

The Philippine Experience in Generating the Water Flow Accounts

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on Environmental Accounting

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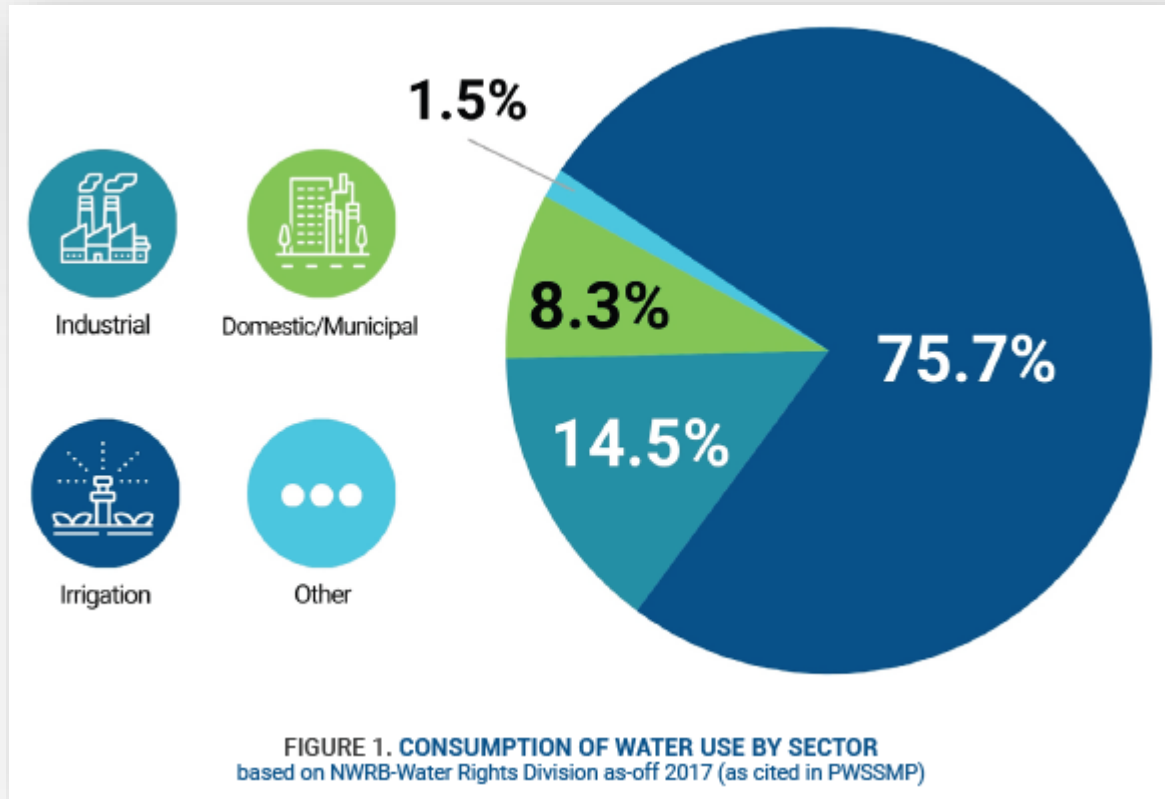
BAGONG PILIPINAS



Outline of Presentation

- Introduction
- Sources and Methods
- Highlights of Results
- Data Gaps and Challenges
- Ways forward

Water Allocation



Source: NWRB Water Rights Division

Although we have abounding water resources, the increasing demand from agriculture, urban and industrial use, and population growth results in pressure on water resources.

Thus, it is necessary to monitor, particularly, to quantify:

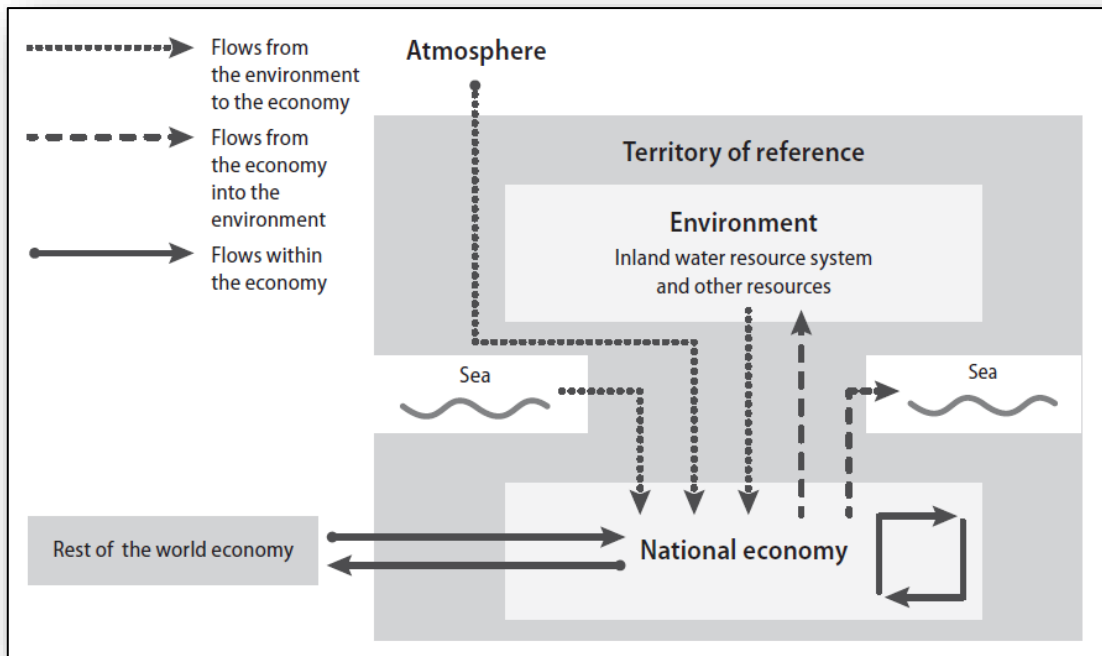
- how much stocks of water we have
- how much water we use for various economic activities
- how much and at what state we return water to the environment

SEEA CF and Water Flow Accounts

□ Describes the interactions between the economy and the environment, the stocks and changes in stocks of natural resources



□ One of the accounts in the SEEA-CF, **water flow accounts** record flows of water that enter and leave the economy and flows of water within the economy.



Applications of the Water Accounts

1. Identify the economic units responsible for the abstraction and discharge of water.
2. Assess and monitor the pressure on water quantities that is exerted by the economy.
3. Evaluate alternative options for reducing the pressure on water.



Flows Accounts Tables

Physical supply table for water

	Abstraction of water; production of water; generation of return flows							Flows from the rest of the world		
	Agriculture, forestry and fishing	Mining and quarrying, manufacturing and construction	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Sewerage	Other industries	Households	Imports	Flows from the environment	Total supply
(I) Sources of abstracted water										
Inland water resources										
Surface water										440.6
Groundwater										476.3
Soil water										50.0
Total										966.9
Other water sources										
Precipitation									101.0	101.0
Sea water									101.1	101.1
Total									202.1	202.1
Total supply abstracted water									1 169.0	1 169.0
(II) Abstracted water										
For distribution										378.2
For own-use	108.4	114.6								743.5
(III) Wastewater and reused water										
Wastewater										
Wastewater to treatment	17.9	117.6								427.1
Own treatment										
Reused water produced										
For distribution					42.7					42.7
For own use		10.0								10.0
Total	17.9	127.6	5.6	1.4	42.7	49.1	235.5			479.8

Abstraction

> the amount of water that is removed from any source, either permanently or temporarily, in a given period of time.

Abstracted Water

> Abstracted water can either be used by the same economic unit that abstracts it or be supplied to other economic units.

