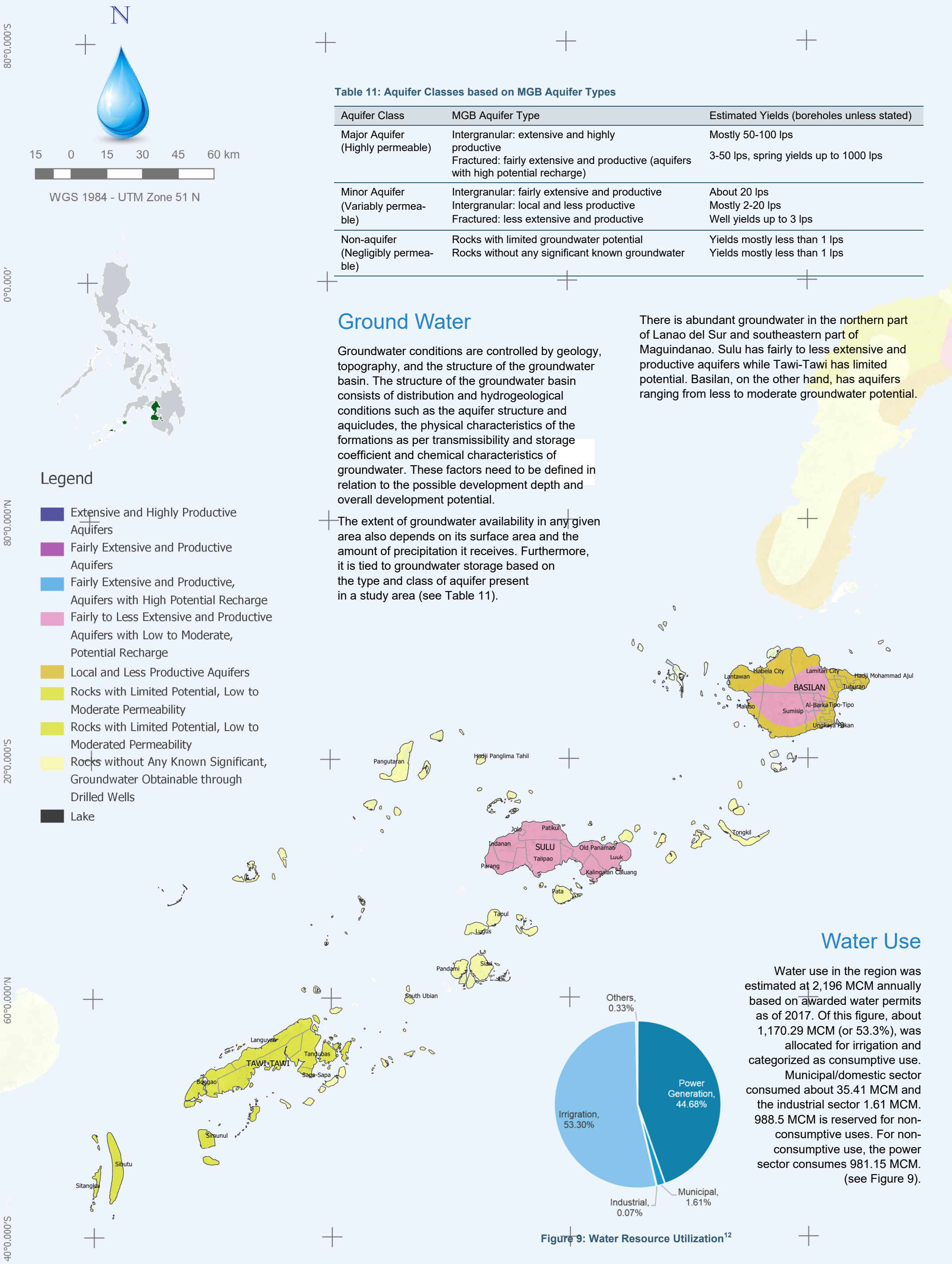


Table 11: Aquifer Classes based on MGB Aquifer Types

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

Ground Water

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

The extent of groundwater availability in any given area also depends on its surface area and the amount of precipitation it receives. Furthermore, it is tied to groundwater storage based on the type and class of aquifer present in a study area (see Table 11).

There is abundant groundwater in the northern part of Lanao del Sur and southeastern part of Maguindanao. Sulu has fairly to less extensive and productive aquifers while Tawi-Tawi has limited potential. Basilan, on the other hand, has aquifers ranging from less to moderate groundwater potential.

Water Use

Water use in the region was estimated at 2,196 MCM annually based on awarded water permits as of 2017. Of this figure, about 1,170.29 MCM (or 53.3%), was allocated for irrigation and categorized as consumptive use. Municipal/domestic sector consumed about 35.41 MCM and the industrial sector 1.61 MCM. 988.5 MCM is reserved for non-consumptive uses. For non-consumptive use, the power sector consumes 981.15 MCM. (see Figure 9).

Figure 9: Water Resource Utilization[12]

Groundwater Availability

MGB

Water Availability, Water Stress and Water Scarcity

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

Water availability per capita was computed by comparing the region and provinces' potential against the 2015 population (as shown in Table 12).

The ARMM has a per capita water availability at around 3,892 m^3/year.

Table 12: Water Availability per Province

Province	Water Availability (m^3/capita/yr) 2015 Population
Lanao del Sur	5,400
Maguindanao (except Cotabato City)	3,467
Basilan (except City of Isabela)	4,524
Sulu	2,026
Tawi-Tawi	4,515
ARMM	**3,892**

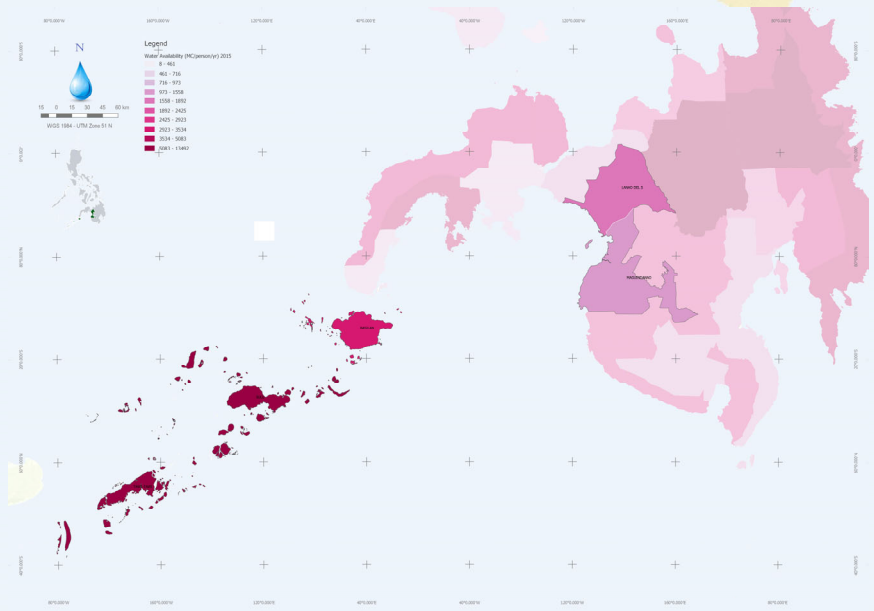


Figure 10: Water Availability Map (2015)

[12] National Water Resources Board. List of Water Permit Grantees, 2017
[13] Managing Water Report 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 6,312,014.

Water Supply and 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 215 MCM/year, 293 MCM/year, and 397 MCM/year, respectively.

Water Demand vs. Water Resources Potential

The water demand of the industrial, business and domestic sectors in the ARMM 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 (397 MCM/year) to the water resources potential of the region (14,717 MCM/year), the availability of water far exceeds the projected water demand of the region 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.

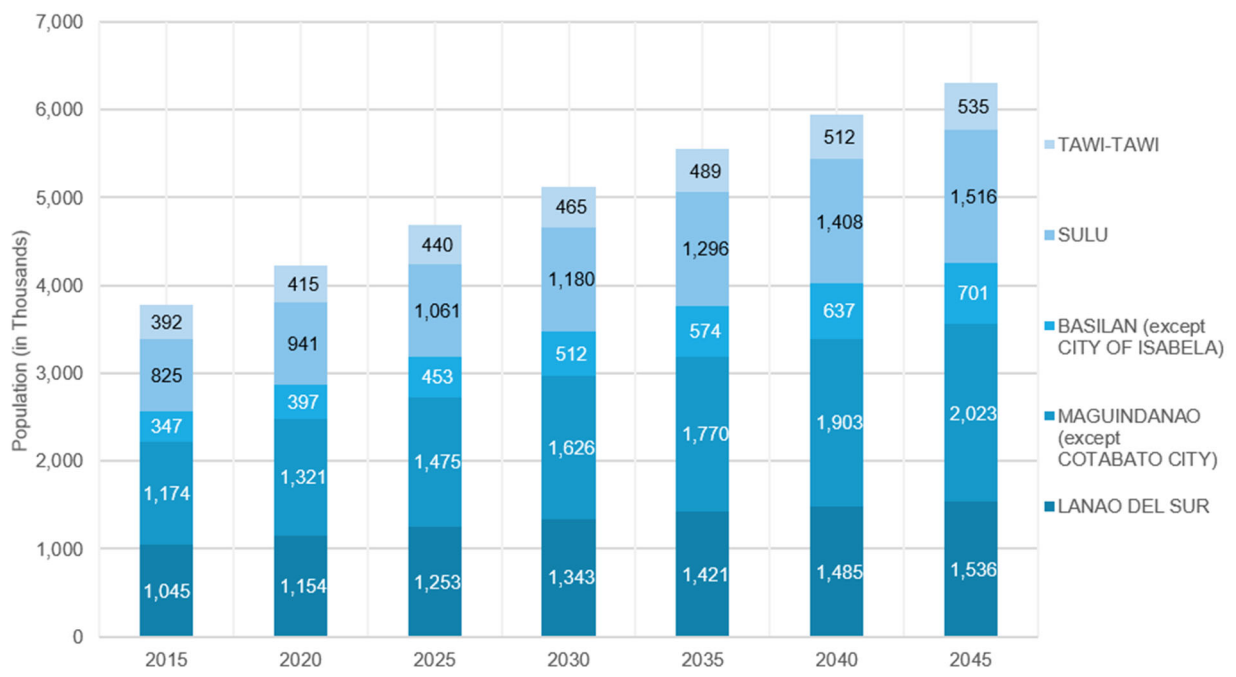


Figure 11: Projected Population

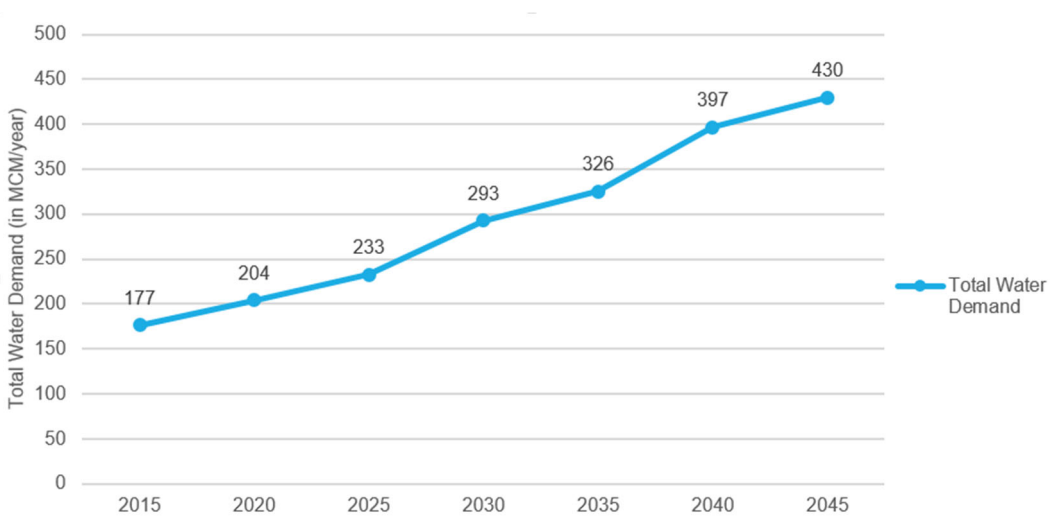
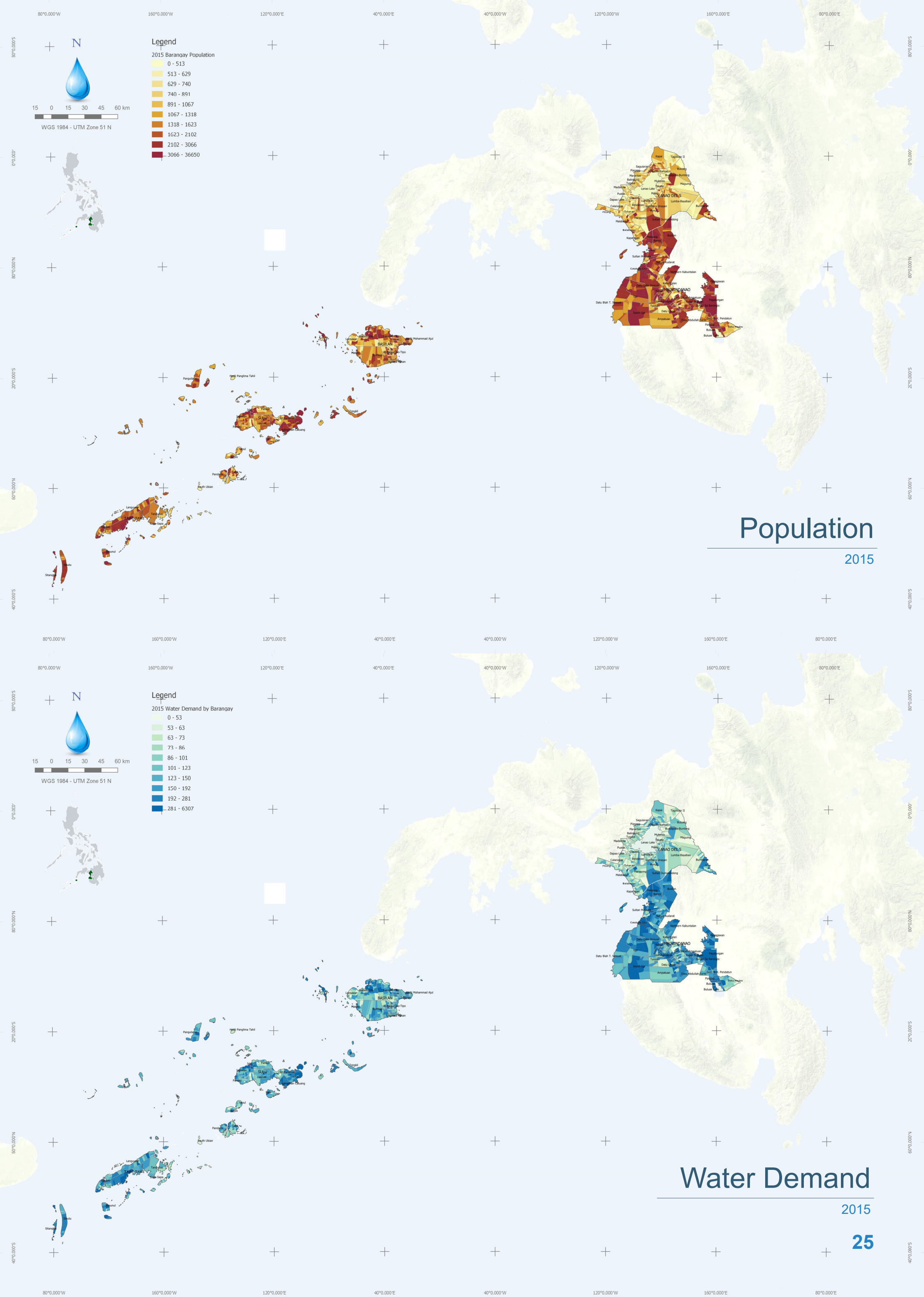


