NATIONAL ECONOMIC AND DEVELOPMENT AUTHORITY

Volume 2: Philippine Water Supply and Sanitation Master Plan

Cagayan Valley Water Supply and Sanitation Databook and Regional Roadmap

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Acronyms

AHFF	Agriculture, Hunting, Fishery and Forestry
AIP	Annual Investment Plan
AM	Assistance to Municipalities
BOD	Biological Oxygen Demand
BWSA	Barangay Water and Sanitation Association
CapEx	Capital Expenditure
CBO	Community-based Organization
CNC	Certificate of Noncoverage
DA	Department of Agriculture
DAO	DENR Administrative Order
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DJF	December, January, and February
DOH	Department of Health
DPWH	Department of Public Works and Highways
DTI	Department of Trade and Industry
EMB	Environmental Management Bureau
FA	Financial Assistance
FAO	Food and Agriculture Organization
FHSIS	Field Health Service Information System
FIES	Family Income and Expenditure Survey
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
GVA	Gross Value Added
HH	Household
HUC	Highly Urbanized City
IEC	Information, Education and Communication
IP	Indigenous People
IWRM	Integrated Water Resource Management
JICA	Japan International Cooperation Agency
JJA	June, July and August
LCE	Local Chief Executive
LDP	Local Development Plan
LFPR	Labor Force Participation Rate
LGU	Local Government Unit
LHB	Local Housing Board
LSB	Local School Board
LSSP	Local Sustainable Sanitation Plan
LWSSP	Local Water Supply and Sanitation Plan
LWUA	Local Water Utilities Administration
M&E	Monitoring and Evaluation
MAM	March, April and May
MDG	Millennium Development Goals
MGB	Mines and Geosciences Bureau
MSME	Micro, Small and Medium Enterprises
NAMRIA	National Mapping and Resource Information Authority
NCR	National Capital Region
NDRRMC	National Disaster Risk Reduction and Management Council
NEDA	National Economic and Development Authority
NGO	Nongovernment Organization
NRW	Nonrevenue Water
NSSMP	National Septage and Sewerage Master Plan
NWRB	National Water Resources Board
O&M	Operations and Management
OBS	Observed Baseline

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

Units

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

2

Region II - Cagayan Valley

Cagayan Valley Region

Introduction

Cagayan Valley, designated as Region II, is located on the northeastern tip of the Philippines.

It is bounded by three big mountain ranges namely, Cordillera on the west, Caraballo on the south and Sierra Madre on the east. On the north is the Babuyan Channel into which the Cagayan River, the largest river system in the country, drains.

Three mountain ranges border the region namely, Cordillera on the west, Caraballo on the south and Sierra Madre on the east. It is the second largest region in the country in terms of land area.

The region is composed of five provinces: Batanes (comprising many islands), Cagayan, Isabela, Nueva Vizcaya and Quirino (situated in the Luzon mainland). It has 10 congressional districts, 3 cities, 90 municipalities and 2,343 barangays. It is also where the Cagayan River flows through the four mainland provinces.

Cagayan Valley has an agriculture-based economy. Its major crops are rice, corn, banana, coconut, and tobacco. Other industries include raising of cattle, swine and poultry, and furniture making. Fishing is the main source of livelihood along coastal communities in Cagayan and Batanes.

Cagayan Valley is especially noted for its unique centuries-old Spanish-inspired churches (one of them, the 18th century-old baroque Tuguegarao Cathedral in Cagayan), stretches of unspoiled beaches, breathtaking waterfalls, and multichambered caves.

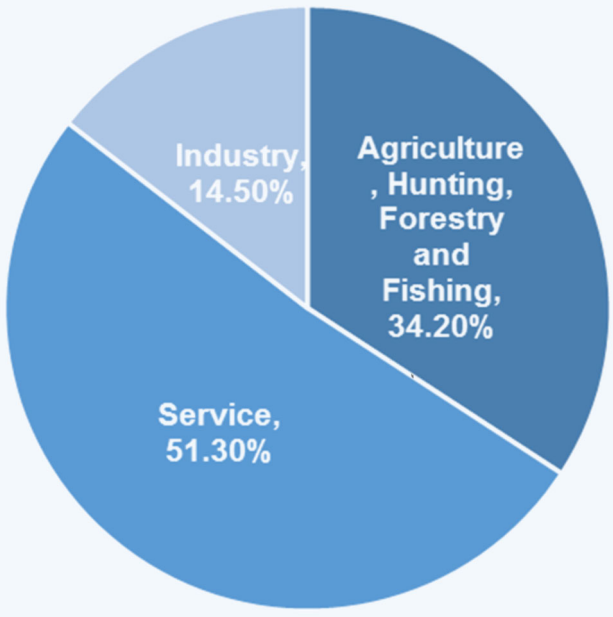

Figure 1: GRDP Contributions per Sector, 2016

Labor and Employment

In 2015, Region II had an estimated labor force participation rate (LFPR) of 63.6%. A great number of those employed worked in the primary sector. The agricultural sector, however, employed the most number of workers accounting for 54.4% of the region's total workforce. The service and industry sector accounted for 37.3% and 8.3%, respectively.

Males comprised more than half of the employed population dominating the agricultural (89%) and industry (71%) sectors. Women, on the other hand, were more involved in the service sector (53%).[2]

Land Classification

The region has a total land area of about 28,229 square kilometers (km²) or 9.6% of the country's total land area. Its topography is generally characterized as sloping. About 40% of the land is mountainous or with slopes greater than 30°. Around 31% covers undulating to hilly terrain and 29% lowlands.

Economy

In 2016, the economy of Cagayan Valley grew by 3.3% accounting for 1.7% of the national gross domestic product (GDP).

The agriculture, hunting, forestry and fishing sector comprised 34.2% of the region's total output registering a decline of 3.0%. The services sector has the biggest share in the gross regional domestic product (GRDP) at 51.3%.[1]

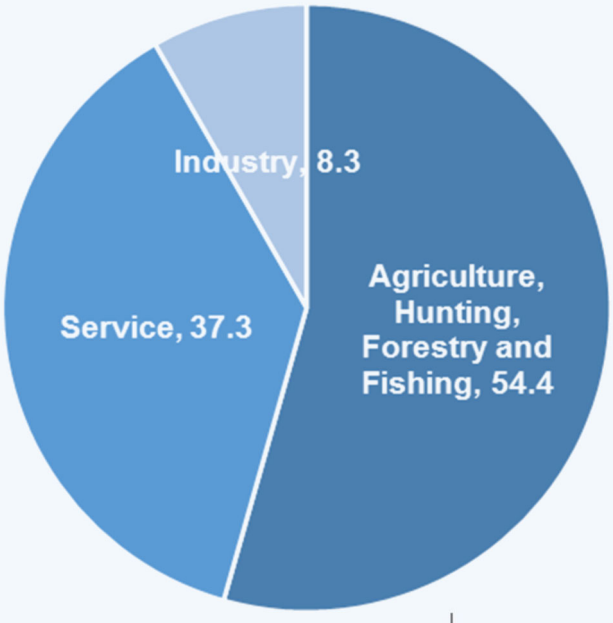

Figure 2: Labor Distribution per Sector, 2015

[1] Philippine Statistics Authority, CountryStat Philippines 2016
[2] Philippine Statistics Authority, Labor Force Survey, 2015

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120°0.000'E
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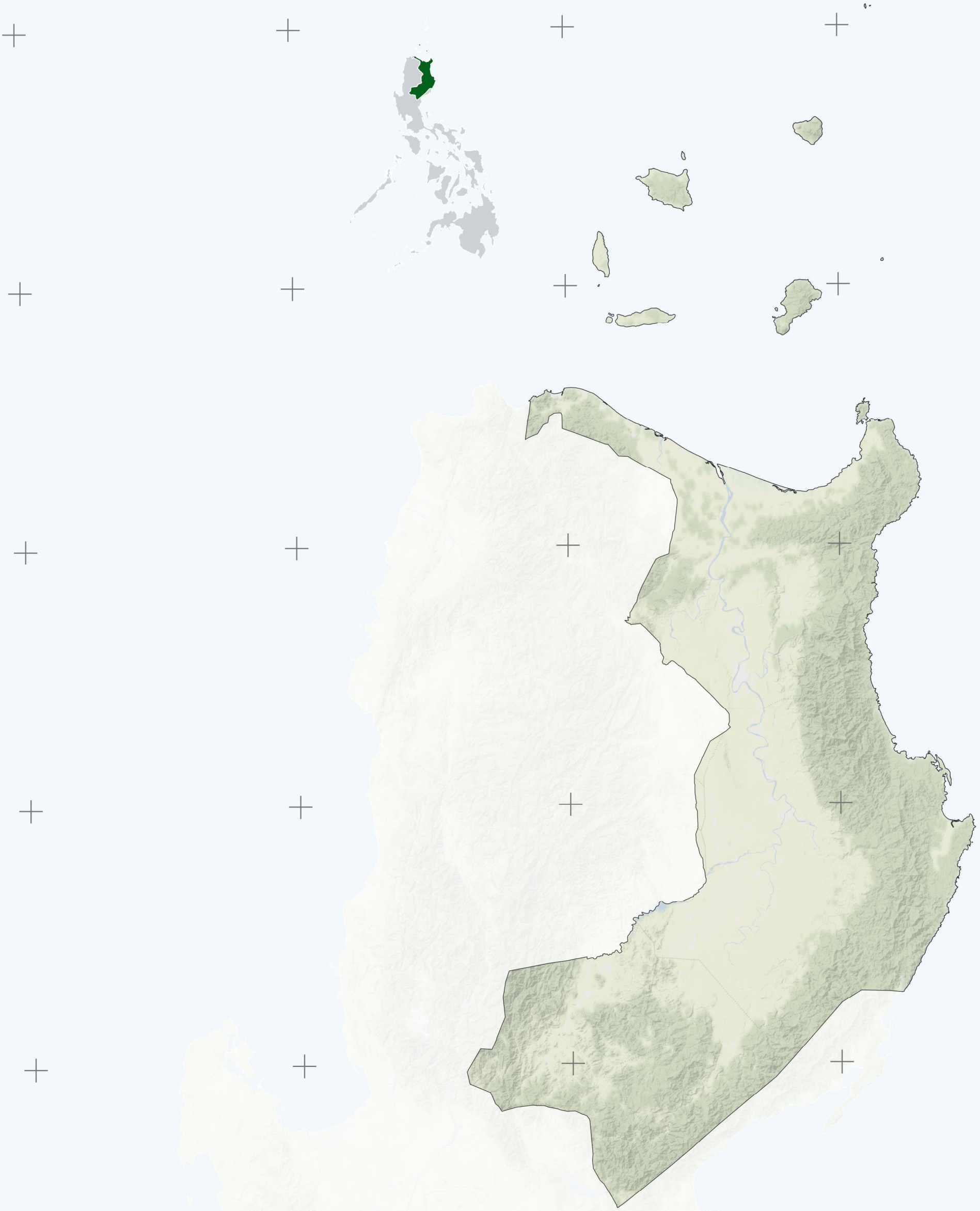
N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N



Demography

Region II is composed of four cities, 89 municipalities, and 2,311 barangays. As of 2015, its population was registered at 3,451,410. Table 1 shows the population distribution among the region's five provinces.

Among the cities and municipalities in the region, Tuguegarao City in Cagayan had the largest population — 153,502. It was followed by three cities in Isabela - Ilagan City (145,568), City of Santiago (134,830), and City of Cauayan (129,523). Three municipalities each in Cagayan and Isabela comprised the rest of the top ten most populous cities and municipalities in Region II.

Household size in the region averages 4.1 persons. The region is predominantly rural — 88% of its population lives in the rural areas while 12% lives in urban areas.

The pie chart on the right shows the population density of the Cagayan Valley Region with a total population density of 120 people per square kilometer. The least dense province is Batanes followed by Isabela. A large percentage of the population is concentrated in the cities such as Tuguegarao City.

Table 1: Population per Province, 2015

Province	2015 Population	Land Area (sq.km.)	Population Density	Household Size (p/HH)
Batanes	17,246	219	80	3.6
Cagayan	1,199,320	9,296	130	4.4
Isabela	1,593,566	12,415	130	4.3
Nueva Vizcaya	452,287	3,976	115	4.1
Quirino	188,991	2,323	80	4.3
Cagayan Valley	**3,451,410**	**28,229**	**120**	**4.1**

Table 2: Urban and Rural Population per Province[3], 2015

Region/Province	Urban	Rural
Cagayan Valley	**12%**	**88%**
Batanes	11%	89%
Cagayan	8%	92%
Isabela	13%	87%
Nueva Vizcaya	10%	90%
Quirino	6%	94%

Family Income and Expenditure

There are about 816,000 households in Cagayan Valley, with an estimated total annual average income of PhP237,000 and a total annual average expenditure of PhP162,000. All income classes earn more than what they spend.

Considering family size as an indicator, a family of five (5) has the largest income-expenditure difference, while a one-person "household" has the least income-expenditure difference. This indicates that a family of five can have more savings as compared to other family sizes.

With respect to the disbursement patterns of families in the region and across income levels, the 2015 Family Income and Expenditure Survey (FIES) indicates that food expenditure registered the highest among the major expenditure groups at 46.9%. Housing expenses followed at 9.1%, while expenses for water, electricity, gas and other fuels were recorded at 8.0%.[4]

Figure 3 which shows a distribution of expenditure indicates that most families spend more for their basic needs.

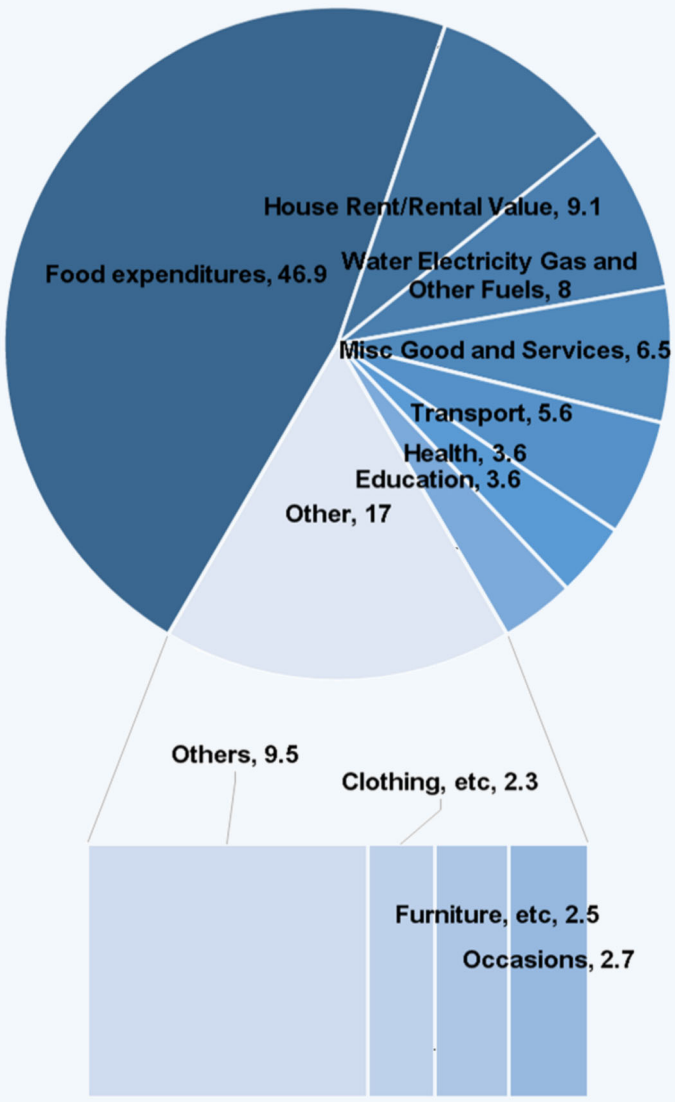


Figure 3: Distribution of Expenditure, 2015

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

80°0.000'W
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40°0.000'N
60°0.000'S
20°0.000'N
0°0.000'
80°0.000'S

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Itbayat
Basco
Mahatao
Ivana
Uyugan
Sabtang
Aparri
Calayan

Legend

Population Density (person/ha)

- 0.00 - 0.44
- 0.44 - 0.89
- 0.89 - 1.33
- 1.33 - 1.88
- 1.88 - 2.56
- 2.56 - 3.47
- 3.47 - 5.00
- 5.00 - 7.23
- 7.23 - 14.04
- 14.04 - 475.56

Santa Praxedes
Claveria
Sanchez-Mira
Pamplona
Abulug
Ballesteros
Camalaniugan
Buguey
Santa Ana
Gonzaga
Santa Teresita
Allacapan
Lal-Lo
Lasam
Gattaran
Santo Ni□o
Alcala
Baggao
Amulung
Rizal
Piat
Iguig
Tuao
Solana
Pe□ablanca
Tuguegarao City
Enrile
Santa Maria
San Pablo
Cabagan
Maconacon
Quezon
Delfin Albano
Tumauini
Divilacan
Mallig
Quirino
Ilagan
Roxas
Gamu
San Manuel
Burgos
Naguilian
Palanan
ISABELA
Aurora
Luna
Cabatuan
San Mateo
Cauayan City
Benito Soliven
San Mariano
Ramon
Alicia
Angadanan
San Isidro
Santiago City
Cordon
San Guillermo
Dinapigue
Diadi
Echague
Villaverde
Ambaguio
Bagabag
Diffun
Jones
Solano
Saguday
San Agustin
Bayombong
Quezon
Cabarroguis
Kayapa
Aglipay
Bambang
Kasibu
Maddela
NUEVA VIZCAYA
QUIRINO
Aritao
Dupax Del Norte
Santa Fe
Nagtipunan
Dupax Del Sur
Alfonso Castaneda

Population Density

PSA, 2015 Census

Climate

Cagayan Valley's climate is one of the coldest in the Philippines with an average temperature ranging from 18° to 21° Celsius and an average high temperature of only 30° Celsius.

It has two pronounced seasons: the dry season which generally lasts from December to May, and the wet season which occurs from June to November. The period from March to August is the hottest.

Hazards

At least 20 towns in the region and in Tuguegarao City have been declared geological hazard zones, which are to be assessed by the Mines and Geosciences Bureau (MGB). Historical evidence and the region's geographical tendencies point to at least 12 municipalities that are prone to natural calamities.[5]

The region is located along the natural path of typhoons. It is also a natural catch basin highly vulnerable to frequent flooding. In fact, strong typhoons devastated the region in 2015 causing massive flooding that claimed lives and damaged property. This has prompted officials of the regional and provincial governments to rethink and revise ineffectual flood control measures. This move was aimed at safeguarding human lives, first and foremost, as well as property. Also, in their collective view, the political will to carry out a comprehensive flood control plan would pave the way for efforts to protect the region's natural resources against inevitable natural hazards.