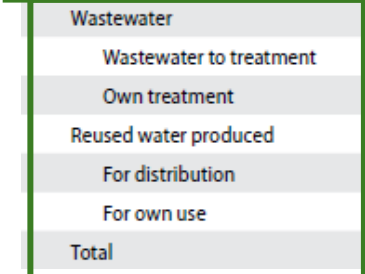
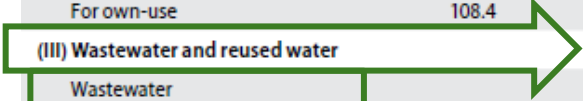
Flows Accounts Tables

	Abstraction of water; production of water; generation of return flows							Flows from the rest of the world		
	Agriculture, forestry and fishing	Mining and quarrying, manufacturing and construction	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Sewerage	Other industries	Households	Imports	Flows from the environment	Total supply
(I) Sources of abstracted water										
Inland water resources										
Surface water									440.6	440.6
Groundwater									476.3	476.3
Soil water									50.0	50.0
Total									966.9	966.9
Other water sources										
Precipitation									101.0	101.0
Sea water									101.1	101.1
Total									202.1	202.1
Total supply abstracted water									1169.0	1169.0
(II) Abstracted water										
For distribution										378.2
For own-use	108.4									743.5
(III) Wastewater and reused water										
Wastewater										
Wastewater to treatment	17.9									427.1
Own treatment										
Reused water produced										
For distribution										42.7
For own use										10.0
Total	17.9									479.8

Wastewater

> Wastewater is discarded water no longer required by the owner or user.

- Supplied to a sewerage facility
- Supplied to another economic unit for further use (reused water)
- **Can be discharged directly to the environment (return flows)**



Flows Accounts Tables

	Abstraction of water; production of water; generation of return flows							Flows from the rest of the world		
	Agriculture, forestry and fishing	Mining and quarrying, manufacturing and construction	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Sewerage	Other Industries	Households	Imports	Flows from the environment	Total supply
(IV) Return flows of water										
To inland water resources										
Surface water										353.2
Groundwater	65.0	23.5								315.4
Soil water										
Total	65.0	23.5								668.6
To other sources		5.9	100.0		230.5		0.2			362.4
Total return flows	65.0	29.4	400.0	47.3	483.8	0.7	4.8			1 031.0
of which: Losses in distribution				47.3						47.3
(V) Evaporation of abstracted water, transpiration and water incorporated into products										
Evaporation of abstracted water	29.5	38.3								86.4
Transpiration	40.2	1.2								41.4
Water incorporated into products	6.5	3.7								10.2
Total supply	267.5	314.8							1 169.0	3 939.5

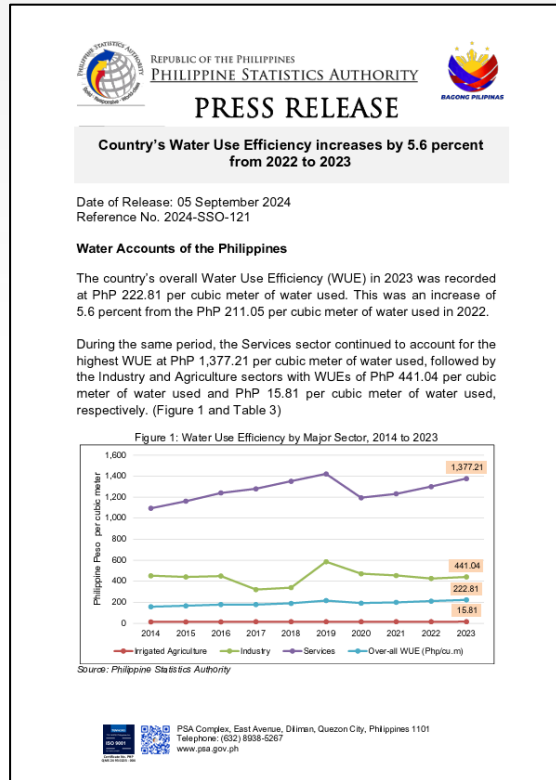
Return Flows

> All water that is returned to the environment is recorded as being supplied to the environment.

Consumption

> Evaporation of abstracted water
 > Transpiration
 > Water incorporated into products

PH Water Flow Accounts: Outputs



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PHILIPPINE STATISTICS AUTHORITY**

PRESS RELEASE

Country's Water Use Efficiency increases by 5.6 percent from 2022 to 2023

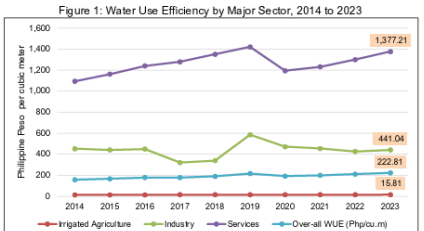
Date of Release: 05 September 2024
Reference No. 2024-SSO-121

Water Accounts of the Philippines

The country's overall Water Use Efficiency (WUE) in 2023 was recorded at PhP 222.81 per cubic meter of water used. This was an increase of 5.6 percent from the PhP 211.05 per cubic meter of water used in 2022.

During the same period, the Services sector continued to account for the highest WUE at PhP 1,377.21 per cubic meter of water used, followed by the Industry and Agriculture sectors with WUEs of PhP 441.04 per cubic meter of water used and PhP 15.81 per cubic meter of water used, respectively. (Figure 1 and Table 3)

Figure 1: Water Use Efficiency by Major Sector, 2014 to 2023

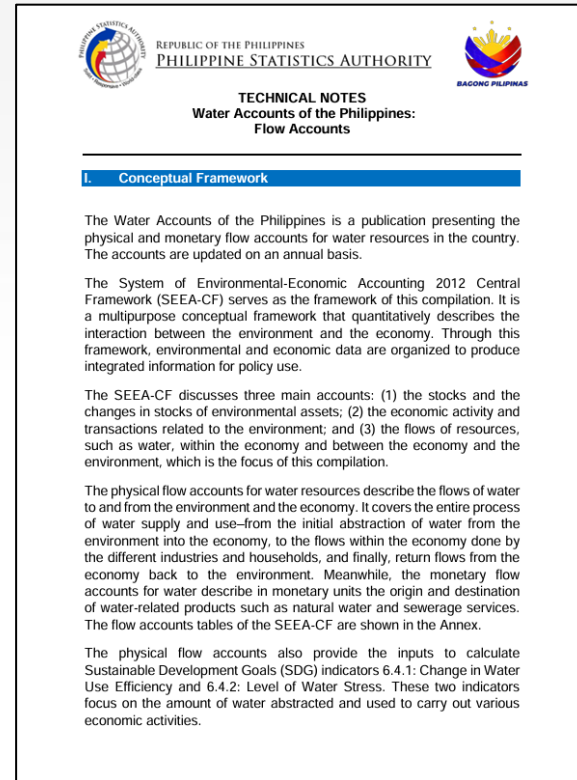


Year	Irrigated Agriculture	Industry	Services	Overall WUE (PhP/cu.m)
2014	15.81	441.04	1,377.21	211.05
2015	15.81	441.04	1,377.21	211.05
2016	15.81	441.04	1,377.21	211.05
2017	15.81	441.04	1,377.21	211.05
2018	15.81	441.04	1,377.21	211.05
2019	15.81	441.04	1,377.21	211.05
2020	15.81	441.04	1,377.21	211.05
2021	15.81	441.04	1,377.21	211.05
2022	15.81	441.04	1,377.21	211.05
2023	15.81	441.04	1,377.21	222.81

Source: Philippine Statistics Authority

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Press Release



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TECHNICAL NOTES

**Water Accounts of the Philippines:
Flow Accounts**

I. Conceptual Framework

The Water Accounts of the Philippines is a publication presenting the physical and monetary flow accounts for water resources in the country. The accounts are updated on an annual basis.

