Policy Brief

SENATE ECONOMIC PLANNING OFFICE

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Quenching Policy Thirst: Reforming Water Governance in the Philippines

The country's water resources are approaching critical thresholds, compounded by persistent and emerging challenges within the water sector. Sustainable and integrated water resource management has become an increasingly urgent and inevitable task. The establishment of a robust water agency, long overdue, is pivotal in shaping a coherent and structured framework for effective water governance toward achieving universal and equitable access to safe water supply and sanitation.

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1. Introduction

Water is an essential resource for socio-economic development, playing a fundamental role in sustaining life and supporting various aspects of human civilization. However, despite its critical importance, a significant portion of the global population continues to face challenges related to access to safe drinking water and sanitation. In 2020, approximately two billion people relied on unsafe drinking water, while nearly half of the world's population lacked access to safely managed sanitation (WHO and UNICEF, 2021).

The Philippines, like many other countries, grapples with mounting pressures on its water resources, driven by factors such as population growth, urbanization, ecosystem degradation, pollution, and climate change. The increasing demand for water, coupled with the deterioration of water-related ecosystems, poses significant challenges to ensuring the quantity and quality of water supply. Addressing these challenges requires a concerted effort to implement sustainable water resource management practices. Despite the demonstrated success of integrative and innovative approaches in managing water stress in other countries, the Philippines lacks a clear and organized framework for water governance. Water governance encompasses a range of political, institutional, and administrative rules, practices, and processes through which decisions are made and implemented, stakeholders' interests are articulated, and decision-makers are held accountable for water management (OECD, 2015).

In the Philippines, water supply and sanitation coverage remain inadequate, with persistent challenges in the water resources sector. These challenges include institutional fragmentation, weak sector planning and monitoring, inadequate data collection, poor performance of water utilities, insufficient infrastructure planning and financing, and inadequate support for marginalized urban and rural communities (ADB, 2013; PWSSMP, 2021; PDP, 2023).

Recognizing the urgency of addressing these challenges, the objective of this Policy Brief is twofold: (1) to assess policy options for comprehensively addressing the complex challenges in the water sector and ensuring the sustainability of water resources across generations; and (2) to explore proposed water governance policy reforms, including the creation of the Department of Water Resources and the Water Regulatory Commission. This paper aims to examine key issues related to water resources, assess the prevailing water governance environment, and explore relevant proposed measures. Drawing insights from global experience and previous studies on water governance, it endeavors to put forward several recommendations for the government to consider as it pursues reforms that are rooted in local realities and capabilities.

2. The State of Water Resources in the Country

The Philippines is an archipelagic country endowed with vast water resources comprising of both surface and groundwater reserves. Despite this abundance, several concerning factors such as the degradation of watersheds, impact of climate change, and deteriorating water quality due to pollution, as well as increased water demand pressures due to population growth and urbanization, pose a threat to resource sustainability.

2.1. Water supply and availability

According to the National Water Resources Board (NWRB), the country's freshwater potential or supply is estimated at 146 billion cubic meters per year (m^3/yr). Of these, 86 percent or 125.8 billion m^3/year are surface water, which comes mainly from watersheds or river basins and lakes. The Department of Environment and Natural Resources (DENR) estimates that at least 70 percent of the Philippines' total land area are watershed areas. The country has a total of 421 principal river basins and 221 lakes. Among the river basins, 18 are considered as major river basins.[1]

On the other hand, total groundwater potential is about 20.2 billion m^3/year, which account for the remaining 14 percent of water resource potential. An average annual rainfall of 2,400 millimeters (mm) fills and replenishes the country's water bodies and aquifers, but due to climate variability and geography, rainfall is unevenly distributed over space and time. The impacts of the El Niño Phenomenon[2] which are predominantly felt in the tropical Pacific induce drought and trigger water shortages in the country (see Box 1). Among water resources regions,[3] Northern Mindanao has the highest water potential at 31 billion m^3/year while Central Visayas has the lowest at 2.9 billion m^3/year.

Box 1. Impacts of the El Niño Phenomenon

In the Philippines, El Niño Southern Oscillation (ENSO) events are associated with the late onset and early finish of the rainy season, weak monsoons, and less tropical cyclone activity (Lansigan et al., 2000), and drier than normal conditions between October to December which may persist until June (NDRRMC, 2019). These climate anomalies can trigger freshwater shortages and lead to significant crop production losses.

Severe drought conditions linked to El Niño events have affected the Philippines in multiple instances, notably during the periods of 1982 to 1983, 1990 to 1992, 1997 to 1998, 2005 to 2006, 2009 to 2010 (Holden, 2013) and 2015 to 2016 (NDRRMC, 2019).

Amid the ENSO-associated drought event of 1991 to 1992, the Metropolitan Water Sewerage System (MWSS) documented a 20-percent deficit in water production, which prompted water rationing in many low water pressure areas of Metro Manila. During the same episode, the National Power Corporation (NAPOCOR) reported a drastic reduction in the generating capacity of several hydropower plants, particularly in Luzon and Mindanao (Jose et al., 1999).

In 1997 to 1998, El Niño caused a 100 percent loss in production during the dry season and more than 33 percent loss during the wet season. (Peras, et al., 2008).

The 2015 to 2016 drought and dry spells affected about 85 percent of the country. A state of calamity was declared in Zamboanga City in January 2016 because of low dam water levels—9 out of 25 dams dried up, 6 were at critical levels and 10 were below normal water levels (NDRRMC, 2019).

Currently, the surface and groundwater resources of the Philippines are facing escalating threats. Many of the country's watersheds are degraded, marked by deteriorated forests, soil erosion, erratic streamflow, and diminishing groundwater resource, among others (DENR, n.d.). As of 2021, only 24 percent of the total area of the country is covered with forests. The ongoing land use conversion to non-forest uses and the degradation of the watersheds will have adverse impacts on the quantity, quality, and water regime, which will consequently threaten the sustainability of water supply (Rola et al., 2018). The expected wetter wet season and drier dry season due to climate change would have profound effects on streamflow, dam operation, and water allocation, among others (Pulhin and Tapia, 2015). Moreover, various studies indicate a decline in both the quantity and quality of groundwater. Approximately 60 percent of the groundwater extraction occurs without water right permits, leading to unregulated and indiscriminate withdrawal and saltwater intrusion in coastal areas (World Bank, 2003).

2.1.1 Degradation of watersheds

Watersheds play a vital role in collecting and storing rainfall underground, subsequently releasing the runoff to sustain life within the habitats encompassed by them. They provide numerous benefits to the environment and human populations, including provision of water supply for drinking, irrigation, and flood control. The

1 Considered as the 18 major river basins are Apayao-Abulug, Abra, Cagayan, Agno, Pampanga, Pasig-Laguna, Bicol, Panay, Jalaur, Ilog-Hilabangan, Agusan, Tagoloan, Cagayan de Oro, Agus, Tagum-Libuganon, Davao, Mindanao, and Buayan-Malungon.

2 The El Niño Phenomenon is associated with the warming of the ocean surface in the central and eastern tropical Pacific Ocean. It occurs on average every two to seven years, and episodes typically last nine to 12 months.

3 The country is divided into 12 water resource regions based on similarities in climate, physiographical features, and hydrological boundaries. These regions are Ilocos, Cagayan Valley, Central Luzon, Southern Tagalog, Bicol, Central Visayas, Eastern Visayas, Western Visayas, Northern Mindanao, Southeastern Mindanao, Southwestern Mindanao, and Southern Mindanao.

Philippines has more than 130 watersheds of varying sizes which account for an estimated 70 percent of the country's land area. However, watersheds in the country are undergoing significant degradation attributed to various factors, including deforestation, land conversion, and unsustainable agricultural practices. Between 1998 and 2010, changes in land use and land cover have been largely unregulated, with forestlands in major river basins shifting to cultivated land, shrub, and grassland. In 2010, barely 25 percent of the major river basins are covered with forest vegetation, from 17.8 million hectares or about 60 percent of the land area in 1934 to about 6.84 million hectares or 23 percent in 2010 (Rola et al., 2018). Since then, total forest cover in the country has only increased by 5.65 percent to 7.23 million hectares in 2020, despite the PhP47-billion allocation for the National Greening Program of the government from 2010 to 2019. Meanwhile, the absence or poor maintenance of erosion control measures in upland farms, improper crop rotations, shortening of the fallow period in *kaingin* cultivation, insufficient or excessive use of fertilizers, and overuse of irrigation water also contribute to watershed degradation (DENR, n.d.).