In 2015, eight (8) flood control projects were initiated under the Fort Magsaysay Military Reservation and Financial Management Services Department of the Department of Public Works and Highways (DPWH) to address the serious problem of river erosion. These projects represented only 75.38% of the target for 2015 — these were due for completion the succeeding year. The commitment to undertake the Flood Risk Management Project (FRMP) as a GOP counterpart, however, encountered delays that year.[6]

On top of the region's extreme susceptibility to intense typhoons, active fault lines are located in the region or on its outskirts.

Climate Change and Hydrological Hazards

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

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

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

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

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

Seasonal Temperature Increase (in °C)	Observed Baseline (1971 - 2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Cagayan	24.5	28.1	28.9	27.1	0.8	1.0	0.9	0.8	2.0	2.2	2.0	1.8
Isabela	24.1	27.9	28.7	26.8	0.8	0.9	0.9	0.8	2.0	2.1	2.1	1.9
Nueva Vizcaya	22.3	25.1	25.4	24.4	0.9	1.0	0.9	0.9	2.0	2.1	1.9	1.9
Batanes	23.0	26.7	28.8	26.9	0.7	0.6	0.6	0.7	1.8	1.6	1.4	1.5
Quirino	23.7	26.8	27.6	26.2	0.9	1.0	1.0	0.9	2.0	2.2	2.0	2.0
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
Cagayan	284.4	207.7	538.4	832.1	6.9	-3.7	2.9	16.3	14.6	-23.3	0.9	-1.0
Isabela	412.2	325.0	530.8	867.0	3.9	-8.6	5.1	13.5	25.1	-29.2	8.7	1.7
Nueva Vizcaya	180.9	416.8	1149.8	880.5	-3.5	-8.6	20.1	9.8	-7.8	-23.6	36.1	-0.5
Batanes	531.1	354.5	928.7	1057.8	-2.1	-7.8	6.4	-14.4	-4.9	-4.4	10.2	-7.4
Quirino	4419.0	465.9	776.4	957.9	-5.7	-18.2	9.7	6.1	-0.9	-33.9	12.9	-5.8

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

Provinces	Station	No. of Days w/ T_{max} >35°C			No. of Dry Days			No. of Days w/		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
Cagayan	Aparri	273	1276	2403	8156	6498	6770	16	33	24
	Tuguegarao	2769	3930	5119	8573	6513	6580	6	25	22
Batanes	Basco	51	1	24	7038	5112	5315	17	13	20

[5] *Mines and Geosciences Bureau*
[6] *National Irrigation Administration*

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Legend

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

Climate

PAGASA, 2015 Data

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

BATANES

CAGAYAN VALLEY

ISABELA

NUEVA VIZCAYA

QUIRINO

Contour Map

NAMRIA

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

ITBAYAT

BASCO
MAHATAO
IVANA
UYUGAN
SABTANG

CALAYAN

CLAVERIA
SANTA PRAXEDES
SANCHEZ MIRA
PAMPLONA
ABULUG
BALLESTEROS
APARRI
CAMALANIUGAN
BUGUEY
ALLACAPAN
SANTA ANA
GONZAGA
LAL-LO
LASAM
GATTARAN
CAGAYAN VALLEY
SANTO NINO
ALCALA
BAGGAO
RIZAL
PIAT
AMULUNG
IGUIG
TUAO
SOLANA
PENABLANCA
TUGUEGARAO CITY
ENRILE
SANTA MARIA
SAN PABLO
MACONACON
SANTO TOMAS
CABAGAN
QUEZON
DELFIN ALBANO
TUMAUINI
DIVILICAN
MALLIG
QUIRINO
ROXAS
ILAGAN
GAMU
SAN MANUEL
ISABELA
PALANAN
AURORA
NAGUILIAN
LUNA
CABATUAN
BENITO SOLIVEN
CAUAYAN CITY
SAN MARIANO
SAN MATEO
RAMON
ALICIA
SAN ISIDRO
ANGADANAN
CORDON
SAN GUILLERMO
CITY OF SANTIAGO
ECHAGUE
DINAPIGUE
DIADI
VILLAVERDE
BAGABAG
AMBAGUIO
SOLANO
DIFFUN
JONES
BAYOMBONG
SAGUDAY
SAN AGUSTIN
QUEZON-NV
AGLIPAY
KAYAPA
BAMBANG
CABARROGUIS
KASIBU
MADDELA
QUIRINO
NUEVA VIZCAYA
ARITAO
DUPAX DEL NORTE
NAGTIPUNAN
SANTA FE
DUPAX DEL SUR
ALFONSO CASTANEDA

500
1000
1500
2000
2500
3000
3500
4000
4500
5000

Average Rainfall

PAGASA, 2015 Data

Legend

Rain Fall Intensity in millimiters

WSS Sector Status

Access to Safe Water

Approximately 88% of Cagayan Valley's population had access to safe water sources in 2015[7].

This translates to around 720,000 HHs out of the total 816,000 HHs. About 16.4% of the population is connected to Level III service in their own homes while 2.72% has Level II connections shared with the community. Access to Level I comprises 80.87%. Safe sources of water under this category include tubed and/or piped deep/shallow wells (owned or shared), protected springs, rivers, streams, etc.

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

Level of Service	National	Cagayan Valley
Level 3	44.1%	16.4%
Level 2	11.2%	2.7%
Level 1 (Safe Sources)	32.4%	69.2%
Subtotal (Safe Sources)	*87.7%*	*88.3%*
Level 1 (Unsafe Sources)	12.3%	11.7%
Total	100.0%	100.0%

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

The region's access to safe water is considered on a par with national average of about 88%, with a discrepancy of about 3%. In terms of access per level of service, Cagayan Valley's numbers do not differ significantly with national statistics, having variances not greater than 10%. Level 3 access, in particular, was recorded at 43.1% as compared with the national percentage registered at 4.1%.

However, based on the data gathered during the Ilocos Regional Planning and Consultation Workshop, all provinces had 100% access to safe water as of 2015 (see Figure 5).[9]

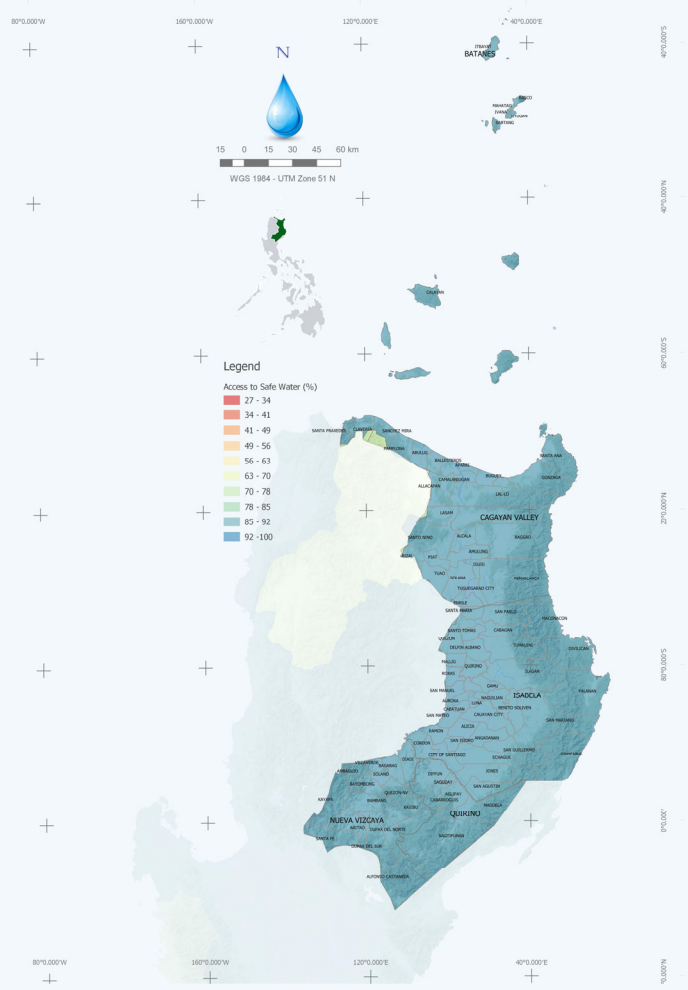


Figure 5: Access to Safe Water at the Provincial Level

As of 2015, 90% of Cagayan Valley residents had drinking water from what was considered "improved and safe water sources". Of the region's total population, 22% drank bottled water. This figure is higher than the percentage of those who owned faucets and those who shared faucet facilities recorded at 9% and 4%, respectively.

At the provincial level, Batanes had the highest access to drinking water while Nueva Vizcaya had the lowest. Nueva Vizcaya, however, had the largest number of people (29%) who drank bottled water, while Batanes had the lowest percentage (4%).

Drinking Water

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

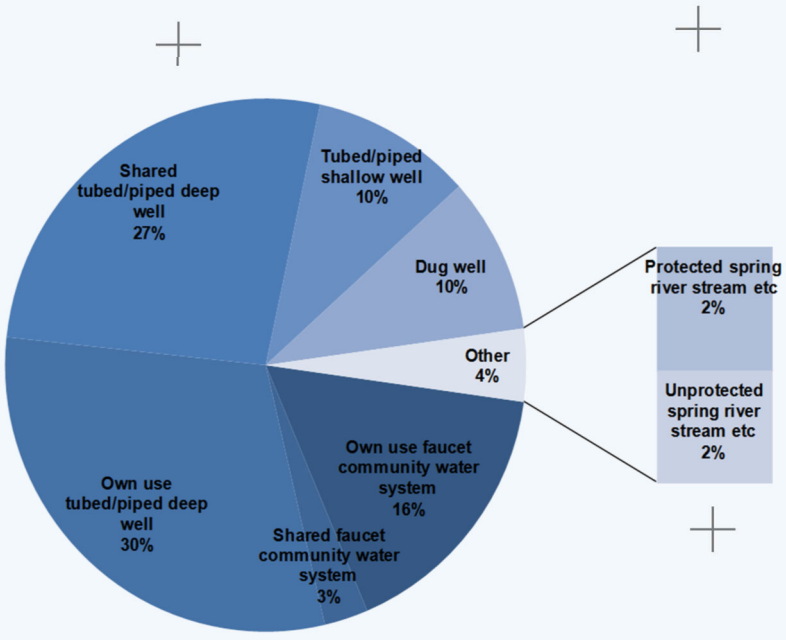


Figure 4: Main Sources of Water Supply, 2015

[7] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[8] Ibid.
[9] Based on Cagayan Valley provinces' first-hand data on access to safe water gathered during the regional consultation and planning workshop

Access to Safe Drinking Water

PSA, 2015 Census

Access to Sanitation

Despite its abundant land and water resources, Cagayan Valley's growth as a region has remained at snail's pace mainly because its economy is principally driven by agri-based activities concentrated in and around Tuguegarao and Santiago City (in Isabela), two of its major urban centers.

Approximately 52% of the region's population has access to improved sanitation.

The 2015 FIES has reported that Region II was lower than the national average in regard to access to improved sanitation. Its open defecation rate stood at 0.27%, which was significantly lower than the national percentage. (The open defecation rate is a proxy indicator of the lack of access to toilet facilities.)

Table 6: National and Regional Access to Sanitation[10]

Sanitation Coverage	National	Cagayan Valley
Improved Sanitation	73.77%	52.20%
Basic Sanitation	19.96%	40.49%
Unimproved Sanitation	2.04%	7.04%
Open Defecation	4.23%	0.27%
Total	100.0%	100.0%

Table 7: Access to Sanitation Facilities per Province[11]

Region/Province	HHs with Sanitary Toilets	HHs with Complete Basic Sanitation Facilities
Region II	97.35%	74.86%
Batanes	92.37%	92.03%
Cagayan	134.56%	77.71%
Isabela	81.93%	63.93%
Nueva Vizcaya	88.29%	76.73%
Quirino	87.61%	87.07%

Cagayan has the highest access to basic sanitation at 134.56%. Isabela has the least number of households with toilet facilities at 81.93%.

The minor discrepancy between Tables 6 and 7 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 6 reflects the specifics per the SDG's definition. Table 7, on the other hand, reflects the rates of access as defined under the MDG, wherein the percentage of households with complete basic sanitation facilities is a subset of those with sanitary toilets.

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

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

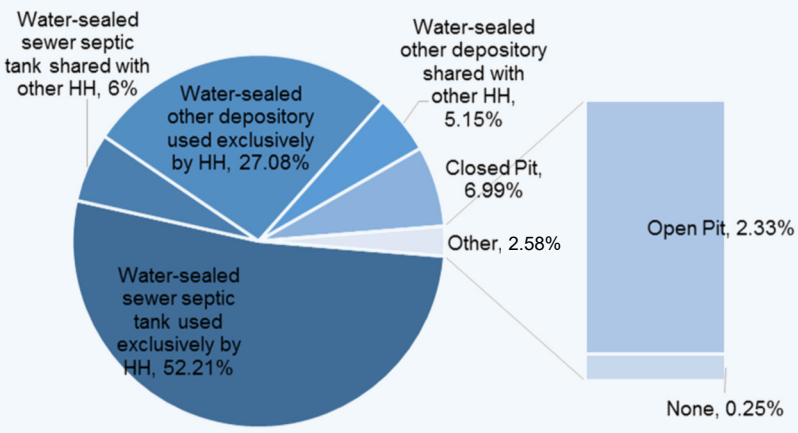


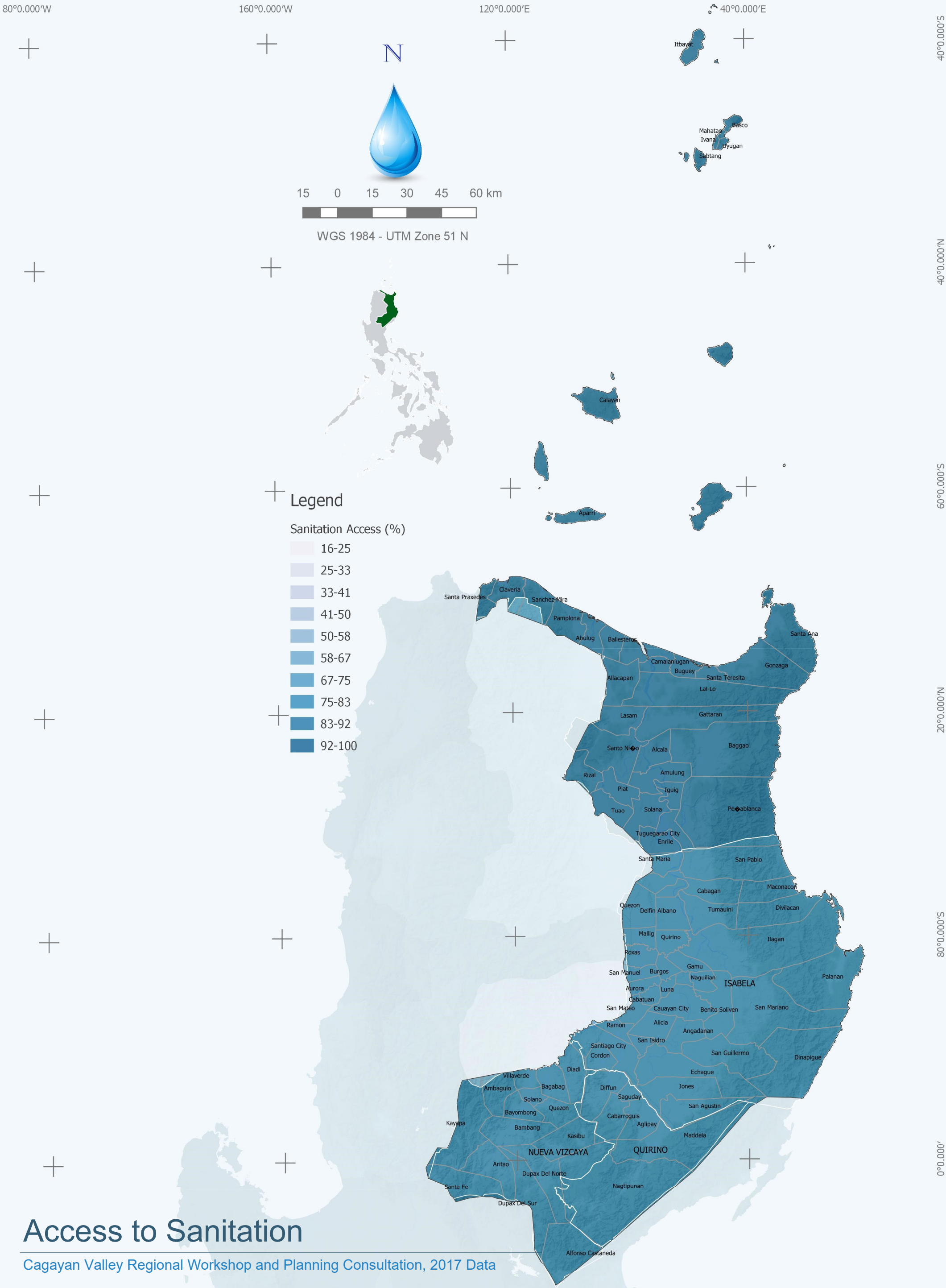
Figure 6: Percentage of HHs with Access to Sanitation Facilities

Figure 6 shows the percentage per type of sanitation facilities to which Cagayan Valley households have access. The terms used to refer to sanitation facilities represent 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 Region II were gathered during the regional consultation and planning workshop. The map on the right shows the extent of access to sanitation of the provinces in the region.

[10] Philippine Statistics Authority, Family Income and Expenditure Survey, 2015
[11] Department of Health, FHSIS Annual Report CY 2015, 2015



Access to Sanitation

Cagayan Valley Regional Workshop and Planning Consultation, 2017 Data

Water Resources

Region II ranks 10th in water resources potential among all administrative regions.

The region's water resources potential totals to 7,870 million cubic meters (MCM)/year, accounting for 5.4% of the country's total. Of this figure, 1,961 MCM/year is groundwater and 5,908 MCM/year is surface water. Annual rainfall in the region averages 2,296 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.

WRR II consists of nine provinces, including the five provinces of Region II and four other provinces of the Cordillera Administrative Region (CAR), i.e., Apayao, Kalinga, Mountain Province and Ifugao.

Surface Water

Of the 18 river basins in the country, three (3) river basins are located in Region II. These are the Agno River Basin, Apayao-Abulug River Basin and the Cagayan River Basin. Tables 8 to 10 show a description and the scope of each river basin.