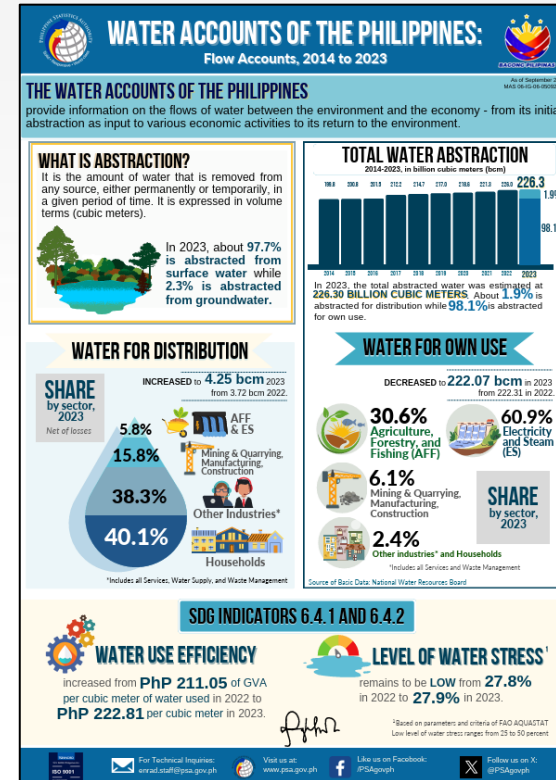
The System of Environmental-Economic Accounting 2012 Central Framework (SEEA-CF) serves as the framework of this compilation. It is a multipurpose conceptual framework that quantitatively describes the interaction between the environment and the economy. Through this framework, environmental and economic data are organized to produce integrated information for policy use.

The SEEA-CF discusses three main accounts: (1) the stocks and the changes in stocks of environmental assets; (2) the economic activity and transactions related to the environment; and (3) the flows of resources, such as water, within the economy and between the economy and the environment, which is the focus of this compilation.

The physical flow accounts for water resources describe the flows of water to and from the environment and the economy. It covers the entire process of water supply and use—from the initial abstraction of water from the environment into the economy, to the flows within the economy done by the different industries and households, and finally, return flows from the economy back to the environment. Meanwhile, the monetary flow accounts for water describe in monetary units the origin and destination of water-related products such as natural water and sewerage services. The flow accounts tables of the SEEA-CF are shown in the Annex.

The physical flow accounts also provide the inputs to calculate Sustainable Development Goals (SDG) indicators 6.4.1: Change in Water Use Efficiency and 6.4.2: Level of Water Stress. These two indicators focus on the amount of water abstracted and used to carry out various economic activities.

Technical Notes



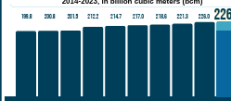
**WATER ACCOUNTS OF THE PHILIPPINES:
Flow Accounts, 2014 to 2023**

THE WATER ACCOUNTS OF THE PHILIPPINES provide information on the flows of water between the environment and the economy - from its initial abstraction as input to various economic activities to its return to the environment.

WHAT IS ABSTRACTION?
It is the amount of water that is removed from any source, either permanently or temporarily, in a given period of time. It is expressed in volume terms (cubic meters).

In 2023, about 97.7% is abstracted from surface water while 2.3% is abstracted from groundwater.

TOTAL WATER ABSTRACTION
2014-2023, in billion cubic meters (bcm)



In 2023, the total abstracted water was estimated at **228.30 BILLION CUBIC METERS**. About **1.9%** is abstracted for distribution while **98.1%** is abstracted for own use.

WATER FOR DISTRIBUTION

SHARE by sector, 2023

- 5.8% Net of losses
- 15.8% Mining & Quarrying, Manufacturing, Construction
- 38.3% Other Industries*
- 40.1% Households

INCREASED to **4.25 bcm** in 2023 from 3.72 bcm 2022.

WATER FOR OWN USE

DECREASED to **222.07 bcm** in 2023 from 222.31 in 2022.

- 30.6% Agriculture, Forestry, and Fishing (AFF)
- 60.9% Electricity and Steam (ES)
- 6.1% Mining & Quarrying, Manufacturing, Construction
- 2.4% Other Industries* and Households

SHARE by sector, 2023

*Includes all Services, Water Supply, and Waste Management

Source: Basic Data, National Water Resources Board

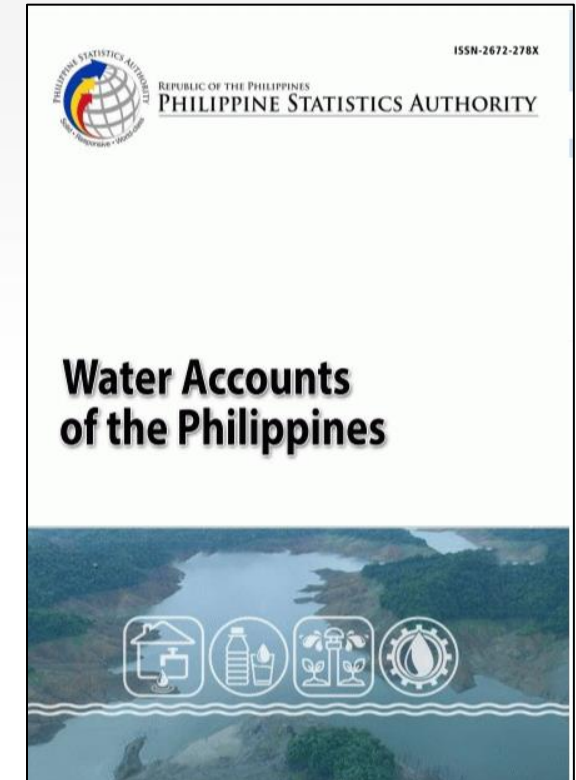
SDG INDICATORS 6.4.1 AND 6.4.2

WATER USE EFFICIENCY
increased from **PhP 211.05** of GVA per cubic meter of water used in 2022 to **PhP 222.81** per cubic meter in 2023.

LEVEL OF WATER STRESS
remains to be **LOW** from **27.8%** in 2022 to **27.9%** in 2023.

*Based on parameters and criteria of FAO AQUASTAT
Low level of water stress ranges from 25 to 50 percent


Infographics



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Water Accounts of the Philippines



Publication

Water Accounts Landing Page: <https://psa.gov.ph/statistics/environmental-accounts/water>

PH Water Flow Accounts: Scope and Aggregations

- ❑ Annually updated and covers a 10-year period
- ❑ Latest version covers 2015 to 2024 (to be released on 25 Sept)
- ❑ Abstraction from Freshwater Resources
 - Surface Water (lakes, rivers and streams, artificial reservoirs)
 - Groundwater (water from aquifers)
- ❑ National level data

Main Data Sources



Summary of Water Permit Grants (Water allocated), by source and by use



- National Accounts of the Philippines
- 2018 Supply and Use Table
- Livestock and Poultry Inventory



Water Production, Billed Volume and Losses
Water Prices



DOST-PCAARRD

Parameters on livestock and poultry daily water requirements, by species



NIA

Parameters on water needed for irrigation, Volume per hectare irrigated

General Methodology *(Physical Accounts)*

Account Entry	Data Item	Calculation, if applicable
A. Abstraction for Own Use		
Agriculture, Forestry and Fishing	<ul style="list-style-type: none"> • Water permit grants (fishery, irrigation) • Daily water requirements of livestock 	Livestock: water requirement * inventory
Mining and quarrying, Manufacturing, and Construction	<ul style="list-style-type: none"> • Water permit grants (industrial) 	
Electricity and Steam	<ul style="list-style-type: none"> • Water permit grants (power) 	
Other Industries	<ul style="list-style-type: none"> • Water permit grants (municipal, recreation, others) <i>minus</i> water for distribution 	

General Methodology

(Physical and Monetary Accounts)