2.1.2 Changes in water flow and availability due to climate change

Numerous challenges posed by climate change are anticipated to primarily manifest through water-related impacts. Climate change is evident, among others, in the increasing frequency and magnitude of extreme events such as stronger typhoons and unprecedented rainfall patterns, and in the creeping slow onset events such as increasing ocean temperatures and rising sea levels. A 2022 World Bank study explained how the impact of climate change on water will vary significantly across the country. First, Luzon and Visayas will likely become wetter on average, while Mindanao will become drier. Second, the frequency of flooding is expected to increase with a projected wetter Luzon, while more devastating impacts of less frequent but high-intensity floods are expected in Mindanao. Third, in water-stressed areas, higher temperatures will likely exacerbate the shortfall in water supply as people use more water to cope, and the evaporation from reservoirs reduces supply. Fourth, runoff due to high rainfall events will affect water quality by increasing river water's turbidity. Fifth, the poor will be disproportionately affected due to reduced employment in irrigated agriculture, reduced availability of water for household uses, and direct exposure to floods and droughts.

The Philippine Development Plan (PDP) 2023-2028 underscored that increase in hydrologic variability further complicates water resources management and planning. It also noted that the effects of climate change on the water cycle will continue to strain built infrastructures through increased evaporation, salinization, and physical damages. The physical infrastructure for delivery of water and sanitation facilities can face disruptions, resulting in contaminated water supplies and the discharge of untreated wastewater and stormwater into living environments. In 2009, Typhoon Ondoy severely affected water infrastructures, causing a 92-percent decrease in water supply capability for Manila Water Company, Inc. and a 25-percent decrease for Maynilad Water Services, Inc. As a result, more than 100,000 households were left without access to piped-in water (Greenpeace, 2009). Many ecosystems, particularly forests and wetlands, are under threat as well. The degradation of ecosystems, exacerbated by climate change, will affect provisioning (water supply) and regulating (natural flood protection) ecosystem services.

2.2. Water use and consumption

According to the NWRB, about 52 percent of water resources or roughly 76 billion m^3 were allocated for various purposes in 2022 based on water permits it issued. By purpose, around 59 percent of allocated water (44.8 billion m^3) was used for hydropower. Hydropower uses water in a non-consumptive way, which means water is returned to the resource system after use. In terms of consumptive use, irrigation is the largest consumer of water at 80 percent (60.8 billion m^3), followed by municipal/domestic use (7.4 billion m^3), industrial (6.2 billion m^3), and other purposes (760 million m^3).

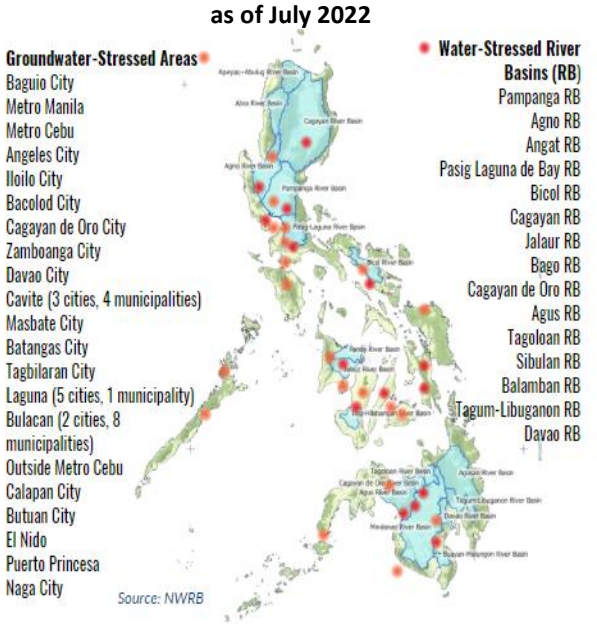
Despite the apparent abundance of water resources, the Philippines has been experiencing water stress since 2017.[4] The level of water stress is defined as freshwater withdrawal as a proportion of available freshwater resources. Water availability in 2020 is only 1,300 m^3 per capita per year nationwide, below the 1,700 m^3 per capita water stress threshold. This figure falls well below the world average of 7,300 m^3 per capita (WEPA, 2021), as well as the Asian average of 3,920 m^3 per capita (Bilal et al., 2023).

[4] Based on the Water Stress Index thresholds used by the NWRB, the Philippines has been under water stress since 2007, as water availability declined to 1,600 m^3 per capita from 2,100 m^3 per capita in 1995.

The country's water stress level has increased from 25.5 percent in 2010 to 27.83 percent in 2022. As per United Nations (UN) standards,[5] this is still classified as low water stress level but under the classification of the World Resources Institute's (WRI) Aqueduct Water Risk Atlas, the Philippines is already under medium high-water stress.[6] Moreover, the national average tends to conceal extreme cases of water stress in certain areas.

The NWRB identified 21 groundwater-stressed areas and 15 water-stressed river basins as of July 2022 based on several factors, including current water resource availability, areas with high water demand due to urbanization and tourism, projected impact of climate change on water resources, and concerns related to water quality (Figure 1). About 27 percent of the Philippine population live within these areas grappling with water stress.

Figure 1. Water-Stressed Areas and River Basins, as of July 2022



2.2.1. Inefficient utilization of water

The inefficient and wasteful provision of the country's irrigation services which is the largest consumer of water contributes to suboptimal water use practices. National irrigation systems utilize about 68 billion m^3 of water annually to irrigate around 1.9 million hectares of farms, primarily dedicated to rice cultivation. This figure surpasses the average of 52 billion m^3 used annually in other countries for irrigating the same area and crop type. This indicates that about 25 percent of the water distributed by the national irrigation systems goes to waste (NEDA, 2023). As existing irrigation infrastructures are prone to leakage and spillage, the problem of water wastage is seen to persist unless these structures are rehabilitated or retrofitted, taking into account the impacts of climate change.

Meanwhile, water utilities grapple with substantial water loss in distribution networks. According to the Local Water Utilities Administration (LWUA), among the 534 water districts under its purview, 46 percent or 244 have non-revenue water (NRW)[7] rates higher than 30 percent, surpassing global average of 20 percent. This reported annual average wastage of 488 million metric tons is about half of Angat dam's annual capacity. According to Metropolitan Waterworks and Sewerage System (MWSS), Maynilad's NRW stands at an annual average of 43 percent.

2.3. Water quality and water pollution

The deterioration of water quality affects the sustainability of water supply as it effectively reduces the amount of usable water within a given area. Freshwater ecosystems, for instance, are confronted with significant challenges due to pollution. Economic activities have led to a notable escalation in the release of effluents into water bodies. Additional contributors to water pollution include improper and inefficient operation of landfills and lack of public cooperation on the proper disposal of sewage and solid wastes. A McKinsey and Ocean Conservancy (2015) study indicated that over half of open dumpsites in the country are located within a kilometer of a waterway and between 70 percent and 90 percent of the waste dumped illegally ultimately end up in waterways.

According to Rola et al. (2018), only 27 percent of 688 classified water bodies in the country have potable water. In Metro Manila, heavily polluted rivers have lost their potential as sources of water supply, and as a result, the MWSS has to obtain its water supply from Angat River, which is located in another river basin.

[5] Categories of water stress used by UN Food and Agriculture Organization (FAO): No stress (0%-25%); Low (25%-50%); Medium (50%-75%); High (75%-100%); Critical (>100%).

[6] Categories of water stress used by WRI: Low (<10% withdrawal); Low to Medium (10%-20% withdrawal); Medium-High (20%-40% withdrawal); High (40%-80% withdrawal); Extremely high (>80% withdrawal).

[7] NRW is quantity of water that is channeled into the water supply system but does not yield returns due to theft, evaporation, faulty metering, poor data gathering, or leakage.

About 43 percent or 180 out of 421 rivers in the country are polluted mainly due to untreated domestic sewage and industrial and agricultural wastes (WEPA, 2021). In 2019, the average biochemical oxygen demand (BOD)[8] in 157 water bodies monitored by the DENR was 21.97 milligrams per liter (mg/L). It is higher than the accepted BOD level for all water classes, indicating the need to improve water quality and reduce water pollution. In 2021, 56 percent (13 of 23) of water bodies classified for public water supply (Class AA and Class A) exceeded guideline values for fecal coliform.[9] Data from the DENR-Environmental Management Bureau (EMB) indicate that domestic sewage has contributed about 33 percent of the BOD load[10] in water bodies, and agricultural and industrial wastes account for 29 percent and 27 percent, respectively (WEPA, 2021). It is estimated that in the country, only 10 percent of wastewater is treated. Moreover, only 5.6 percent of households are connected to sewerage systems[11] (PSA, 2023).

Groundwater is likewise not free from contaminants. Pollution of groundwater can emanate from various sources, including domestic wastewater, agricultural runoffs, and industrial effluents. Studies indicate that residues of nitrate, nitrite, and herbicides, which are attributed to the application of fertilizers in agricultural activities, have been detected in various groundwater resources (PIDS, 2001; Tirado, 2007; Inson et al., 2021). Domestic wastewater is the principal contributor of bacterial contamination within groundwater reservoirs. The existence of coliform bacteria within potable water sources can lead to the spread of waterborne illnesses like diarrhea, cholera, dysentery, and hepatitis A, among others. From 2010 to 2019, an average of 50,058 cases of water-borne diseases were reported annually. Diarrheal diseases are among the top causes of infant deaths in the country (PSA, 2021).