Table 8: Agno River Basin Characteristics

Agno River Basin	
Area	6,219.66 km^2
River Classification	Class A - upper portion Class C - lower portion
Scope	
Benguet	CAR
Ifugao	CAR
Mountain Province	CAR
Nueva Ecija	Region III
Nueva Vizcaya	Region II
Pangasinan	Region III
Tarlac	Region III
Zambales	Region III
Pampanga	Region III
Uses	Domestic, Municipal, Agricultural, Energy and Industrial

Table 9: Apayao-Abulug River Basin Characteristics

Apayao-Abulug River Basin	
Area	3,776 km^2
River Classification	Class C
Scope	
Apayao	CAR
Cagayan	Region II
Uses	Power, Fisheries, Industrial, Recreational, Commercial, Domestic and Irrigation

Table 10: Cagayan River Basin Characteristics

Cagayan River Basin	
Area	27,493 km^2
River Classification	Class A - upper portion Class C - lower portion
Scope	
Apayao	CAR
Benguet	CAR
Ifugao	CAR
Kalinga	CAR
Mountain Province	CAR
Abra	CAR
Cagayan	Region II
Isabela	Region II
Nueva Vizcaya	Region II
Quirino	Region II
Aurora	Region III
Nueva Ecija	Region III
Uses	Agriculture, Domestic, Municipal, Commercial, Energy, Tourism and Industrial

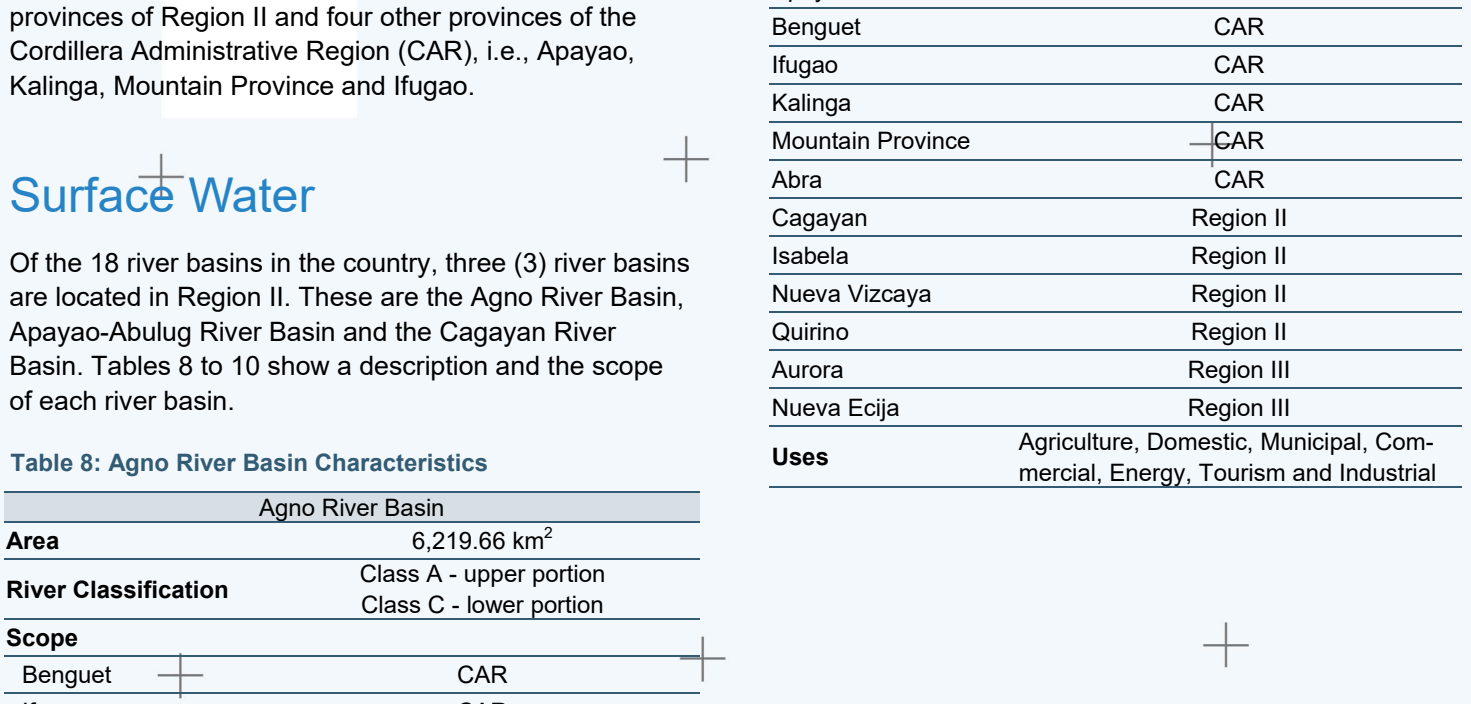


Figure 7: Water Resources Potential and Annual Rainfall[12]

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

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

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Itbayat
Mahatao
Basco
Ivana
Uyugan
Sabtang
Calayan
Aparri

Legend

- Water Bodies
- Major River Basin

Abulug Watershed
Abra Watershed
Cagayan Watershed
Pampanga River Basin

Claveria
Santa Praxedes
Sanchez-Mira
Pamplona
Abulug
Ballesteros
Camalaniugan
Buguey
Santa Teresita
Lal-Lo
Gonzaga
Santa Ana
Allacapan
Lasam
Gattaran
Baggao
Santo Ni�o
Alcala
Amulung
Rizal
Piat
Iguig
Tuao
Solana
Pe�ablanca
Tuguegarao City
Enrile
Santa Maria
San Pablo
Maconacon
Cabagan
Quezon
Delfin Albano
Tumauini
Divilacan
Mallig
Quirino
Ilagan
Roxas
Gamu
Burgos
Naguilian
ISABELA
Palanan
Aurora
Luna
Cabatuan
San Mateo
Cauayan City
Benito Soliven
San Mariano
Ramon
Alicia
Angadanan
San Isidro
Santiago City
Cordon
San Guillermo
Dinapigue
Diadi
Echague
Villaverde
Ambaguio
Bagabag
Diffun
Jones
Solano
Saguday
Quezon
San Agustin
Bayombong
Cabarroguis
Kayapa
Bambang
Aglipay
Kasibu
Maddela
NUEVA VIZCAYA
QUIRINO
Aritao
Dupax Del Norte
Santa Fe
Nagtipunan
Dupax Del Sur
Alfonso Castaneda

Cagayan Valley Rivers and Tributaries

DENR, NWRB, NAMRIA

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).

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

Some parts of Cagayan and Quirino are categorized under the major aquifer class, while mainland Cagayan Valley is predominantly underlain by the minor aquifer class (specifically the local and less productive aquifers). Its northern part and southern part, on the other hand, along with islands of Batanes, are underlain by non-aquifer areas that have limited groundwater potential.

Water Use

As of 2017, water use in the region based on awarded water permits amounts to about 35,964.59 MCM annually. About 29,085.52 MCM (or 81%) is allocated for power generation and is categorized under non-consumptive use. The remaining 6,880.07 MCM is reserved for consumptive use (Figure 8).

The irrigation sector consumes the highest volume of water among all sectors with 99% allocation.

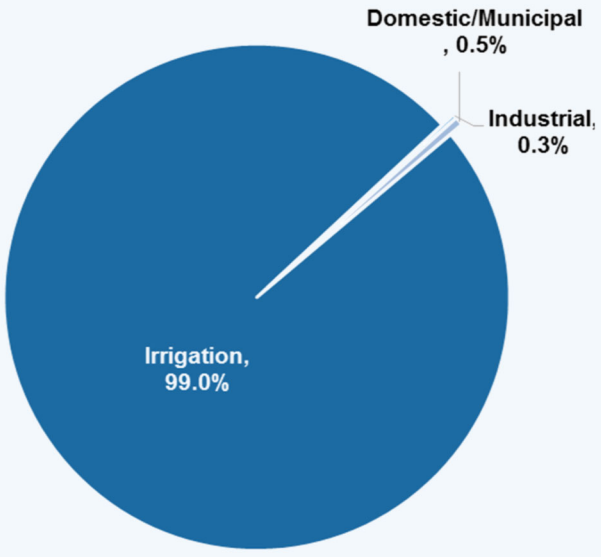


Figure 8: Consumptive Water Use, 2017[13]

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.)[14]

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

The Cagayan Valley Region has a per capita water availability that is above said threshold, i.e., around 2,000 m^3/year.

Table 12: Water Availability per Province

Province	Water Availability (m^3/capita/year) 2015 Population
Batanes	3,540
Cagayan	2,161
Isabela	2,172
Nueva Vizcaya	2,451
Quirino	3,427
Cagayan Valley Region	**2,750**

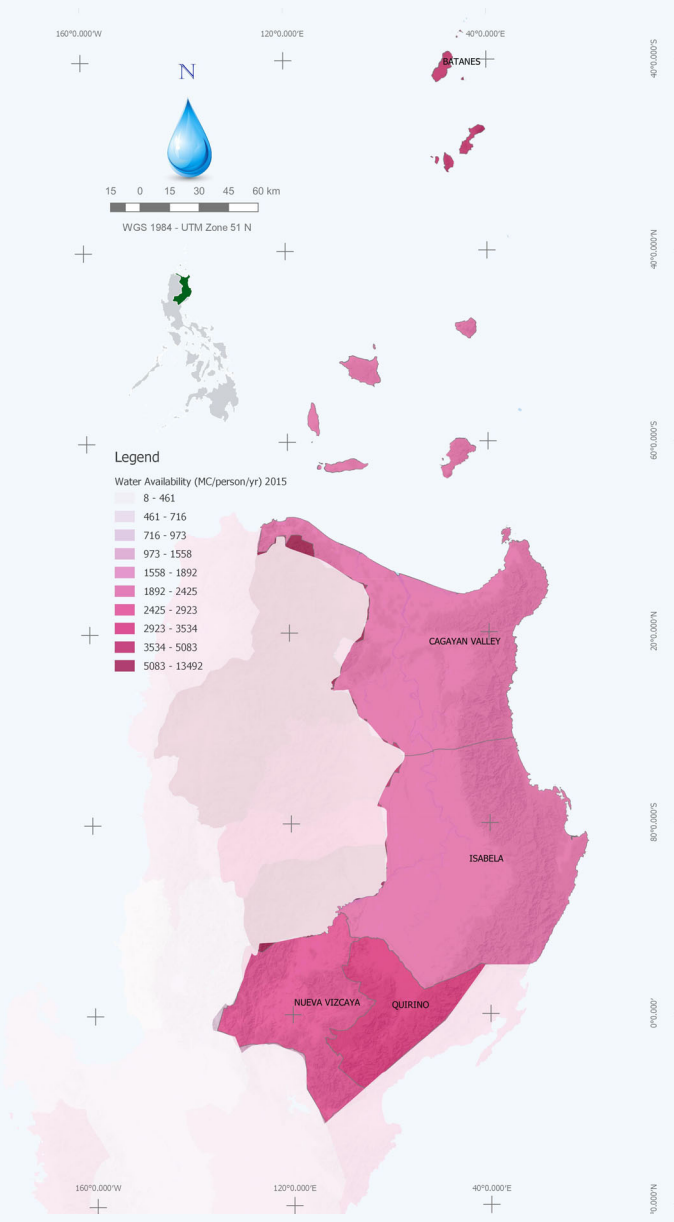


Figure 9: Water Availability Map, 2015

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

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Itbayat
Basco
Mahatao
Ivana
Uyugan
Sabtang
Calayan
Aparri

Legend

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

Claveria
Santa Praxedes
Sanchez-Mira
Pamplona
Abulug
Ballesteros
Camalaniugan
Buguey
Santa Ana
Gonzaga
Santa Teresita
Allacapan
Lal-Lo
Lasam
Gattaran
Santo Ni�o
Alcala
Baggao
Rizal
Amulung
Piat
Iguig
Tuao
Solana
Pe�ablanca
Tuguegarao City
Enrile
Santa Maria
San Pablo
Cabagan
Maconacon
Quezon
Delfin Albano
Tumauini
Divilacan
Mallig
Quirino
Ilagan
Roxas
Gamu
San Manuel
Burgos
Naguilian
ISABELA
Palanan
Aurora
Luna
Cabatuan
San Mateo
Cauayan City
Benito Soliven
San Mariano
Alicia
Ramon
Angadanan
San Isidro
Santiago City
Cordon
San Guillermo
Dinapigue
Diadi
Villaverde
Echague
Ambaguio
Bagabag
Diffun
Jones
Solano
Saguday
Quezon
San Agustin
Bayombong
Cabarroguis
Kayapa
Aglipay
Bambang
Kasibu
Maddela
NUEVA VIZCAYA
QUIRINO
Aritao
Dupax Del Norte
Santa Fe
Nagtipunan
Dupax Del Sur
Alfonso Castaneda

Groundwater Availability

MGB

WSS Sector Status

Population Projection

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

Employing PSA's 2010-based population projections which were adjusted to conform with the actual 2015 population, the region's population is projected to reach 4,385,800.

Water Supply Demand

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

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

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

By 2022, 2030, and 2040, the total water demand of the region would have reached 139 MCM/year, 158 MCM/year, and 173 MCM/year, respectively.

Water Demand vs. Water Resources Potential

The water demand of the industrial, business and domestic sectors in the Cagayan Valley Region 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 (173 MCM/year) to the water resources potential of the region (7,870 MCM/year), the availability of water far exceeds the region's projected water demand up to 2045.

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

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

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

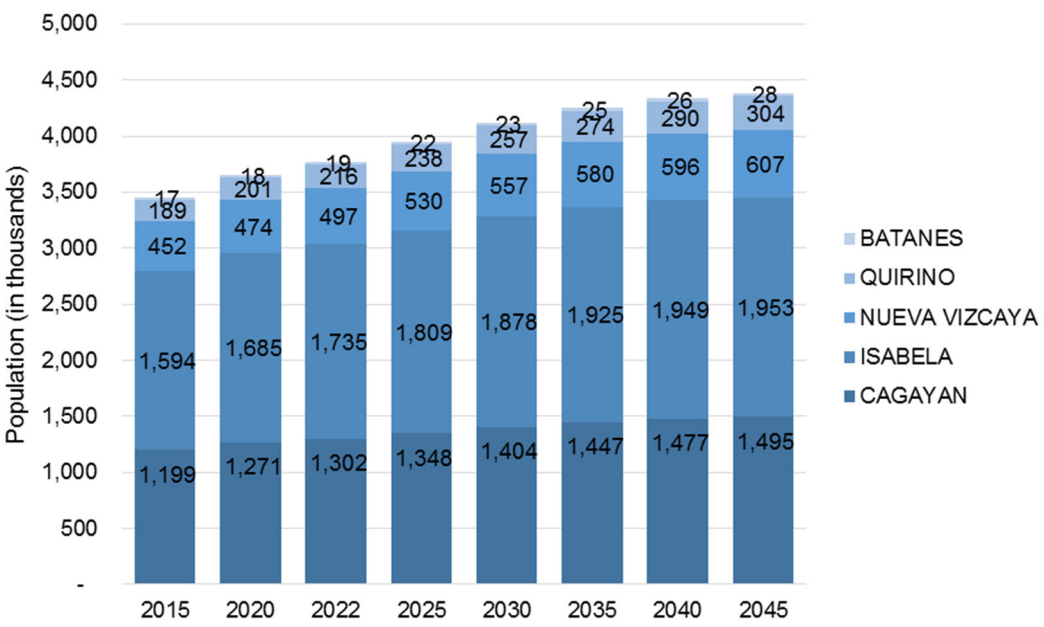


Figure 10: Projected Population

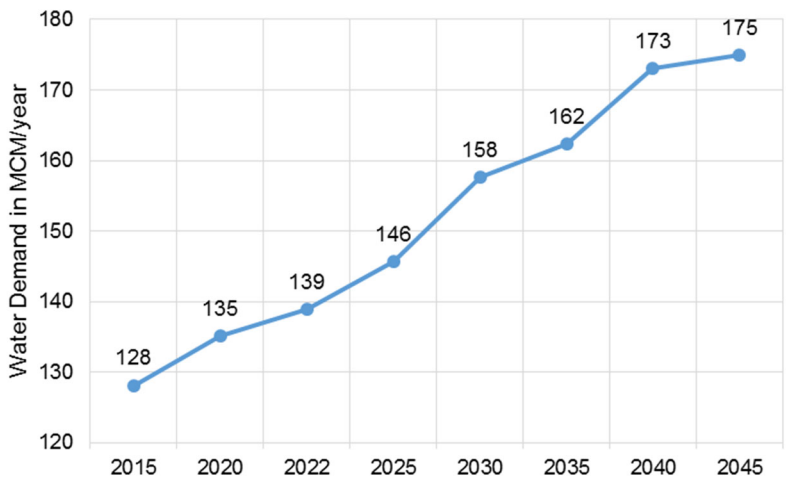
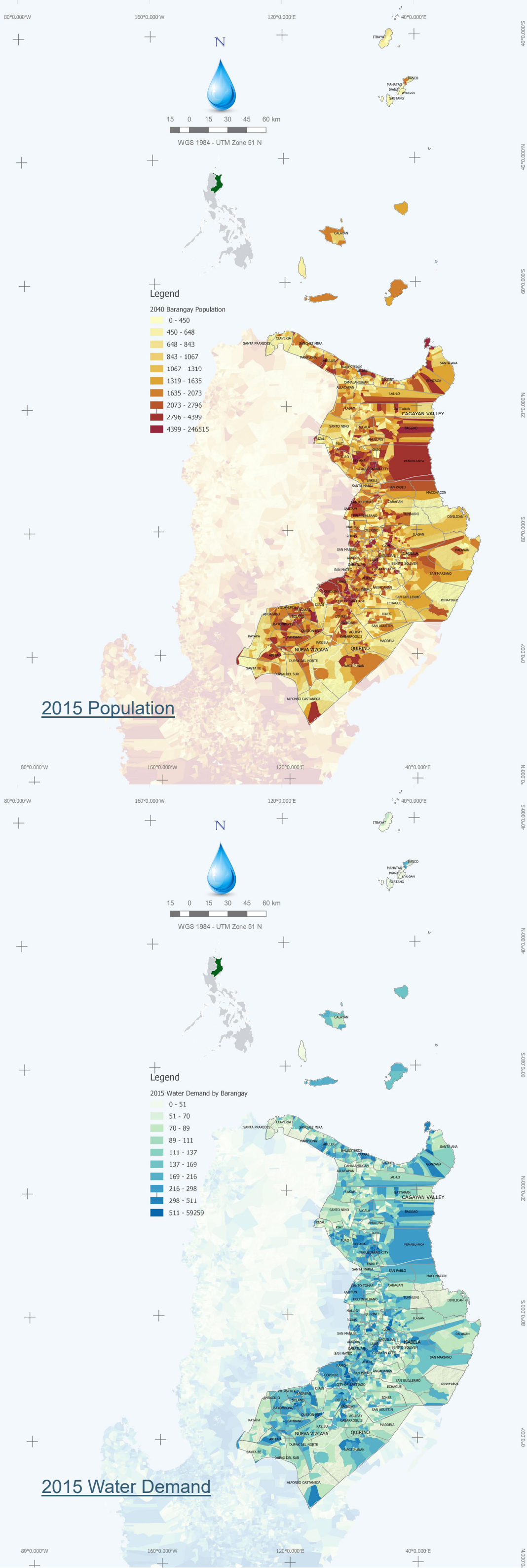
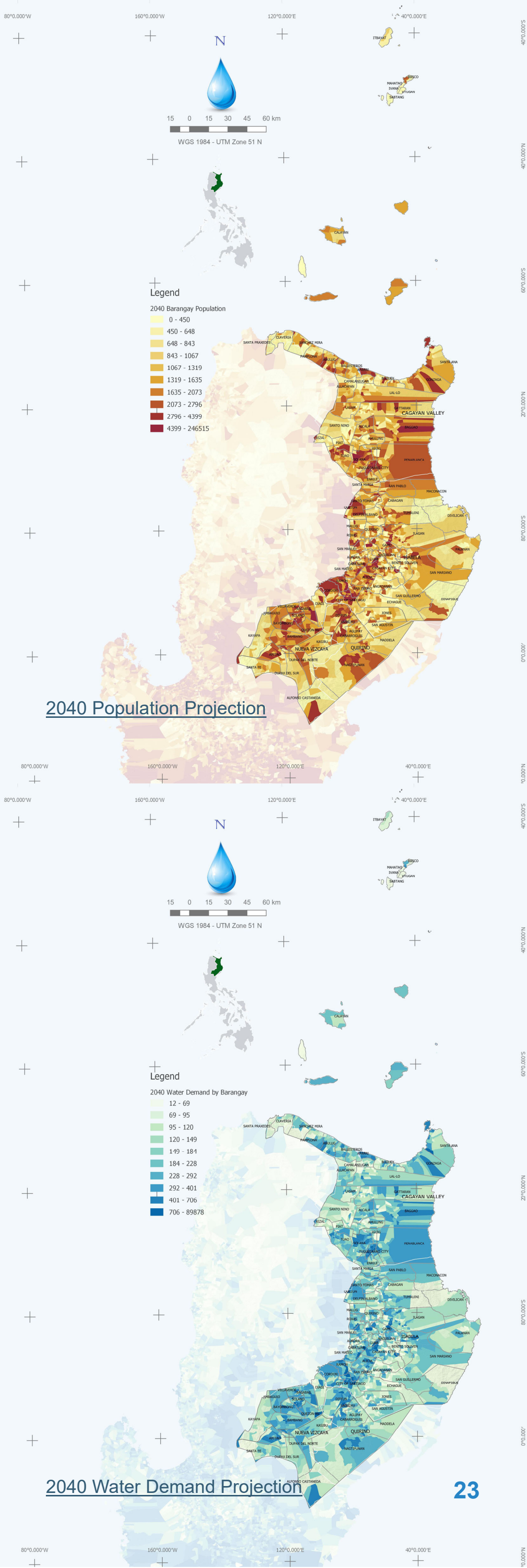