Figure 12: Projected Water Demand

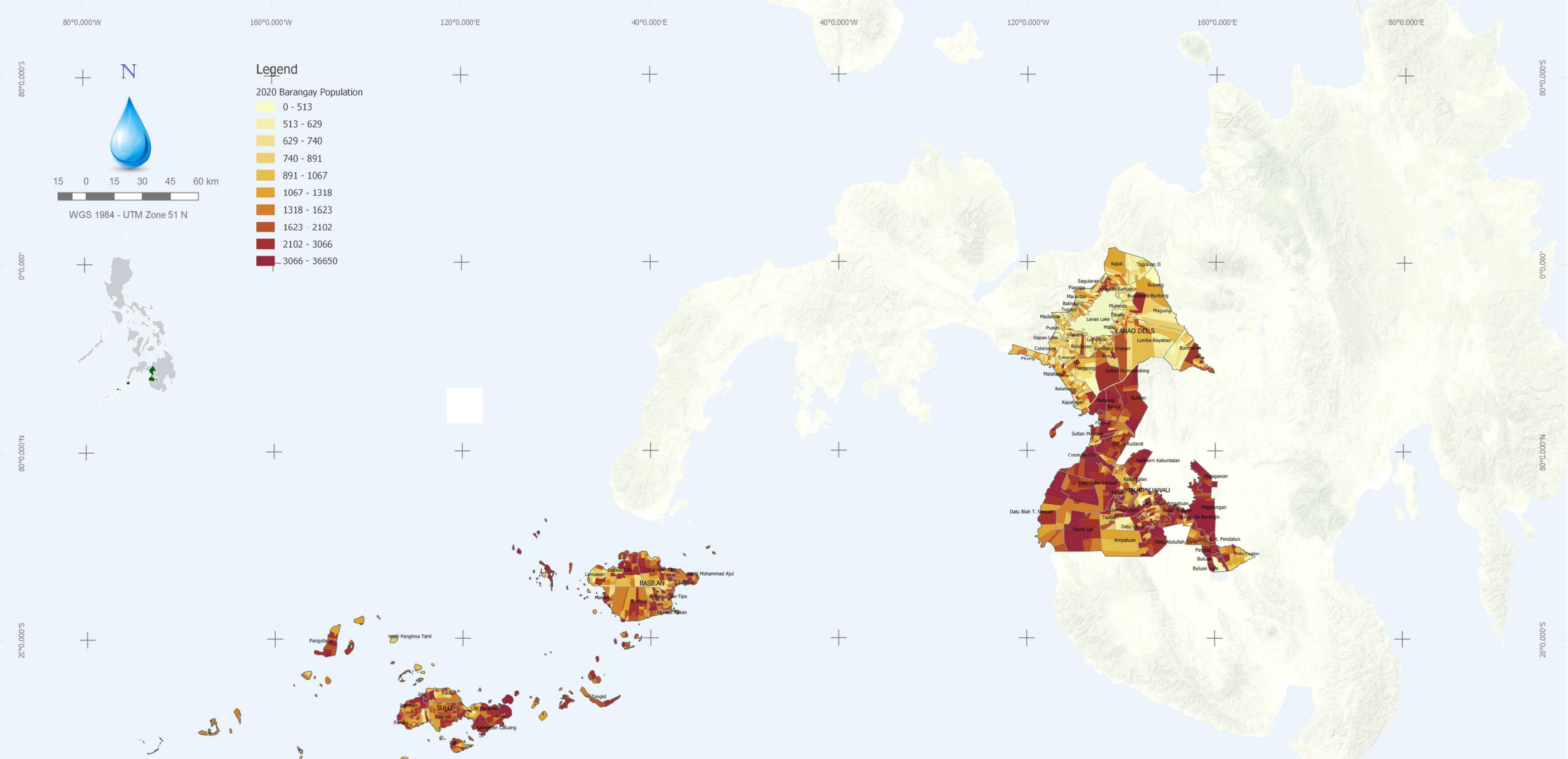


Population

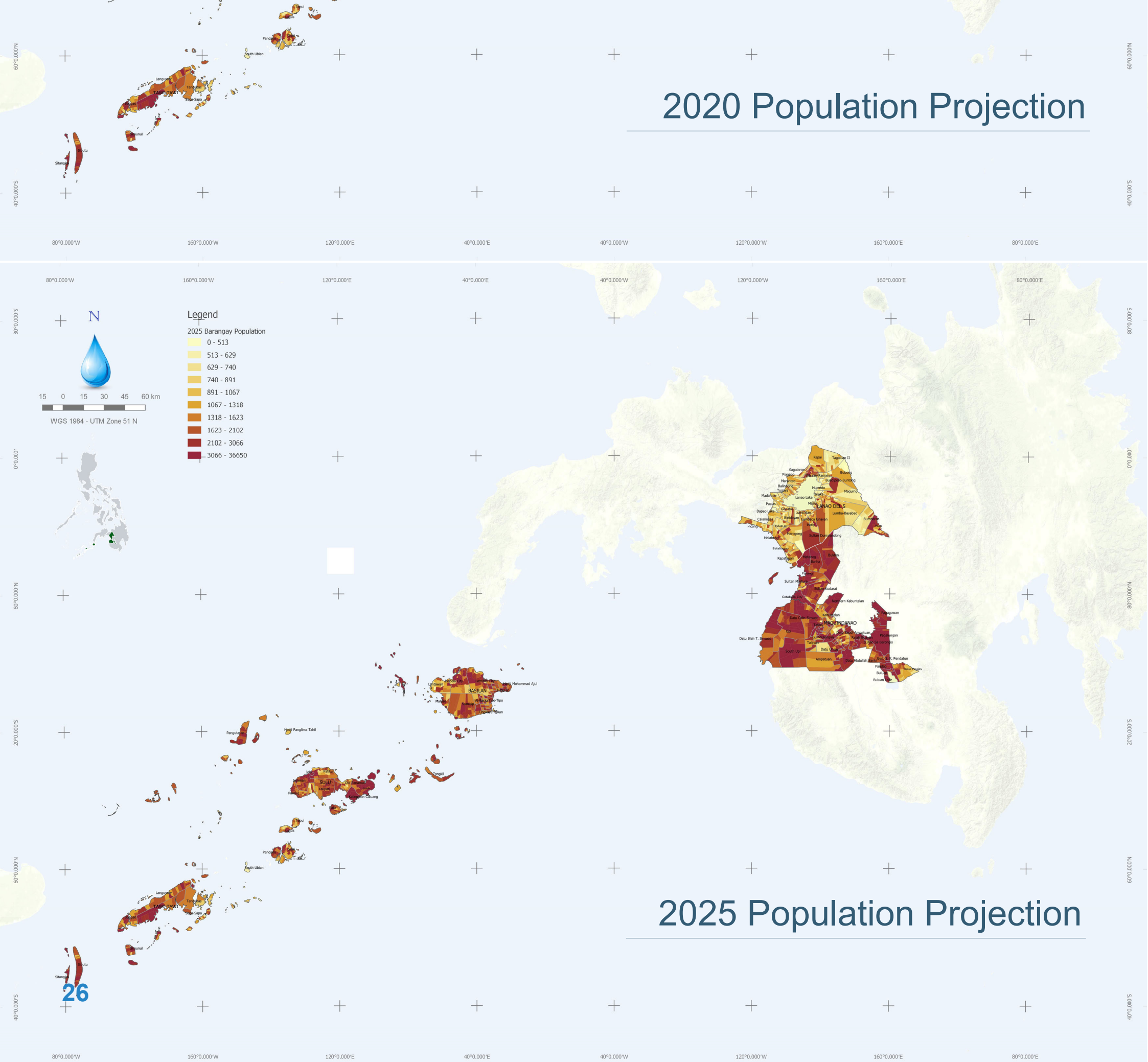
2015

Water Demand

2015



2020 Population Projection



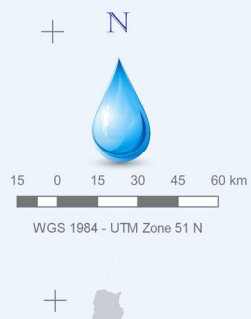
2025 Population Projection

Legend

2030 Barangay Population

- 0 - 513
- 513 - 629
- 629 - 740
- 740 - 891
- 891 - 1067
- 1067 - 1318
- 1318 - 1623
- 1623 - 2102
- 2102 - 3066
- 3066 - 36650

2030 Population Projection

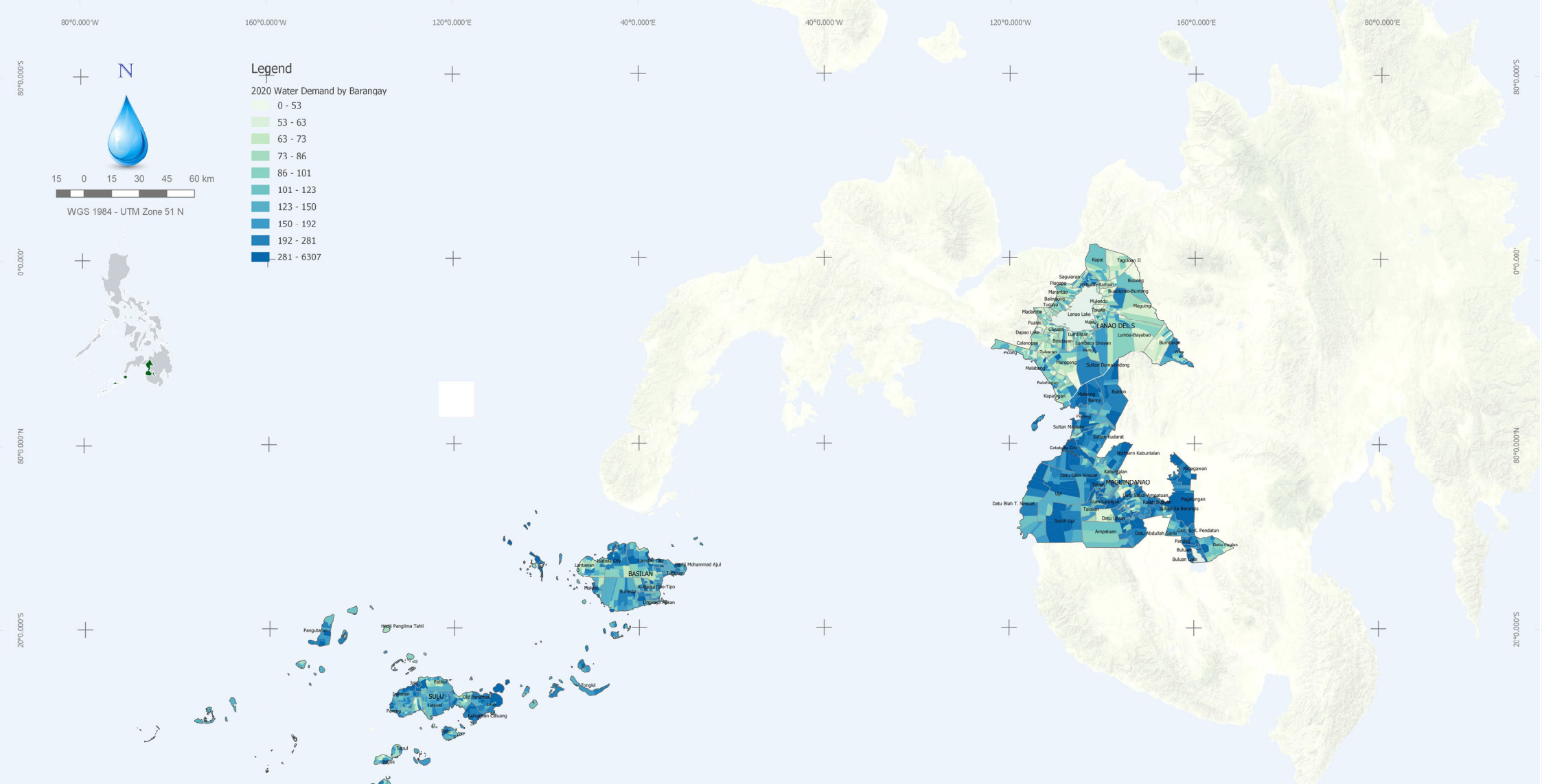


Legend

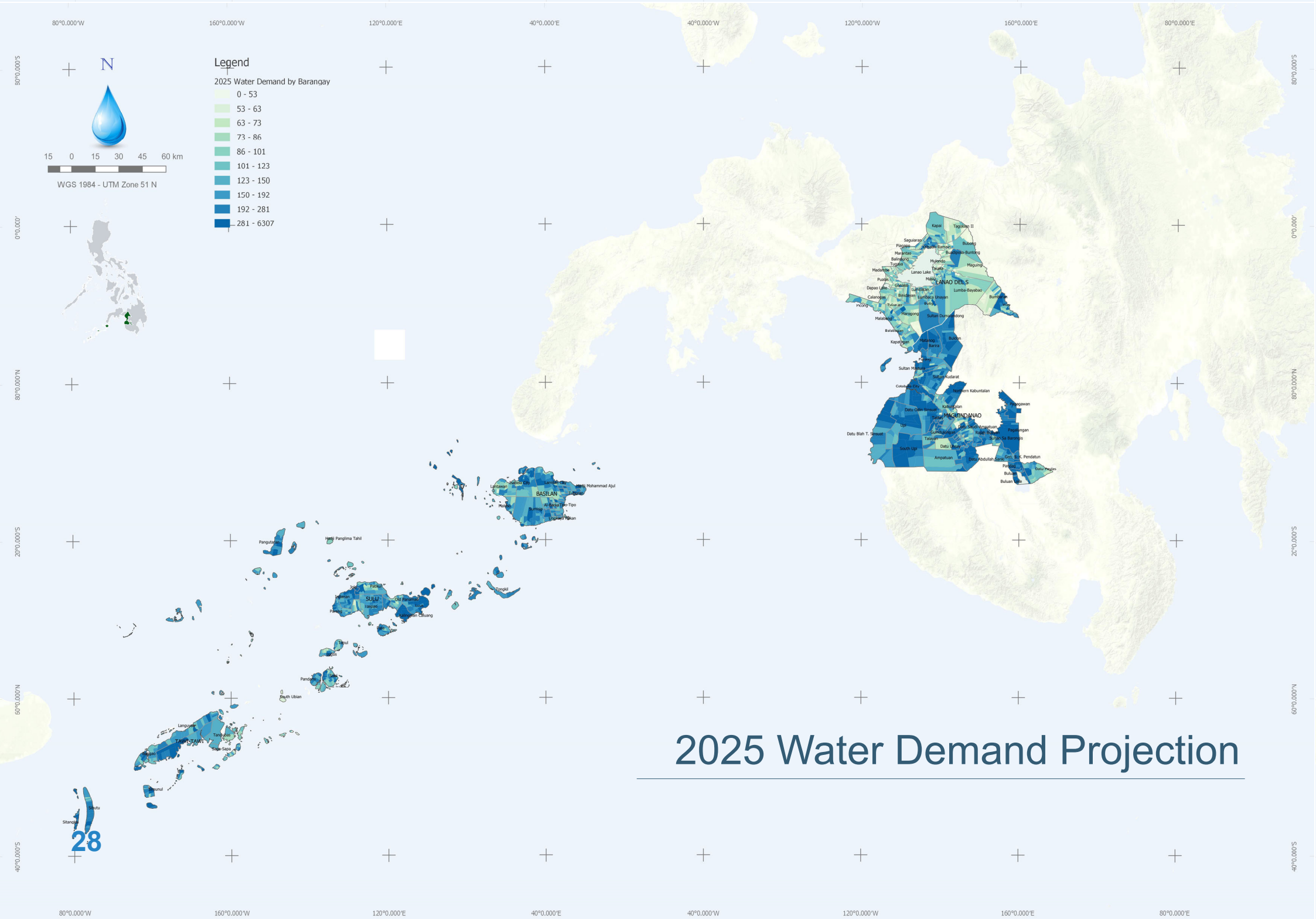
2040 Barangay Population

- 0 - 513
- 513 - 629
- 629 - 740
- 740 - 891
- 891 - 1067
- 1067 - 1318
- 1318 - 1623
- 1623 - 2102
- 2102 - 3066
- 3066 - 36650