Saltwater intrusion in coastal aquifers has also become an increasing threat to the quality of freshwater supply. This arises from the excessive withdrawal of groundwater, exacerbated by climate change due to sea level rise. The flow of salty water in the aquifers leads to chloride concentrations in excess of potable water quality standards[12] and can make the water unusable without additional processing or treatment. Studies and saltwater intrusion modelling find evidence of current and future saltwater encroachment in some coastal aquifer systems in the country (PIDS, 2001; Taclan, 2011; Insigne and Kim, 2010; Ng et al., 2018).

3. Status of the Philippines' Water Supply, Sanitation, and Hygiene (WASH)

In 2015, the Philippines along with 192 United Nations member states committed to the Sustainable Development Goals (SDGs), including achieving universal access to safe water and sanitation by 2030. According to the 2022 Annual Poverty Indicators Survey (APIS), 96.3 percent or 25.9 million families had basic service level drinking water from an improved source with roundtrip collection time not more than 30 minutes. This is a modest improvement from 93.9 percent or 24.2 million families in 2020. However, 2.4 percent or 646,608 families still rely on sources of drinking water that are classified as unsafe. These sources include surface water, as well as unprotected wells or springs. Nevertheless, the target under the PDP 2023-2028 of safe water supply coverage for 97.5 percent of families by 2028 seems attainable if current trends continue. The standards to achieve this target are, however, regarded to be low. Safe water supply sources under this goal cover not only piped water connections but also include boreholes or tube wells, protected dug wells, protected springs, rainwater, and packaged or delivered water. According to the 2022 APIS, only 17.2 percent or 4.6 million families actually have water piped directly into their homes.

The 2022 APIS data also show that 84 percent or 22.6 million families had basic sanitation service level or used an improved sanitation facility that is not shared with another household. This was a 3.6-percentage point increase from 2020. Despite this progress, the Philippines is still far from hitting the PDP end-of-plan target of 98.17 percent. Moreover, ending open defecation by 2025 remains a challenge as 2.6 percent or 688,981 families still practice open defecation (2022 APIS). A 2008 World Bank study found that poor sanitation in the

[8] BOD is a measure of the quantity of oxygen used by microorganisms (e.g., bacteria) in the oxidation of organic matter in water over a specific period. BOD standards are as follows: Class AA (Public Water Supply Class I)-<1mg/L; Class A (Public Water Supply Class II)-<3mg/L; Class B (Recreational Water Class I)-<5mg/L; Class C (Fishery Water, Recreation Water Class II, Industrial Water Supply Class I)-<7mg/L; Class D (For Agriculture, Irrigation, Livestock Watering; Industrial Water Supply II; and Other Inland Water)-15mg/L.

[9] Fecal coliform guideline values: Class AA-<20 Most Probable Number per 100 milliliter (MPN/100mL); Class A-<50 MPN/100mL.

[10] BOD concentration

[11] Including shared facilities

[12] Under the Philippine National Standards for Drinking Water of 2017, the maximum allowable level of chloride is 250 mg/L.

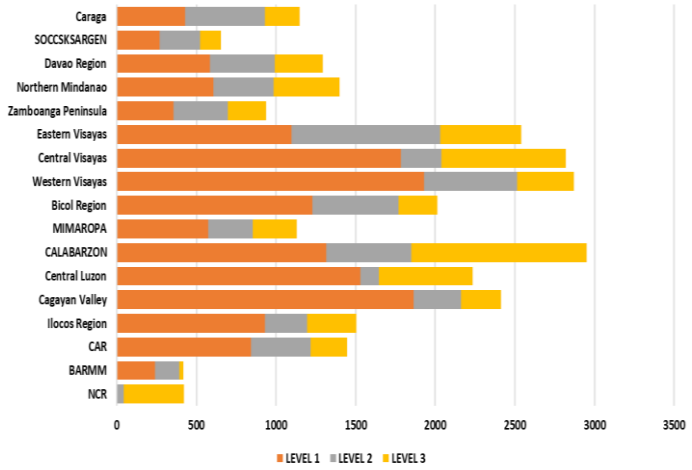
Philippines resulted in economic costs of approximately US$1.4 billion or PhP77.8 billion per year. This estimate covers impacts on health, water resources, welfare, and tourism.

In terms of regional access, the National Capital Region (NCR) and Central Luzon have the highest percentage of families with basic service level of drinking water at 99.3 percent while Central Luzon leads in the percentage of families with sanitation facility at 92.5 percent. On the other hand, the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) reports the lowest percentage of families with basic service level of drinking water and sanitation facility at 87.8 percent and 51.6 percent, respectively.

The Department of the Interior and Local Government's (DILG) Local Government Support Fund–Provision of Potable Water Supply, also known as *Sagana at Ligtas na Tubig sa Lahat* (LGSF-SALINTUBIG)[13] pinpointed 134 municipalities that lack sufficient access to safe drinking water. As of 2020, the provinces with the highest numbers of such municipalities include Zamboanga del Norte (13); Cagayan (10); Sultan Kudarat (8); Zamboanga Sibugay (7); Agusan del Sur (6); and Capiz, Cotabato, Lanao del Norte, and Bohol–each with 5 municipalities falling into this category.

In terms of water service provider (WSP) performance across regions (Figure 2), CALABARZON stands out with the highest number of Level III (piped connections) WSPs, closely followed by Central Visayas and Central Luzon. For Level II (communal faucet), Eastern Visayas ranks highest, trailed by Western Visayas and Bicol Region. Meanwhile, Western Visayas has the highest count of Level I (point source) WSPs, followed by Cagayan Valley and Central Visayas. Notably, NCR relies predominantly on Level III WSPs, with only one Level I WSP. These combined WSPs have served approximately 13.6 million households as of 2022, representing 50.36 percent of all households based on the 2022 APIS data, which account for 26.9 million households.

Figure 2. Water Service Providers by Level of Service by Region, 2020



Source: NWRB (2022)
**Level 1: point source; Level 2: communal faucet; Level 3: piped connections*

On the monitoring of quality of drinking water, there are 135 laboratories accredited by the Department of Health (DOH) as of March 2023. Out of these, 59 percent are privately-owned, and 41 percent are government-owned. Most of these laboratories are in Metro Manila, while there are none in the Bicol Region and BARMM.

4. The Philippine Policy Waterscape

Under Article XIV, Section 8 of the 1987 Philippine Constitution, all waters of the country belong to the State. The exclusive authority to grant rights for accessing, utilizing, and developing the vital resource rests solely with the State. The Water Code of the Philippines of 1976 under Presidential Decree (PD) No. 1067 serves as the overarching law governing water appropriation, utilization, exploitation, development, control, conservation and protection, and dispute resolution. In addition, there are at least eight other legal frameworks that govern the water sector in the country that provide for: (1) the creation of local water districts; (2) sanitation requirements of establishments; (3) privatization of State-run water facilities; (4) establishment of protected areas; (5) water quality standards and regulations; (6) protection of watersheds that are sources of water for irrigable areas; and (7) recognition of the sustainable traditional resource rights of indigenous peoples, among others (see Annex 1).

[13] The primary goal of this program is to ensure widespread availability of water and sanitation services (WSS) using a comprehensive WASH strategy. This strategy involves enhancing the capabilities of local entities through capacity-building initiatives, as well as engaging in the rehabilitation, enhancement, and creation of appropriate water service levels—Level I or point source, Level II or communal faucets, and Level III or piped connections.

With the many water-related legal frameworks at play, several institutions with varying mandates, distinct domains, and sectoral interests operate within the sector. The DENR is the lead agency responsible for the conservation, management, development, and proper use of the country's environmental and natural resources. However, several departments, bureaus, and attached agencies share responsibility for planning and managing the country's water resources. The NWRB has three major functions: (1) formulating policies and plans within the framework of Integrated Water Resources Management (IWRM);[14] (2) water resource regulation through the issuance of water permits and resolution of water use conflicts; and (3) economic regulation through the issuance of Certificate of Public Convenience and setting of water tariffs of private water service providers. Under the principle of decentralization, local government units (LGUs) are primarily responsible for providing water supply systems, communal irrigation facilities, small water impounding projects, drainage and sewerage, and implementing community-based forestry and local flood control projects as mandated by Republic Act (RA) No. 7160 or the Local Government Code of 1991.