Figure 11: Projected Water Demand



2015 Population



2040 Population Projection

2015 Water Demand

2040 Water Demand Projection

WSS Infrastructure

Water service providers (WSPs) of various management types serve around 26% of the Cagayan Valley Region[15].

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 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[16], 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 were 64 WDs serving the Cagayan Valley. A total of 33 WDs are classified as nonoperational while the remaining 31 WDs are operational.

Isabela has the highest number of operational WDs. The total population covered by these WDs is about 451,000 or roughly 29% of the service coverage of 1.5 million. No WDs, however, have been set up in Batanes.

LGU-led Water Utilities

There are 52 LGU-led water utilities covering 26 areas and serving 114,859 users or 3% of the total population of Cagayan Valley.

BWSA

There are 38 BWSA utilities within the region covering 12 areas or about 1% of its total population.

RWSA

There are 216 RWSA utilities within the region serving 71,935 people or about 2% of its total population. Nueva Vizcaya has the highest number of RWSA utilities (95) serving the most number of users, i.e., about 25,830.

The map on the right shows the location of operational and nonoperational WDs in the region. Barangays with Level 3 water service provided by various WSPs (except WDs) are likewise shown.

Table 13: Water Service Provider per Province

Province	No. of LGUs	Type and No. of WSPs		Service Area	Population Served	
					Total	%
Cagayan	29	WD	24	495,162	217,483	44%
		LGU	19		22,380	2%
		BWSA	22		8,525	1%
		RWSA	41		20,335	2%
		Others	39		18,217	2%
Subtotal			**145**	**1,199,320**	**286,940**	**24%**
Nueva Vizcaya	15	WD	7	51,028	4,321	8%
		LGU	14		11,050	2%
		BWSA	7		9,855	2%
		RWSA	95		25,380	6%
		Others	264		46,635	10%
Subtotal			**387**	**452,287**	**97,241**	**22%**
Isabela	37	WD	28	859,689	217,216	25%
		LGU	14		76,945	5%
		BWSA	7		4,885	0%
		RWSA	53		16,860	1%
		Others	468		119,805	8%
Subtotal			**570**	**1,593,566**	**435,711**	**27%**
Quirino	5	WD	5	149,437	12,123	8%
		LGU	1		250	0%
		BWSA	2		1,395	1%
		RWSA	27		9,360	5%
		Others	111		40,195	21%
Subtotal			**146**	**188,991**	**63,323**	**34%**
Batanes	6	WD	0	-	-	0%
		LGU	4		4,234	25%
		BWSA	0		-	0%
		RWSA	0		-	0%
		Others	0		-	0%
Subtotal			**4**	**17,246**	**4,234**	**25%**
Cagayan Valley Region	92	WD	64	1,555,316	451,143	29%
		LGU	52		114,859	3%
		BWSA	38		24,660	1%
		RWSA	216		71,935	2%
		Others	882		224,852	7%
Grand Total			**1,252**	**3,451,410**	**887,449**	**26%**

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

Water Districts and Areas Covered by Level III Service

LWUA, PAWD, NWRB Listahang Tubig, 2017 Data

Sanitation

Sanitation is the provision of facilities and services for the safe management and disposal of human waste. Without sanitation, water quality degrades, health is compromised and the environment becomes vulnerable to natural and man-made hazards.

This section discusses the connection between growing water demand and its harmful 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.

At 0.27%, the Cagayan Valley Region has the lowest open defecation rate in the country. In 2015, about 9,319 people were reported practicing open defecation in waterless areas which do not have access to sanitation facilities.

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

Wastewater and Domestic Biological Oxygen Demand

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

The map below shows the current BOD in Cagayan Valley.

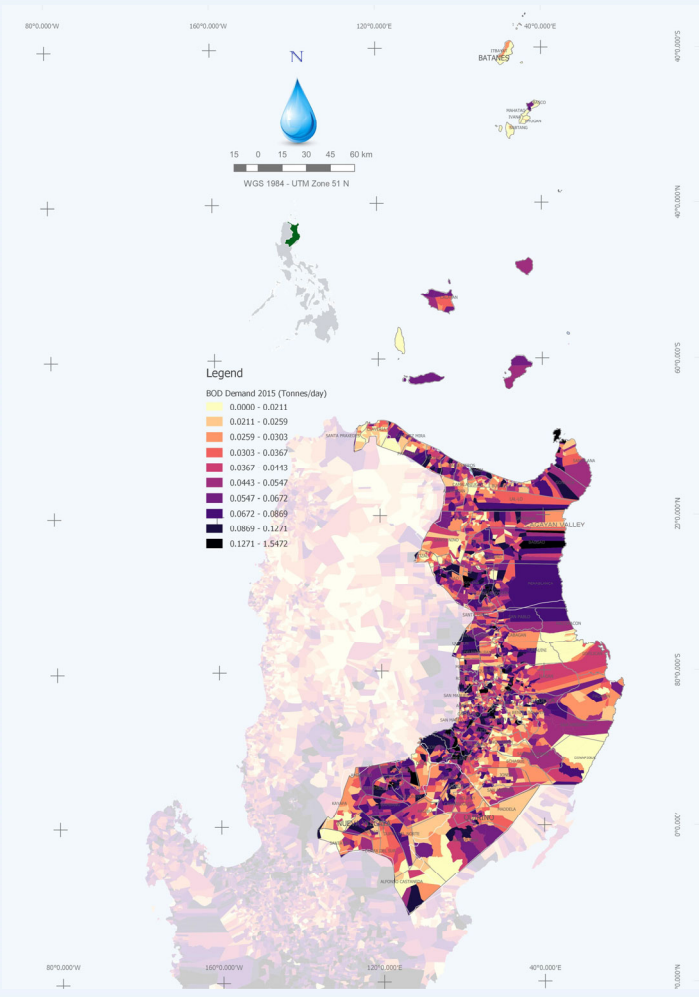


Figure 12: Biological Oxygen Demand, 2015

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

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

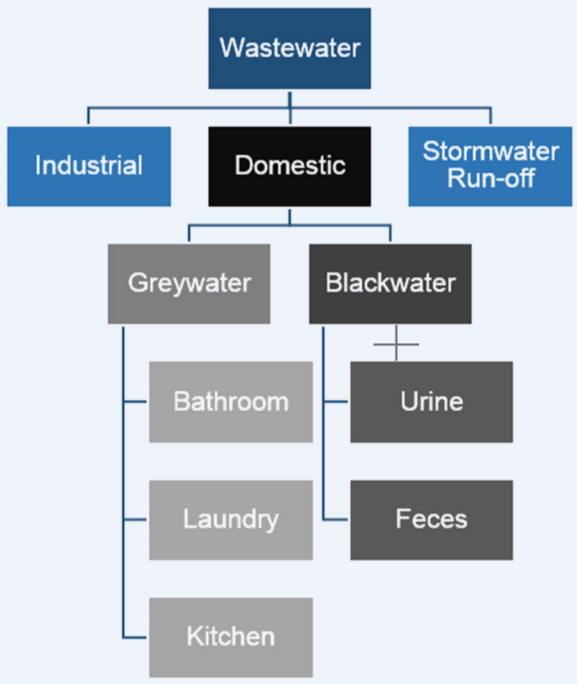


Figure 13: Categories of Wastewater

In the absence of other data, only domestic BOD can be estimated. A BOD factor of 37 grams per person per day (unit pollution load) is assumed; for highly urbanized areas, 53 grams[17] per person per day is used.

The wastewater[18] produced by each province is directly proportional to its water demand as well as its population. It is assumed that wastewater generated is 80% of the total water demand. The current wastewater in the region is shown in Figure 14.