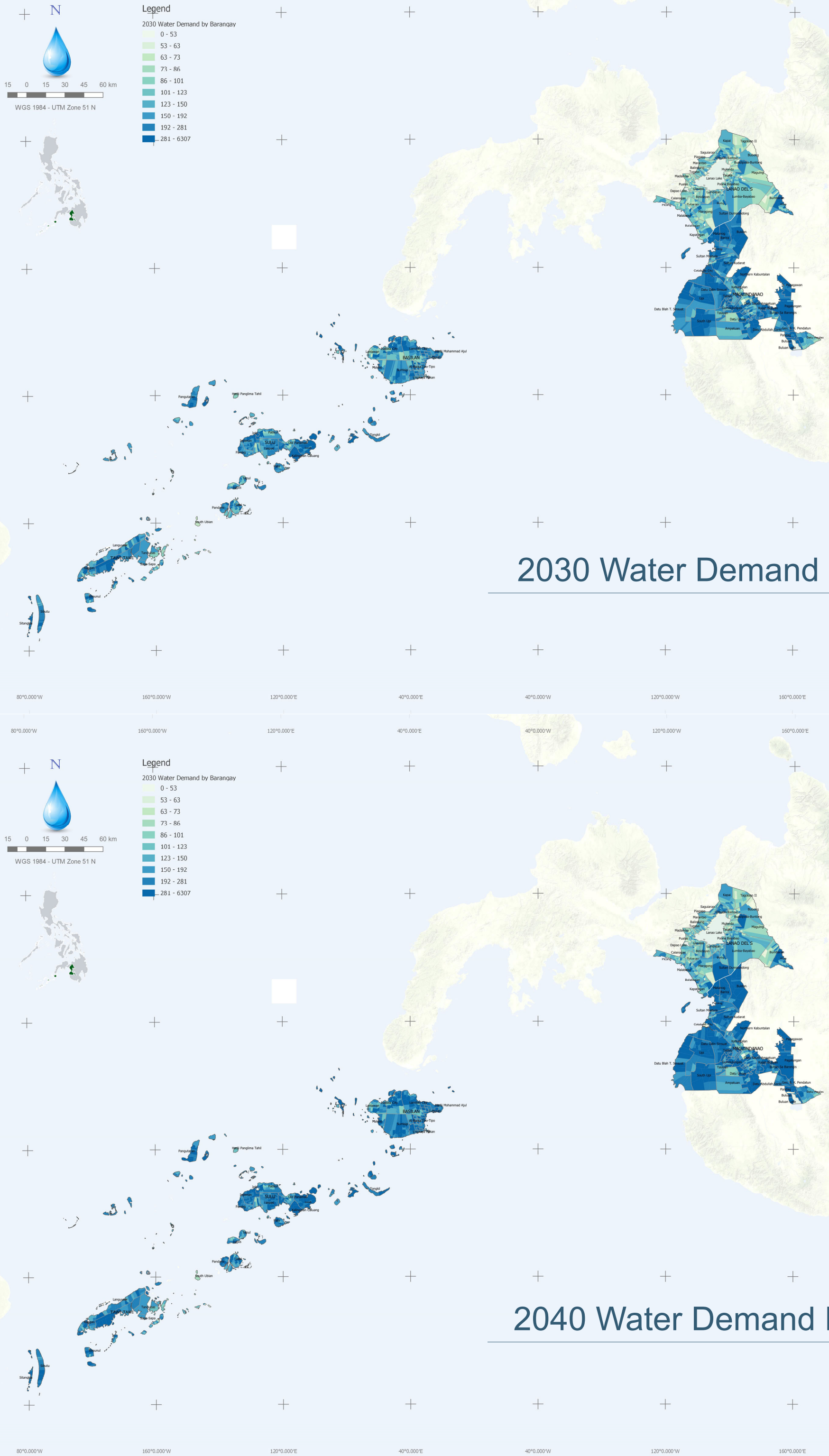
2040 Population Projection



2020 Water Demand Projection



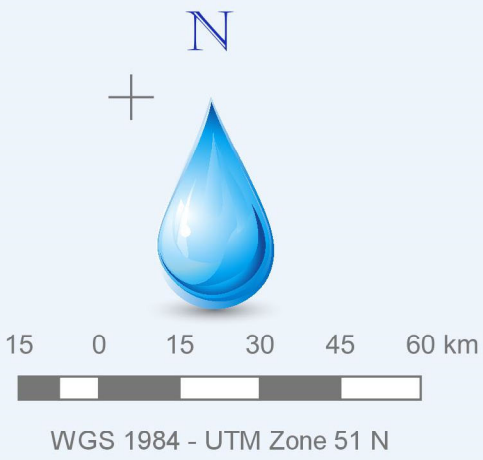
2025 Water Demand Projection



2030 Water Demand Projection

2040 Water Demand Projection

WSS Infrastructure



Around 12% of the ARMM is served by WSPs of various management types[14].

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

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

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

Water Supply Service Providers

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

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

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

Water Districts

As of 2015, there are 6 operational WDs in ARMM – 2 in Basilan, 2 in Lanao del Sur and 1 each in Sulu and Tawi-Tawi. Isabela City WD in Basilan is also operational; however, it is not tallied as it is not under the jurisdiction of the ARMM but rather of Region IX (Zamboanga Peninsula Region). Only 2.53% of the total population of ARMM are served by the WDs.

LGU-led Water Utilities

There are 65 LGU-led water utilities in the ARMM which only serves 2% of population.

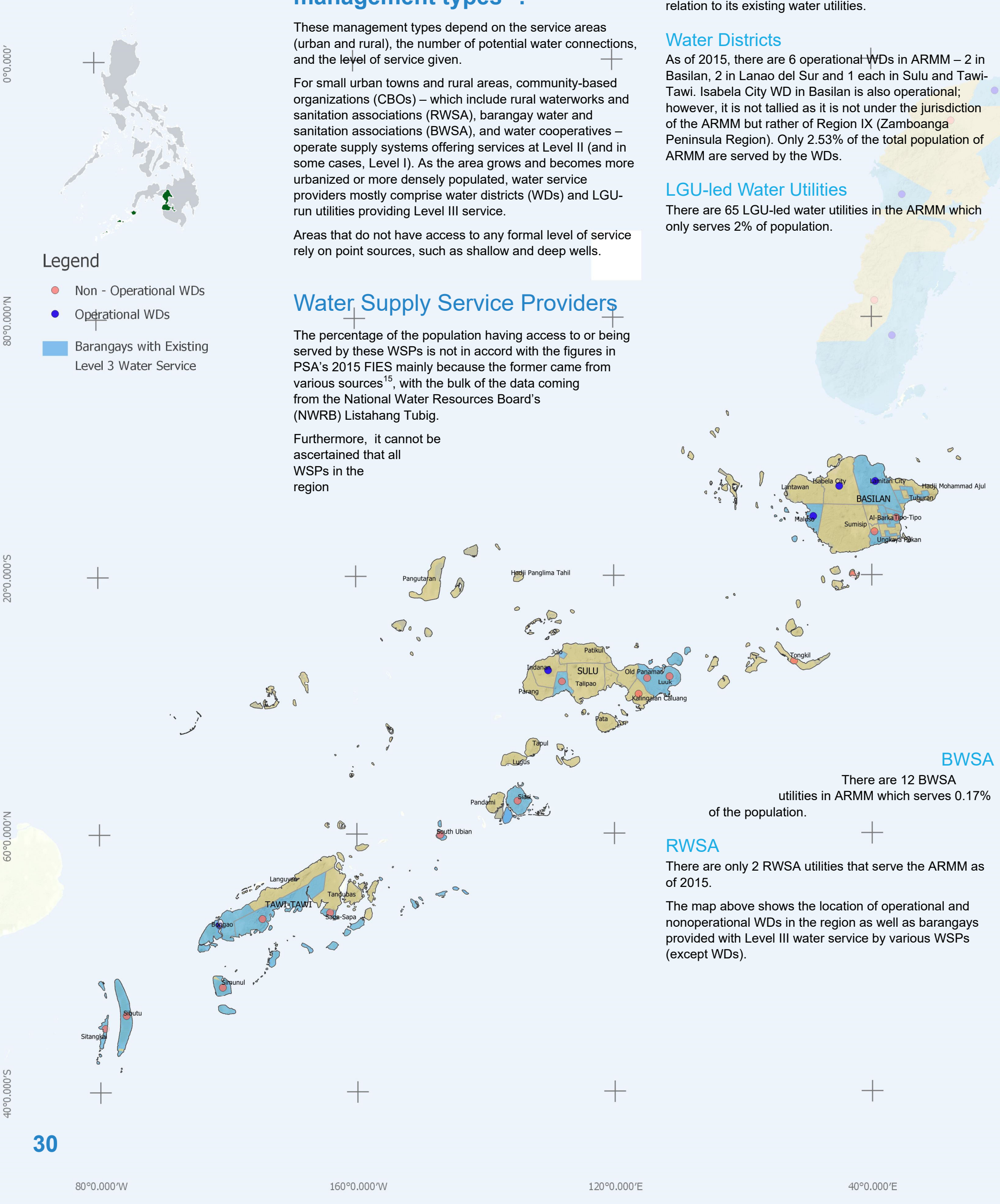
BWSA

There are 12 BWSA utilities in ARMM which serves 0.17% of the population.

RWSA

There are only 2 RWSA utilities that serve the ARMM as of 2015.

The map above 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 Districts and Areas Covered with Level III Service

LWUA, PAWD, NWRB Listahang Tubig, 2017 Data

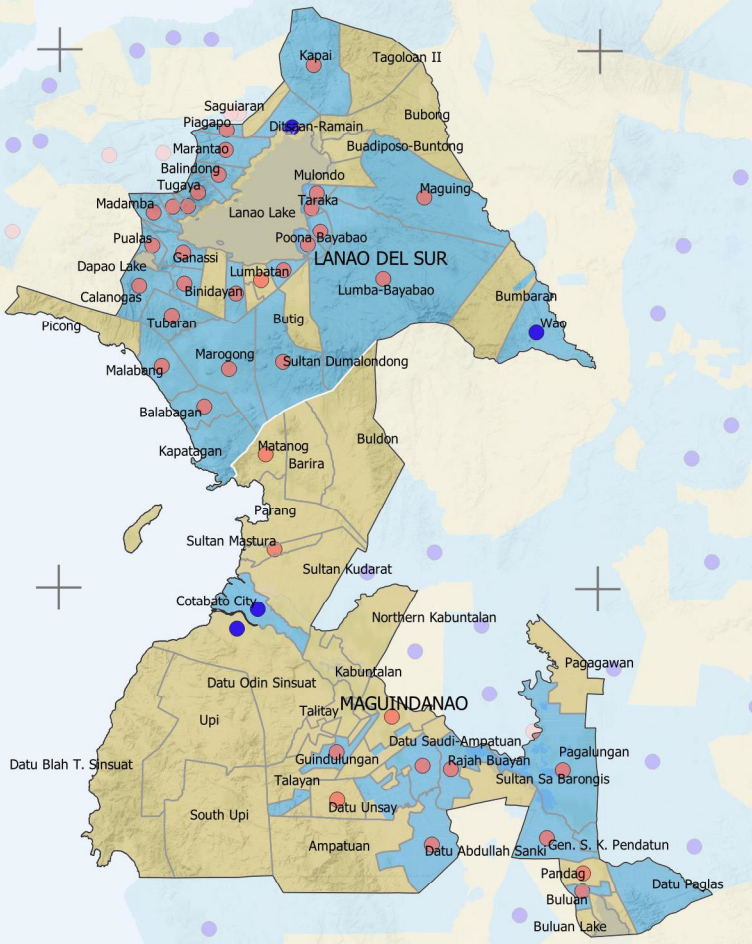


Table 13: Water Service Providers per Province

Province	No. Of LGUs	Type & No. Of WSPs		Service Area	Population Served	
					Total	%
Lanao del Sur	40	WDs	2		36,325	3.47%
		LGU led	55		82,610	7.90%
		BWSA	6		2,670	0.26%
		RWSA	1		13,660	1.31%
		Private/Others	128		228,600	21.87%
		Subtotal	**192**	**1,045,429**	**327,540**	**34.81%**
Maguindanao	36	WDs	-		-	-
		LGU led	5		2,540	0.22%
		BWSA	2		1,250	0.11%
		RWSA	-		-	-
		Private/Others	2		585	0.05%
		Subtotal	**9**	**1,173,933**	**4,375**	**0.37%**
Basilan	12	WDs	2		27,820	8.03%
		LGU led	4		4,150	1.20%
		BWSA	4		2,580	0.74%
		RWSA	-			0.00%
		Private/Others	2		8,805	2.54%
		Subtotal	**12**	**346,579**	**43,355**	**12.51%**
Sulu	19	WDs	1		19,745	2.39%
		LGU led	-		-	-
		BWSA	-		-	-
		RWSA	-		-	-
		Private/Others	-		-	-
		Subtotal	**1**	**824,731**	**19,745**	**2.39%**
Tawi-Tawi	11	WDs	1		11,825	3.03%
		LGU led	1		110	0.03%
		BWSA	-		-	-
		RWSA	1		890	0.23%
		Private/Others	4		25,145	6.44%
		Subtotal	**7**	**390,715**	**37,970**	**9.73%**
Autonomous Region in Muslim Mindanao	**118**	WDs	6		95,715	2.53%
		LGU led	65		89,410	2.36%
		BWSA	12		6,500	0.17%
		RWSA	2		14,550	0.38%
		Private/Others	136		263,135	6.96%
		Grand Total	**221**	**3,781,387**	**469,310**	**12.40%**

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

Sanitation

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

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

Open Defecation

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

ARMM has the highest open defecation rate among all regions at 18.32%. As of 2015, about 692,750 people, mostly informal settlers along coasts, were reported practicing open defecation These waterless areas do not have access to sanitation facilities

The map below shows the areas in the region where open defecation is most 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 14 shows the current BOD in the ARMM.