Table 1. Key Agencies in the Water Sector

Department/Agency	Description/Function
DENR	Responsible for the conservation, management, development, and proper use of the country's environmental and natural resources
NWRB	Regulates the utilization, exploitation, development, conservation, and protection of water resources
LWUA	A specialized lending institution for the development of provincial water districts that also exercises technical and economic regulation of water districts
DPWH	Responsible for major infrastructure projects including flood control and water resources projects
DOH	Sets standards for drinking water and monitor compliance
NIA	Responsible for the development and management of irrigation systems
NAPOCOR	In charge of the development of hydroelectric generation of power
MWSS	Provides water supply and sewerage services to Metro Manila, Rizal, and selected municipalities in Bulacan and Cavite through their two private concessionaires, Manila Water and Maynilad
MWSS-Regulatory Office (RO)	Reviews, monitors, and enforces rates and service standards of concessionaires
MMDA	Responsible for integrated flood control, drainage, and sewerage system for Metro Manila
LLDA	Develops the Laguna Lake region through management of water resources
NEDA	Develops policies and targets for the water supply and sanitation sector

Source: SEPO (2011)

As shown in Tables 1 and 2, many of the key agencies in the water sector share tasks in policy planning, data monitoring, regulation, infrastructure and program development, and operation of water facilities, among other responsibilities. Several other agencies and bureaus work in the areas of water quality and sanitation, watershed management, integrated area development, irrigation, research, cloud seeding, water supply, flood management, ports and navigation, and fisheries and agriculture.

Table 2. Water-Related Functions of Key Government Agencies

GOV'T AGENCIES	POLICY PLANNING	DATA MONITORING	SCIENTIFIC MODELLING	INFRAS-TRUCTURE & PROGRAM DEV'T	OPERATION OF WATER FACILITIES	REGULATORY FUNCTIONS	FINANCING	PUBLIC RELATIONS, CAP DEV, & IEC	LOCAL RBO DEV'T
NWRB	✓	✓		✓		✓		✓	
LWUA	✓	✓		✓		✓	✓	✓	
DENR	✓	✓		✓		✓	✓	✓	✓
LGUs	✓	✓		✓	✓	✓	✓	✓	
DPWH	✓	✓		✓	✓			✓	
DOH	✓	✓		✓		✓		✓	
NIA	✓	✓		✓	✓			✓	
NAPOCOR	✓	✓		✓	✓			✓	
PAGASA	✓	✓	✓	✓				✓	
DOF	✓						✓	✓	
MWSS	✓	✓		✓	✓	✓		✓	
DILG	✓	✓		✓				✓	
DOE	✓	✓		✓				✓	
MMDA	✓	✓		✓	✓	✓		✓	
DOT				✓		✓		✓	
LLDA	✓	✓	✓	✓		✓		✓	
NEDA	✓						✓		

Source: Rola et al. (2018)

Water districts, concessionaires, private water utilities, LGU-run utilities, rural waterworks and sanitation associations, and other community-based utilities are subject to regulation by the NWRB, LWUA, MWSS, or LGUs in terms of resource, technical/operational (minimum performance standards), and economic (water rate setting). While the involvement of multiple institutions is deemed necessary due to the complexity of the water sector, the Philippines does not have a single and unifying body with the over-all authority and capability to manage and develop water resources for competing uses. Although the NWRB has an expansive mandate

[14] IWRM is a process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

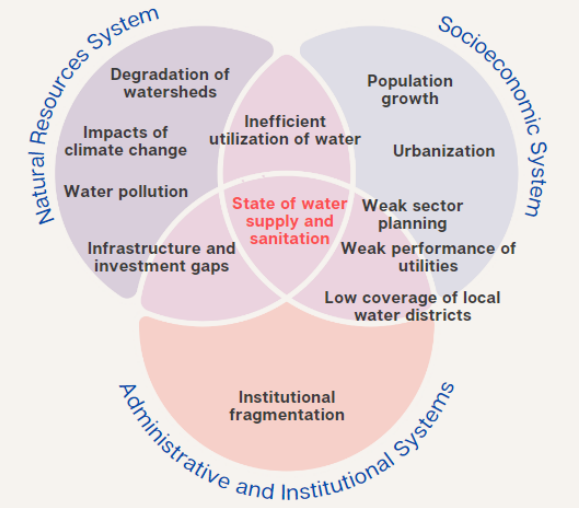
under the Water Code to regulate the "utilization, exploitation, development, conservation and protection of water resources," various studies highlighted that it is ill-equipped to execute such role.

To integrate and harmonize policies in the water resource sector, President Ferdinand Marcos, Jr. issued Executive Order No. 22 in April 2023 creating the Water Resources Management Office (WRMO) under the supervision of the DENR which aims to "ensure the immediate implementation of the Integrated Water Resources Management in line with the UN Sustainable Development Goals and formulate a corresponding Integrated Water Resources Master Plan (IWRMP)." It also mandates the WRMO to shepherd the passage of a bill establishing a Department of Water and/or a Water Regulatory Commission. It also affixed to the DENR all water-related agencies such as the NWRB, MWSS and its corporate and regulatory offices, LWUA and local water districts, and the Laguna Lake Development Authority (LLDA).

5. Issues and Challenges

Given that water resource is a vital component of ecosystems, its issues and challenges must also be viewed within the broader framework of interconnected dynamics between the natural, socio-economic, and administrative systems, highlighting their intersections. This discussion adopts the Philippine Water Supply and Sanitation Master Plan (PWSSMP) framework as summarized in Figure 3.

Figure 3. Summary of Issues and Challenges in the Philippine Water Supply and Sanitation Sector



Source: PWSSMP (2021) with authors' adaptations

5.1. Natural resources system

As earlier discussed, securing water availability has become a growing challenge due to issues the natural resource ecosystem is grappling with. This includes the persistent deterioration in the condition of Philippine watersheds, grave pollution issue and the looming impact of climate change which disrupt the availability, quantity, and quality of water resources.

5.2 Socio-economic factors

While water supply decreases due to pressures in the natural resources system, water demand increases due to population growth, urbanization, and socio-economic development.

Like many developing nations, the Philippines has experienced rapid population growth and urbanization, leading to heightened water consumption and increased demand for water in food production. From 1990 to 2020, the total population of the Philippines grew at an average annual rate of 2.7 percent. Projections indicate that the population could reach up to 115 million by mid-2025 and 142 million by 2045. From 2010 to 2020, the total population in all 146 cities nationwide has increased by an average of 19.27 percent. In 2020, cities had an average population density of 4,690 persons per square kilometer (sq.km.), almost 13 times higher than the national average of 363 persons per sq.km. (PSA, 2021). The per capita water availability has dwindled by 38 percent in 25 years, from 2,100 cubic meters in 1995 to 1,300 meters in 2020 (NWRB, 2023). A 1998 Japan International Cooperation Agency (JICA) study identified 9 major urban areas (Metro Manila, Metro Cebu, Davao City, Baguio City, Angeles City, Bacolod City, Iloilo City, Cagayan De Oro City, and Zamboanga City) where water demand is expected to at least double in 2025 from 1995 levels. Based on current trends, the country is projected to face significant water shortages by 2040 (WRI, 2015).

5.3 Administrative and institutional factors

The administrative and institutional structures in the water sector are often blamed for the current state of water resource management in the country.

5.3.1 Institutional fragmentation

The fragmentation of water governance in the Philippines can be attributed to the involvement of multiple institutions and actors, each with different hierarchical coverage, mandates, and represent the interests of

diverse constituencies. Malayang (2004) presents a model that characterizes the governance of water resources in the Philippines as having multiple levels, sectors, and themes. The entities responsible for overseeing water management operate across different levels, ranging from local to national tiers. The decision-making and activities that impact water resources involve a range of sectors, encompassing both governmental and non-governmental actors, such as LGUs, industries, fishing communities, civil society groups, and residents living in proximity to water bodies. Additionally, water governance encompasses diverse themes, including pollution control, climate change adaptation, watershed enhancement, and public health and sanitation. The management of water resources involves over 30 distinct agencies, each possessing varying levels of authority and accountability. Notably, there lacks a central authority to supervise the entire spectrum of water resource management activities. The PDP 2023-2028 points out the fragmented water management approach in the Philippines, noting that the lack of inter-agency coordination leads to isolated planning in various water-related sectors. This approach overlooks the interconnectedness of water systems and prioritizes decisions based on political boundaries rather than ecological ones, such as river basins or aquifers, for more integrated management. Rola et al. (2016) observed that there are no vertical and horizontal linkages among the water-related institutions, resulting in high costs of coordination (Elazegui, 2004). Within the natural resources system alone, despite presumed linkages between water, land, and forest resources in the laws, structures to support interconnectivity between these diverse actors and policy areas are weak or non-existent (Hall et al., 2015).