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

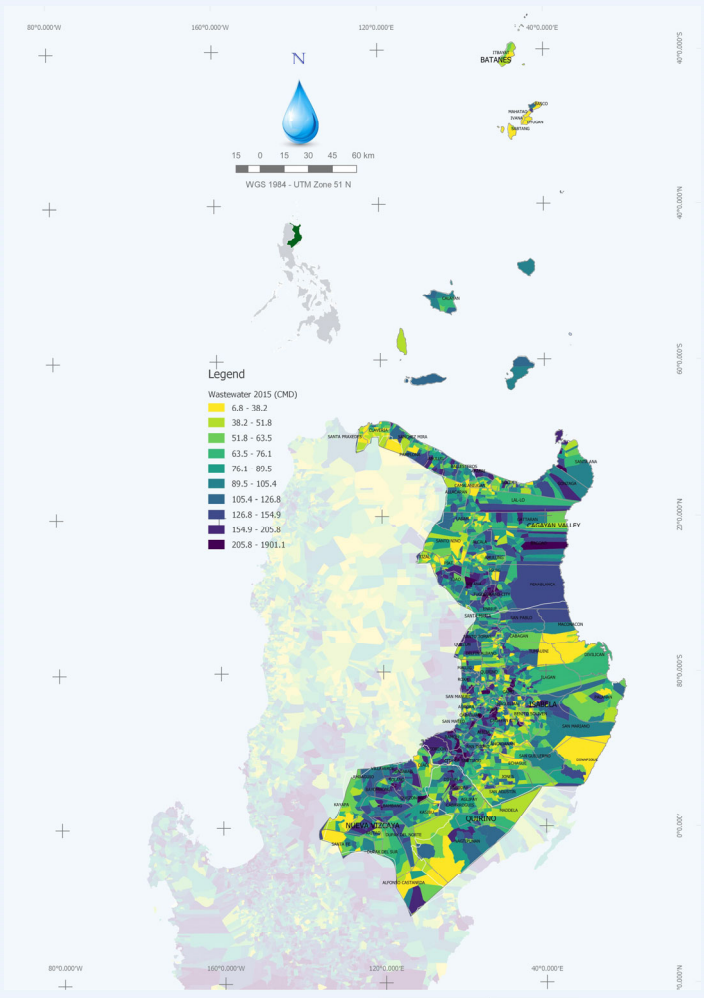


Figure 14: Wastewater Produced, 2015

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

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Legend

% Open Defecation

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

CAGAYAN

ISABELA

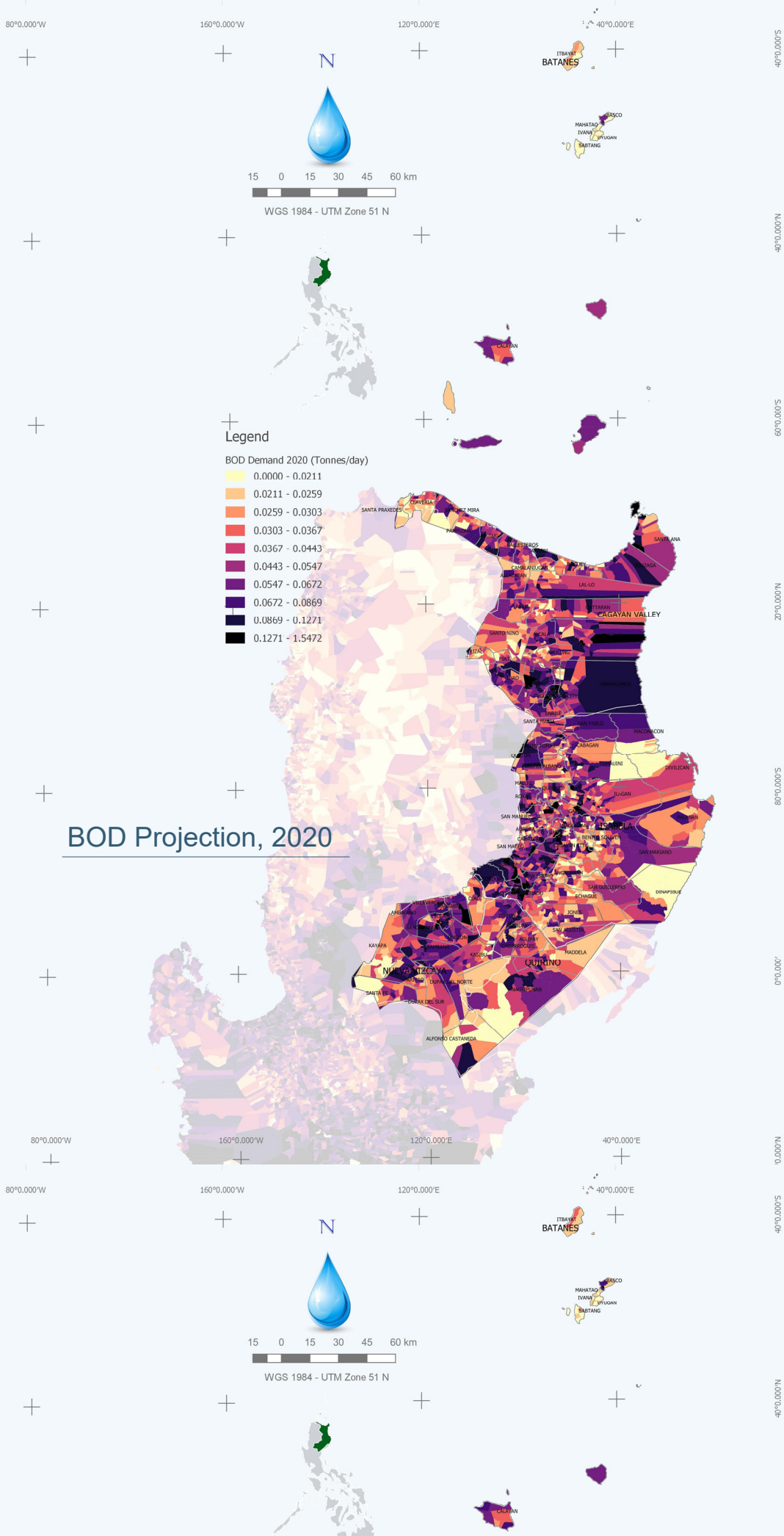
NUEVA VIZCAYA

QUIRINO

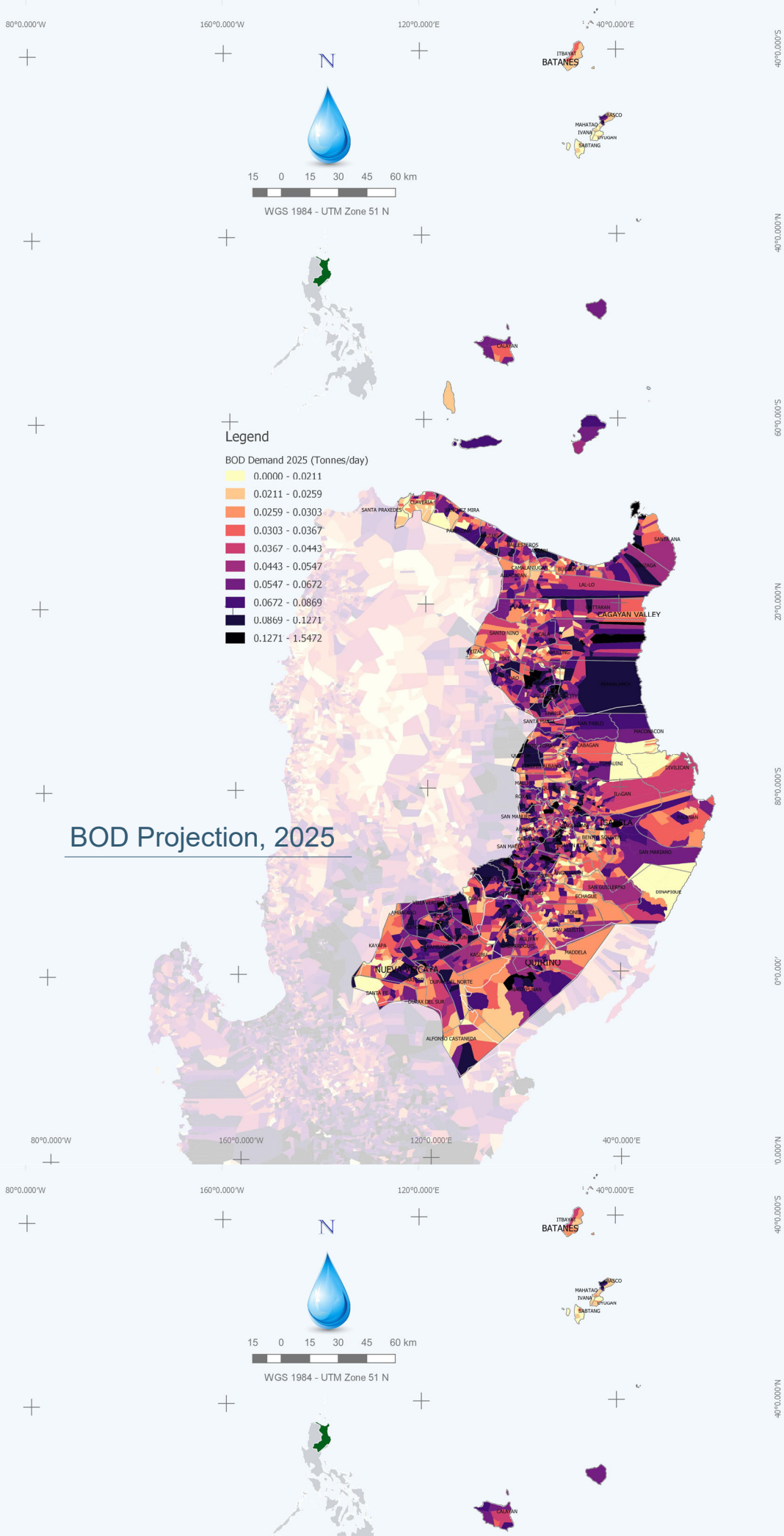
Open Defecation

PSA, 2015 Data

BOD Projection, 2020



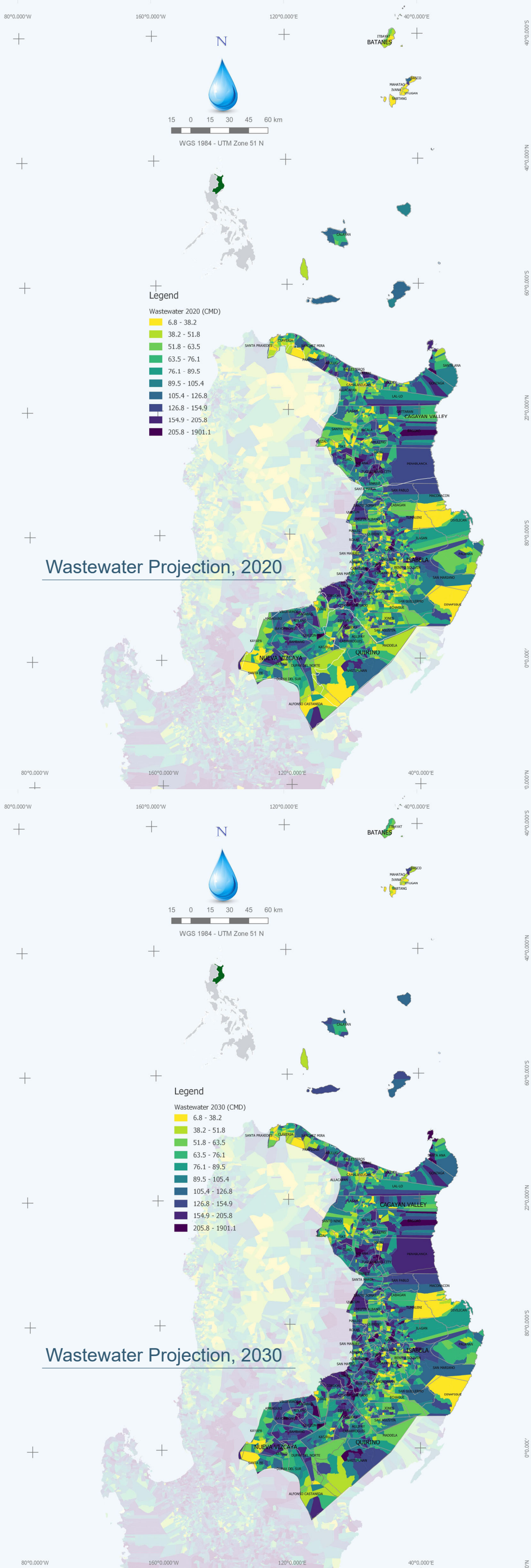
BOD Projection, 2025



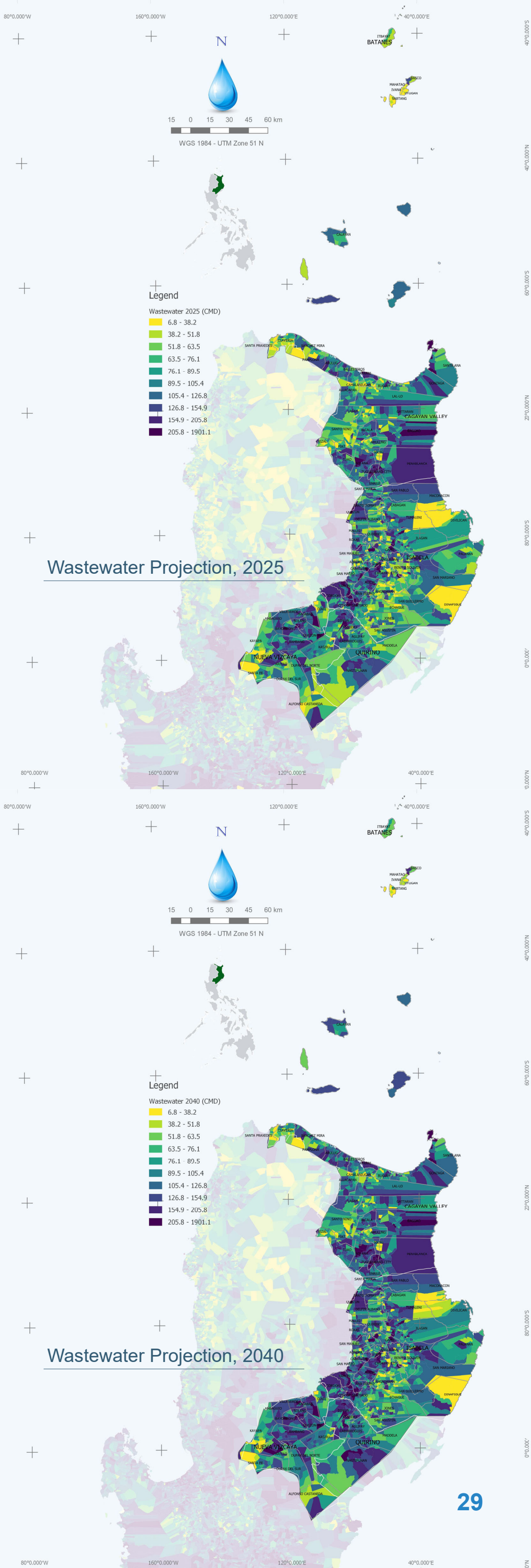
BOD Projection, 2030

BOD Projection, 2040

Wastewater Projection, 2020



Wastewater Projection, 2025



Wastewater Projection, 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.

As discussed in the water resources section of this report, Cagayan Valley has three major river basins. Table 14 shows the list of tributary rivers of the river basins with their corresponding classifications.

Table 14: Classification of Tributary Rivers in Region II

River Basin	River	Class
Apayao-Abulug River Basin	Binuan	B
	Karagawan	B
	Laco	B
	Malabanig	B
	Malunog	B/C
	Nagan	AA/A
	Naguillan	A
	Tumog	B/C
Agno River Basin	Benguet	A
	Itogon	C
	Antamok	A
	Bokod	A
	Adunot	A
	Kabayan	A
	Alenod	A
	Ambulalacao Lake	AA
	Pangasinan	C
Cagayan River Basin	Cagayan	A/C
	Upper Cagayan	A/C
	Magat	C
	Ilagan	C
	Siffu-Mallig	C
	Chico	C

It is a fact that these river basins have been threatened by the indiscriminate or illegal discharge and disposal of liquid and solid industrial, agricultural and domestic waste. Table 15 shows the prevailing causes and impacts on the river basins. It lists certain activities that degrade the water quality thereof.

Based on the wastewater projection maps, most cities and growing municipalities in Cagayan Valley have higher water demand as compared to that of other areas. The former generate more wastewater and wastes that, if left untreated, would contribute to the further degradation of the quality of water of existing and future water sources and resources. Unrestrained wastewater disposal will increase the incidence of waterborne diseases.

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

Table 15: Main Industries and their Impacts on Water Quality of the River Basins

Source	Impact/Potential Waste Generated
Industrial	
Improper disposal of mine tailings by small-scale mining operators in Nueva Vizcaya and Quirino	Increased mercury and cyanide levels
Agricultural	
Fertilizer runoff	Increased nitrate and phosphate levels from non-point sources
Pesticide runoff	Increased pesticide levels from non-point sources
Domestic Water Supply	
Lack of knowledge, poor water resource management and inadequate and dilapidated water supply facilities	Insufficient supply of water for domestic use
Domestic Wastewater	
Absence of a domestic wastewater collection system	Increased BOD
Absence of septic tanks	Increased total coliform and fecal coliform
Open defecation	Increased incidence of waterborne diseases
	Aquatic plants and animals unsafe for human consumption
Solid waste pollution	
Open dump sites; limited capacity and inefficient management of controlled dump sites	Water pollution; degradation of tributaries and river basins
Sedimentation	
River bank erosion/siltation with high velocity rainfall runoff	Increased Total Suspended Solids (TSS)
Poor flood control and drainage facilities, lack of instruments for rainfall and flood measurements and siltation	Frequent flooding

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.[19]

In 2015, it was reported that there were 10,294 cases of acute watery diarrhea in Cagayan Valley per 2015 Field Health Service Information System (FHSIS). There were also 5 cases of cholera and 1,312 cases of typhoid in the region.

These figures indicate that many residents in the region still have no access to safe drinking water and adequate sanitation facilities.

As of 2017, the Department of the Interior and Local Government (DILG) reported 11 waterless[20] municipalities in Cagayan Valley (see Figure 15).

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

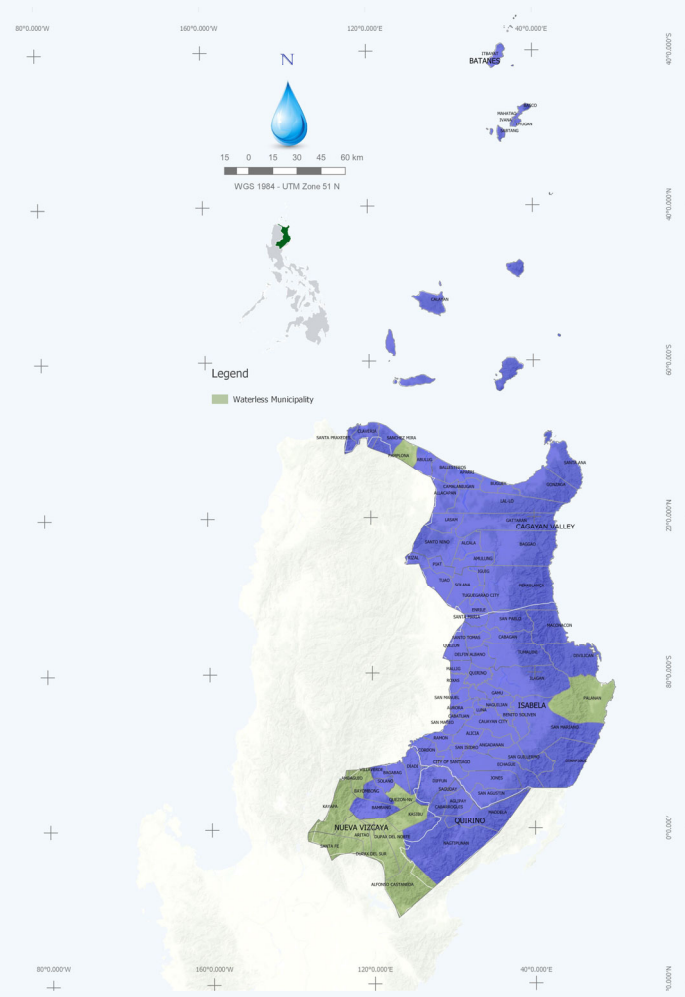


Figure 15: Waterless Municipalities

[19] World Health Organization
[20] Waterless Municipalities defined as municipalities with less than 50 percent service coverage, National Anti-Poverty Commission, 2010

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

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Itbayat
Mahatao
Basco
Ivana
Uyugan
Sabtang

Legend

With Water Quality Problem

Aparri
Calayan

Santa Praxedes
Claveria
Sanchez-Mira
Pamplona
Abulug
Ballesteros
Camalaniugan
Buguey
Santa Ana
Gonzaga
Santa Teresita
Allacapan
Lal-Lo
Lasam
Gattaran
Baggao
Santo Ni�o
Alcala
Amulung
Rizal
Piat
Iguig
Tuao
Solana
Pe�ablanca
Tuguegarao City
Enrile
Santa Maria
San Pablo
Cabagan
Maconacon
Quezon
Delfin Albano
Tumauini
Divilacan
Mallig
Quirino
Ilagan
Roxas
Gamu
San Manuel
Burgos
Naguilian
Palanan
ISABELA
Aurora
Luna
Cabatuan
San Mateo
Cauayan City
Benito Soliven
San Mariano
Ramon
Alicia
Angadanan
San Isidro
Santiago City
Cordon
San Guillermo
Dinapigue
Diadi
Echague
Villaverde
Ambaguio
Bagabag
Diffun
Jones
Solano
Saguday
Quezon
San Agustin
Bayombong
Cabarroguis
Kayapa
Aglipay
Bambang
Kasibu
Maddela
NUEVA VIZCAYA
QUIRINO
Aritao
Dupax Del Norte
Santa Fe
Nagtipunan
Dupax Del Sur
Alfonso Castaneda

Areas with Water Quality Problems

Water Districts' Water Quality Monitoring Data, LWUA, 2015 Data

WSS Sector Gaps

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

Issues, Constraints and Challenges

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

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

Planning and Development

Planning is commonly defined as "a strategic process to achieve developmental objectives." In a broad sense, it is a fundamental management undertaking that requires "logical thinking, rational decision-making and total dependence on reliable data and factual information."

The participants identified the inclusion and allocation of funds for the WSS sector in development plans as a "facilitating factor", reasoning that this sector should top the list of priority programs.

The strict implementation of the Philippine National Standards for Drinking Water (PNSDW) as stipulated in Presidential Decree 198 (which authorizes the formation of local water districts), and Presidential Decree 856 (the Code of Sanitation of the Philippines) is a facilitating factor.

Cited as "hindering factors" were the inaccessibility of financing schemes and the low level of awareness among LGUs thereof, poor enforcement of national and local policies, the setting up of multiple water institutions, the high susceptibility of the WSS sector to disasters caused by climate change, and the lack of information dissemination programs about the sustainable use of water resources as well as the proper treatment and disposal of wastewater.

Regulation

While the compliance of concerned institutions with the PNSDW and strict enforcement of the Clean Water Act were identified as key "facilitating factors", the efficiency of the regulatory system, however, is hindered by the following: the lack of awareness of tariff regulations imposed by the National Water Resources Board (NWRB), inadequate incentives for water districts, political interference, and incompetent regulators with respect to the management of WSPs.

Cross-cutting Issues

In regard to policy and institutional concerns, the government's plan to strengthen the WSS sector by creating an apex body that would institutionalize reforms in water services and resource management is a facilitating factor. This, is in line with the legislative agenda in the PDP 2017-2022, which is backed by Regional Development Plans (RDPs). Deputizing agencies tasked with processing and issuing water permits and crafting relevant policies and ordinances at the local level are expected to eliminate the drawbacks created by groups with competing vested interest.

Other key issues identified are the fragmented structure of institutions regulating the WSS sector and the absence of a regional counterpart of NWRB which affects project implementation at the sub-national level.

With respect to leadership, the WSS sector should be prioritized by the current administration by giving more teeth to laws governing the provision of funding support for WSS projects. In the participants' collective view, policy making and enforcement should be shielded from arbitrary political interference. A strong political will, should be built to enable regional and provincial governments to respond to the shared goals of WSS sector stakeholders.

On the cultural, behavioral and attitudinal dimensions of project interventions, the commitment of service providers to expand service coverage and increase the number of service connection is important.

One of the main takeaways underscored the redeeming value of the "bayanihan" spirit among Filipinos as a "behavioral factor" that encourages and motivates them to adhere to good practices in the use, conservation and protection of water resources. At the other end of the cultural spectrum, however, lies the lack of cultural sensitivity on the part of "outsiders" and even stakeholders to local customs and traditions among indigenous people (IPs). The limited knowledge (and naiveté) among rural residents of the importance of water sanitation and proper waste disposal is also lamented.

With regard to capacity building, good network and linkages among the stakeholders were noted, especially on the national government's advocacy to inform and educate the general public on sanitation and provision of potable water.

The initiatives of the LGUs to facilitate the delivery of WSS services were also cited as an "enabling factor". However, the lack of funding and limited manpower of LGUs to conduct vigorous and massive IEC campaigns on basic sanitation, and the inadequate managerial, technical and financial capability of LGUs to initiate and manage specific programs and undertakings to improve access to safe water and sanitation degrade the quality of the delivery of these services.

Table 16 summarizes the hindering and facilitating factors impacting the WSS sector in Region II.