Account Entry	Data Item	Calculation, if applicable
B. Distributed Water		
AFF MAQ, MFG, CNS Electricity, gas, steam and air-conditioning supply Other Industries	<ul style="list-style-type: none"> Water expenses of different industries (Input-Output Table, Intermediate Consumption series, Final Consumption) Water prices 	<ol style="list-style-type: none"> Use IO to get ratio of water supply to total IC Use this ratio to get IC-water for the time series Convert to physical units using water prices
Households	<ul style="list-style-type: none"> Water expenses of households (Input-Output Table, Household Final Consumption Expenditure series) Water prices <ul style="list-style-type: none"> Gross Output of Water (unorganized) - own abstraction of households 	<ol style="list-style-type: none"> Use IO to get ratio of water supply to total HFCE Use this ratio to get HFCE-Water for the time series Convert to physical units using water prices

General Methodology *(Physical Accounts)*

Account Entry	Data Item	Calculation, if applicable
C. Return Flows of Water		
Industries	<ul style="list-style-type: none"> Parameters on wastewater generation <ul style="list-style-type: none"> Guidelines from UNSD Study on Consumptive Water-Use Coefficients Water Accounts Australia 	Total Water Supplied to Industry* (1- water use coefficient) by industry
	<ul style="list-style-type: none"> Water duties for irrigation 	Water supplied to irrigation <i>minus</i> water requirement of irrigated area
Households	<ul style="list-style-type: none"> 80% of the water supplied to households 	
D. Losses	<ul style="list-style-type: none"> Non-revenue water 	
E. Evaporation, Transpiration, Water incorporated into products	Balancing item for total supply and total use	

General Methodology *(Indicators)*

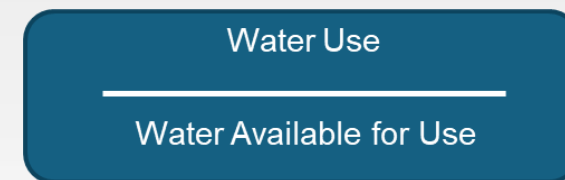
Gross Value Added

Water Used

SDG 6.4.1 – Water Use Efficiency

- ❑ From the national accounts, compute the gross value added (GVA) of the following major industries:
 - Irrigated agriculture (irrigated crops, livestock and poultry, aquaculture, support activities)
 - Mining and Quarrying, Manufacturing, Electricity and Steam, Construction (MIMEC)
 - Water Supply, Sewerage and Waste Management, Services
- ❑ For each industry, divide the GVA by the volume of water used to calculate the water use efficiency (WUE)
- ❑ Get the weighted average WUE, with volume of water used as the weights

General Methodology *(Indicators)*



SDG 6.4.2 – Level of Water Stress

- ❑ From the Water PSUT, determine the Total Freshwater Withdrawals (TFWW)
- ❑ From the FAO Aquastat Database, get the Total Renewable Water Resources (TRWR) and Environmental Flow Requirements (EFR) for the Philippines

❑ Level of water stress is computed as:

$$\frac{TFWW}{TRWR - EFR}$$

****Data for the Philippines (used by FAO in the global computation of the indicator)***

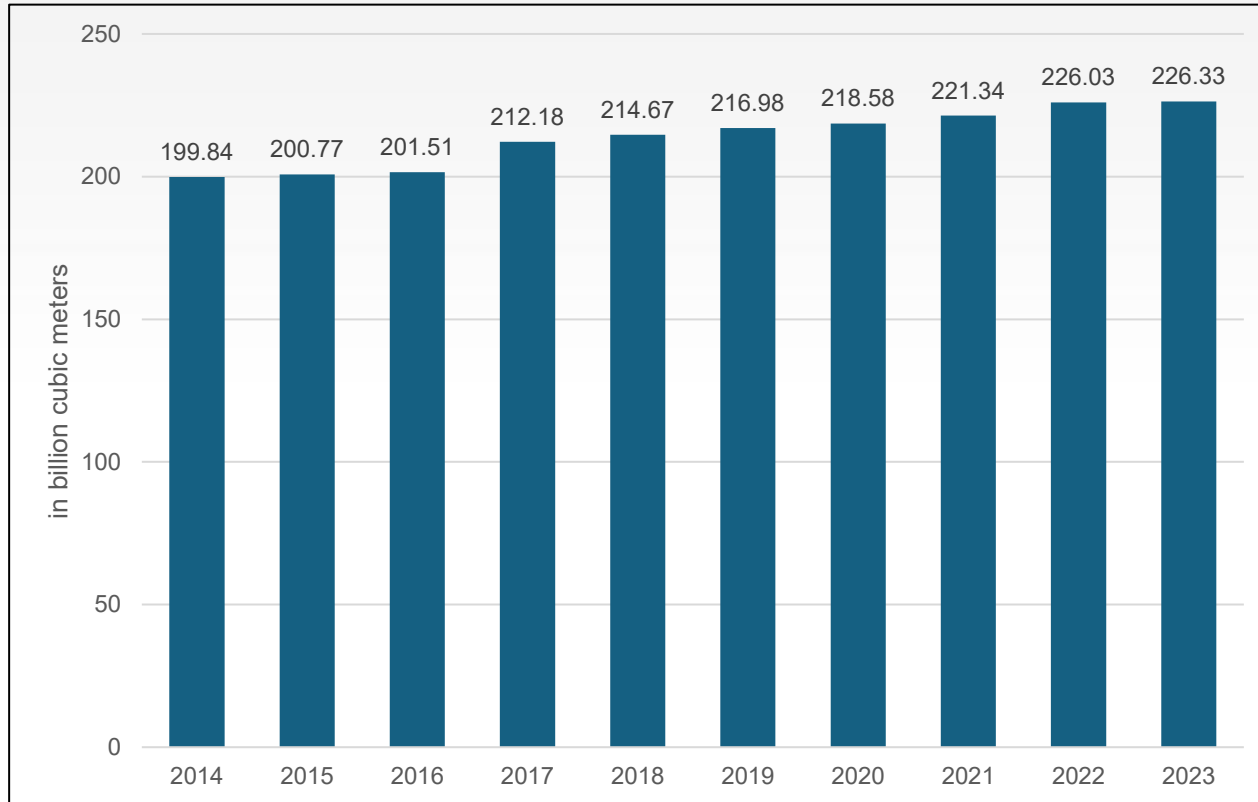
Total renewable freshwater resources = 479 billion cubic meters

Environmental flow requirements = 151.9 billion cubic meters

Results

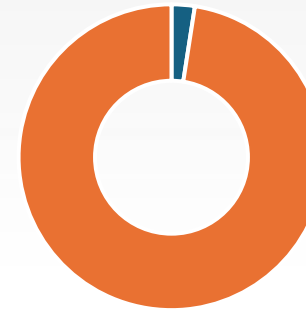
*Total Abstraction of Water. Abstraction for Own Use.
Distributed Water. Water Use Efficiency. Level of Water Stress.*

Total Abstraction of Water



Volume of Water Abstraction,
in billion cubic meters

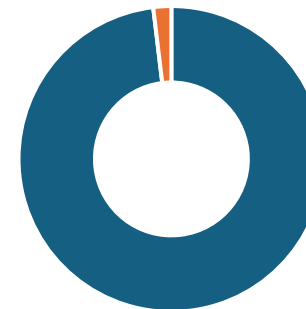
By source:



97.7 percent sourced from **Surface Water**
(rivers, lakes, streams, artificial reservoirs)

2.3 percent from **groundwater**

By use:

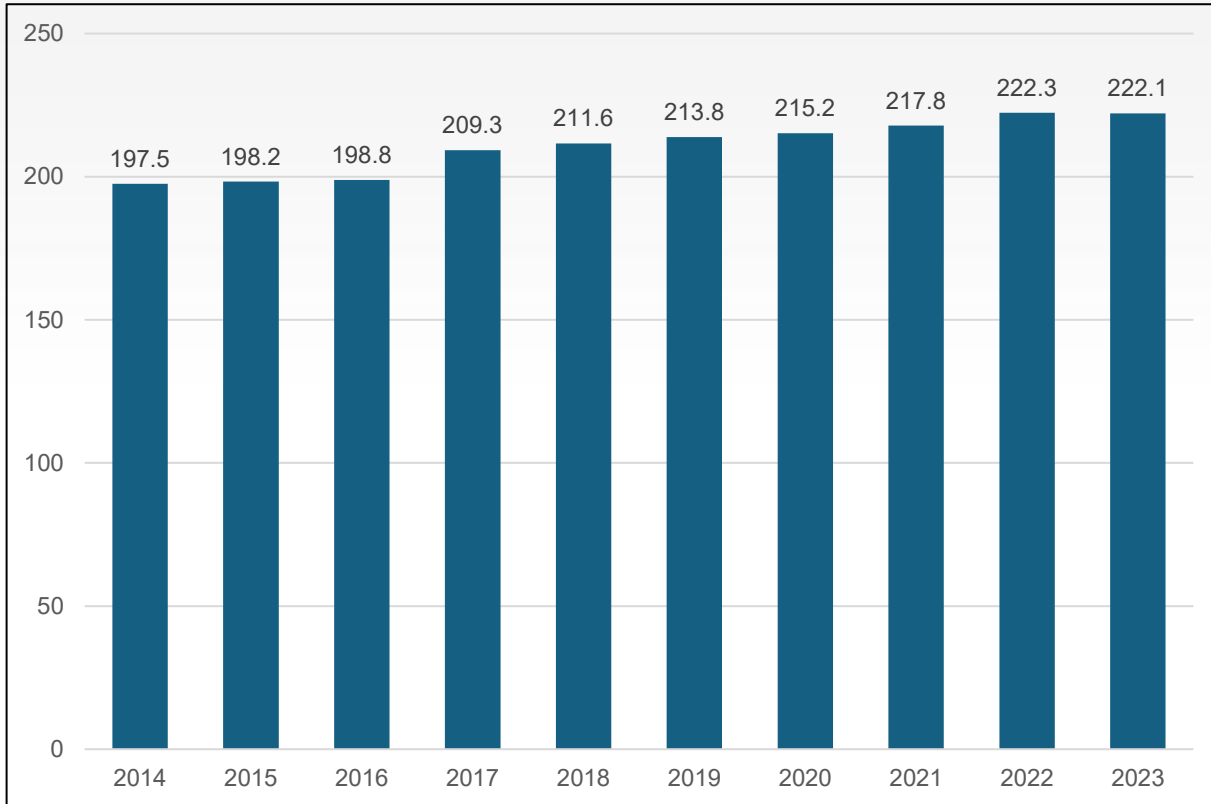


98.1 percent is abstracted for **own use**

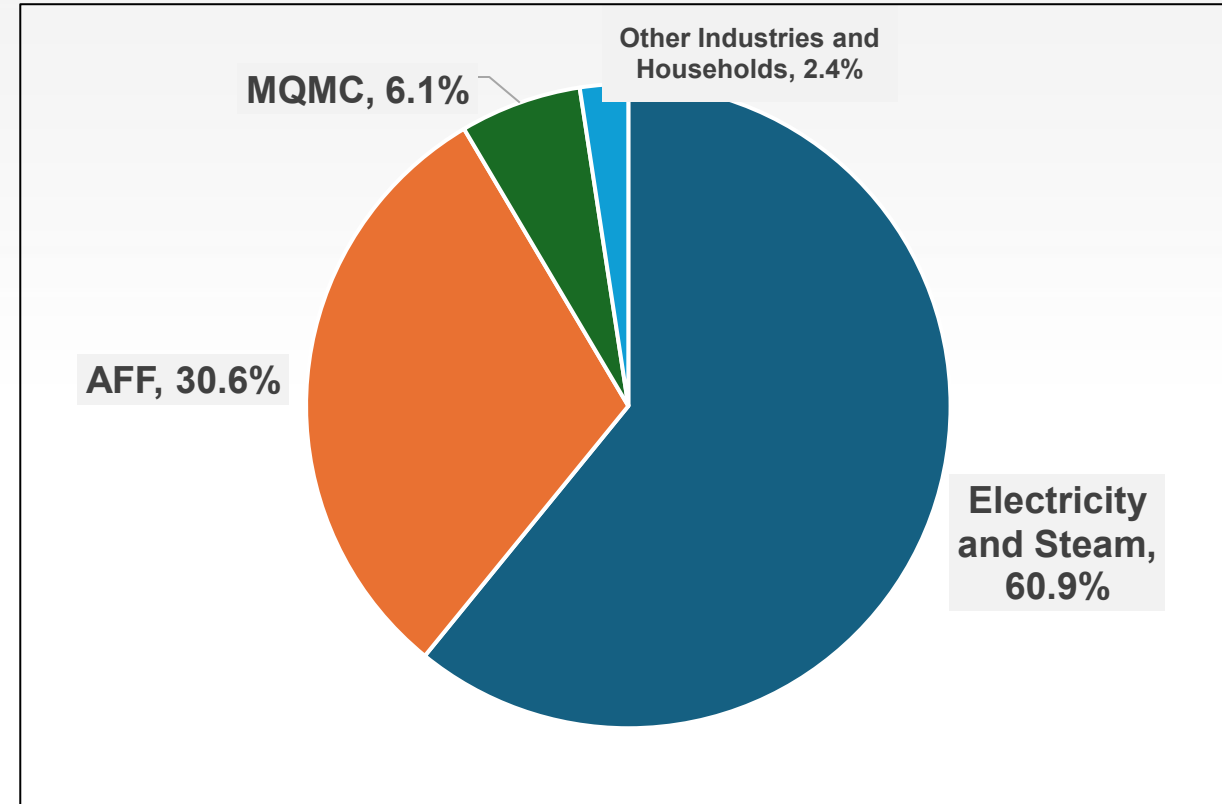
1.9 percent for **distribution**

Percentages: 2023

Abstraction for Own Use

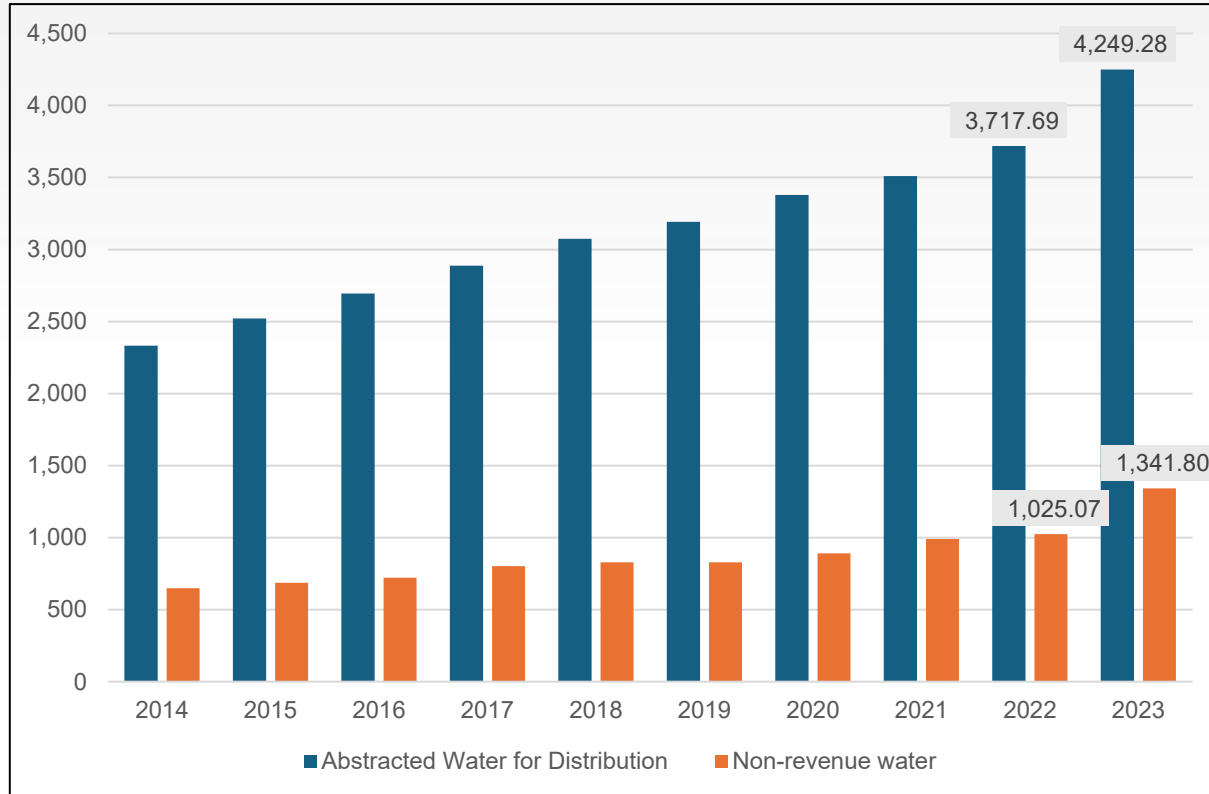