Regulatory frameworks and mechanisms for technical/operational standards and water rate setting are not harmonized to enhance efficiency and effectiveness. For example, a 2020 Philippine Institute for Development Studies (PIDS) study found several conflicts between the regulations of NWRB and LWUA. First, there are overlaps in terms of regulation for water districts (Category B),[15] LGU-run utilities (Category B), and rural waterworks and sanitation associations (Category C),[16] as summarized in Table 3. Second, there are no uniform technical standards to easily identify performing and non-performing water utilities. Third, the methodology for determining water rates differs among various regulators.

Table 3. Regulatory Involvement of Water-Related Agencies

Water Utility	Resource Regulation	Technical / Operations Regulation	Economic Regulation
Water Districts	NWRB	LWUA, Optional NWRB (Category B)	LWUA, Optional NWRB (Category B)
Private Water Utilities with Certificate of Public Convenience	NWRB	NWRB	NWRB
LGU-Run Utilities	NWRB	LGU, Optional NWRB (Category B)	LGU, Optional NWRB (Category B)
Rural Waterworks and Sanitation Associations	NWRB	NWRB (Category C) and LWUA	NWRB (Category C) and LWUA (if with loans with LWUA)
Other Community-Based Utilities	NWRB	NWRB (Category C)	NWRB (Category C)
Manila Water and Maynilad	NWRB	MWSS-Regulatory Office	MWSS-Regulatory Office

Source: PIDS (2020)

The establishment of a national regulatory authority is crucial for ensuring the appropriate pricing of water services across the country, as noted by the World Bank in 2023. This body would be responsible for defining service level standards, ensuring cost-recovery tariffs,[17] and overseeing the performance of WSPs.

5.4 Policies, regulation, and management

The difficulties in sector planning, the underperformance of water utilities, and the inadequate coverage by local water districts effectively mirror the current situation of regulation and management in the country's water sector.

5.4.1 Weak sector planning

Because of fragmented and overlapping functions in the water sector, there is no central planning body for water and no available integrated water databases for decision support (Hall et al., 2015). Without coordinated planning, it will be difficult for multiple actors to meet the range of sectoral policy goals without undermining

[15] Category B water utilities are government-owned or -run water utilities that do not opt to be classified as Category A (water utilities operating for profit) or the NWRB has classified as Category B. This category only applies for those who voluntarily opt for NWRB regulation.

[16] Category C water utilities and community-based water utilities that are not operating for profit, have not expanded/or are not expanding outside their original jurisdiction, and do not opt to be classified as Category A or B, or the NWRB has classified as Category C.

[17] Cost-recovery tariffs cover the total costs of service provision.

the sustainability of the water resource base. There is a scarcity of updated data on water resources, water supply and demand, consideration of climate scenarios, water supply access and coverage, and water quality and sanitation, among other essential information, on which policies and programs for water resource management and sustainability at the local and national levels should be based. The alignment and coherence of policies and planning across domains such as land use planning, water management, ecosystem protection, and climate change adaptation are currently lacking. For example, inappropriate land use development can affect watersheds and water supplies and cause increased losses due to flooding.

5.4.2 Weak performance of utilities

The primary challenge facing the growing water utilities sector is the insufficient provision of safe water facilities, particularly in expanding towns and cities (DAP, 2019). This issue is exacerbated by the fragmented regulatory framework, inadequate planning and oversight, limited private sector investments, subpar performance by water utilities, and inadequate support for rural water supply. Water utilities' under-performance is largely attributed to high NRW, primarily affecting small-scale local water utilities due to resource and capacity limitations.

Box 2. High Non-Revenue Water Issues of Water Utilities

The 2022 Annual Audit Reports by the Commission on Audit (COA) highlighted deficiencies in the performance of water utilities. For instance, several water districts in Mindanao have high levels of NRW that could potentially put their financial stability at risk and impact the standard of water services they deliver. The Davao City Water District, with a substantial NRW rate of 36 percent, faced a potential revenue shortfall of more than PhP1.512 billion. Zamboanga City Water District, at a 61.6 percent NRW rate, saw losses of PhP493.112 million. Likewise, the Butuan City Water District in Agusan del Norte and the Valencia City Water District in Bukidnon encountered comparable losses, estimated at PhP106.5 million and PhP98.4 million, respectively, with NRW rates of 47.86 percent and 45.66 percent.

Similarly, the Metro Cebu Water District struggled with NRW management, resulting in annual revenue losses since 2020 due to its inability to reduce NRW. In 2021, its NRW production reached 29 percent, exceeding the LWUA's acceptable limit of 20 percent (COA, 2022).

Water districts serve the largest proportion of population across all regions among WSPs (PIDS, 2020). LGU-run utilities make up 16 percent of all WSPs, while the rest are privately operated, often as smaller organizations serving limited areas (see Annex 2).[18] Approximately 36 percent of the country's population receives services from the private sector, with joint ventures being the most common form of private sector involvement in water districts (World Bank, 2023). Among WSPs, LGU-operated systems were found to have the worst performances. Insufficient funds, excessive political interference, lack of technical, financial, and managerial capacities, market misbehaviors such as either very low or excessively high tariffs, zero cost recovery, and lack of sustainability regulations are mostly seen in poorly managed LGU-run utilities (DILG, 2022; JWRC, 2019; Arangkada, 2018). A 2023 World Bank survey covering 47 LGU-run utilities revealed that 68 percent are operating at a loss, primarily due to high operational costs and low revenue. This financial strain hampers their ability to enhance services and expand coverage. Additionally, these utilities lack defined targets for service delivery and efficiency.

Urban and rural areas in the country face significant water supply interruptions, with small WSPs struggling to ensure a continuous supply due to system pressures and resource constraints. The MWSS recorded an average daily interruption of 7.38 hours from January to September 2023. The East Zone faced interruptions due to mainline breakages and network maintenance, while the West Zone experienced issues like reservoir depletion, leak repairs, and line connections.[19] Water service interruptions has prompted urgent calls from senators for MWSS and water concessionaires to find solutions, highlighting the critical need for governmental intervention to resolve water supply challenges.

The national government recognizes LGUs' struggles in water service delivery and has provided support. However, since the Supreme Court's ruling on the Mandanas-Garcia Case took effect in 2022, national government agencies (NGAs) have scaled down or phased out various programs and projects like DILG's SALINTUBIG (see Annex 3). Since its inception in 2012, 340 out of 455 waterless[20] municipalities (75 percent) and 1,123 out of 1,353 waterless and far-flung barangays (83 percent) have successfully transitioned from their

[18] Examples include barangay water and sanitation associations (BWSA) and rural waterworks and sanitation associations (RWSA) for local communities. Homeowner associations also manage water systems in some properties where there are no LGU-run utilities or dominant private players.

[19] Manila Water covers East Zone concession area which includes the cities of Makati, Mandaluyong, Marikina, Pasig, San Juan, Taguig, and the municipality of Pateros, and parts of the cities of Quezon and Manila, and parts of the province of Rizal. Maynilad is the concessionaire for the West Zone which includes the cities of Caloocan, Malabon, Navotas, Valenzuela, Pasay, Parañaque, Las Piñas, Muntinlupa, and parts of the cities of Quezon, Manila and Makati, and parts of the province of Cavite.

[20] Area with less than 50 percent water supply coverage

status. However, given that over a quarter of LGUs (455) still lack the capacity to fully assume their devolved functions, invest in water services, and continue NGAs' initiatives based on their constituents' needs and priorities, discontinuation of targeted support without a proper transition (i.e., failure to prioritize water supply and sanitation (WSS) projects in LGUs' devolution transition plans), could widen the local water service delivery gap.

5.4.3 Low service coverage of local water districts (LWDs)

Out of the 875 Level III LWDs, 39 percent or 343 of these are non-operational. According to the LWUA, this is due to the lack of water sources in the area; scarce funding to develop water supply system facilities immediately after the formation of LWDs; problems with water quality, water pressure, and limited supply; limited revenues to cover the basic operational costs; decreased interest of LGUs in reactivating LWDs; lack of funds; projects abandoned by contractors; and difficulty in finding qualified personnel. These factors significantly impact their creditworthiness and deter potential private investors. Out of the 1,617 cities and municipalities outside the NCR, 38 percent or 622 are not yet covered by LWDs. Expanding the coverage of LWDs coverage is seen as crucial especially in lower class municipalities where private investment is hesitant.

For the past four years, national government subsidy allocation for the LWUA's water supply projects have averaged only eight percent of its budget proposals.[21] In 2023, funding focused on sanitation projects in the areas covered by the Manila Bay Continuing Mandamus. As of December 2022, the LWUA has granted PhP40.5 billion in loans to qualified LWDs in urban areas. For the period 2023-2028, 519 water supply projects worth PhP8.6 billion and 10 sanitation projects worth PhP1.65 billion are targeted to be completed.[22] While this is a welcome development, the succeeding section discusses the huge investment requirements for the sector.