Table 16: Facilitating and Hindering Factors

Area	Facilitating Factors	Hindering Factors
Planning and Development	DILG and partner agencies which should provide grants to LGUs for SALINTUBIG projects	Lack and poor enforcement of national and local policies
	WATSAN (water and sanitation) as a priority program/ project of the provincial and municipal governments	Difficulties encountered by LGUs in complying with stringent requirements regarding access to funds from financing institutions
	The annual allocation for WATSAN projects which is included in the development plans	Politicians with vested interests using water as a political commodity (particularly during elections) for political expediency
		The high susceptibility of water and sanitation infrastructure to disasters caused by climate change
		The need to regulate multiple water institutions by one body (e.g., by proposing a Department of Water)
Service Provision	PD 198 which mandates the delivery of safe and potable water round the clock.	Overextraction of groundwater which will gradually lessen well production and threaten water supply
	PD 856, Chapter II (Sanitation Code of the Philippines)	Limited LGU ordinances that will support/strengthen existing laws on sanitation
	PNSDW	Problems associated with waste disposal
	Basic right to access to safe water supply as mandated by enacting laws/ordinances	LGUs' lack of funding for the dissemination of public information on proper wastewater disposal
	Increase in service connections and improvement of service provided by WSPs	
Regulation	Prompt submission of reports	Lack of awareness on the part of WSPs that NWRB regulates their tariff
	Compliance with PNSDW	Lack of competent regulators
	Strict enforcement of the Clean Water Act	Political interference
	Affordable tariff	NWRB's lapses
	Incentives encouraging WDs to comply with water quality standards	Incompetence of government officials
	Funding/Sourcing of funds	
Policy and institutional development	Creation of an apex body under the PDP/RDP 2017 - 2022 legislative agenda that will strengthen the WSS sector	The fragmented institutional structure governing the WSS sector which hinders the effective implementation of policies/plans
	Deputizing a government agency (i.e. NIA, DENR) regarding grant of water permits to facilitate project implementation at the subnational level	The absence of a regional counterpart of NWRB which has delayed project implementation
	Enforcement of policies by concerned institutions to help strengthen the WSS sector	
Political Leadership	Political learning that promotes civic responsibility, participation, and social justice	The lack of political will among elected and appointive officials (motivated by political patronage) to implement and support WSS
	Priority given to the WSS sector by the current administration	Limited funding support from agencies/institutions which hamper project implementation
Cultural/ Behavioral/ Attitudinal Issues	Service providers that are willing and able to increase service connections	The tendency of most Filipinos to become regionalistic ("kanya-kanya", "tayo-tayo", "sila-sila") Improper maintenance of water and wastewater facilities
	Responsible use of water resources	Dole-out mentality of beneficiaries/recipients is not financially and economically feasible for use
	Cultural sensitivity	The lack of cultural sensitivity; IPs leading to brain drain Insufficient knowledge of residents (especially in rural communities and far-flung areas) on the importance of safe water, sanitation and proper waste disposal
	Proper conservation of water resources	Improper maintenance of water facilities
	Observance of customs and traditions that are not contrary to ethical values and common sense	
Capacity Building	Capability of LGUs to facilitate the provision of WSS services	The lack of LGU personnel to conduct IECs on basic sanitation
	Continuity of the national government's effort to maintain a good network for IEC campaigns	The lack of technical and managerial skills and expertise in LGUs
	Vigorous and massive Information drive on the government's plans and programs on safe water supply and sanitation	Lack of knowledge on proper wastewater disposal
		Lack of awareness of the importance of basic and improved sanitation

Regional Vision

“Region II is at the forefront by year 2040 in providing world-class, universal, affordable, sustainable, safe and equitable water supply and sanitation for a healthy and productive community.”

The vision statement for the Cagayan Valley Region WSS sector was developed by the visioning group in the hope that it will provide the government and stakeholders direction to achieving the goal of safe access to and sustainable water supply and sanitation throughout the region by the year 2040.

In keeping with this vision, key strategies and corresponding success indicators contributing towards the achievement of the overall sector vision have been adopted. Key projects and programs have been identified, including WSS targets in accord with the national WSS targets in line with the PDP and SDG.

Strategic Framework

The creation of the strategic framework begins with the determination of the issues, constraints and challenges of the water supply and sanitation sector. The diagram on the right shows specific highlights and contrasts,

pertaining to areas displaying best practices and those needing improvement.

The figure shows strategic priorities for Region II highlighting the provinces’ individual plans. Priority areas include water supply expansion, plan/program upgrading, resource mobilization, water resources protection, policy enforcement, monitoring and evaluation and regulation and standards. 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 17.

Table 17: Strategies in Achieving Increased Access to Potable Water

Segment	Target	Strategic Statement
Undeveloped/Underdeveloped		
Level 1	▪ 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 2	▪ 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 3	▪ 100% coverage of franchise area ▪ Ensuring the sustainability of operations of Level III systems ▪ Continuing expansion programs to ensure 100% coverage	▪ Increasing private sector participation ▪ Ensuring a robust regulatory framework to balance the interest of consumers and operators/WSPs ▪ Encouraging business establishments and residential communities to embark on rainwater harvesting programs

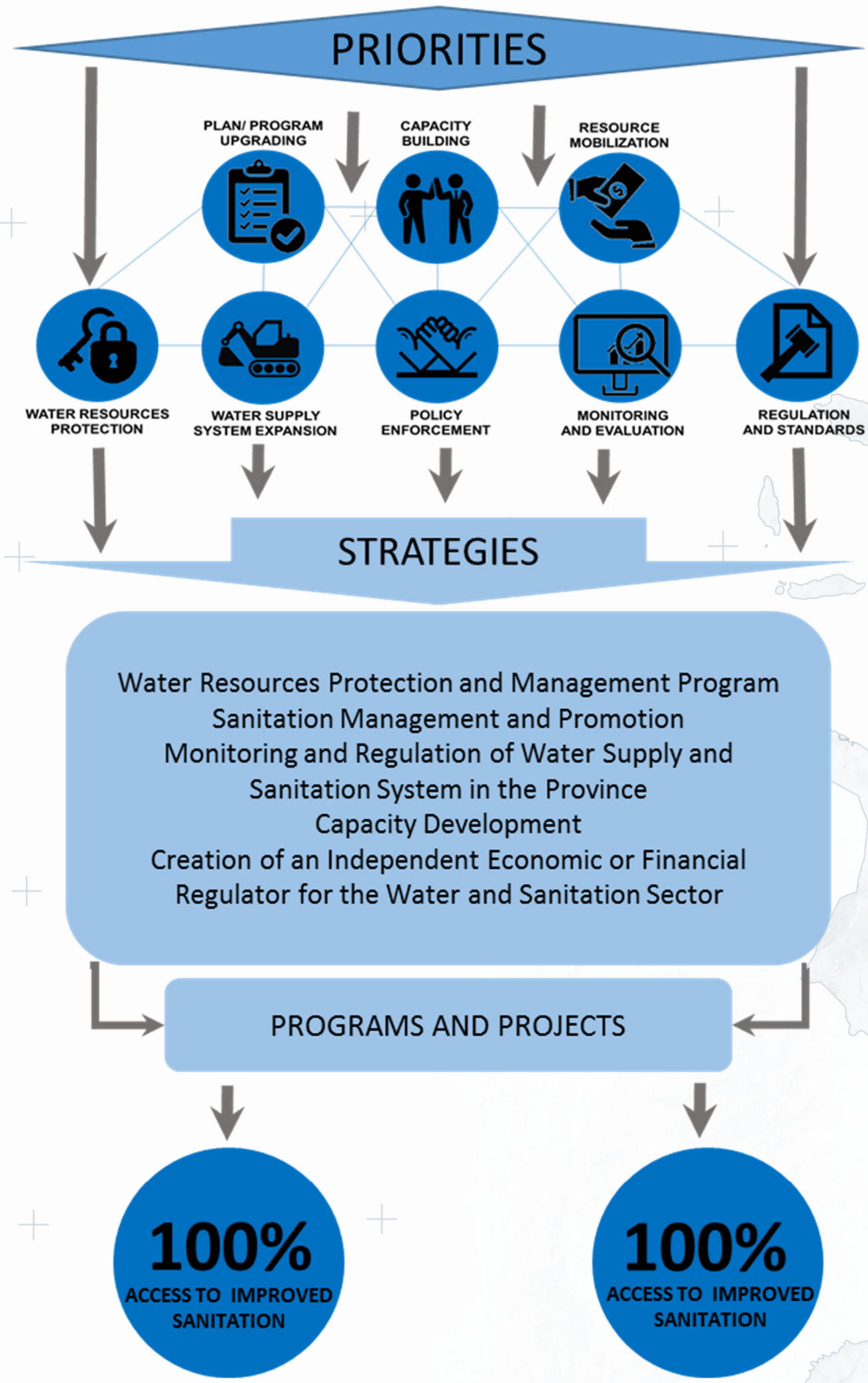


Figure 16: Cagayan Valley Region WSS Strategic Framework

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.

Region II strives to achieve 95% access to safe water by 2022 and 100% access by 2030. Universal access by 2030 means more than 1 million HHs will benefit. Improved access to sanitation is set at 90% by 2022 and universal access by 2030.

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

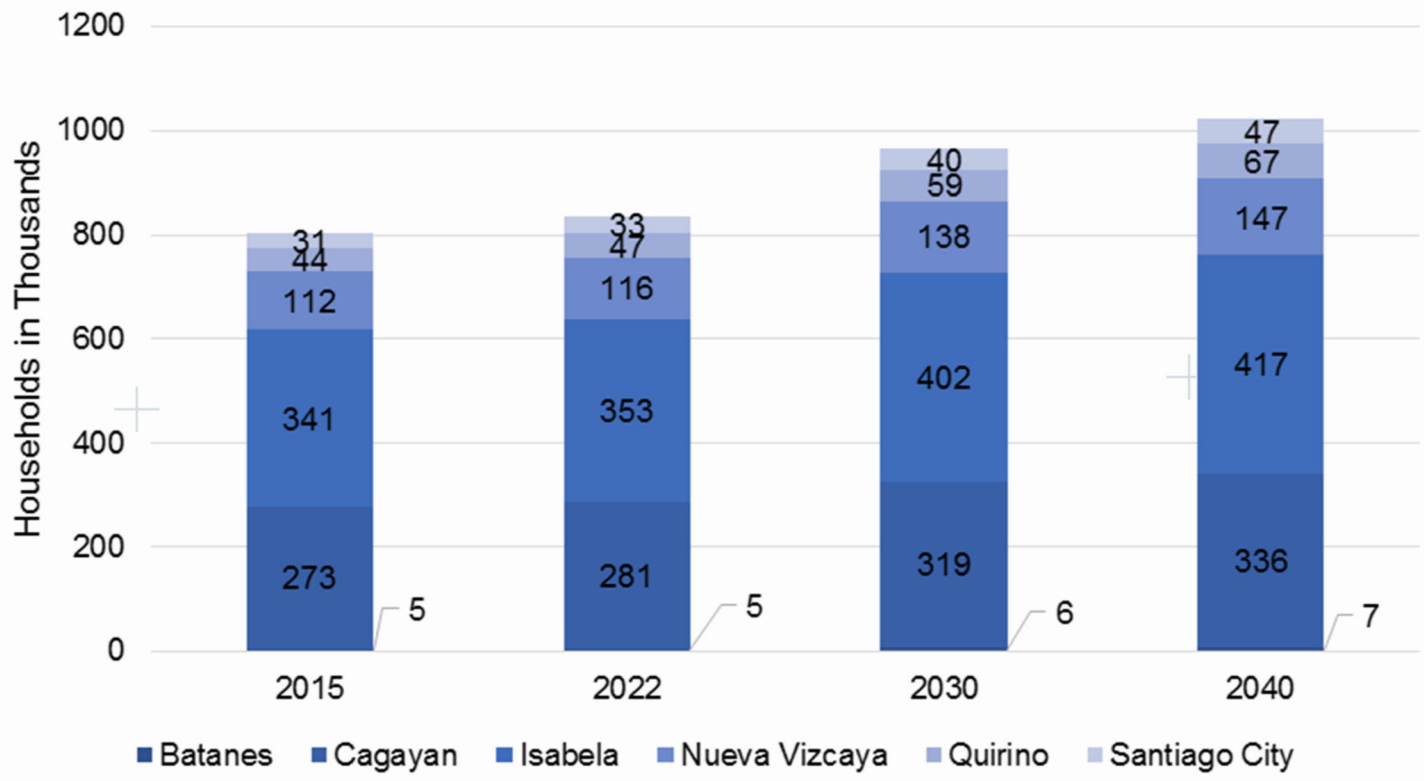


Figure 17: Targeted Households with Access to Safe Water

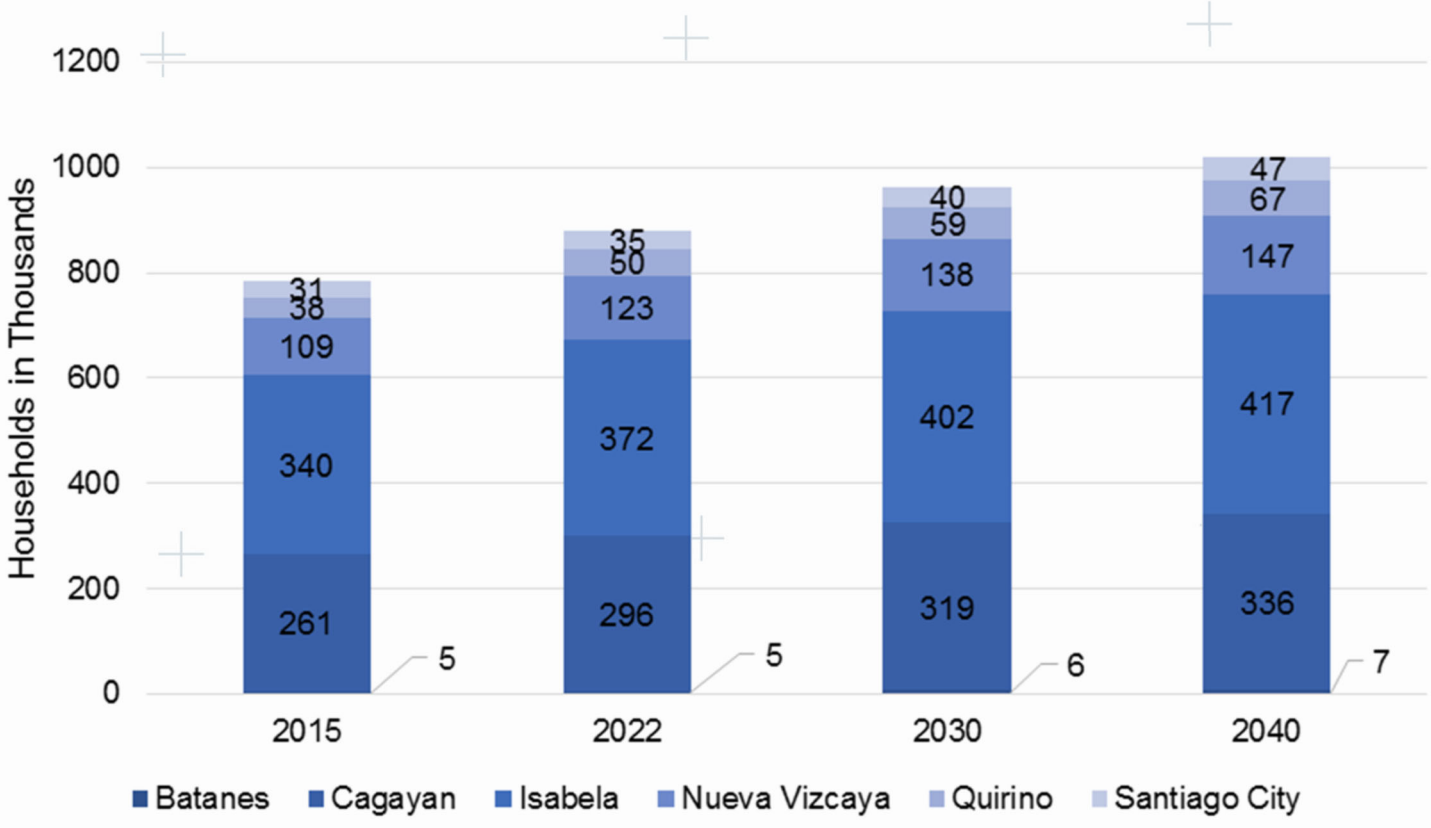


Figure 18: Targeted Households with Access to Sanitation

Water Supply Targets

BATANES			
Category	2022	2030	2040
Level 3	95.0%	100.0%	100.0%
Level 2	5.0%	0.0%	0.0%
Level 1	0.0%	0.0%	0.0%
With Access	100.0%	100.0%	100.0%
No Access	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

CAGAYAN			
Category	2022	2030	2040
Level 3	70.0%	85.0%	100.0%
Level 2	15.0%	15.0%	0.0%
Level 1	10.0%	0.0%	0.0%
With Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

ISABELA			
Category	2022	2030	2040
Level 3	70.0%	85.0%	100.0%
Level 2	15.0%	15.0%	0.0%
Level 1	10.0%	0.0%	0.0%
With Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

NUEVA VIZCAYA			
Category	2022	2030	2040
Level 3	70.0%	85.0%	100.0%
Level 2	15.0%	15.0%	0.0%
Level 1	10.0%	0.0%	0.0%
With Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

QUIRINO			
Category	2022	2030	2040
Level 3	70.0%	85.0%	100.0%
Level 2	15.0%	15.0%	0.0%
Level 1	10.0%	0.0%	0.0%
With Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

CAGAYAN VALLEY			
Category	2022	2030	2040
Level 3	68.9%	83.2%	100.0%
Level 2	14.7%	15.1%	0.0%
Level 1	11.4%	1.7%	0.0%
With Access	95.0%	100.0%	100.0%
No Access	5.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

Sanitation Targets

BATANES			
Category	2022	2030	2040
Improved	100.0%	100.0%	100.0%
Basic	0.0%	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%

CAGAYAN			
Category	2022	2030	2040
Improved	100.0%	100.0%	100.0%
Basic	0.0%	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%

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

NUEVA VIZCAYA			
Category	2022	2030	2040
Improved	27.0%	100.0%	100.0%
Basic	61.0%	0.0%	0.0%
Shared/Communal/Limited	12.0%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

QUIRINO			
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%

CAGAYAN VALLEY			
Category	2022	2030	2040
Improved	90.4%	100.0%	100.0%
Basic	7.2%	0.0%	0.0%
Shared/Communal/Limited	2.5%	0.0%	0.0%
Open Defecation	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%

Strategic Interventions

After the regional planning and consultation workshop, a working document detailing specific strategic interventions to improve water supply and sanitation access in Region II 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 18 and 19 show the specific strategic interventions for water supply and sanitation, respectively.

Table 18: 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 19: 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*
Medium Access Areas with 30% to 59% Improved Sanitation Coverage	▪ Local Sustainable Sanitation Plan (LSSP) should be incorporated into the WSS Sector Plan, LDP, AIP, and local health plan. ▪ A septage management program should be developed to provide service to the entire population using a customized approach in rural areas. ▪ The NSSMP subsidy grant should be included in septage management programs. ▪ A sanitation ordinance covering septage management services should be passed, possibly integrating it with the environment code and WQMA action plan.	▪ Sanitation programs should focus on implementing septage management programs and completing projects on basic sanitation and zero open defecation. ▪ Systems should be expanded to cover increase in population and additional buildings. ▪ M&E system should conform to PSA/ Census (covered by households desludged and on-site systems). ▪ Sewerage system programs should be introduced.	▪ Tariff should be computed using full cost recovery with possible infusion of capex subsidy for septage management projects (with possible clustering of LGUs). ▪ LGU/WD implementers have undergone compliance training given by DOH and DENR (particularly in septage management systems), and by DA regarding regulations/ guidelines on disposal of by-products. ▪ Strict penalties should be imposed on those not complying with certain procedures, including LGUs/WDs, by filing cases with the environmental ombudsman.	▪ Promotions should focus on enjoining households to have their septic tanks desludged once SMP is in place; the importance of building the right septic tanks and the benefits of good sanitation should likewise be promoted. ▪ Building buy-in for paying for sanitation services should be promoted.