Volume of Water Abstracted for Own Use, in billion cubic meters

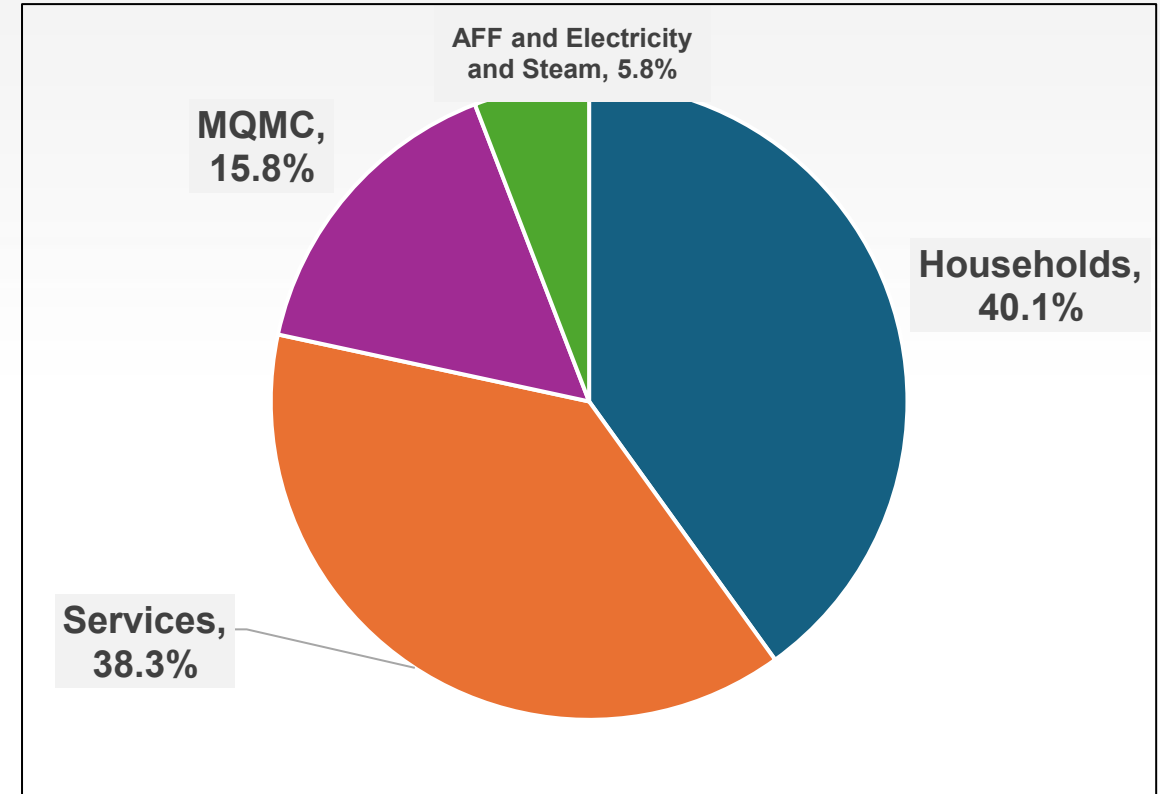


Share of Water Abstracted for Own Use by Industry, 2023

Distributed Water

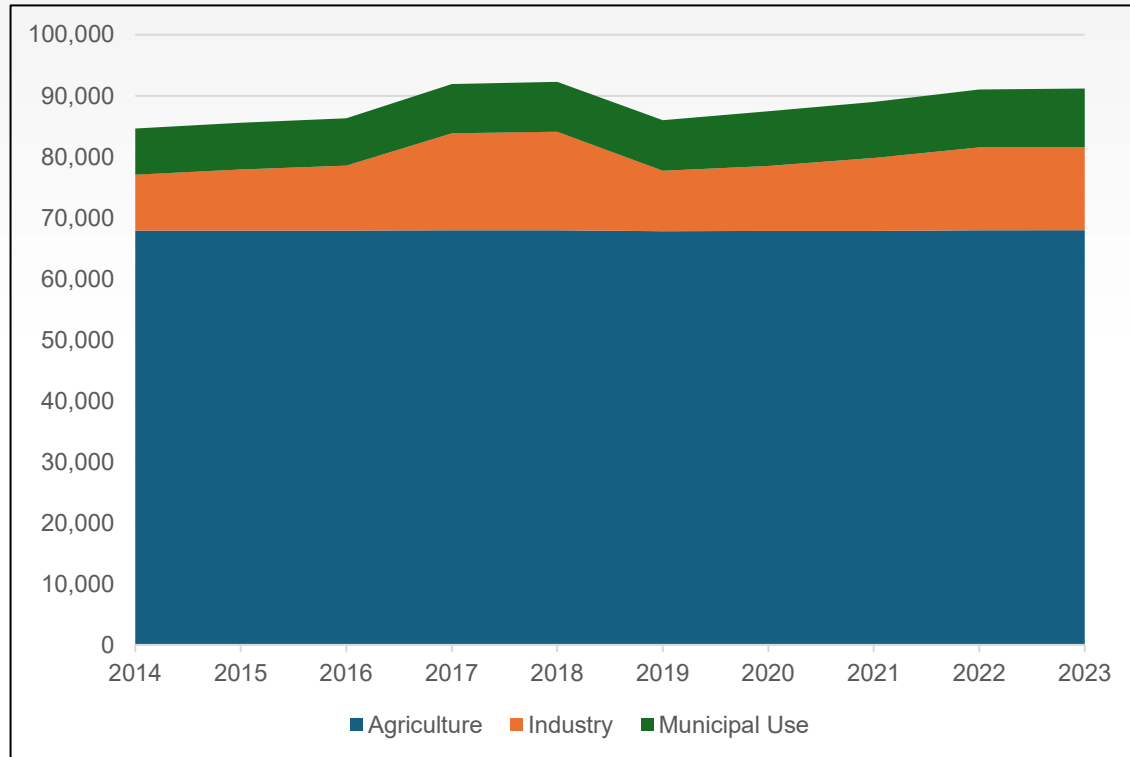