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

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

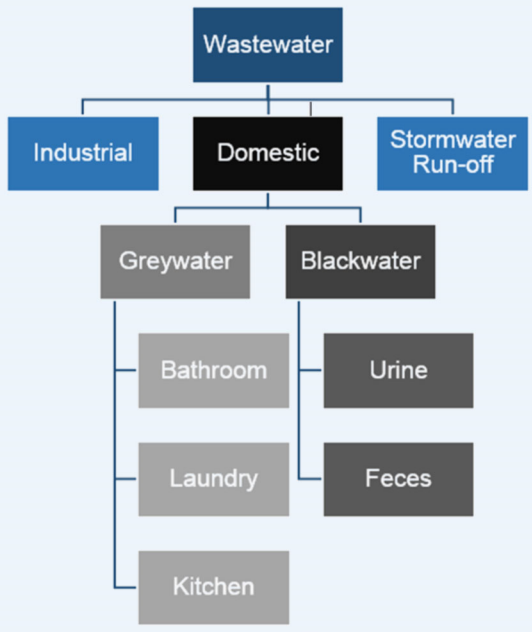


Figure 13: Categories of Wastewater

Open Defecation

PSA, 2015 Data

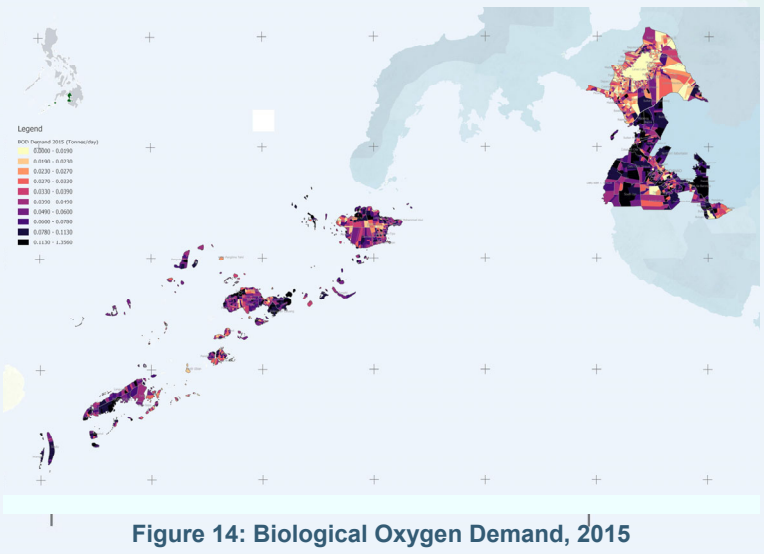


Figure 14: Biological Oxygen Demand, 2015

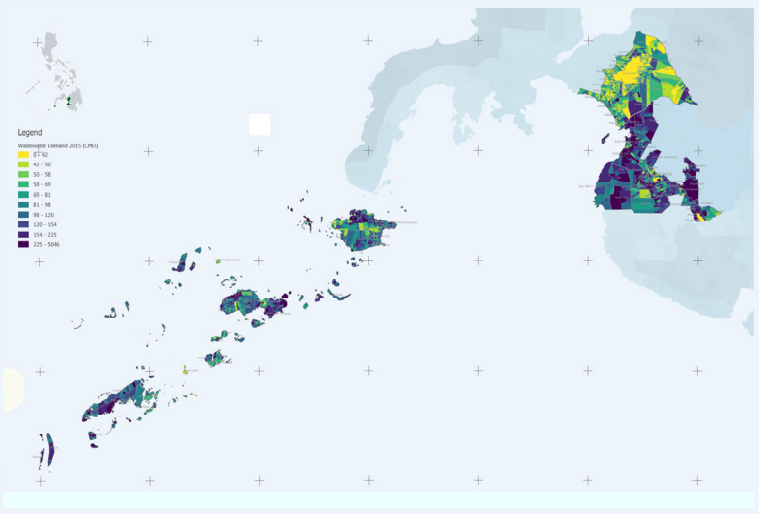


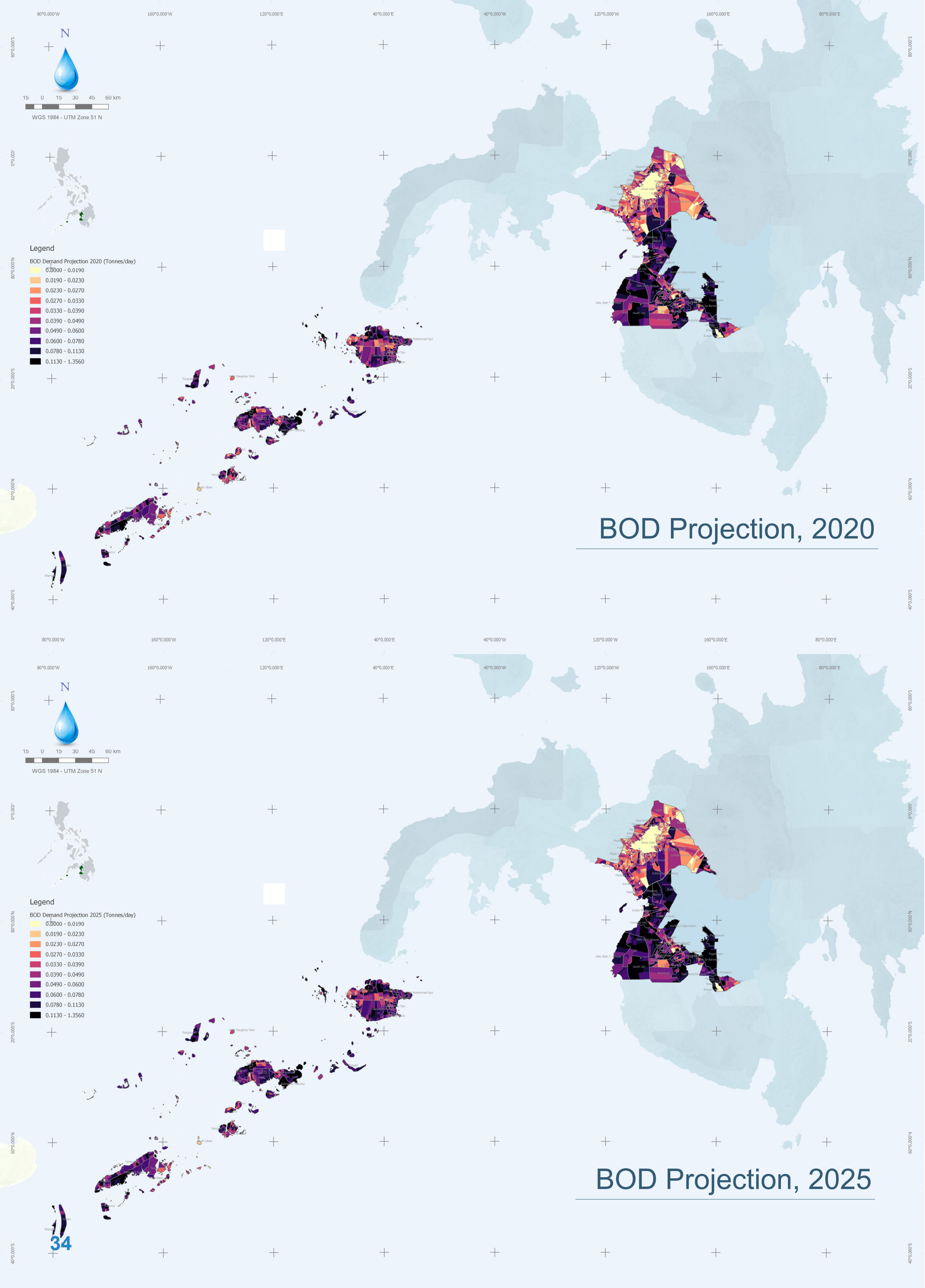
Figure 15: Wastewater Produced, 2015

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

The wastewater[17] produced by each province is directly proportional to its water demand as well as its population. It is assumed that wastewater generated is 80% of the total water demand. The current wastewater in the region is shown in Figure 15.

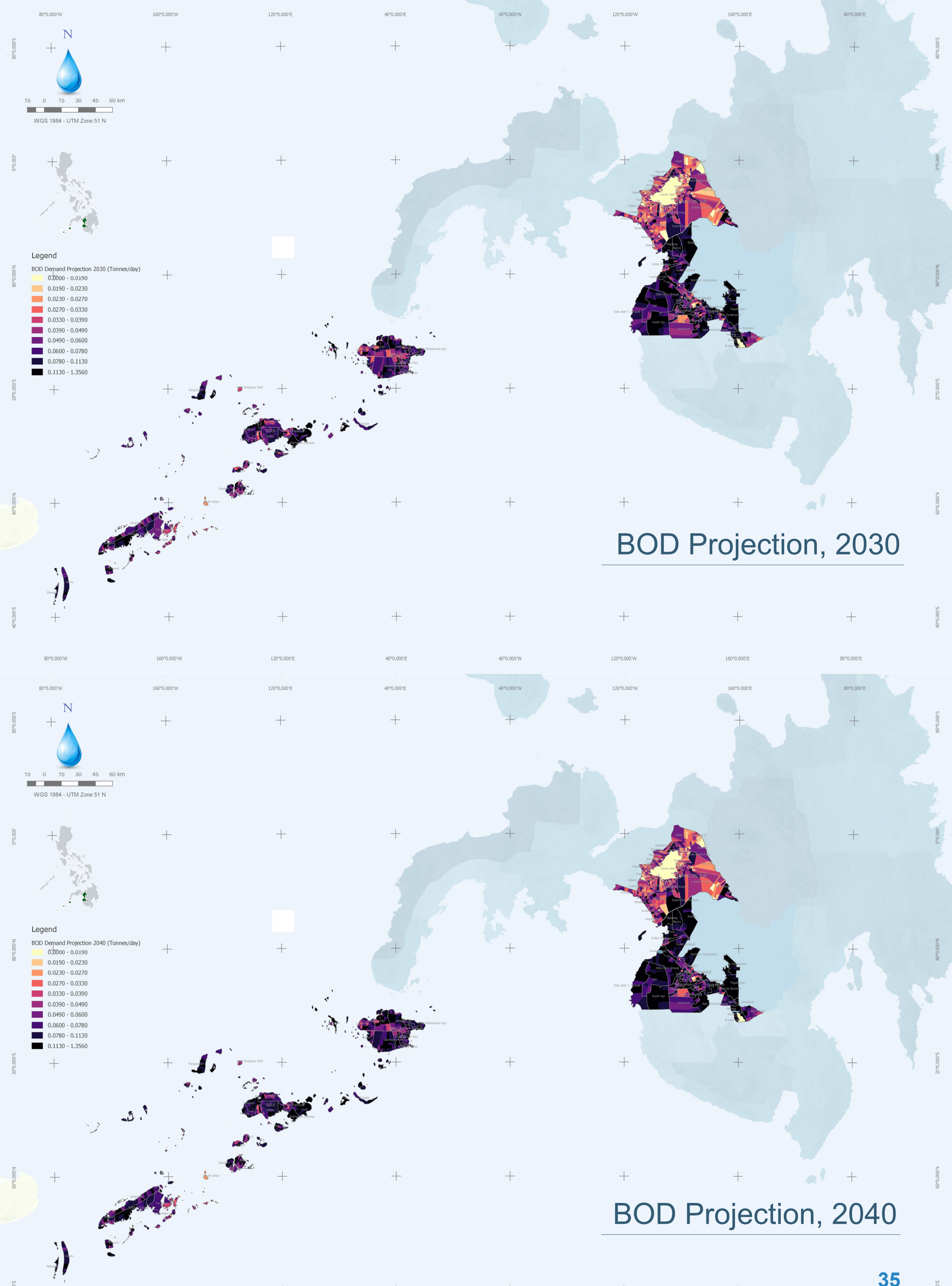
BOD and wastewater projections until 2040 are shown in the succeeding pages.