5.5 Infrastructure and investment gaps

Due to the fragmentation of the water sector, investments in infrastructure have not been comprehensively planned and coordinated. Multiple water supply utilities operate in the same areas, which led to the inefficient use of funds and redundant investments (PIDS, 2021). Moreover, the sector grapples with inadequate private sector investment, due to current water tariff policies, land acquisition difficulties, and lengthy water permit process (World Bank, 2022). Within the domestic water sector, the primary focus has been on water provisioning by water districts and local water works, with relatively less attention placed on sanitation. Consequently, only an average of about PhP3.4 billion has been invested annually for water supply and sanitation programs from 2008 to 2012 (NEDA, 2021). This figure is a far cry from the estimated amount of PhP1.07 trillion needed to achieve universal access to water supply and sanitation by 2030 (Table 4).

Table 4. Total Investment Requirements from 2020-2030

Investment Requirements (in PhP billion)	
Physical	1,068.19
Water Supply:	511.08
Level III	451.06
Level II	52.87
Level I	7.15
Sanitation:	557.11
Improved/Basic	433.52
Septage	54.89
Sewerage	68.70
Non-Physical	1.13
Eight Key Reform Agenda (KRAs)*	0.32
Project Management	0.81
TOTAL	**1,069.31**

Source: PWSSMP (2021)

**KRAs are Establishing Effective WSS Sector Institutions, Creating and Ensuring Effective WSS Services, Balancing Water Supply and Demand, Building Climate Resiliency, Enabling Access to Funding and Financing, Managing Data and Information, Driving Research and Development (additional investments for 2024-2030 to be defined at a later stage)*

The Philippines also ranks among the top 10 countries in the Asia Pacific region with the highest annual investment costs required for water supply, sanitation services, and flood protection. This is due to insufficient support for operation and maintenance, often underpriced water services leading to poor returns on investments, lack of data and analytical tools to access complex water-related investments, and policy incoherence with weak regulation enforcement (OECD, 2021).

[21] Based on the LWUA's original budget proposal to Department of Budget and Management (DBM)

[22] These include water supply extension programs for existing LWDs; water supply development for newly formed LWDs; improvement and rehabilitation projects to operationalize non-operational LWDs; reduction of NRW; and Disaster Response and Recovery Program.

The PDP 2023-2028 points out the lack of an updated and comprehensive inventory of water-related infrastructure, hindering the implementation of a coordinated rehabilitation and maintenance program, which in turn leads to the deterioration of many water-related infrastructures. Although a substantial annual budget (PhP74 billion annual average from 2013-2023) is allocated for flood control under the Department of Public Works and Highways (DPWH), many parts of the country continue to suffer from massive floods year after year. According to the World Bank (2022), despite having over a hundred dams with a total capacity of almost 7 million m^3, the Philippines has a significantly lower per capita storage capacity of 68 m^3 as of 2017, compared to neighboring countries like Vietnam (473 m^3), Malaysia (722 m^3), and Thailand (1,145 m^3).

6. Policy Options

Addressing the increasing water challenges requires comprehensive institutional and regulatory frameworks to create a supportive environment for solutions.

6.1 Water governance

Senate bills filed in the 19th Congress that seek to streamline water-related functions in the government and create new unifying institutions can be clustered into four options:

1) A Department of Water Resources (DWR) to be the primary policy, planning, coordinating, implementing, monitoring, and administrative entity, and a Water Regulatory Commission (WRC) to rationalize economic and administrative regulation of water utilities (Senate Bill Nos. 102, 1021, and 2013);
2) Only a DWR (SBNs 87, 1244, 1395, and 2412);
3) Only a WRC (SBNs 1428); and
4) A Water Resources and Management (WRMA)/Water Resources Authority of the Philippines (WRAP) (SBNs 185 and 268).

A DWR is envisioned to be responsible for the comprehensive and integrated development and management of water resources and their optimal allocation among competing users. Among the Senate bills that propose a DWR, one of the main differences is the extent to which water-related responsibilities of various agencies are transferred to the DWR. Some of the agencies and/or their relevant offices which have water-related responsibilities that will be transferred to the DWR include the NWRB, DENR's River Basin Control Office, DENR-EMB's Water Quality Management Section, DPWH's Flood Control Management Cluster, DILG's Water Supply and Sanitation Unit, National Economic and Development Authority's (NEDA) Infrastructure Committee on Water Resources, and Manila Bay Task Force, among others.

Correspondingly, relevant powers and functions of the National Pollution Control Commission, DENR's Mines and Geosciences Bureau, DENR's Biodiversity Management Bureau (for the protection and conservation of natural wetlands), DPWH (for the National Sewerage and Septage Management Program and the implementation of RA No. 6716 or the Rainwater Collector and Springs Development Act), DPWH's Bureau of Design and Bureau of Research and Standards, Department of Agriculture's (DA) Bureau of Fisheries and Aquatic Resources, DA's Bureau of Soils and Water Management (for the utilization and management of water, including rain-making projects), DOH (for drinking water quality), and Tourism Infrastructure and Enterprise Zone Authority (for the implementation of RA No. 9593 or the Tourism Act of 2009) will also be transferred to the DWR.

The DWR is tasked to coordinate all related aspects of water resources development and management across sectors, agencies/departments, and stakeholders, such as in policy making and planning, data collection and evidence gathering, conduct of special studies, and implementing direct interventions, among other activities. The DWR's attached agencies will include the WRC, LWUA, MWSS, LLDA, and the National Irrigation Administration (NIA). Additionally, a National Water Sector Policy Council/Board will be established to oversee policymaking and harmonization of water-related policies.

The DWR will also serve as a water resource regulator, which shall issue and enforce guidelines for the equitable and efficient allocation of the country's water resources for various purposes such as domestic and municipal water supply, irrigation, sanitation, hydropower, fisheries, industrial, and recreational.

Moreover, the DWR bills seek to streamline and strengthen economic and technical regulation for the water sector by establishing the WRC under the DWR's administrative supervision, centralizing oversight over all WSPs, regardless of their public or private nature. For instance, at present, LGU-operated utilities autonomously set their water rates and tariffs; water districts fall under the regulatory purview of the LWUA; privately-owned water utilities are regulated by the NWRB; and water supply services within the economic zones are regulated by the Philippine Economic Zone Authority (PEZA). This fragmented regulatory framework leads to inconsistencies in water pricing and economic behavior across the water utilities sector.

The establishment of the WRC aims to bridge the regulatory gap by introducing an overarching framework designed to harmonize economic regulations and technical standards, qualifications, and measurements of service in WSS. The Regulatory Units of the WRC shall review, determine, and approve proposed water and sewerage tariffs, rates, and charges that WSPs may impose upon consumers. The Water Utilities Division of the NWRB, the Regulatory Offices of the MWSS and LWUA, and the Regulatory Units of all special economic zones will be transferred to the WRC. This reform proposal intends to standardize service delivery, improve transparency through the public reporting of comprehensive performance data, and eliminate the current inconsistencies in pricing mechanisms across the sector. Publicizing the performance data, including the best and worst performers, can build public trust, encourage improvement of services, and ensure accountability among WSPs.

This proposed institutional reform to an extent mirrors the established framework already seen in the energy sector, where the Department of Energy (DOE) is responsible for preparing, coordinating, and supervising plans, programs, and projects of the government in the energy sector, while the Energy Regulatory Commission (ERC) holds the authority to set and approve transmission and distribution wheeling charges and retail electricity rates. This strategic division of responsibilities demonstrates a model of efficient regulatory and operational management that the water sector reform appears to emulate.

The creation of a new department, however, is being met with some resistance given the government's fiscal constraints and possible concerns of existing agencies whose functions may be sustained under the DWR. Aside from the budgets of agencies and offices to be transferred to the DWR and WRC, an amount of at least PhP2 billion is proposed by some bills for initial operations considering the organization of the bureaus, services, and water resources regional offices of the DWR and regulatory units of the WRC.

Meanwhile, the DPWH in its position paper submitted to the House of Representatives has expressed strong opposition against the transfer of its functions relating to the conduct of hydrological surveys, monitoring of streamflow, other water data collection, construction of water infrastructure, and flood control activities, among others. The DPWH argues that these duties are integral to its mandate as the government's engineering and construction agency. This stance was considered by the House of Representatives with the approval on Third Reading of its version of a "National Water Resources Act" under House Bill No. (HBN) 9663, which retains the said functions to the DPWH and limits the DWR's involvement in these areas to a coordinating role.

Additionally, HBN 9663 maintains the DENR's current responsibilities related to water quality management, collection of water-related data, and adjudication of water pollution cases, as well as preserves the DOH's authority in setting and enforcing drinking water quality standards. HBN 9663 also reconstitutes the NWRB as the National Water Resources Allocation Board under the DWR. A careful analysis of the existing and potential mandates and functions related to the sustainable and integrated water resource management may guide the development of the DWR bill in the Senate for its counterpart measure, ensuring that it not only avoids conflicts with existing agencies but also fosters synergy and efficiency in addressing the nation's water challenges.
An alternative proposal suggests establishing an authority (WRMA/WRAP) instead. This approach is expected to involve fewer bureaucrats while still maintaining responsibility for the holistic and integrated development and management of water services in the country.