Volume of Water for Distribution, in million cubic meters

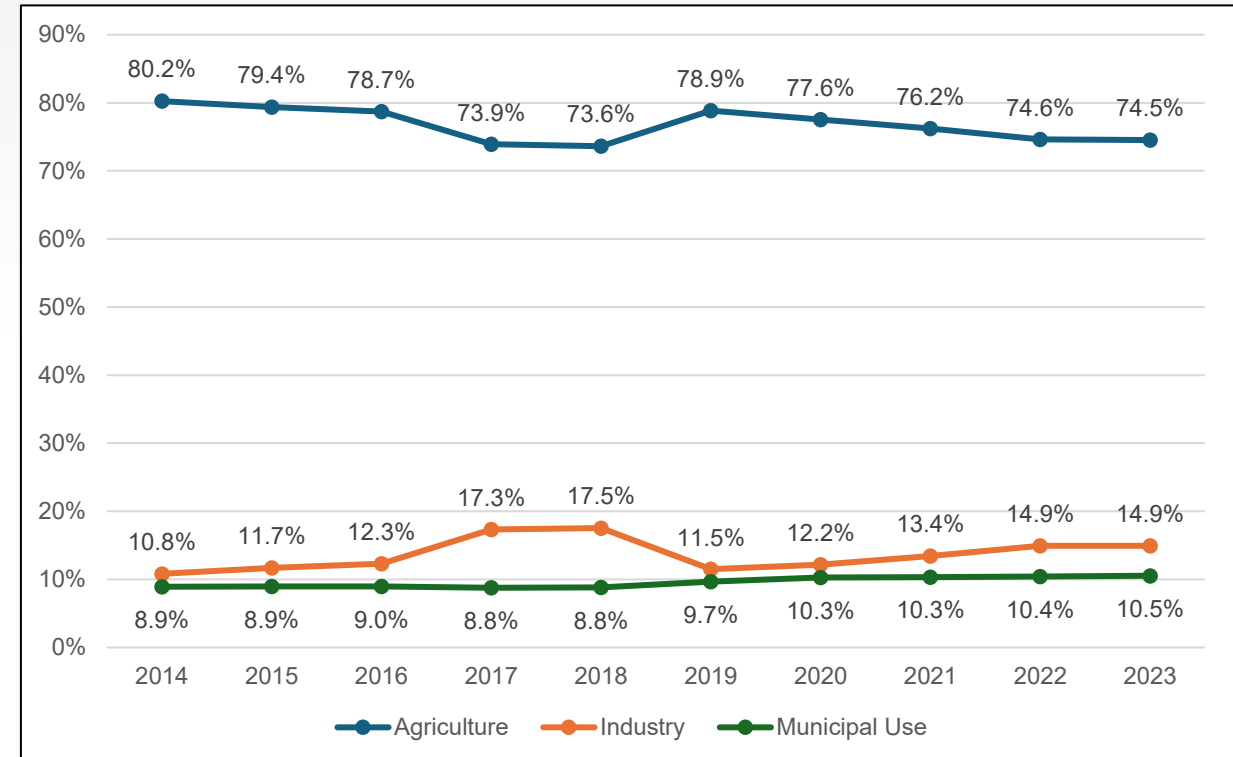


Share of Distributed Water by Industry, 2023

Water Use by Major Industries

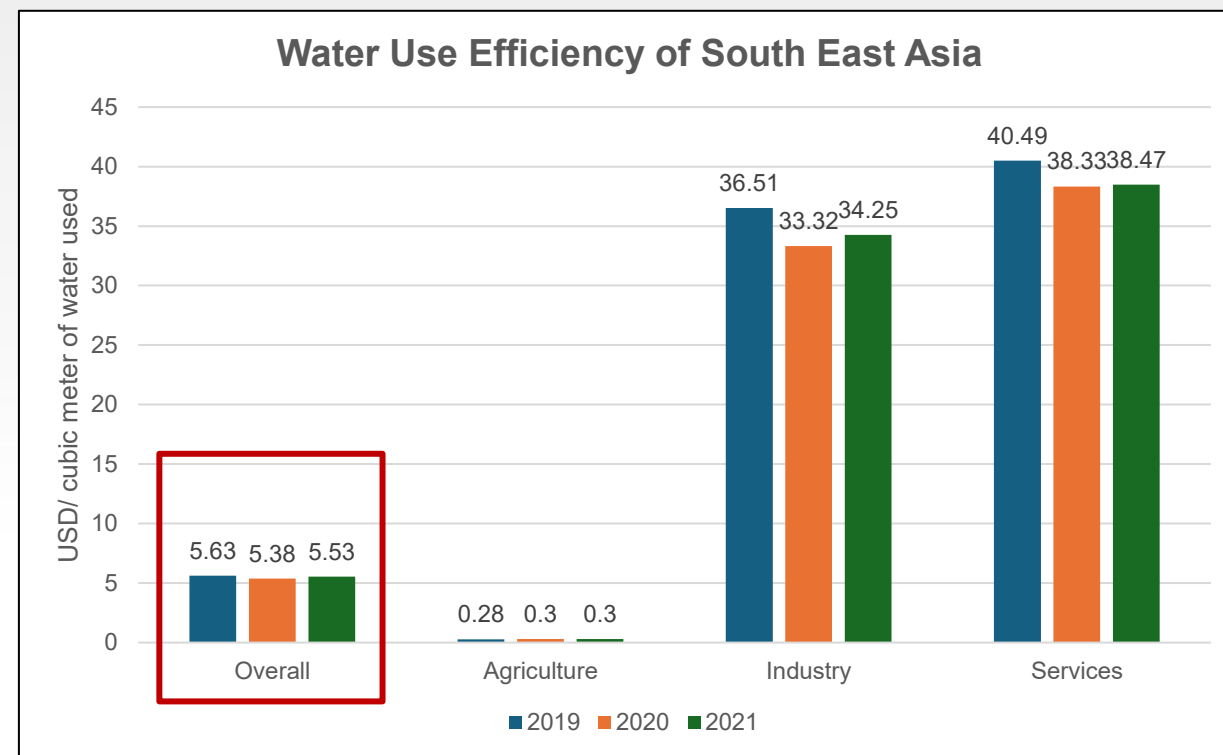
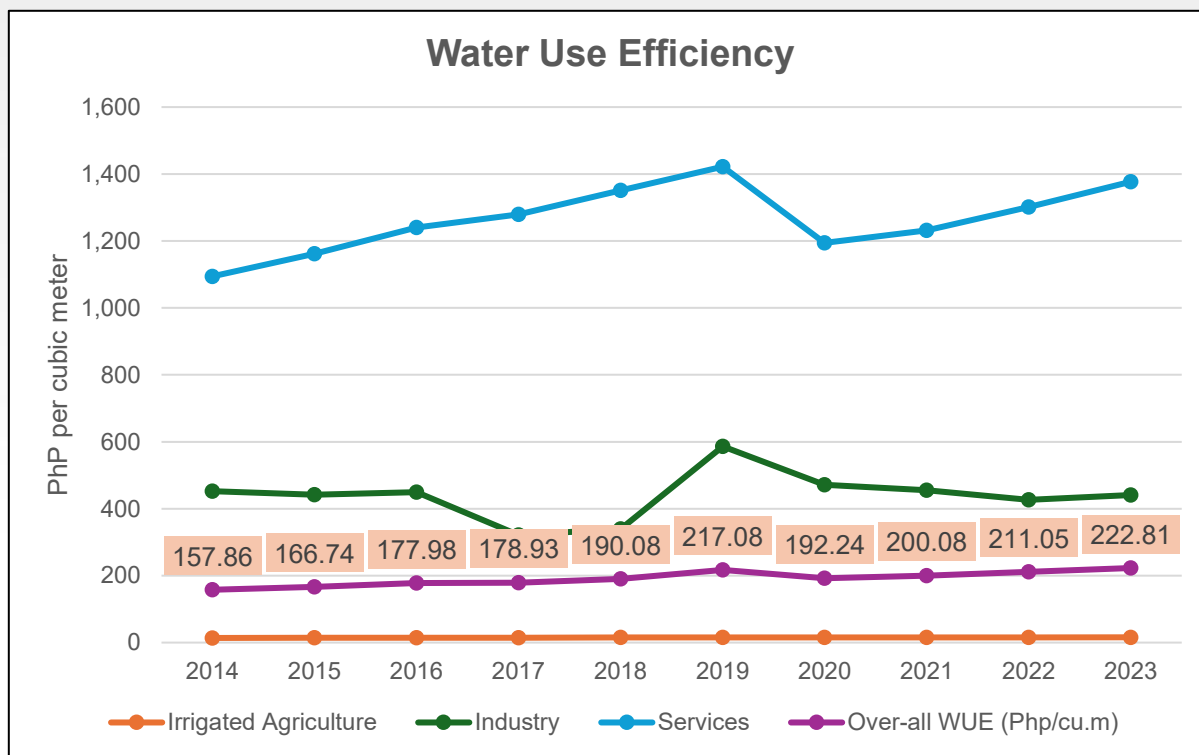