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



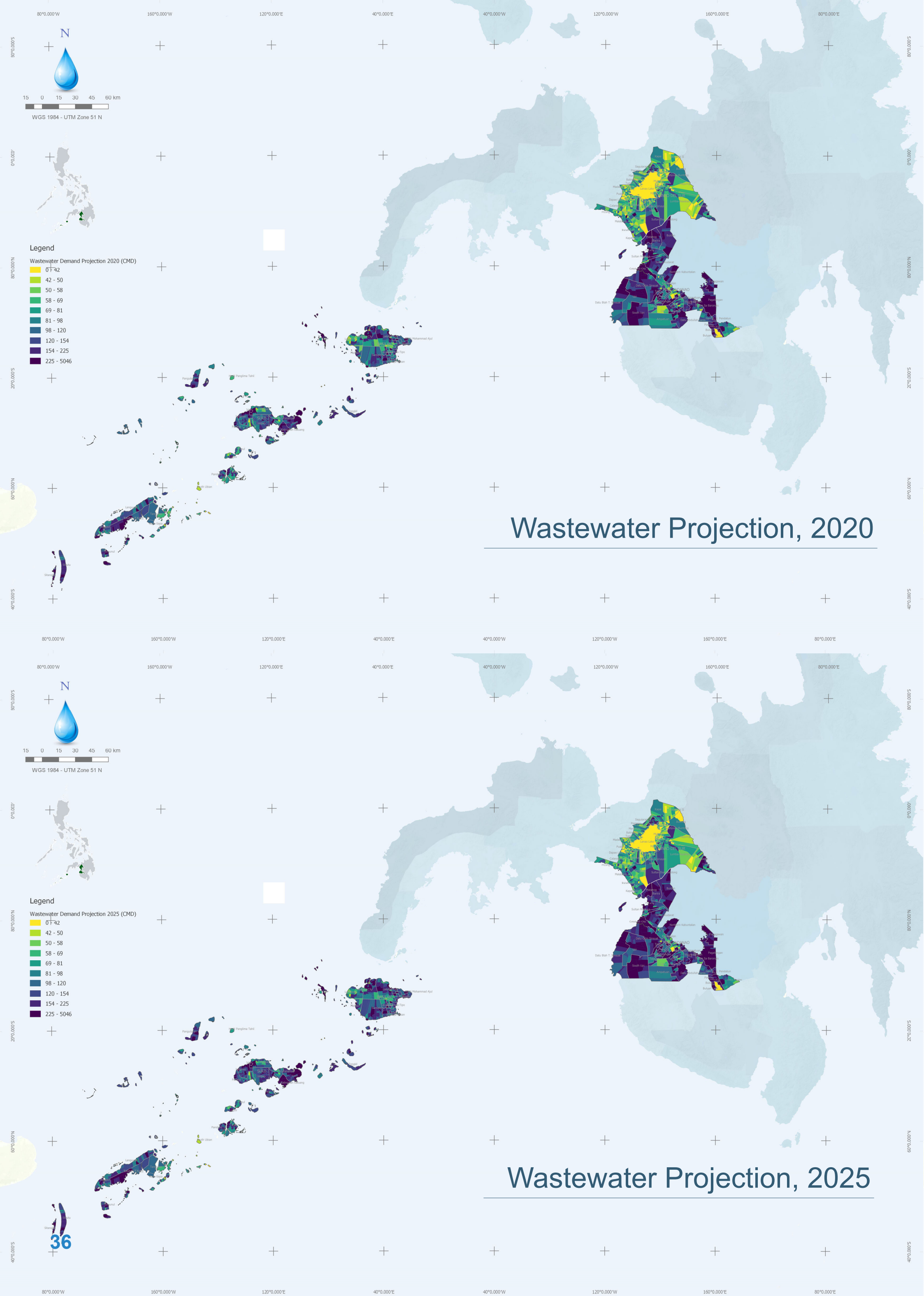
BOD Projection, 2020

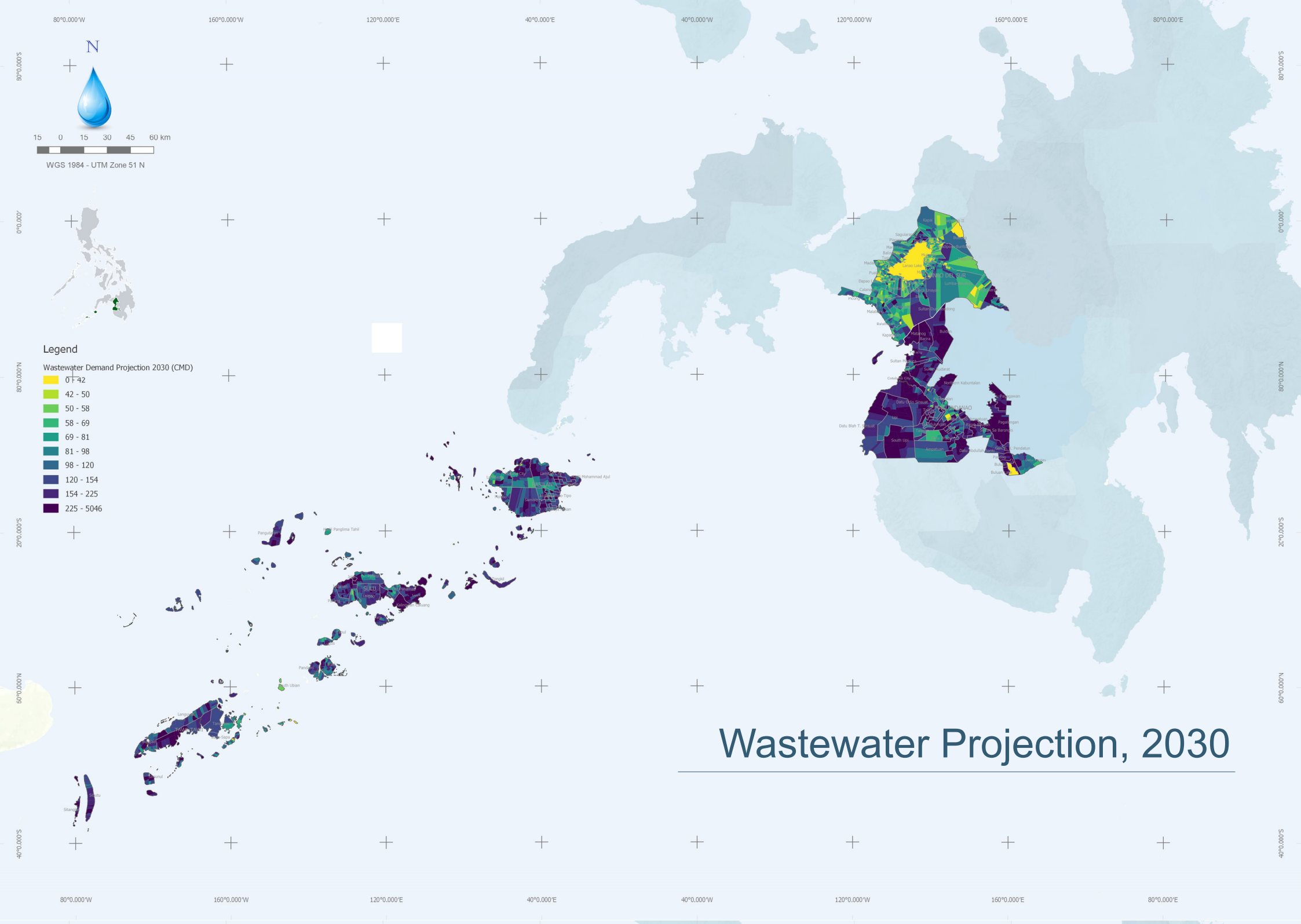
BOD Projection, 2025



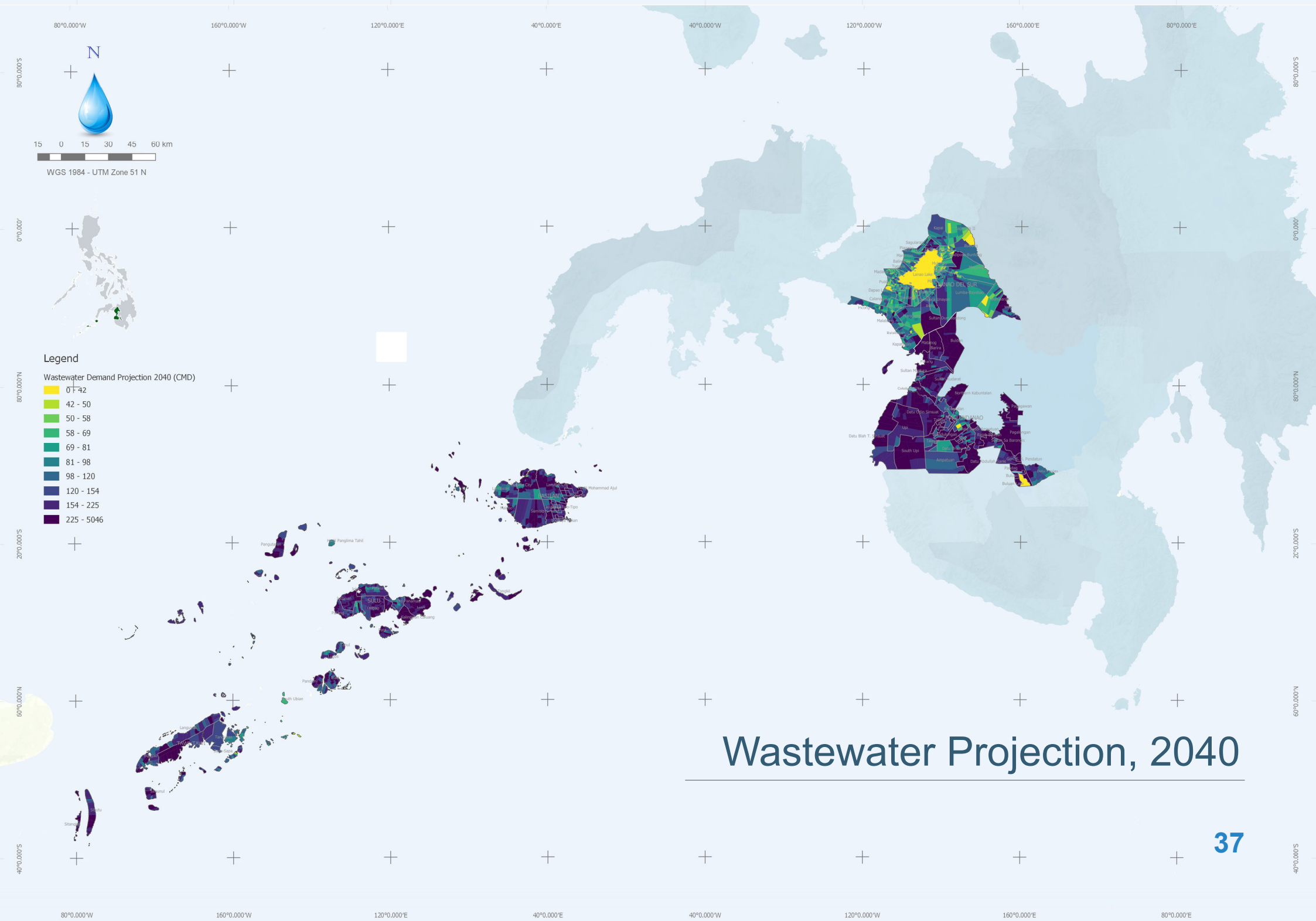
BOD Projection, 2030

BOD Projection, 2040

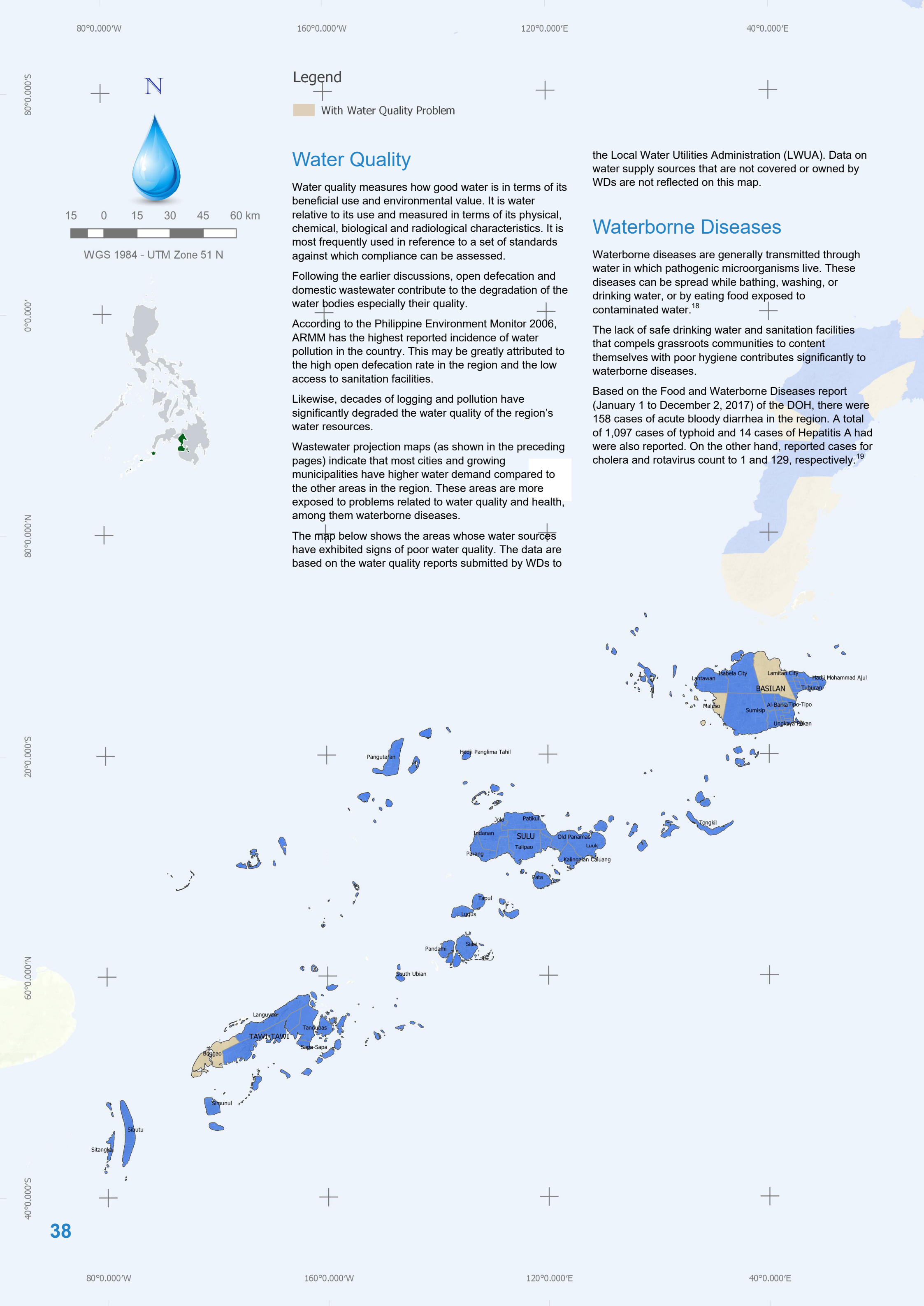

80°0.000'W
160°0.000'W
120°0.000'E
40°0.000'E
40°0.000'W
120°0.000'W
160°0.000'E
80°0.000'E
N
15 0 15 30 45 60 km
WGS 1984 - UTM Zone 51 N
Legend
Wastewater Demand Projection 2020 (CMD)
0 - 42
42 - 50
50 - 58
58 - 69
69 - 81
81 - 98
98 - 120
120 - 154
154 - 225
225 - 5046
Wastewater Demand Projection 2025 (CMD)
SULU
TAWI-TAWI
Wastewater Projection, 2020
Wastewater Projection, 2025



Wastewater Projection, 2030



Wastewater Projection, 2040



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.

Following the earlier discussions, open defecation and domestic wastewater contribute to the degradation of the water bodies especially their quality.

According to the Philippine Environment Monitor 2006, ARMM has the highest reported incidence of water pollution in the country. This may be greatly attributed to the high open defecation rate in the region and the low access to sanitation facilities.

Likewise, decades of logging and pollution have significantly degraded the water quality of the region's water resources.

Wastewater projection maps (as shown in the preceding pages) indicate that most cities and growing municipalities have higher water demand compared to the other areas in the region. These areas are more exposed to problems related to water quality and health, among them waterborne diseases.

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

Waterborne Diseases

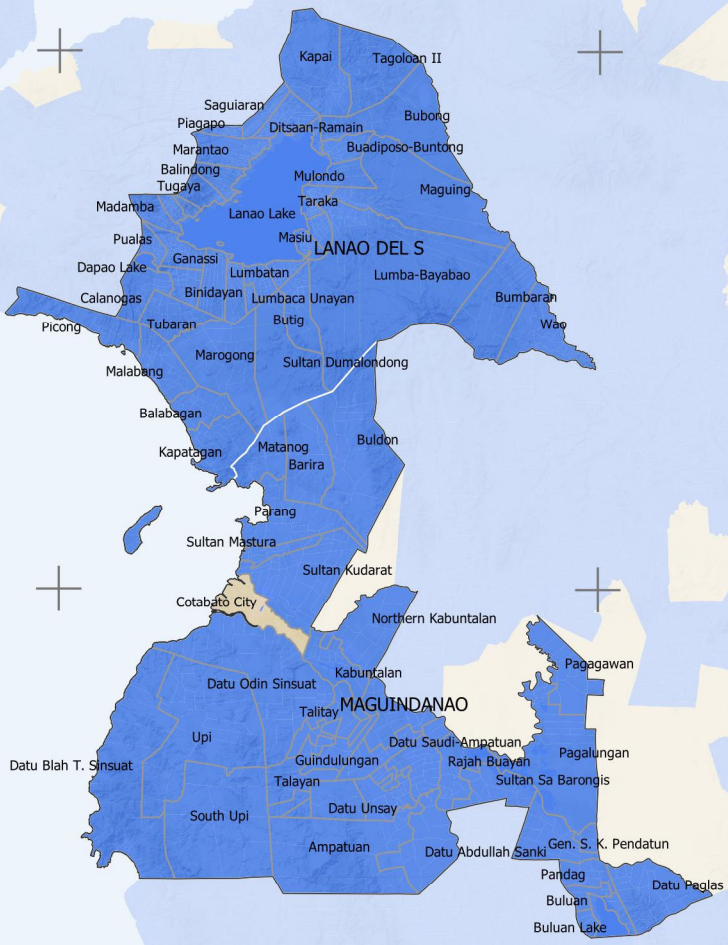
Waterborne diseases are generally transmitted through water in which pathogenic microorganisms live. These diseases can be spread while bathing, washing, or drinking water, or by eating food exposed to contaminated water.[18]

The lack of safe drinking water and sanitation facilities that compels grassroots communities to content themselves with poor hygiene contributes significantly to waterborne diseases.

Based on the Food and Waterborne Diseases report (January 1 to December 2, 2017) of the DOH, there were 158 cases of acute bloody diarrhea in the region. A total of 1,097 cases of typhoid and 14 cases of Hepatitis A had were also reported. On the other hand, reported cases for cholera and rotavirus count to 1 and 129, respectively.[19]

Areas with Water Quality Problems

Water Districts' Water Quality Monitoring Data, LWUA, 2015



As of 2017, the Department of the Interior and Local Government (DILG) reported 87 waterless[20] municipalities in the ARMM. (see Figure 16)

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.

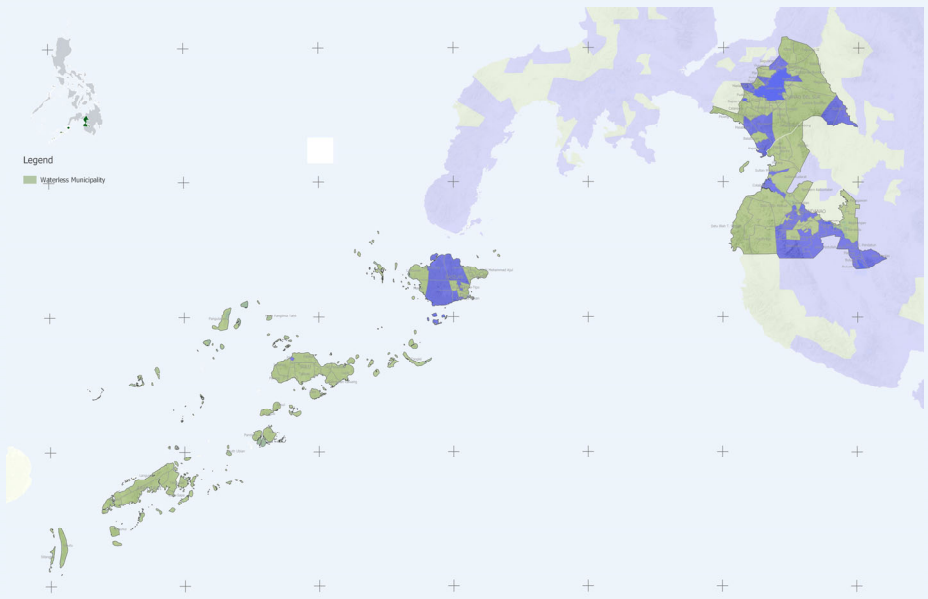


Figure 16: Waterless Municipalities

[18] World Health Organization
[19] Department of Health, Epidemiology Bureau, Food and Waterborne Diseases, 2017
[20] Municipalities with less than 50% service coverage, National Anti-Poverty Commission, 2010

WSS Sector Gaps

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

Issues, Constraints and Challenges

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

The planning workshop participated in by concerned provincial officers from Region IV-A 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.