All these bills seek to address the overwhelming competition for jurisdictions over funding and water management of several government agencies, eliminate duplication of functions, provide uniform regulatory standards and requirements, enhance data sharing and evidence-based decision-making among attached agencies, and foster efficient resource allocation.

Some of these legislative measures place the proposed bodies under the administrative supervision of the President (SBNs 268 and 1428), underscoring the requirement for top-level leadership and robust government-wide coordination. Nevertheless, this organizational structure does not necessarily guarantee a more effective outcome. A strong political will holds greater significance and influence to prioritize and fully implement water governance reforms. Moreover, it is imperative to secure the full cooperation of all agencies concerned. This collaboration is necessary to clearly define roles and responsibilities, establish a seamless interdepartmental interface, and identify any unintended consequences that may arise from the reorganization.

It is worth noting that the private sector supports reforms that would restructure the governance and institutional arrangements within the water sector, including the establishment of an apex body and a clear regulatory framework. Both the establishments of the DWR and the WRC are actually included as priority legislative measures under the PDP 2023-2028.

Although the proposed measures are well intended to address the institutional fragmentation in the water sector, it is crucial to highlight the potential pitfall of "isomorphic mimicry."[23] There is a risk of replicating existing bureaucratic inefficiencies or introducing new complexities if administrative operability is not addressed. This can result in capability traps[24] where resources are invested in maintaining new structures rather than improving water management outcomes.

Aside from the water governance bills, several water-related bills are under consideration in the Senate.

6.2 Water sustainability

The proposed Water Sustainability Act (SBN 16) aims to update and consolidate all existing frameworks for water management. Specifically, the bill aims to accomplish a Philippine Water Sustainability Framework and set annual targets pursuant to SDG 6. The Framework shall include policies on safe and affordable drinking water, sanitation and hygiene, safe reuse, wastewater treatment, water use efficiency, protection of water-related ecosystems, and IWRM, among others. Moreover, SBN 542 promotes gray water[25] use while SBN 2323 establishes a National Soil and Water Conservation Program. Proposed Senate Resolution No. (SRN) 561 raises possible water shortage concerns in Metro Manila and other affected areas due to dry season.

Although the DWR bills also seek to address water sustainability issues and mandates the development of a comprehensive and integrated National Water Resources Management Framework Plan, they lack specific details regarding the Plan's components and the establishment of targets for effective monitoring and evaluation.

6.3 Equitable access to safe and clean drinking water

SBN 310 directs the Department of Social Welfare and Development (DSWD), in cooperation with the DOH and the DPWH, to undertake a three-year program for constructing potable water systems in every barangay, focusing on areas affected by water-borne diseases. SBN 1048, proposing the Safe Water Drinking Act, requires bimonthly water quality assessments, revising the Philippine Sanitation Code of 1975 under PD No. 856. It directs WSPs to prepare water safety plans to be approved by the DOH. SBN 603 directs the Food and Drug Administration (FDA) to regulate the quality standards of bottled water while SBN 880 mandates employers to provide free drinking water.

The DWR bills are guided by the principle that access to safe water supply and improved sanitation is a human right that needs to be fulfilled and protected. Incorporating specific provisions on programs that will promote equitable access to clean and safe water will further strengthen the measure.

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[23] Isomorphic mimicry happens when systems adopt the camouflage of organizational forms that are deemed successful elsewhere to hide their actual dysfunction (Pritchett et al., 2012).

[24] Capability stagnates, or even deteriorates, over long periods of time even though governments remain engaged in pursuing reforms (Andrews et al., 2012).

[25] Gray water is a wastewater that is not pathologically infectious and is not contaminated with fecal matter. The reuse of gray water not only minimizes freshwater usage but also reduces wastewater entering sewers or treatment systems.

6.4 Rainwater harvesting

Several bills (SBNs 454, 545, and 990) require the creation of rainwater harvesting structures in various types of development within Metro Manila, while SBN 128 extends this requirement to major cities nationwide. SBN 342 mandates the installation of rainwater catchments in all barangays in Metro Manila and major cities. Meanwhile, SBN 1687 designates the NWRB as the lead agency in developing strategies to mitigate disasters caused by heavy rainfall and requires the installation of rainwater harvesting facilities in homes, industries, schools, and the agriculture sector. It is worth noting that the DWR bills also recognize the need for water recycling and conservation, with specific provisions on the rainwater harvesting requirements in SBN 1395. SRN 568, on the other hand, seeks to evaluate the implementation of RA No. 6716.

6.5 Protection of watersheds

On the protection of watersheds, relevant Senate bills seek to protect, conserve, and rehabilitate water-related ecosystems (SBN 16), especially watersheds that support the National Irrigation System under the NIA (SBN 966). The DWR and WRMA bills provide that the DENR shall continue to have the primary authority and responsibility for protecting the environment and managing the country's watersheds (SBNs 102, 185, 1021, and 2013). However, the DENR's interface with the DWR/WRMA should be clearly defined as some of these bills also indicate that the DWR/WRMA shall manage and conserve the country's water resources, including enhancement and maintenance of water quality, watershed conservation, control of water pollution, and environmental restoration.

In addition, recognizing that watersheds are interconnected land and water systems, integrated land use and water resources management are underscored in these measures. The bills provide that all national and local land use plans shall incorporate water resource management plans (SBN 268); require the coordination with LGUs to ensure the integration of water resources development plans in local development plans (SBN 185); and direct the coordination with the Department of Human Settlements and Urban Development (DHSUD) to ensure the protection of water sources in proposed land use plans and projects (SBN 2013).

7. Best Practices in Water Governance

The Organisation for Economic Co-operation and Development (OECD)-adopted principles on water governance are rooted in broader governance principles: legitimacy, transparency, accountability, human rights, rule of law, and inclusiveness. These also provide a tool for understanding whether water governance systems are performing optimally and where change, reforms, or actions are needed. The twelve principles[26] are clustered around three main dimensions: effectiveness, efficiency, and trust and engagement.

Effectiveness in water governance means clearly defined and sustainable water policy goals and targets at different levels of government, as well as implementing these goals and meeting expected targets. Efficiency refers to its contribution to maximizing the benefits of sustainable water management and welfare at the least cost to society. Trust and engagement refer to building public confidence and ensuring inclusiveness through democratic legitimacy and fairness for society at large. Furthermore, the OECD asserts that policy responses to water challenges will only be visible if they are coherent and integrated.

These principles in water governance have been implemented in various countries. For example, in 2018, South Korea embarked on a national reform initiative to tackle the institutional and financial inefficiencies of its national water management, which entailed the transfer of authority pertaining to water resources conservation, utilization, and development from the Ministry of Land, Infrastructure, and Transport (MOLIT) to the Ministry of Environment (MOE). In addition, the integration encompassed the consolidation of authorities responsible for overseeing groundwater quantity and quality, as well as the management of multi-regional and local waterworks, under the purview of the MOE.

Several Southeast Asian countries also took steps. Thailand established the Office of National Water Resources in 2017 to develop a 20-year National Water Resources Management Plan with increased watershed capacity. Indonesia's National Medium-Term Development Plan aims for universal water and sanitation access by 2024.

[26] The OECD's Twelve Principles on Water Governance are: data and information; financing; regulatory frameworks; innovative governance; integrity and transparency; stakeholder engagement; trade-offs across users, rural and urban areas, and generations; monitoring and evaluation; clear roles and responsibilities; appropriate scales within the basin systems; policy coherence; and capacity.

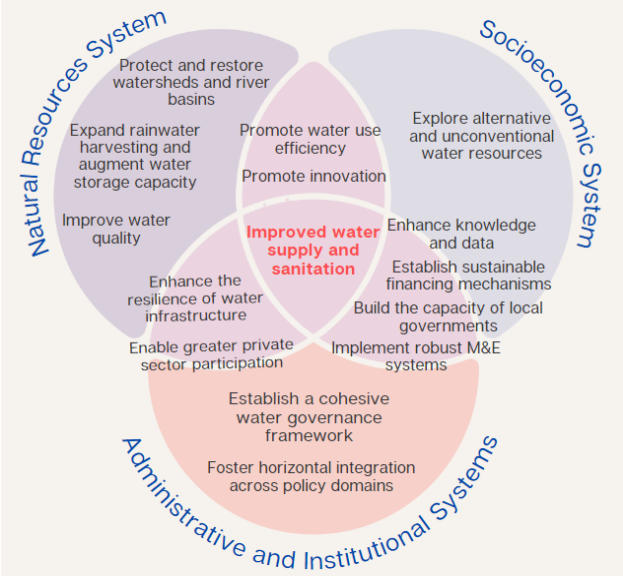
Malaysia allocated US$5.5 billion in 2021 for water projects, including integrated river basin management and flood mitigation programs. Singapore's Public Utilities Board launched a US$3.4 billion project in 2008, the Deep Tunnel Sewerage System. This system functions as a "used water superhighway," utilizing deep tunnel sewers to transport used water via gravity to centralized reclamation points situated along the coast. The treated water is further purified and would accommodate an expected population increase in the country from 4.5 million to 5.5 million upon the project's completion. In Europe, the Netherlands adjusted flood protection standards based on future climate uncertainties.