Physical Interventions

To meet the targets for access and coverage as well as the normative content of water (service standards), capital investments are necessary. The details of these investments in 2022 and 2030 are listed in Table 20.

Table 20: Capital Investments Required for 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 21).

Table 21: Institutional and Regulatory Reforms Required to Achieve Water Supply and Sanitation Goals

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

Addressing the Gaps

Water Supply Investment Requirements

Physical Investments

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

Region II requires capital investments for infrastructure development of about PhP18.74 billion and PhP8.68 billion to achieve 2022 and 2030 targets, respectively. Unit development costs used to arrive at these sums are estimated at PhP31,300 per HH for Level III, PhP18,400 Level II, and PhP8,300 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 Region II) were derived by applying regional cost factors (with respect to labor, material, and equipment costs) to the computed development base costs for NCR. NCR values are pegged at PhP31,800 per household for Level III, PhP18,700 for Level II, and PhP8,400 for Level I.

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

Aside from the direct costs, indirect costs were considered in estimating the total investment requirements. These items include project preparation activities (which may affect budget considerations) before actual construction work begins. Items considered and percentage values used in relation to the total direct costs computed are shown in Table 22.

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

Nonphysical Investments

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

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

Proposed interventions include the following:

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

The map on right shows the areas where priority WD projects for Region II have been approved and those pending approval. It shows five municipalities with WDs included in LWUA's priority list of projects. Metro Tuguegarao WD has secured LWUA's financial assistance (FA). The funding requests of the other four (4) WDs in Diffun, Naguilian, Diadi and Luna are pending approval (as of this writing).

Table 22: 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 23: Total Investment Costs for Water Supply Sector

Province/City	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Batanes	38	52
Cagayan	5,585	2,697
Isabela	9,240	3,759
Nueva Vizcaya	2,559	1,322
Quirino	1,167	663
Santiago City	155	191
Total	**18,744**	**8,684**

[21] *Based on industry standards*

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

N

15 0 15 30 45 60 km

WGS 1984 - UTM Zone 51 N

Itbayat
Basco
Mahatao
Ivana
Uyugan
Sabtang
Calayan
Aparri

Legend

- Approved Projects
- Pending Projects

Claveria
Santa Praxedes
Sanchez-Mira
Pamplona
Abulug
Ballesteros
Santa Ana
Camalaniugan
Buguey
Gonzaga
Allacapan
Santa Teresita
Lal-Lo
Lasam
Gattaran
Santo Ni□o
Alcala
Baggao
Rizal
Amulung
Piat
Iguig
Tuao
Solana
Pe□ablanca
Tuguegarao City
Enrile
Santa Maria
San Pablo
Cabagan
Maconacon
Quezon
Delfin Albano
Tumauini
Divilacan
Mallig
Quirino
Ilagan
Roxas
Gamu
San Manuel
Burgos
Naguilian
ISABELA
Palanan
Aurora
Luna
Cabatuan
San Mateo
Cauayan City
Benito Soliven
San Mariano
Ramon
Alicia
Angadanan
San Isidro
Santiago City
Cordon
San Guillermo
Dinapigue
Diadi
Villaverde
Ambaguio
Bagabag
Diffun
Echague
Jones
Solano
Saguday
Quezon
San Agustin
Bayombong
Cabarroguis
Kayapa
Aglipay
Bambang
Kasibu
Maddela
NUEVA VIZCAYA
QUIRINO
Aritao
Dupax Del Norte
Santa Fe
Nagtipunan
Dupax Del Sur
Alfonso Castaneda

LWUA Priority Projects

LWUA, 2018 Data

Sanitation Investment Requirements

Physical Investments

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

Region II will need about PhP525 million for basic sanitation from 2016 to 2022 to reach its target of 100%.

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

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

The region will need about PhP1.85 billion and PhP166 million 2022 and 2030, respectively, for its septage management program.

Sewerage System Program. There are no sewerage systems required at this time in the Region II. However, rapidly urbanizing cities (i.e., candidate HUCs) should also consider planning for sewerage services in the interim. Candidate HUCs may be closely examined initially in Isabela (e.g., in Ilagan and Cauayan) and Nueva Vizcaya (e.g., in Bayombong and Solano) as the pace of urbanization may set in more rapidly in these places and in the capital towns of other provinces.

Table 24: Total Investment Costs for Sanitation Sector

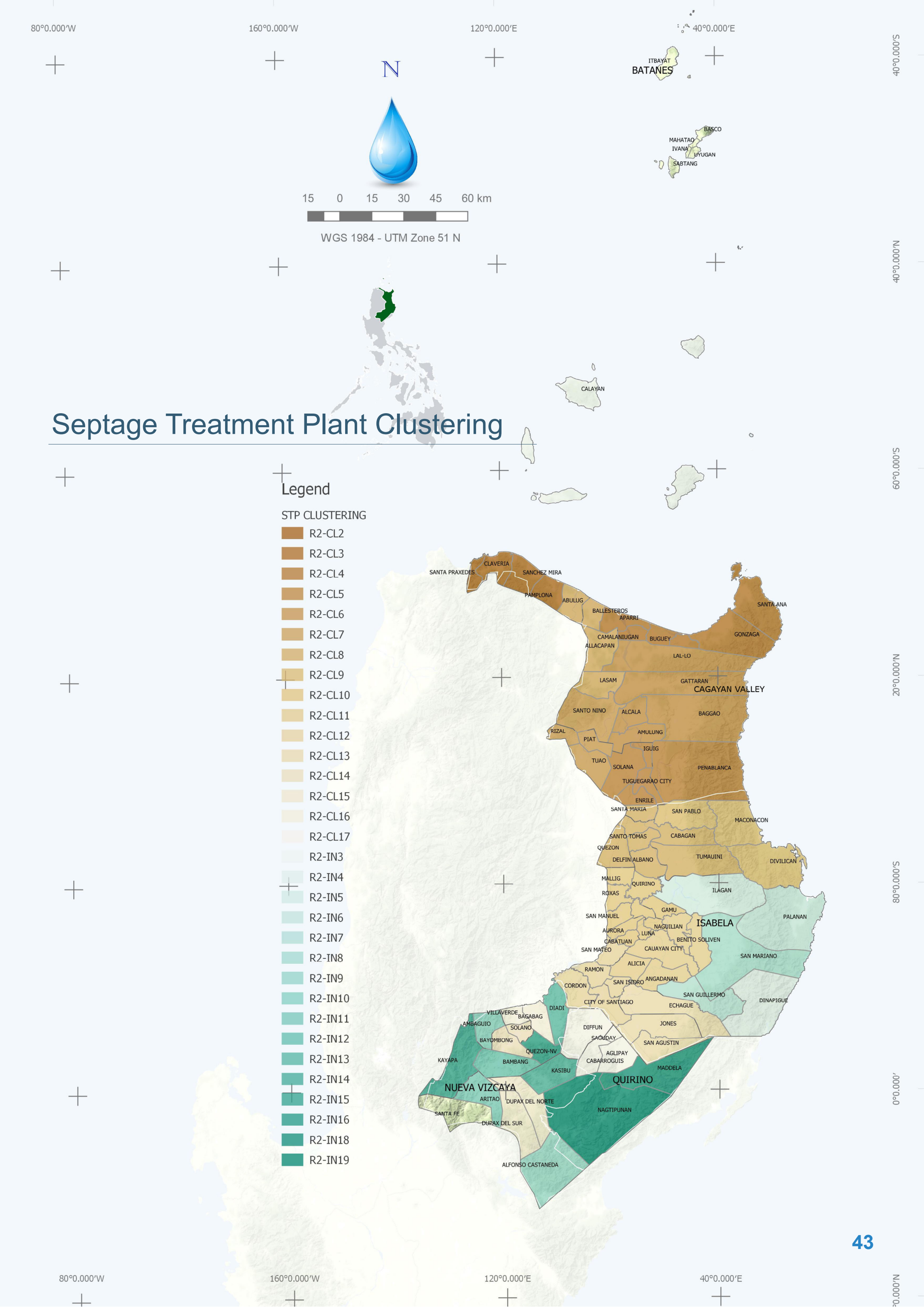
Province	Total Investment Cost (in PhP Million) 2022	Total Investment Cost (in PhP Million) 2030
Batanes	25	26
Cagayan	1,605	692
Isabela (including Santiago City)	3,040	965
Nueva Vizcaya	2,792	413
Quirino	1,184	276
Total	**8,646**	**2,372**

Nonphysical Investments

Cagayan Valley, 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.

Septage Treatment Plant Clustering



Proposed Projects and Programs

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

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

This list of projects does not cover only infrastructure projects, but also nonphysical investment requirements, such as capacity development programs, information dissemination campaigns, and watershed management plans. These projects run the gamut from conception, proposal, pre-feasibility and feasibility study stages, detailed engineering design, to pre-procurement and procurement. Figure 19 shows the distribution of the investment requirement per province. Based on the proposed projects and programs, the region needs PhP76.2 billion to boost its WSS sector.

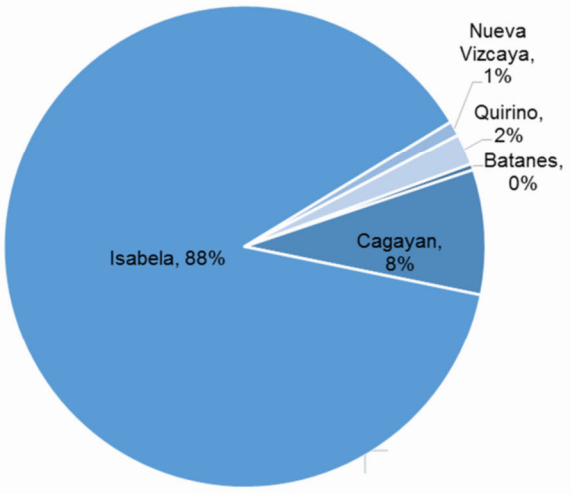


Figure 19: Distribution of Investment Requirement per Province

Batanes								
Water Supply	Period	Budget Requirement (PhP Million)	Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)	
1 Installation and maintenance of water testing facilities	Short Term	1.50	1 Construction of domestic wastewater and septage treatment plant (Phase 1)	Short Term	50.00			
2 Operation and maintenance expenses of water testing facilities	Short Term	-	2 Construction of domestic wastewater and septage treatment plant (Phase 2)	Medium Term	100.00			
3 Installation of rainwater harvesting facilities in HHs (Phase 1)	Short Term	35.00	3 Operation and maintenance of septage treatment plant (Phase 1)	Short Term	4.00			
4 Installation of rainwater harvesting facilities in HHs (Phase 2)	Medium Term	60.00	4 Operation and maintenance of septage treatment plant (Phase 2)	Medium Term	4.00			
5 Drilling of deep wells (Phase 1)	Short Term	2.00	5 Regular desludging of septic tanks (Phase 1)	Short Term	20.00			
6 Drilling of deep wells (Phase 2)	Medium Term	6.00	6 Regular desludging of septic tanks (Phase 2)	Medium Term	20.00			
7 Tree planting in watershed areas (Phase 1)	Short Term	2.00	7 Training of technical manpower and other personnel	Short Term	0.40	**315.40**	**5,390**	
8 Tree planting in watershed areas (Phase 2)	Medium Term	3.00						
9 Fencing of existing water sources	Short Term	5.00						
10 Training of specialists and personnel (Phase 1)	Short Term	1.00						
11 Training of specialists and personnel (Phase 2)	Medium Term	1.50						
	Total	**117.00**		**Total**	**198.40**			

Cagayan								
Water Supply	Period	Budget Requirement (PhP Million)	Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)	
1 Feasibility study and bulk water treatment plant (Phase 1)	Short Term	1,340.48	1 Septage Treatment Plant, IEC on water-tight septic tanks; funding scholarly research studies	Short Term	216.83			
2 Feasibility study and bulk water treatment plant (Phase 2)	Medium Term	2,178.63	2 Septage Treatment Plant, IEC on water-tight septic tanks; funding scholarly research studies	Medium Term	201.29			
3 Dam Project in Penablanca	Medium Term	2,000.00	3 IEC (Phase 1)	Short Term	3.00			
4 IEC with regard to Tariff Formulation and Operations (Phase 1)	Short Term	3.00	4 IEC (Phase 2)	Medium Term	5.00			
5 IEC with regard to Tariff Formulation and Operations (Phase 2)	Medium Term	5.00	5 IEC (Phase 1)	Short Term	3.00			
6 Source Disinfection (Phase 1)	Short Term	13.00	6 IEC (Phase 2)	Medium Term	5.00			
7 Source Disinfection (Phase 2)	Medium Term	10.00	7 Metro Tuguegarao WD Cluster Septage Mgmt. Project (covering Tuguegarao City, Penablanca, Piat and Solana)	Long Term	950.00	**7,308.23**	**295,834**	
8 Centralized water laboratory (DOH-accredited) within the province, formulation of kpi and strict submission of reports (Phase 1)	Short Term	179.00						
9 Centralized water laboratory (DOH-accredited) within the province, formulation of kpi and strict submission of reports (Phase 2)	Medium Term	125.00						
10 Establishment of watersheds, Watershed Management Plan, reforestation (Phase 1)	Short Term	20.00						
11 Establishment of watersheds, Watershed Management Plan, reforestation (Phase 2)	Medium Term	50.00						
	Total	**5,924.11**		**Total**	**1,384.12**			

Isabela									
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Reforestation thru Isabela Greening Project (Phase 1)	Short Term	5.00	1	Construction and installation of sanitary toilets (Phase 1)	Short Term	50,000.00		
2	Reforestation thru Isabela Greening Project (Phase 2)	Medium Term	25.00	2	Construction and installation of sanitary toilets (Phase 2)	Medium Term	100.00		
3	Forest protection law enforcement thru the Isabela Environment Protection Task Force (Phase 1)	Short Term	2.00	3	Training in proper utilization of sanitary toilets (Phase 1)	Short Term	20.00		
4	Forest protection law enforcement thru the Isabela Environment Protection Task Force (Phase 2)	Medium Term	5.00	4	Training in proper utilization of sanitary toilets (Phase 2)	Medium Term	40.00		
5	Aral Kalikasan sa Eskwela at Barangay (Phase 1)	Short Term	1.00	5	Construction of a sanitary landfill per district (Phase 1)	Short Term	500.00		
6	Aral Kalikasan sa Eskwela at Barangay (Phase 2)	Medium Term	3.00	6	Construction of a sanitary landfill per district (Phase 2)	Medium Term	500.00		
7	Water sampling and treatment; formulation of Water Safety Plan (Phase 1)	Short Term	20.00	7	Operation of vermi composting facility and material recovery facility (Phase 1)	Short Term	20.00		
8	Water sampling and treatment; formulation of Water Safety Plan (Phase 2)	Medium Term	40.00	8	Operation of vermi composting facility and material recovery facility (Phase 2)	Medium Term	20.00		
9	Construction of distribution and lateral lines (Phase 1)	Short Term	2,000.00	9	Construction of five clustered septage treatment plants in Dist. 1, 2, 3, 4, coastal towns (Phase 1)	Short Term	300.00		
10	Construction of distribution and lateral lines (Phase 2)	Medium Term	2,000.00	10	Construction of five clustered septage treatment plants in Dist. 1, 2, 3, 4, coastal towns (Phase 2)	Medium Term	300.00		
11	Implementation of socialized billing on water use (Phase 1)	Short Term	2.00	11	Construction of sewerage systems (Phase 1)	Short Term	300.00		
12	Implementation of socialized billing on water use (Phase 2)	Medium Term	5.00	12	Construction of sewerage systems (Phase 2)	Medium Term	900.00		
13	ISO certification on operations, management and technology (Phase 1)	Short Term	10.00	13	Construction of wastewater and septage treatment plant	Long Term	288.00	**67,448.30**	**371,522**
14	ISO certification on operations, management and technology (Phase 2)	Medium Term	20.00	14	Construction of septage treatment plant (2 clusters)	Long Term	20.00		
15	Construction of separate water systems in the province (Phase 1)	Short Term	3,500.00						
16	Construction of separate water systems in the province (Phase 2)	Medium Term	1,000.00						
17	Construction of transmission and distribution Lines (Phase 1)	Short Term	1,000.00						
18	Construction of transmission and distribution Lines (Phase 2)	Medium Term	1,000.00						
19	Climate change adaptation activities (Phase 1)	Short Term	500.00						
20	Climate change adaptation activities (Phase 2)	Medium Term	500.00						
21	Design and construction of multipurpose stormwater detention facilities (Phase 1)	Short Term	500.00						
22	Design and construction of multipurpose stormwater detention facilities (Phase 2)	Medium Term	500.00						
23	Design and construction of new facilities (Phase 1)	Short Term	500.00						
24	Design and construction of new facilities (Phase 2)	Medium Term	1,000.00						
25	Upgrading of Levels 1 and 2 service to Level 3; construction of distribution and lateral lines	Long Term	2.00						
26	Water Resources Protection and Management Program	Long Term	0.30						
		Total	**14,140.30**			**Total**	**53,308.00**		