Planning and Development

The most common hindering factors were: inconsistency of baseline data and information from certain agencies and those from the WDs; LGU’s lack of access to financial resources particularly for the Marawi Rehabilitation Program.

Among the facilitating factors proposed are: data banking and management; involvement of agencies in levelling off complete and consistent data; LGUs’ and other agencies’ support; strong participation and support of the community.

There are also noticeable hindering factors related to stakeholders and implementing agencies in the sector which include: non-readiness of project studies especially in the technical aspect (main reason why the administration of these are at a standstill, or if not, delayed); lack of technical expertise among project staff in the WSS sector; absence of LWUA on a regional level.

Facilitating factors include: site validations and studies, continuous deliberation on water and sanitation issues, and proper training on the necessary technicalities for water supply projects are some facilitating factors.

Service Provision

Issues on the service provision area are mostly on monitoring and evaluation (M&E). Hindering factors mainly include: lack of basic information on projects; lack of concrete guidelines and regulations; lack the proper knowledge and expertise on the operation of water systems; no accountability in sustaining the needs of the project; non-prioritization of WSS projects; weak enforcement of codes and laws; and lack of technical aspect on policies.

Facilitating factors include: education of stakeholders on the importance of facilities; trainings and seminars for appointed personnel; and involvement of the beneficiaries and constant coordination through consultations and awareness campaigns.

Regulation

Concerns on the regulation area are generally on the political aspect and include unclear and opaque policies, politicization, lack of awareness of stakeholders on political issues, and lack of capacity of implementers. Other factors hindering this area are: unpolished and vague policies; and regulations are done for compliance only.

Some political leaders are unaware of their power to implement projects and are hesitant in implementing sanctions due to possible losses in political support. Projects are instituted as to where the politicians want them to be instead of where they are really needed. Lobbying functional regulatory institutions and policy-making bodies are mitigating factors.

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

Table 14: Hindering and Facilitating Factors

Area	Hindering Factors	Facilitating Factors
Planning and Development	Non-readiness of raw and congruent data and information	Data banking and management system
		Assignment of IT staffs to maintain the system
		Involvement of agencies in data and information gathering
	Declaration of non-reliable information	Realistic information to address the trend
	Slow accessibility of financial resources particularly for Marawi Rehabilitation Program	Immediate response of the government to fast track water system developments
	Political rivalry	Trust and confidence, and community-driven development.
	Non-readiness of project studies especially on the technical aspect	Site validation and study
	Inharmonious status of water supply and sanitation in ARMM	Continuous deliberation on WSS issues
	Absence of courtesy call and collaboration of implementing agencies with the LGU and community	Partnerships between agencies and LGUs
		Identification of a focal person who is dedicated to finishing plans
	Lack of knowledge on the planning process	Identification of a focal person who is knowledgeable about planning or has a planning experience
	Unsustainability of projects	Sense of ownership of LGUs
	Lack of resources and financial support	Joint venture with private agencies
		Allocation of funds
	Incoherence of projects to objectives	Consultation from constituents
Service Provision	Geographical location of island municipalities	Increase competency of work-force
	Climate change	
	Water scarcity	Utilization of available water resources
	Negligence of motivation and empowerment	Involvement of beneficiaries
	Lack of information dissemination	Conduct water and sanitation awareness
	Weak enforcement of sanitation policy	Lobby for the formulation of ordinances
	Low prioritization on sanitation	Increase prioritization and demand on sanitation
	Minimal monitoring on sanitation	Increase determination to public service
	Low technical on policy formulation	Capacity building on policy formulation
	Unsustainability of programs	Creation of suitable programs for current conditions
	No single agency to take responsibility for both water supply and sanitation	Creation of an organization to oversee
	Lack of sense of accountability	Education of stakeholders on the importance of facilities
	Employment of political appointees	Conduct of trainings and seminars
		Improvement in the hiring process
	Lack of accurate and viable feasibility studies	Conduct of actual field investigations
Regulation	Unoriginal ordinances and unpolished policies	Strict monitoring and implementation of issued policies
	Political interests	Capacitate competencies
	Lack of education on water supply and sanitation	Capacitate legislative and executive competencies
	Lack of policies for water and sanitation	Lobbying to policy making bodies
	Hesitance on the implementation of sanctions	Strict and fair implementation of policies
	Selfish attitude towards rewards	
	Lack of financial allocation for rewards	Inclusion in the budgetary proposal
	Illegal logging	Strict implementation of ordinances and national laws
	Unclear policies and political issues	Stakeholder consultation
		Strict compliance
	Employment of unsuitable personnel	Improvement in the hiring process
	Lack of expertise and lack of training	Capacitate through trainings
	Lack of technical knowledge regarding monitoring and inspection	Formulation of standards of water quality
	Water and sanitation as a last priority	Equal assessment of policies

Provincial Visions

The individual Provincial WSS visions (see Table 15) were constructed by the visioning groups of each province with a goal of having universal access to safe and sustainable water all throughout the region by the year 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 WSS 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 the ARMM highlighting the provinces' individual plans. Cluster 1 priority areas include infrastructure development, alliance building and financing. On the other hand, those of Cluster 2 include infrastructure development, policy development and enforcement, capacity building and community empowerment. 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 16.

Table 15: Provincial Water Supply and Sanitation Visions

Province	WSS Vision
Cluster 1	
Lanao del Sur	**By 2030, the Province of Lanao del Sur will have full access to a sustainable water supply and sanitation services 24/7, managed by highly skilled technical personnel through the harmonious relationship between LGUs and concerned agencies with the cooperation of the entire community.**
Maguindanao	**By 2030, all Maguindanaons have access to safe and sustainable water system and complete basic sanitation facilities with stakeholders valuing, prioritizing, supporting and effectively implementing water supply and sanitation programs.**
Cluster 2	
Basilan	**By 2040, Basilan is foreseen as a self-sufficient province once it has successfully lay down in place the following elements: (a) safe water, (b) sustainable water supply and sanitation, and (c) oneness of family in every community as they live a wonderful life.**
Sulu	**Every Tausug family is envisioned to have sustainable access to safe water sanitation for all facilities at home, schools, offices or hospitals, and sustainable water source, including protection of watersheds.**
Tawi-Tawi	**Tawi-Tawi by 2040 is envisioned to become an economic zone area with the completion of the following three elements: (a) watershed protection for water supplies' continuous function, (b) water treatment of these water sources, and (c) connectivity of all the municipalities in socio-economic and education sectors.**

Table 16: 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

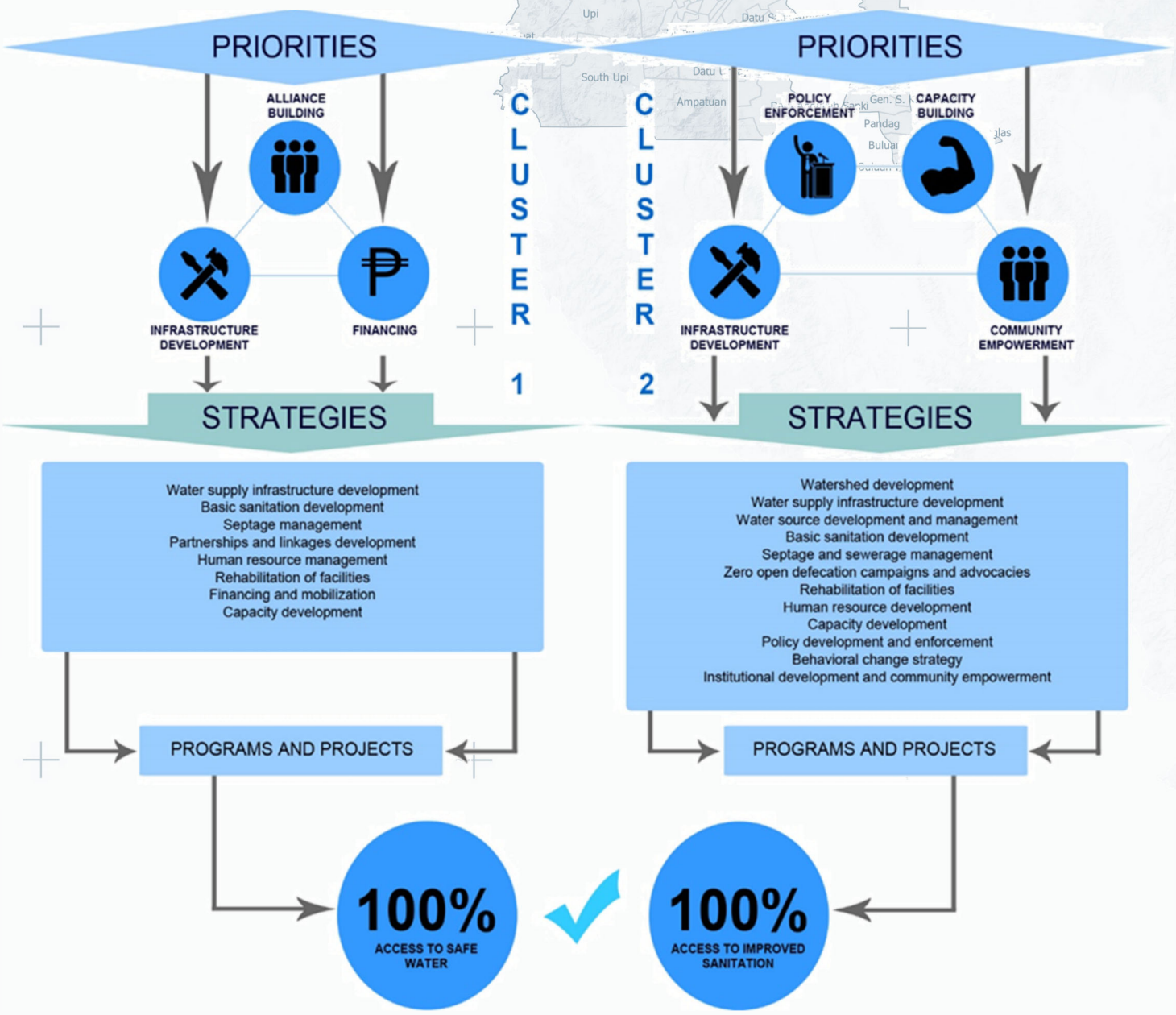


Figure 17: ARMM WSS Strategic Framework

Access Targets for Water Supply and Sanitation

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

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

The ARMM strives to achieve 92.8% access to safe water by 2022 and 99.5% by 2030. Universal access by 2040 means more than 979,799 HHs will benefit. For sanitation, improved access is set at 97% for 2022 and universal access by 2030.

Figures 18 and 19 graphs the WSS for 2022 and 2030 in terms of additional households.