Volume of Water Use



Percent Distribution of Water Use

Water Use Efficiency

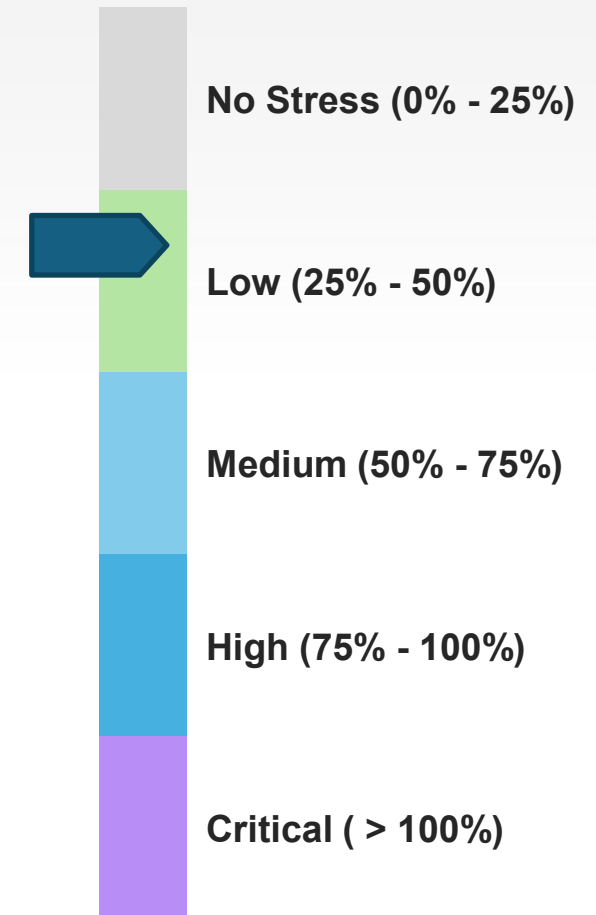
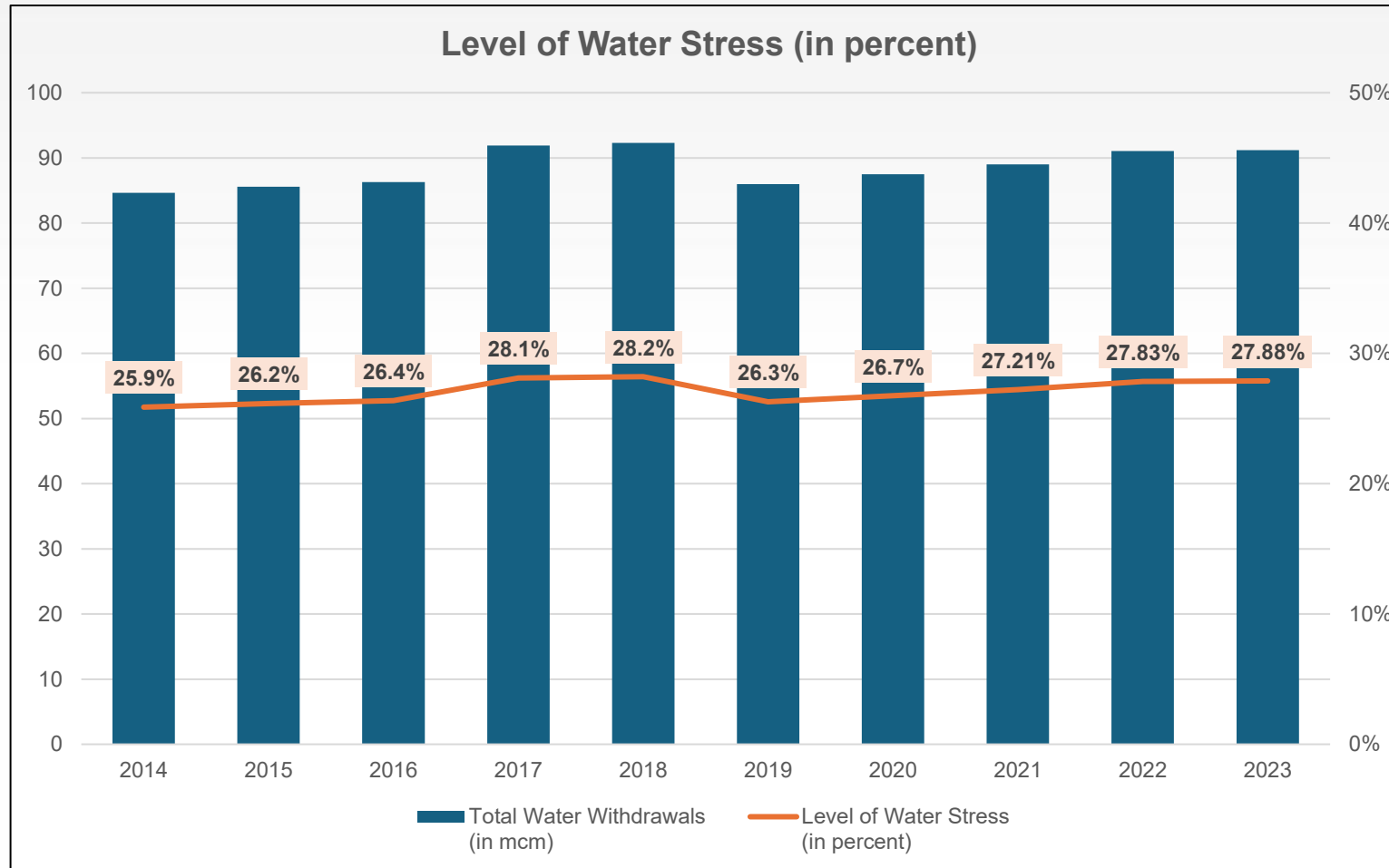


	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Overall	2.39	2.47	2.64	2.82	3.00	3.17	3.38	3.40	3.61	4.12	3.65	3.80	4.01	4.23
Irrigated Agriculture	0.23	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.30	0.30	0.29	0.29	0.30
Industry	7.51	7.04	7.52	8.02	8.59	8.39	8.53	6.10	6.44	11.13	8.96	8.65	8.10	8.38
Services	17.03	17.72	18.77	19.71	20.78	22.06	23.55	24.30	25.66	27.00	22.68	23.39	24.71	26.15

Source: FAO

Philippines - Water Use Efficiency
 Unit: USD / m³
 GVA in Php, Constant 2018 Prices
 Peso-Dollar Exchange Rate (Ave. 2018) @ Php 52.6583 = 1 USD

Level of Water Stress



Data Gaps and Challenges

- ❑ In the absence of actual water used/abstracted, data on water permits and allocations are utilized.
- ❑ The accounts cover surface water and groundwater abstraction. Soil water and other sources are yet to be included.
- ❑ Due to limited data on wastewater and reuse of water, return flows of water are estimated using industry parameters or water-use coefficients from international sources.
- ❑ National-level data are informative but local-level data are required for policy.

Ways Forward

- ❑ Continually improve the accounts through addressing the currently identified data gaps and limitations
- ❑ Strengthen data sharing mechanisms through the interagency committees and working groups
- ❑ Compile Regional Water Flow Accounts for targeted policy application
- ❑ Develop Asset Accounts and Ecosystem Accounts related to water for a more integrated analysis
- ❑ Progressive implementation of the Philippine Ecosystem and Natural Capital Accounting System (PENCAS) Act (institutionalize NCA, designate the agencies responsible for its implementation and provide them funding, and mandate its use in policy and decision-making)



Thank you

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