Quirino									
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Construction of community-managed water source systems in urban barangays (132 barangays)	Short Term	264.00	1	Provision of toilet bowls to households practicing open defecation	Short Term	5.58		
2	Construction of municipality-managed safe water source and filtration facilities tapping DBB river in the municipality of Cabarroguis	Short Term	150.00	2	Provision of toilet bowls to households with shared or communal toilets	Short Term	20.00		
3	Expansion of water districts		-	3	Construction of septage treatment plant facility (2 clusters)	Short Term	20.00		
	-Diffun Water District (Phase 1)	Short Term	20.00	4	Holding of general assemblies in barangays re: proper human waste disposal (Phase 1)	Short Term	0.20		
	-Diffun Water District (Phase 2)	Medium Term	30.00	5	Holding of general assemblies in barangays re: proper human waste disposal (Phase 2)	Medium Term	0.20		
	-Aglipay Water District (Phase 1)	Short Term	20.00	6	Quarterly review of health and sanitation program (Phase 1)	Short Term	0.20		
	-Aglipay Water District (Phase 2)	Medium Term	30.00	7	Quarterly review of health and sanitation program (Phase 2)	Medium Term	0.20		
	-Cabarroguis Water District (Phase 1)	Short Term	25.00	8	Training of RSIs in sustainable sanitation (Phase 1)	Short Term	0.10		
	-Cabarroguis Water District (Phase 2)	Medium Term	30.00	9	Training of RSIs in sustainable sanitation (Phase 2)	Medium Term	0.10		
	-Maddela Water District (Phase 1)	Short Term	20.00	10	Consultative meeting with RSI (Phase 1)	Short Term	0.10		
	-Maddela Water District (Phase 2)	Medium Term	30.00	11	Consultative meeting with RSI (Phase 2)	Medium Term	0.10		
4	Provision of an operational bacterial, chemical and physical water analysis laboratory	Short Term	10.00						
5	Yearly maintenance of labs doing water analysis	Short Term	5.00						
6	Hiring of manpower (1 med tech and 1 lab aide)	Short Term	2.50						
7	Provision of water disinfectants to owners/ developers of water sources (Phase 1)	Short Term	0.10						
8	Provision of water disinfectants to owners/ devolopers of water sources (Phase 2)	Medium Term	0.10						
9	Enforcing strict compliance of WRS and WDs with requirements re: bacterial analysis/physical and chemical analysis twice a year		-						
10	Issuance of health certificates to employees of WRS and WDs and provision of Hepa B kits, deworming tablets, sputum bottles	Short Term	0.16					**1,621.57**	**49,697**
11	Training of HW re: proper handwashing, iWASH, water demand management; IEC campaigns among households on water demand management (Phase 1)	Short Term	0.54						
12	Training of HW re: proper handwashing, iWASH, water demand management; IEC campaigns among households on water demand management (Phase 2)	Medium Term	0.54						
13	QPOWERS(Quirino Protection of Watershed Ecosystems and Rivers) (Phase 1)	Short Term	158.74						
14	QPOWERS(Quirino Protection of Watershed Ecosystems and Rivers) (Phase 2)	Medium Term	15.87						
15	Quirino Watershed Rehabilitation Project (Phase 1)	Short Term	72.90						
16	Quirino Watershed Rehabilitation Project (Phase 2)	Medium Term	7.29						
17	Quirino Rivers Rehabilitation and Protection (Phase 1)	Short Term	60.00						
18	Quirino Rivers Rehabilitation and Protection (Phase 2)	Medium Term	6.00						
19	Biodiversity Partnership Project (Phase 1)	Short Term	558.00						
20	Biodiversity Partnership Project (Phase 2)	Medium Term	55.80						
21	Integrated Watershed Enhancement Project within Critical Slopes of Cagayan River Basin in Quirino Province (Phase 1)	Short Term	0.43						
22	Integrated Watershed Enhancement Project within Critical Slopes of Cagayan River Basin in Quirino Province (Phase 2)	Medium Term	0.43						
23	Regular meetings of EMB Task Force (Phase 1)	Short Term	0.25						
24	Regular meetings of EMB Task Force (Phase 2)	Medium Term	0.40						
25	IEC campaign on water demand management for EMB taskforce in municipalities and barangays (Phase 1)	Short Term	0.37						
26	IEC campaign on water demand management for EMB taskforce in municipalities and barangays (Phase 2)	Medium Term	0.37						
		Total	**1,574.80**			**Total**	**46.78**		

Nueva Vizcaya									
	Water Supply	Period	Budget Requirement (PhP Million)		Sanitation	Period	Budget Requirement (PhP Million)	Total Budget Requirement (PhP Million)	HH Beneficiaries (2022)
1	Policy development and formulation among stakeholders (LGUs, WSPs, NGA, WDs) (Phase 1)	Short Term	0.22	1	Policy development and formulation for SANITATION PROGRAM among stakeholders	Short Term	-		
	(PhP 36,000/year - to cover monthly/ quarterly meeting expenses)		-	2	Development of Manual of Operations for sanitation facilities (for effective management of water services, planning, monitoring and evaluation)	Short Term	0.10		
2	Policy development and formulation among stakeholders (LGUs, WSPs, NGA, WDs) (Phase 2)	Medium Term	0.29	3	Training in regular maintenance and operation of sanitation facilities	Short Term	-		
	(PhP 36,000/year - to cover monthly/ quarterly meeting expenses)		-	4	Establishing linkage with all national/ international agencies for possible technical assistance or funding	Short Term	0.10		
4	Training re: regular maintenance and operation /	Short Term	0.20	5	Regular IEC activities among existing users	Short Term	0.10		
5	Establishing linkage with all national/ international agencies for possible technical assistance or funding	Short Term	0.10	6	IEC campaigns re: new housing facilities and new households	Short Term	-		
6	Regular IEC activities among existing users	Short Term	0.05	7	Sanitary toilet construction/provision of PTBs/porcelain toilet bowls to HHs	Short Term	12.14		
7	IEC programs for new service connections, expansion areas (Phase 1)	Short Term	0.10	8	Construction of wastewater and septage treatment plant	Short Term	-		
	(10,492 / 13,490 new HH X P10.00)		-		Phase 1: Urban areas:		-		
8	IEC programs re: new service connections, expansion areas (Phase 2)	Medium Term	0.13		1. Bambang (4 x 6 Meters)	Short Term	24.00		
	(10,492 / 13,490 new HH X PhP10.00)		-		2. Bayombong and Solano - (4 x 8 Meters)	Short Term	32.00		
9	NV Greening Program: reforestation of watershed areas (Phase 1)	Short Term	66.00		3. Dupax Del Sur and Dupax Del Norte (4 x 8 Meters)	Short Term	32.00		
	(NV Program Budget/ Year = PhP 11M) province-wide implementation		-		4. Bagabag and Villaverde (4 x 8 Meters)	Short Term	32.00		
10	NV Greening Program: reforestation of watershed areas (Phase 2)	Medium Term	88.00		5. Quezon (3 x 7 Meters)	Short Term	21.00		
	(NV Program Budget/Year = PhP 11M) province-wide implementation		-		6. Aritao (3 x 7 Meters)	Short Term	21.00		
11	Water Treatment (Phase 1)	Short Term	0.09		Phase 2:		-		
	(Provision of chlorine granules to households with unsafe water sources)		-		1. Santa Fe (3 x 7 Meters)	Medium Term	21.00		
	(PhP 15,000.00/Year)		-		2. Alfonso Castaneda	Medium Term	21.00		
12	Water Treatment (Phase 2)	Medium Term	0.12		3 x 7 Meters)	Medium Term	21.00	**754.30**	**122,593**
	(Provision of chlorine granules to households with unsafe water sources)		-		3. Diadi (3 x 7 Meters)	Medium Term	21.00		
	(PhP 15,000.00/Year)		-		4. Kasibu (3 x 7 Meters)	Medium Term	21.00		
13	Regular water testing (Phase 1)	Short Term	1.20		5. Kayapa (3 x 7 Meters)	Medium Term	21.00		
	(Regular fund of PHO - purchase of chemicals/repair of equipment)		-		6. Ambaguio (3 x 7 Meters)	Medium Term	21.00		
	(PhP 200K/year)		-						
14	Regular water testing (Phase 2)	Medium Term	1.60						
	(Regular fund of PHO - purchase of chemicals/repair of equipment)		-						
	(PhP 200K/year)		-						
15	Construction of Level II	Short Term	4.50						
	(10units) (PhP 450,000.oo / Unit)		-						
16	Construction of Level III	Short Term	130.25						
	(1 Municipality - Villaverde)		-						
	(Population - 18,607individuals / 3,721.4 HH)		-						
	x PhP 35,000 / HH		-						
17	Expansion of Level III water system in 15 municipalities	Medium Term	140.00						
	(Assumption: 10M / LGU WS expansion)		-						
		Total	432.85						

	Water Supply and Sanitation	Timeline	Budget Requirement (PhP Million)
1	Development of a manual of operations for water supply facilities and sanitation re: effective management of water services, planning, monitoring and evaluation	Short Term	0.10
		Total	**0.10**

	Total	**321.44**

Identified Priority Projects (2019-2020)

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

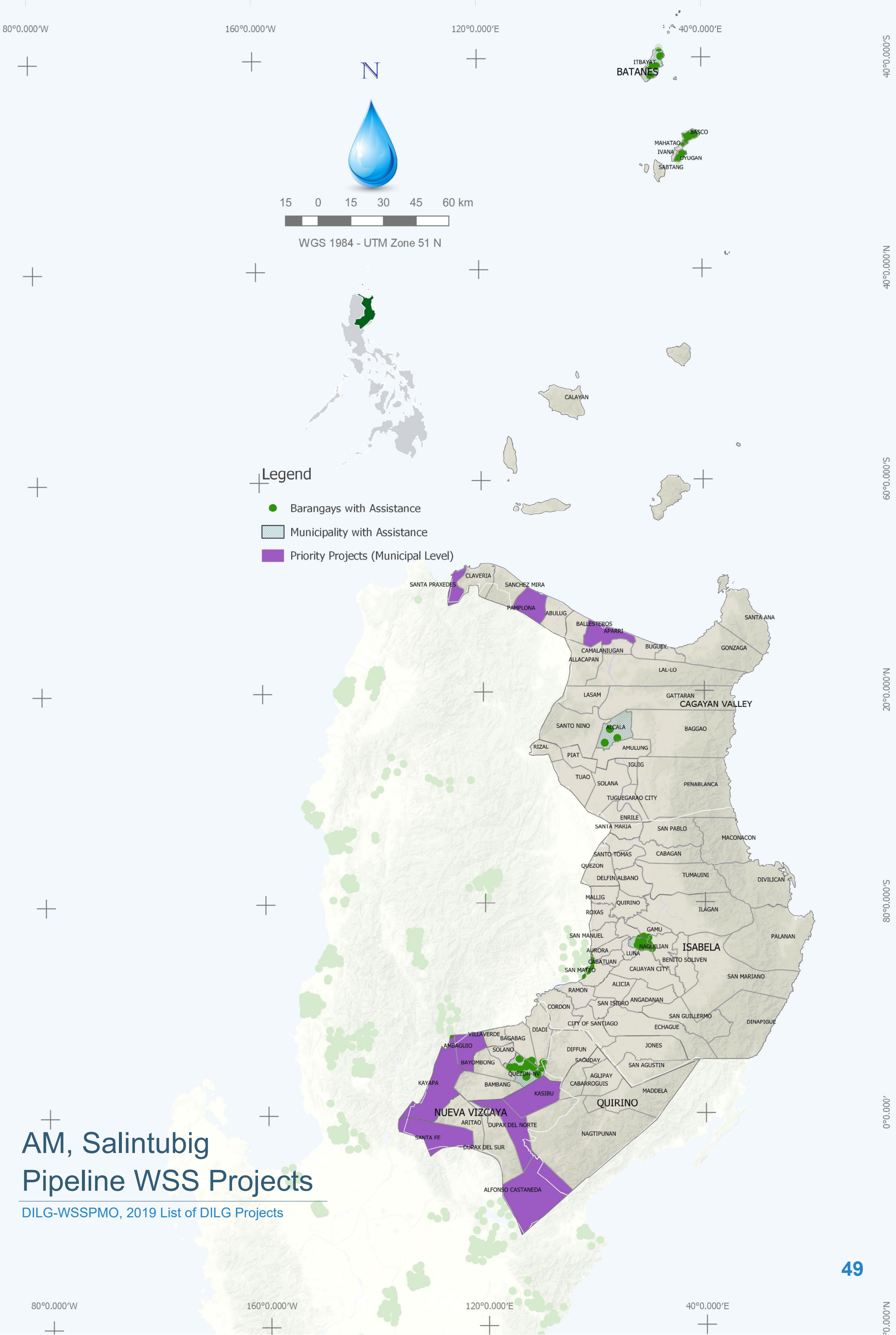
Assistance To Municipalities (2019)				
Province	Municipality	Project Type	Project Title	Amount (PhP)
Batanes	Basco	Potable Water Supply System	Rehabilitation/ Improvement Of Level III Water System	6,444,000.00
Batanes	Itbayat	Potable Water Supply System	Expansion Of Level II Water System	5,075,000.00
Batanes	Uyugan	Rainwater Catchment Facility	Construction Of Rain Collectors	2,000,000.00
Batanes	Uyugan	Potable Water Supply System	Expansion Of Water System	1,500,000.00
Cagayan	Alcala	Potable Water Supply System	Expansion Of Water System In Tupang Alcala	511,000.00
Cagayan	Alcala	Potable Water Supply System	Expansion Of Potable Water System In Jurisdiction-Pagbangkeruan, Alcala	2,000,000.00
Cagayan	Alcala	Potable Water Supply System	Expansion Of Water System In Afusing Daga, Alcala	8,000,000.00
Isabela	Reina Mercedes	Potable Water Supply System	Expansion Of Level II Water System	2,325,000.00
Nueva Vizcaya	Quezon	Potable Water Supply System	Upgrading Of Water System	724,000.00
			Total	**28,579,000**

SALINTUBIG (2019)			
Province	Municipality	Name Of Project	Amount
Cagayan	Aparri	Construction Of Water Supply Facilities At Navagan, Bulala Sur, Bulala Norte And Linao	20,000,000
Cagayan	Pamplona	Potable Water Supply	2,000,000
Cagayan	Santa Praxedes	Potable Water Supply	2,000,000
Nueva Vizcaya	Alfonso Castañeda	Construction Of Potable Water System in Mandunot (Salintubig)	2,000,000
Nueva Vizcaya	Ambaguio	Construction Of Water System	2,000,000
Nueva Vizcaya	Dupax Del Norte	Water Supply And Sanitation Program	1,500,000
Nueva Vizcaya	Kasibu	Construction Of Water Supply System	5,000,000
Nueva Vizcaya	Kayapa	Construction Of Potable Water System	1,000,000
Nueva Vizcaya	Santa Fe	Potable Water Supply	1,000,000
		Total	**36,500,000**

LWUA (2017-2018)				
Province	Water District	Project Type	Status	Amount
Cagayan	Metro Tuguegarao WD	Expansion	Approved	350,000,000.00
Quirino	Diffun WD	Expansion/Admin Bldg.	Pending Approval	15,000,000.00
Isabela	Naguilian WD	Expansion	Pending Approval	10,000,000.00
Nueva Vizcaya	Diadi WD	Expansion	Approved	14,000,000.00
Isabela	Luna WD	Operational Loan	Approved	500,000.00
			Total	**389,500,000**

AM, Salintubig
Pipeline WSS Projects

DILG-WSSPMO, 2019 List of DILG Projects



Appendix A: Provincial Profiles

BATANES	six (6) municipalities	Basco, Itbayat, Ivana, Mahatao, Sabtang, Uyugan
	29 barangays	1 urban, 28 rural
Land Area	219.01 sq. km.	
Demographics (2015)	Population (2015) – 17,246 Population Growth Rate (2000 to 2015) – 0.30 Population Density – 79 per sq. km.	
Economy	• Major industries - agriculture, fishery • Major crops - garlic, camote, cassava, gabi, sugarcane, cattle • Batanes is the smallest province in the country, but is made up of 10 volcanic islands.	
Poverty Incidence (2015)	On Families – 0.0% On Population – 0.0%	

CAGAYAN	28 municipalities	Abulug, Alcala, Allacapan, Amulung, Aparri, Baggao, Ballesteros, Buguey, Calayan, Camalaniugan, Claveria, Enrile, Gattaran, Gonzaga, Iguig, Lal-lo, Lasam, Pamplona, Peñablanca, Piat, Rizal, Sanchez-Mira, Santa Ana, Santa Praxedes, Santa Teresita, Santo Niño (Faire), Solana, Tuao
	one (1) component city	Tuguegarao City
	820 barangays	23 urban, 797 rural
Land Area	9,295.75 sq. km.	
Demographics (2015)	Population (2015) – 1,199,320 Population Growth Rate (2000 to 2015) – 1.24 Population Density – 130 per sq. km.	
Economy	• Major industries - agriculture, livestock, fishery, woodcraft • Major products - cattle, hog and carabao meat, poultry, hardwood, rattan, bamboo • Major crops - rice, corn, peanut, beans, fruits • Cagayan has the largest fishing grounds in the region (73% of the potential fishpond area).	
Poverty Incidence (2015)	On Families – 13.3% On Population – 15.9%	

ISABELA	34 municipalities	Alicia, Angadanan, Aurora, Benito Soliven, Burgos, Cabagan, Cabatuan, Cordon, Delfin Albano, Dinapigue, Divilacan, Echague, Gamu, Jones, Luna, Maconacon, Mallig, Naguilian, Palanan, Quezon, Quirino, Ramon, Reina Mercedes, Roxas, San Agustin, San Guillermo, San Isidro, San Manuel, San Mariano, San Mateo, San Pablo, Santa Maria, Santo Tomas, Tumauini
	one (1) independent city	Santiago City
	one (1) component city	Cauayan City, Ilagan City
	1,055 barangays	47 urban, 1,008 rural
Land Area	9,295.75 sq. km.	
Demographics (2015)	Population (2015) – 1,593,566 Population Growth Rate (2000 to 2015) – 1.41 Population Density – 130 per sq. km.	
Economy	• Major industries - agriculture, fishery, livestock • Major crops - rice, corn, monggo, tobacco, coffee, banana, mango • Isabela is the country's top corn-producing province, contributing 21% of the annual national production.	
Poverty Incidence (2015)	On Families – 10.6% On Population – 15.2%	

NUEVA VIZCAYA	15 municipalities	Alfonso Castañeda, Ambaguio, Aritao, Bagabag, Bambang, Bayombong, Diadi, Dupax del Norte, Dupax del Sur, Kasibu, Kayapa, Quezon, Santa Fe, Solano, Villaverde
	275 barangays	13 urban, 262 rural
Land Area	3,975.67 sq. km.	
Demographics (2015)	Population (2015) – 452,287 Population Growth Rate (2000 to 2015) – 1.38 Population Density – 110 per sq. km.	
Economy	• Major industries - agriculture, fishery, mining • Major crops - rice, corn, vegetables, pomelo, oranges • Cagayan Valley's gateway is Nueva Vizcaya, where all travelers going up north will inevitably pass through. The province is a vital crossroad to the region, and the Central Luzon and Cordillera regions, making it an ideal hub for transport, trade and tourism.	
Poverty Incidence (2015)	On Families – 9.1% On Population – 13.6%	

Appendix A: Provincial Profiles

QUIRINO	six (6) municipalities	Aglipay, Cabarroguis, Diffun, Maddela, Nagtipunan, Saguday
	132 barangays	4 urban, 128 rural
Land Area	2,323.5 sq. km.	
Demographics (2015)	Population (2015) – 188,991 Population Growth Rate (2000 to 2015) – 1.59 Population Density – 81 per sq. km.	
Economy	• Major industries - agriculture, furniture-making, dried flower production • Major products - dried flowers, woodcrafts, baskets, banana chips • Major crops - rice, corn, banana, coffee, peanuts • With its diverse natural resources such as caves, rivers, waterfalls, mountains and valleys, and forests, Quirino is tagged as the province "where the adventure begins".	
Poverty Incidence (2015)	On Families – 18.7% On Population – 26.5%	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60°0.000′S
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