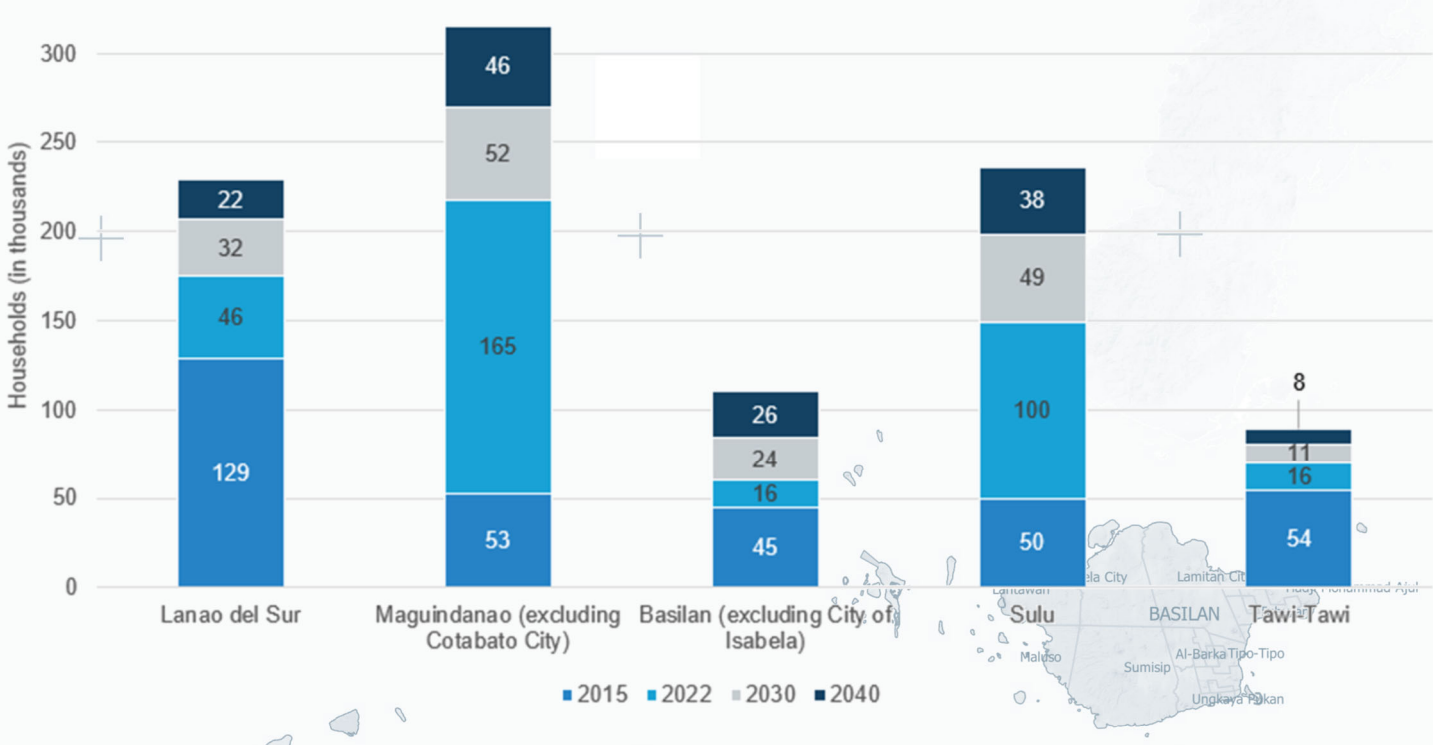


Figure 18: Targeted Households with Access to Safe Water

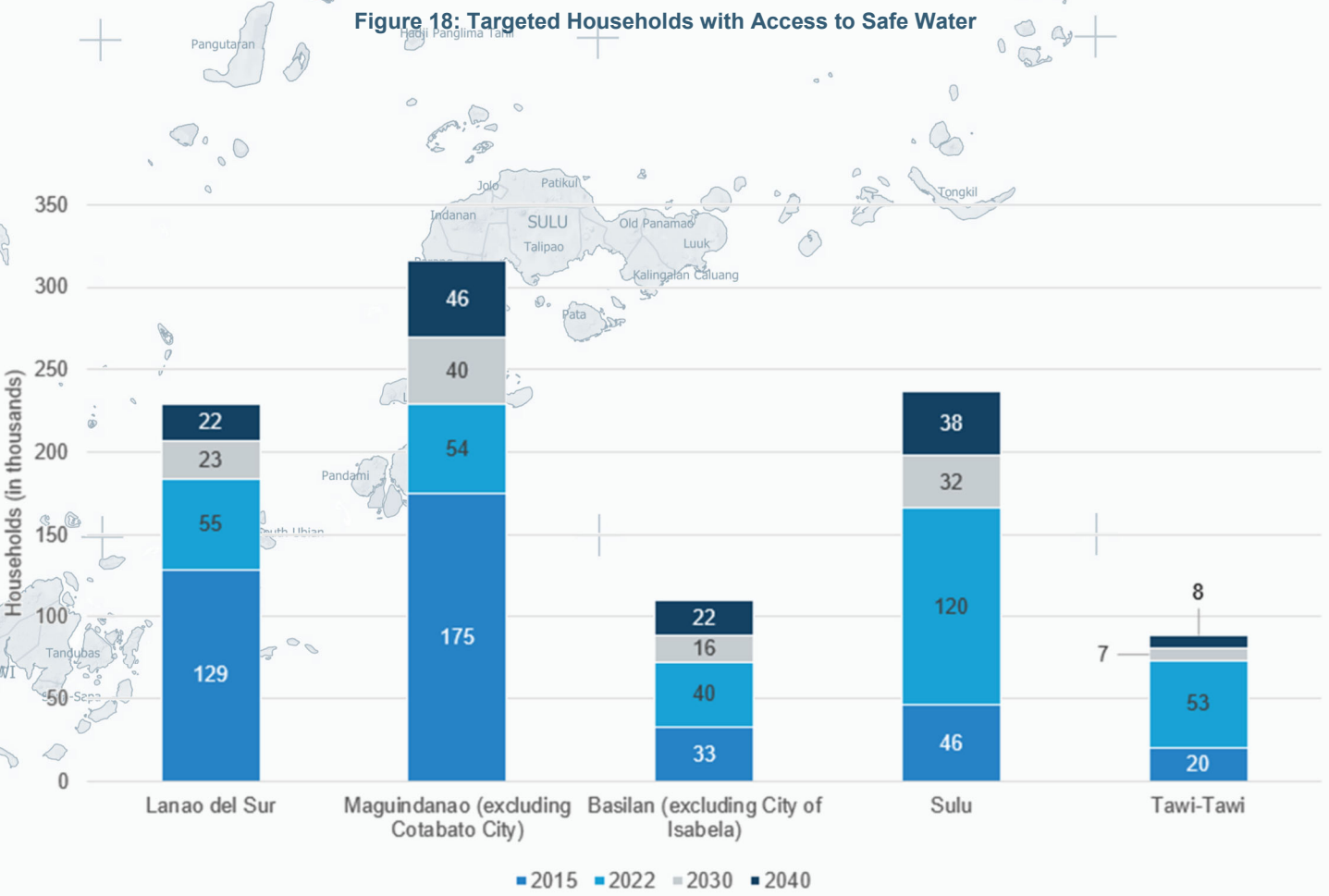


Figure 19: Targeted Households with Access to Sanitation

Water Supply Targets

LANAO DEL SUR			
Category	2022	2030	2040
Level III	50.0%	85.0%	100.0%
Level II	30.0%	10.0%	0.0%
Level I	15.0%	5.0%	0.0%
Safe Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

MAGUINDANAO (EXCLUDING COTABATO CITY)			
Category	2022	2030	2040
Level III	15.0%	50.0%	100.0%
Level II	60.0%	40.0%	0.0%
Level I	20.0%	10.0%	0.0%
Safe Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

BASILAN (EXCLUDING CITY OF ISABELA)			
Category	2022	2030	2040
Level III	30.0%	40.0%	100.0%
Level II	25.0%	35.0%	0.0%
Level I	28.0%	20.0%	0.0%
Safe Access	83.0%	95.0%	100.0%
No Access	17.0%	5.0%	0.0%
Total	100.0%	100.0%	100.0%

SULU			
Category	2022	2030	2040
Level III	10.0%	25.0%	100.0%
Level II	30.0%	45.0%	0.0%
Level I	50.0%	30.0%	0.0%
Safe Access	90.0%	100.0%	100.0%
No Access	10.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

TAWI-TAWI			
Category	2022	2030	2040
Level III	15.0%	20.0%	100.0%
Level II	37.0%	40.0%	0.0%
Level I	43.0%	40.0%	0.0%
Safe Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

ARMM			
Category	2022	2030	2040
Level III	24.8%	49.7%	100.0%
Level II	39.6%	32.8%	0.0%
Level I	28.4%	17.0%	0.0%
Safe Access	92.7%	99.5%	100.0%
No Access	7.3%	0.5%	0.0%
Total	100.0%	100.0%	100.0%

Sanitation Targets

LANAO DEL SUR			
Category	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	0.0%	0.0%	0.0%
Shared / Communal / Limited	1.0%	0.0%	0.0%
Open Defecation	2.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

MAGUINDANAO (EXCLUDING COTABATO CITY)			
Category	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	3.0%	0.0%	0.0%
Shared / Communal / Limited	0.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

BASILAN (EXCLUDING CITY OF ISABELA)			
Category	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%

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

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

ARMM			
Category	2022	2030	2040
Improved	97.0%	100.0%	100.0%
Basic	2.0%	0.0%	0.0%
Shared / Communal / Limited	0.5%	0.0%	0.0%
Open Defecation	0.5%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

Strategic Interventions

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

Tables 17 and 18 show the specific strategic interventions for water supply and sanitation, respectively.

Table 17: 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 18: 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*
Low Access Areas with 0 to 29 % Improved Sanitation Coverage	• Local Sustainable Sanitation Plan (LSSP) to be incorporated in to the WSS Sector Plan, LDP, AIP, and local health plan • Plan for developing and legislating basic sanitation program to make sure that every household and building has a toilet and septic tank/onsite treatment • Financial support for basic sanitation programs – combination of micro-finance and behavior change communication; possibly integrating OBA, sweat equity, and sanitation vouchers • Plan for developing interventions for rural and inaccessible areas including developing alternative onsite systems	• Sanitation program should focus on implementing basic sanitation programs and zero open defecation programs • M&E system conforming to PSA/ Census in-placed (covered by onsite systems) • Initiate the introduction of septage management programs •	• LGU/WD implementors have undergone compliance trainings from DOH and DENR (particularly for basic sanitation systems) • Compliance to Office of the Building Officials and Sanitary Inspectors regulations and guidelines • Implement strict penalties for those not complying to building regulations and for openly defecating • Sanctions to be imposed on building officials for failing to regulate septic tanks that are not up to code	• Promotions should focus on enjoining the public to build their toilets and septic tanks; proper construction and use of toilets and septic tanks; general promotions on the benefits of good sanitation • Inform public on the health and environmental hazards of open defecation

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 19.

Table 19: Capital Investments Required for the 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.

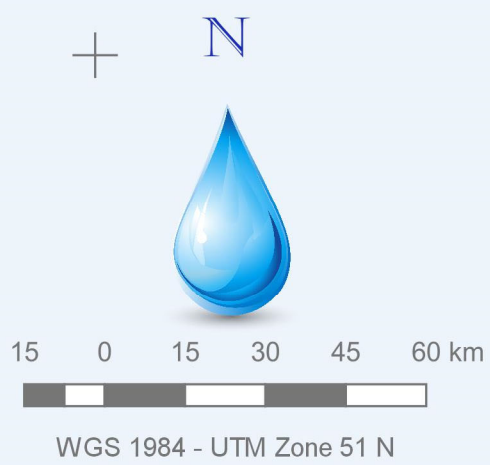
Targets for 2022 will mainly focus on basic sanitation. The septage and sewerage management programs are to be undertaken to achieve 2030 targets, although these programs may be implemented as early as 2022.

Non-physical 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 20.

Table 20: Institutional and Regulatory Reforms Required for Water Supply and Sanitation Goals

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



Addressing the Gaps

Water Supply Investment Requirements

Physical Investments

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

The ARMM requires capital investments for infrastructure development of about PhP10.77 billion and PhP12.53 billion to achieve 2022 and 2030 targets, respectively. Unit development costs employed to arrive at these sums are estimated at PhP35,800 per HH for Level III, PhP21,000 for Level II, and PhP9,400 for Level I.

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

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

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

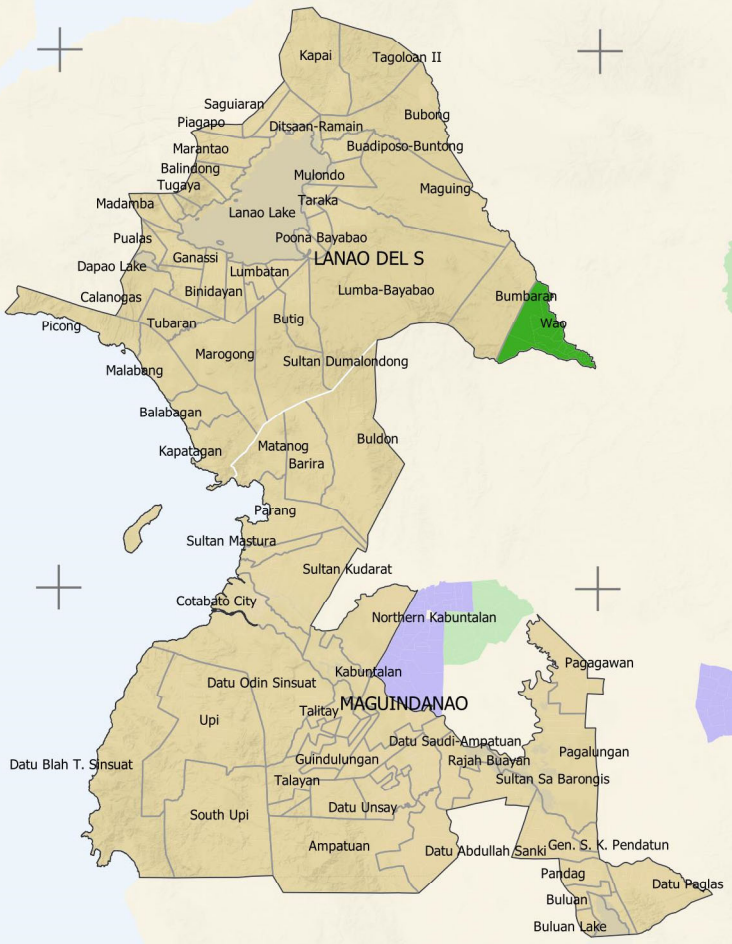
Aside from the direct costs, indirect costs were considered in estimating the total investment requirements. These items include project preparation activities (which may affect budget considerations) before actual construction work begins. Items considered and percentage values used in relation to the total direct costs computed are shown in Table 21.

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

LWUA Priority Projects

2015, LWUA



Non-Physical 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 above shows the two ARMM LGUs where priority WD projects are pending approval for LWUA's financial assistance (FA) — Maluso WD and Wao WD.

Table 21: Indirect Costs Employed[21]

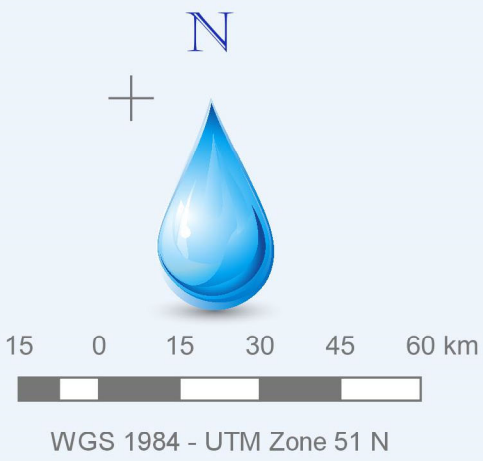
Water Supply		
Contingency	10.0%	Percentage of Total Direct Cost
Feasibility Study	3.0%	Percentage of Total Direct Cost
Detailed Engineering Design	6.0%	Percentage of Total Direct Cost
Construction Supervision	5.0%	Percentage of Total Direct Cost
ROW/Land Acquisition	3.0%	Percentage of Total Direct Cost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

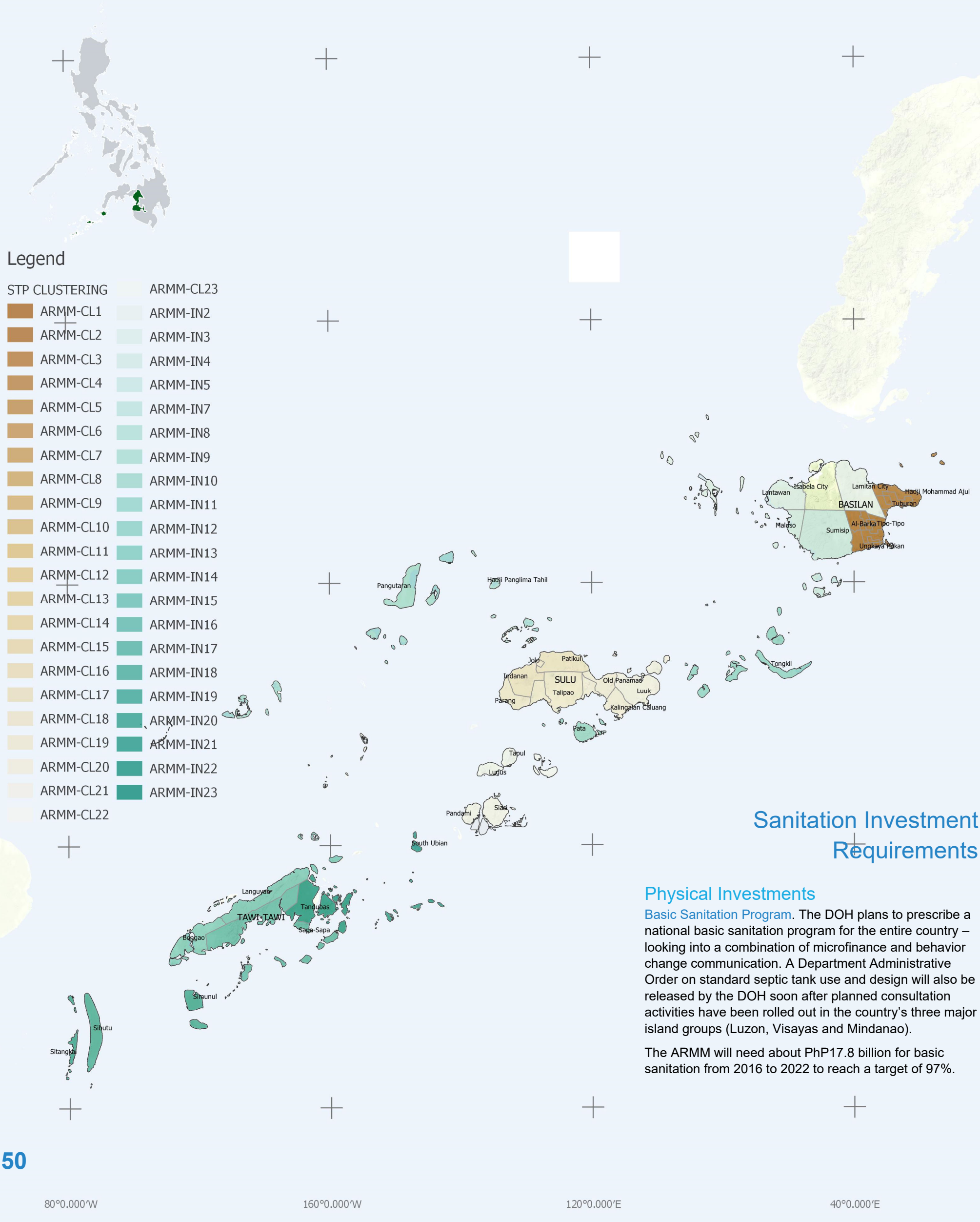
Table 22: Total Investment Costs for Water Supply Sector

Province	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Lanao del Sur	2,788	3,906
Maguindanao (excluding Cotabato City)	4,538	4,672
Basilan (excluding City of Isabela)	660	986
Sulu	2,134	2,596
Tawi-Tawi	649	376
Total	**10,770**	**12,535**

[21] *Based on Industry Standards*

80°0.000'W
160°0.000'W
120°0.000'E
40°0.000'E
80°0.000'S
0°0.000'
80°0.000'N
20°0.000'S
60°0.000'N
40°0.000'S





Sanitation Investment Requirements

Physical Investments

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

The ARMM will need about PhP17.8 billion for basic sanitation from 2016 to 2022 to reach a target of 97%.