8. Conclusion and Recommendations

Given the wide spectrum of interconnected threats to sustainable water resources, the long-unquenched thirst for policy reforms in the water sector can no longer be ignored. The Senate needs to act on the pending bills that aim to establish a cohesive water governance framework, through the creation of the Department of Water Resources (DWR) and the Water Regulatory Commission (WRC). These bodies are designed to ensure that all Filipinos have access to safely managed water and sanitation services, while harmonizing the regulation of water services. Success hinges on robust implementation capabilities, requiring substantial investment in human and institutional capacities to empower the DWR and the WRC to fulfill their extensive duties effectively.

The other proposed measures discussed in this Policy Brief underscore the equally significant aspects of water resource management and thus, should inform the development of a comprehensive DWR Law. These include the importance of protecting water-related ecosystems, ensuring equitable access to clean and safe drinking water, harnessing rainwater harvesting to augment water supplies, and ensuring the sustainability of water resources. Drawing from global experiences and extensive studies on water governance, the following are some recommendations, also summarized in Figure 5, that may merit consideration. Notably, the proposed bills also aim to tackle most of these recommendations, albeit to varying extents.

Figure 5. Summary of Recommendations to Improve the State of Water Supply and Sanitation in the Philippines



Source: PWSSMP (2021) with authors' adaptations

1) ***Protect and restore watersheds and river basins to maintain their role as reliable water sources.*** This includes recognizing and mitigating the risks of infrastructure development that may harm the natural integrity of rivers, lakes, aquifers, and wetlands, along with their water retention ability and ecosystem functioning. IWRM plans, especially of the 18 major river basins, should also account for the impacts of climate change on water availability and quality.

2) ***Promote water use efficiency.*** This is to engender the adoption of water conservation techniques in agriculture, reduction of non-revenue water, and the encouragement for consumers to lower their water use through information, education, and communication (IEC) efforts.

3) ***Improve water quality.*** Provide sufficient human and financial resources to monitor water pollution levels, trends, and changes over time, ensuring that this information is publicly available. Wastewater treatment services should be expanded and programs to tackle agricultural pollution should be established.

4) ***Establish sustainable financing mechanisms for the water sector.*** This is to meet the financial needs of water and sanitation services, infrastructure, and ecosystem protection. It will require coordinated investment from private, international, and governmental sources, and adjusting policies like water pricing to reflect true costs. Moreover, the government should provide systematic support to WSPs towards creditworthiness through capacity building.

5) ***Enable greater private sector participation in water.*** Aside from establishing appropriate tariff policies that promote viable operations and encourage investments, developing water supply and sanitation projects that serve multiple municipalities or cities will be more attractive to the private sector (World Bank, 2022).

6) ***Enhance knowledge and data for better water governance.*** Accessible hydrological, scientific, social, economic, and financial data and information, along with an integrated water information system, are crucial for assessing water availability and use, climate-related risks, watershed conditions, water quality, water levels, and performance of water service providers, among others.

7) ***Implement robust monitoring and evaluation (M&E) systems.*** In support to the reforms in water governance, evaluation plays a crucial role in assessing the effectiveness and impact of water policies and programs, identifying successes and areas for improvement, and ensuring that resources are optimized.

8) ***Build the capacity of local governments.*** Given that some LGUs still lack the ability to manage water services effectively, the national government should offer coordinated support and targeted assistance to those in need such as improving their staff skills and technical expertise, thereby leveraging full devolution as an opportunity to bolster local capabilities.

9) ***Foster horizontal integration across policy domains related to water.*** This integration will create synergies for achieving policy goals like in environmental protection, health, land use, urban planning, poverty reduction, agriculture, energy, climate change adaptation, and disaster risk reduction.

10) ***Expand rainwater harvesting and augment water storage capacity to address water shortage and flooding.*** *Develop facilities such as small water impoundments, retarding* basins, and small dams or reservoirs, focusing on areas with limited water access.

11) ***Enhance the resilience of water infrastructure.*** Critical infrastructure such as water storage facilities, pumping stations, irrigation facilities, treatment plants, and pipelines should be designed or retrofitted to withstand adverse impacts of extreme rainfall, tropical cyclones, sea level rise, and other natural hazards.

12) ***Explore alternative and unconventional water resources within a circular economy framework.*** This approach aims to optimize the use and recycling of water resources, offering reliable alternatives to traditional supplies.

13) ***Promote the advancement and widespread adoption of innovation across various water-related domains.*** Innovation is direly needed in irrigation water conservation, wastewater treatment, potable reuse, rainwater harvesting, purification and filtration systems, smart water meters, and real-time water quality monitoring. Success in this vital aspect relies on a supportive governance structure that enables the scaling and implementation of such innovations.

Annex 1. Major Legal Frameworks that Govern the Water Sector in the Philippines

Legal Framework	Year Promulgated/Enacted
PD No. 198 or the Provincial Water Utilities Act	1973
PD No. 522 or the Act Prescribing Sanitation Requirements for the Operation of Establishments and Facilities for the Protection and Convenience of the Travelling Public	1974
PD No. 856 or the Code on Sanitation of the Philippines	1975
PD No. 1067 or the Water Code of the Philippines	1976
RA No. 6716 or the Rainwater Collector and Springs Development Act	1989
RA No. 7160 or the Local Government Code	1991
RA No. 7586 or the National Integrated Protected Areas Systems Act	1992
RA No. 8041 or the National Water Crisis Act	1995
RA No. 8371 or the Indigenous Peoples Rights Act	1997
RA No. 8435 or the Agriculture and Fisheries Modernization Act	1997
RA No. 9275 or the Clean Water Act	2004
RA No. 9593 or the Tourism Act	2009
RA No. 11038 or the Expanded National Integrated Protected Area Systems Act	2018

Source: SEPO (2011)

Annex 2. Water Service Providers, by Management Type and Level of Service

Management Type	Total Number of WSPs		Level of Service		
	No.	Percentage	Level 1	Level 2	Level 3
BWSA	7,915	28%	3,923	2,714	1,274
RWSA	1,541	5%	68	658	815
Cooperative	403	1%	46	85	272
Unnamed Water Service Provider	8,861	31%	8,048	593	212
LGU-Run Utility	4,439	16%	1,211	1,703	1,522
Water District	722	3%	21	5	694
Homeowners' Association	391	1%	169	78	144
Real Estate Developer	160	1%	7	8	145
Industrial Locator	49	0%	3	4	42
Peddler	342	1%	174	132	36
Ship Chandler	4	0%	1	2	1
Other Private Operators	2,166	8%	760	268	1,138
Refilling Stations	1,256	4%	1,188	40	27
Grand Total	**28,249**	**100%**	**15,619**	**6,290**	**6,322**

Source: NWRB Listahang Tubig (August 2023)

Annex 3. Water-Related Programs, Activities, and Projects (P/A/P) for Discontinuance

Department/Agency	P/A/P
DENR-OSEC	Soil Conservation and Watershed Management including River Basin Management and Development
DENR-EMB	Implementation of Clean Water Regulations
DOT-NPDC	Rehabilitation of Water & Sprinkler System, Dredging and Waterproofing of Lagoon
DILG-LGSF	Provision for Potable Water Supply (SALINTUBIG)
GOCC-NIA	Repair of Groundwater Pump Irrigation Systems
GOCC-NIA	Establishment of Groundwater Pump Irrigation Systems Project
GOCC-NIA	Communal Irrigation System Sub-Program
GOCC-NIA	Extension/Expansion of Existing Irrigation Systems
GOCC-NIA	Irrigation Management Transfer Support Services
GOCC-NIA	*Balikatan Sagip Patubig* Program
GOCC-NIA	Small Irrigation Project

Source: DBM (2021)

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This Policy Brief was principally prepared by Social Development Sector Head Maria Victoria M. Evangelista and Microeconomics Sector Staff Officer Toni Rose D. Billones with inputs from the Microeconomics Sector Head Peter Anthony S. Turingan under the supervision of the SEPO Directors and the overall guidance of its Director General. The views and opinions expressed herein are those of the SEPO and do not necessarily reflect those of the Senate, of its leadership, or of its individual members. For comments and suggestions, please e-mail us at sepo@senate.gov.ph or at senatesepo@gmail.com.