Septage Treatment Plant Clustering

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 above.

The region will spend about PhP1.673 billion and PhP2 million for year 2022 and 2030, respectively, for its septage management program.

Sewerage System Program. There are no plans concerning sewerage systems yet in the ARMM. However, rapidly urbanizing cities (i.e., candidate HUCs) should also consider planning for sewerage services in the interim.

Candidate HUCs in Basilan (e.g. Lamitan) may be closely examined initially as urbanization may set in more rapidly in these places than in other capital cities or towns.

Table 23: Total Investment Costs for Sanitation Sector

Province	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Lanao del Sur	4,784	1,146
Maguindanao (excluding Cotabato City)	7,867	1,873
Basilan (excluding City of Isabela)	2,375	714
Sulu	6,068	1,470
Tawi-Tawi	2,628	306
Total	**23,722**	**5,510**

Non-Physical Investments

The ARMM, 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, 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 20 shows the distribution of the investment requirement per province. Based on the proposed projects and programs, the region needs PhP 52.537 billion boost its WSS sector.

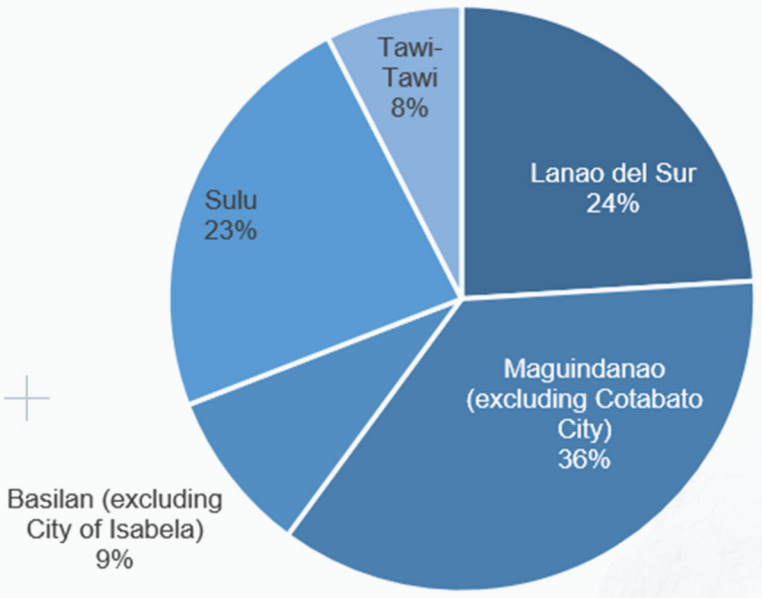


Figure 20: Distribution of Investment Requirement per Province

Basilan								
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Feasibility Study of the Water Sources & Data Banking System of Basilan Water Supply	Short Term	75.00	1	Feasibility study of the sanitation facilities and technologies applicable in the province: Establishment of databanking system	Short Term	75.00	
2	Watershed Development:		120.00	2	Social Preparation on Sanitation : Information dissemination; Partner with religious group, DEPED and other NGO's; Develop informational and cultural sensitive material/ IEC's	Short Term	30.00	
3	Provision of Water Infrastructure Water System Development Program	Medium Term	891.00	3	Targeting municipalities and barangays for ZOD by provision of Latrine Bowl & Cem	Long Term	1,030.00	
4	Rainwater harvesting in HH's, Schools & Government Facilities (Not for food and drinking)	Short Term	75.00	4	Construction of canals along the road; public septic tank, piping system, and communal toilet in public places for travellers	Long Term	6.38	
5	Procurement of Mobile Water Boat for island Municipalities	Short Term	297.00	5	Regular Monitoring of current status per LGU's	Short Term	2.94	
6	Water Truck with mobile water treatment plant for mainland far flung areas without near water	Short Term	223.00	6	Septage Management: Construction of STP per cluster and LGU monitoring of septic tank	Medium Term	510.00	**3,727.32**
7	Ensuring 24/7 access to Potable and Safe water supply, Rehabilitation of dilapidated pipelines of Level III water supply	Short Term	120.00	7	Training of personnel involved in sanitation program	Short Term	2.00	
8	Monitoring & Maintenance of access to safe & potable water supply	Short Term	55.00			**Total**	**1,656.32**	
9	Sustainability of Rural Water Supply Svstem / Creation of responsible bodies to maintain the water svstem	Short Term	75.00					
10	Procurement of Laboratory Apparatus, equipment & reagent. To test the Mandatory Parameters based on PNSDW 2017	Short Term	50.00					
11	Training for LGU & Stakeholders on Basic Chlorination and Maintenance of Water System	Short Term	24.00					
12	Twinning and Benchmarking to successful water providers	Medium Term	24.00					
13	Livelihood project for the IP's	Short Term	42.00					
		Total	**2,071.00**					

Lanao del Sur								
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Assessment of Existing Marawi City WD Water System	Short Term	50.00	1	Basic Sanitation Program for Lanao del Sur	Long Term	3,990.15	
2	Construction of Pumping Station, Reservoir and Pipelines from Brgy. Bubonga Marawi to Buadi Sucayo to Sagonsongan	Long Term	50.00	2	Septage Treatment Plant (STP) in 7 clusters of Lanao del Sur	Long Term	330.34	
3	Salintubig Program of 7 Barangays (Basak, Malutlut, East Basak, Luksa Datu, Marawi Poblacion, Mipaga, Sagonsongan)	Long Term	75.00			**Total**	**4,320.49**	**9,936.00**
4	Water Access Supply to all Households in Lanao del Sur	Long Term	5,440.51					
		Total	**5,615.51**					

Maguindanao								
	Water Supply	Period	Budget Requirement		Sanitation	Period	Budget Requirement	Total Budget Requirement
1	Level II Water System for health facilities	Short Term	350.00	1	Provision of cash grant to municipal verified and certified as ZOD area with sanitation facilities and vest practices.	Short Term	750.00	
2	Central Maguindanao Integrated Potable Water System Phase 2	Long Term	8.50	2	Mobilization funds for monitoring and evaluation of sanitation programs	Short Term	0.00	
3	Construction of Modular Water Treatment Facility 8000CMD Capacity	Short Term	4.00	3	Zero Open Defecation Program (ZODP)	Short Term	2,000.00	
4	Pipeline Replacement Project along National Highway (Brgy. Tanuel - Brgy. Broce DOS)	Short Term	9.60	4	Community-Led Total Sanitation Hands-on Training	Short Term	7.00	
5	Construction of water system level II for:	Long Term	1,717.40	5	Production of Information Education Campaign	Short Term	2.00	
		Total	**2,089.50**	6	Provision of funds for the construction/ installation of individual toilet facility	Short Term	1,500.00	
				7	Construction of communal sanitation facilities and toilets; and rehabilitation on existing communal toilets	Short Term	500.00	**9,054.97**
				8	Construction of STPs for:	Long Term	2,193.67	
						Total	**6,952.67**	
					Both Water Supply and Sanitation	Timeline	Budget Requirement (₱ Million)	
				1	Capacity Bulding	Short Term	8.00	
				2	Feasibility Study	Short Term	4.80	
						Total	**12.80**	

Sulu								
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Update Water Inventory and Assessment	Short Term	3.80	1	Implementation ofCommunity Led-Total Sanitation:	Short Term	3,944.80	
2	Conduct Watershed Inventory	Short Term	0.95	2	Construction of Clustered Septage	Short Term	236.00	
3	Tree Planting & Reforestation	Medium Term	8.00			**Total**	4,180.80	
4	Upgrading andRehabilitation of Jolo Mainland Water District	Short Term	200.00		Water Supply and Sanitation	Timeline	Budget Requirement (PhP Million)	
5	Construction of Level II and III Water System	Medium Term	2,099.87	1	Capacity Development training	Medium Term	8.00	
6	Provision of Desalination for island municipalities	Short Term	450.00	2	Hiring of water & sanitary specialist	Medium Term	4.80	
7	Construction Water analysis laboratory & Equipment	Short Term	20.00	3	Hiring of Sanitary Inspectors	Medium Term	28.80	**7,502.34**
8	Development of FS and hiring of consultant	Short Term	10.00			**Total**	**41.60**	
9	Rain Water management: Construction of ferrocement rain water collector with filtration	Medium Term	471.73					
10	Enforcement of Environmental Laws: Develop IEC Materials and FGD with communities	Short Term	2.75					
11	Organization of Barangay Water and Sanitation Association	Short Term	2.85					
12	Formulate Provincial/Municipal WASHPlan / Create ordinance creating local WASH Council	Short Term	10.00					
		Total	**3,279.94**					

Tawi-Tawi								
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)
1	Identify all Water sources. Including Rain Water (Harvesting in HHs, schools, government facilities); Assessment and mapping of water sources; Conduct FS and Training of PWSST; Establishment of Water Treatment Plants and Water Quality Testing Laboratory.	Short Term	1,980.00	1	Conduct of survey on sanitation facilitiesand practices	Short Term	82.00	
2	Training for WSPs, ILGUs and other stakeholders	Short Term	87.00	2	Intensive IEC on Intensive IEC on Social Mobilization Focused Group Discussion/ Tri-Media	Short Term	45.00	
3	Monitoring of water quality and compliance to applicable laws	Short Term	25.00	3	Trainings on Sanitation	Short Term	60.00	
4	Livelihood Projects for the IPs j relevant to watershed/forest protection and management)	Short Term	20.00	4	Inspection and Monitoring Activities	Short Term	135.00	
5	Organize a Monitoring Team	Short Term	30.00	5	Construction of STP's in 11 identified clusters and Construction of Sanitation Facilities	Short Term	2,371.00	**4,843.00**
		Total	**2,142.00**			**Total**	**2,693.00**	
					Water Supply and Sanitation	Timeline	Budget Requirement (PhP Million)	
				1	Capacity Development training	Medium Term	8.00	
						Total	**8.00**	

Appendix A: Provincial Profiles

BASILAN	11 municipalities	Akbar, Al-Barka, Hadji Mohammad Ajul, Hadji Muhtamad, Lantawon, Maluso, Sumisip, Tabuan-Lasa, Tipo-Tipo, Tuburan, Ungkaya Pukan
	two (2) component cities	City of Isabela (administratively under Region IX), Lamitan City
	210 barangays (excluding City of Isabela)	37 urban, 173 rural
Land Area	1,103.5 square kilometers	
Demographics (2015)	Population (2015) – 346,579 Population Growth Rate (2000 to 2015) – 1.91 Population Density – 310 per sq. km	
Economy	• Major industries - agriculture, fishery/aquaculture, handicraft • Major products - palm oil, fish such as tuna, mackerel and sardines; woven cloth and trinkets made by the Yakan tribe; crafts made from pineapple fiber • Major crops - coconut, coffee, black pepper, natural rubber, pineapple	
Poverty Incidence (2015)	On Families – 28.3% On Population – 37.0%	

LANAO DEL SUR	39 municipalities	Amai Manabilang, Bacolod-Kalawi, Balabagan, Balindong, Bayang, Binidayan, Buadiposo-Buntong, Bubong, Butig, Calanogas, Ditsaan-Ramain, Ganassi, Kapai, Kapatagan, Lumba-Bayabao, Lumbaca-Unayan, Lumbatan, Lumbayanague, Madalum, Madamba, Maguing, Malabang, Marantao, Marogong, Masiu, Mulondo, Pagayawan, Piagapo, Picong, Poona Bayabao, Pualas, Saguiran, Sultan Dumalondong, Tagoloan II, Tamparan, Taraka, Tubaran, Tugaya, Wao
	one (1) component city	Marawi City
	1,159 barangays	12, urban, 1147 rural
Land Area	3872.89 square kilometers	
Demographics (2015)	Population (2015) – 1,045,429 Population Growth Rate (2000 to 2015) – 1.77 Population Density – 270 per sq. km	
Economy	• Major industries - agriculture, fishery, forestry, weaving • Major products - *malong*, brass • Major crops - rice, corn, coconut, banana, pineapple, coffee, "hot moro", "hot chili"	
Poverty Incidence (2015)	On Families – 66.3% On Population – 71.9%	

Tawi-Tawi	11 municipalities	Bongao, Languyan, Mapun, Panglima Sugala, Sapa-Sapa, Sibutu, Simunul, Sitangkai, South Ubian, Tandubas, Turtle Islands
	203 barangays	10 urban, 193 rural
Land Area	1,087.4 square kilometers	
Demographics (2015)	Population (2015) – 390,715 Population Growth Rate (2000 to 2015) – 1.27 Population Density – 360 per sq. km	
Economy	• Major industries - agriculture, fishery • Major products – seaweed, seafood • Major crops - copra, root crops, fruits and vegetables • Tawi-Tawi is the largest seaweed-producing province in the country with roughly 80% of its people earning a living from seaweed farming.	
Poverty Incidence (2015)	On Families – 10.6% On Population – 12.6%	

MAGUINDANAO	36 municipalities	Ampatuan, Barira, Buldon, Buluan, Datu Abdullah Sangki, Datu Anggal Midtimbang, Datu Blah T. Sinsuat, Datu Hoffer Ampatuan, Datu Odin Sinsuat, Datu Paglas, Datu Piang, Datu Salibo, Datu Saudi-Ampatuan, Datu Unsay, General Salipada K. Pendatun, Guindulungan, Kabuntalan, Mamasapano, Mangudadatu, Matanog, Northern Kabuntalan, Pagagawan, Pagalungan, Paglat, Pandag, Parang, Rajah Buayan, Shariff Aguak, Shariff Saydona Mustapha, South Upi, Sultan Kudarat, Sultan Mastura, Sultan sa Barongis, Talayan, Talitay, Upi
	one (1) independent city	Cotabato City (administratively under Region XII)
	508 barangays (excluding Cotabato City)	20 urban, 488 rural
Land Area	4,871.6 square kilometers	
Demographics (2015)	Population (2015) – 1,173,933 Population Growth Rate (2000 to 2015) – 2.54 Population Density – 240 per sq. km	
Economy	• Major industries - agriculture, fishery, livestock, handicraft • Major products - freshwater fish, shellfish, livestock such as chicken, goat and water buffalo; handicrafts made from wood, bamboo, rattan and fiver • Major crops - rice, corn, coconut, yam, sweet potatoes, vegetables such as squash and beans	
Poverty Incidence (2015)	On Families – 48.8% On Population – 57.2%	
SULU	19 municipalities	Banguingui, Hadji Panglima Tahil, Indanan, Jolo, Kalingalan Caluang, Lugus, Luuk, Maimbung, Old Panamao, Omar, Pandami, Panglima Estino, Pangutaran, Parang, Pata, Patikul, Siasi, Talipao, Tapul
	410 barangays	17 urban, 393 rural
Land Area	1,600.4 square kilometers	
Demographics (2015)	Population (2015) – 824,731 Population Growth Rate (2000 to 2015) – 1.89 Population Density – 520 per sq. km	
Economy	• Major industries - fishery/aquaculture, handicraft • Major products - handicrafts such as boats, bladed weapons, bronze and brassware; *pis* cloth, embroidered textiles, shellcraft, traditional house carvings, and carved wooden grave markers • Major crops - abaca, coconut, coffee, orange, *lanzones*	
Poverty Incidence (2015)	On Families – 49.6% On Population – 54.9*%	

NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

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

www.neda.gov.ph
NEDAhq