

WORKING PAPER

Environmental Governance in the Philippines

A Pathway to Sustainable Development through the Effective Management of Natural Assets

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Abstract

This paper discusses the pivotal role of environment governance and the management of natural resources in a country's sustainable development trajectory. It exemplifies alternative management approaches applied to water resources as a primary natural asset and suggests alternate strategies for addressing the complexities around environment governance. The evolution of environment governance in the Philippines is described together with its ranking on environment performance and the strategy being adopted in the current Philippine Development Plan 2017-2022 to mainstream ecological integrity in the socioeconomic agenda to ensure quality of life for all Filipinos. The state and governance of the country's water resources is described and analyzed through the policy, public administration system and regulatory framework that directs water delivery to citizens. Total asset management approach is recommended as an innovative governance mechanism to enable the administration towards achieving water security. Given the intersectoral dimensions of environment governance, this paper further shares insights and illustrates collaborative and competitive governance approaches as alternative strategies that can help integrate environment governance within national and subnational strategies. Further the paper highlights the importance of assessing and evaluating policy effectiveness and measure of environment performance as a means for improving environment governance for a stronger path towards sustainable development.

Keywords: *environment governance, policy effectiveness, integrated development, public administration, water resources, asset management*



Natural resources and their management play an important role in the development of the Philippines. The environment and natural resource sector (ENR) is a key pillar in the country's economy, with agriculture, fisheries and forestry representing about 10% of the gross domestic product and 30 % of employment¹. The growth and performance of these sectors and the provision of livelihood, especially to resource dependent communities is supported by the natural assets and ecosystem services from the ENR sector². Equally important is the natural capital that is generated from these natural assets in their role of providing inputs and environmental services for economic production³. The sustenance of the Philippines' unique and sensitive ecosystem with its natural assets⁴ that make its habitats and coastal areas (in particular) both attractive and a large contributor to revenue generation is threatened by enormous pollution and environmental degradation which is exacerbated by climate change induced impacts and risks from natural disasters. Ineffective management has degraded the country's significant biodiversity resources; water and air pollution levels threaten accepted health standards and greenhouse gas emissions are increasing, largely, from the transport and power sectors. Exacerbation from increasing risks of climate change and natural disasters that cause irreversible environment change has re-focused the need for improvements in environmental governance, health and strengthening resilience to support accelerated economic growth that the administration aims to achieve for improving the welfare of the poor and marginalized members of society. The current Philippine Development Plan (PDP) 2017-2022 draws lessons from past implementation

practices, aligns with global commitments, and includes more intersectoral strategies to rehabilitate and restore degraded natural resources, and protect the fragile ecosystems while improving the welfare of resource-dependent communities (National Economic and Development Authority [NEDA], 2017).

The Philippines committed, in 2015 to the Global Agenda 2030⁵ with the Sustainable Development Goals (SDGs). These recognized the need for an institutional paradigm shift by combining results, people and processes, with their 17 goals and 169 targets. These help to reinforce the collaboration between policy makers at all levels of government and their departments⁶. The Asia Pacific Sustainable Development Goals Outlook specifically describes these inter SDG linkages, together with global, national, sectoral implications and highlights the importance for institutions to make shifts in decisionmaking and chart implementation roadmaps that are different from business as usual approaches. (UNESCAP, ADB, & UNDP, 2017) the Asian Development Bank (ADB). Further impetus for this paradigm shift for decisionmaking is provided by the Paris Agreement (December 2015) to reduce greenhouse gas emissions and limit global warming and the Sendai Framework (2015) for building resilience for reduction in disaster risks, in nations and communities^{7,8}, which in particular recognized the significance of a shared responsibility of the

1 Environment includes natural resources including water, air, soil, their physical properties and interrelationships with human beings, other living creatures, plants and microorganisms. Environment also encompasses all external conditions affecting the life, development and survival of an organism (any form of animal or plant). Thus "Environment is the totality of all the external conditions affecting the life, development and survival of an organism" (UN Statistics Division of Economic and Social Information and Policy Analysis, 2001)

2 Biological assets (produced or wild), land and water areas with their ecosystems, subsoil assets and air form natural assets. Ecosystem services include the (a) *provisioning* (e.g., food, raw materials, freshwater); (b) *regulating* (e.g., local climate and air quality, carbon sequestration and storage, erosion prevention); (c) *supporting* (e.g., habitats for species, maintenance of genetic diversity); and (d) *cultural* (e.g., recreation, tourism)

3 Natural capital provides energy, water, flood control, storm mitigation and other environmental services that benefit the entire country including cities

4 Natural assets typically include pristine beaches and shorelines, living coral reefs, fauna and flora, estuaries, lagoons, coastal systems, including mangroves, dunes, marine ecosystems and other local natural habitats, wetlands, surface and ground water resources)

5 The Global Agenda 2030 is a plan of action for people, planet and prosperity. The 17 Sustainable Development Goals and 169 targets build on the Millennium Development Goals. Agreed among all Heads of State and Government and High Representatives meeting at the United Nations Headquarters in New York from 25-27 September 2015. <https://sdgs.un.org/2030agenda>

6 The Sustainable Development Goals (SDGs), i.e., Global **Goals**, were adopted by all United Nations member states in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. <https://sustainabledevelopment.un.org/post2015/transformingourworld>.

7 The Paris Agreement gathers all nations to undertake ambitious efforts towards combating climate globally. It aims for a o global temperature rise this century to be below 2 degrees Celsius and to continue efforts to limit the temperature increase further to 1.5 degrees Celsius (<https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>)

8 The Sendai Framework for Disaster Risk Reduction 2015-2030 provides concrete actions for disaster risk protection. It converges with the other 2030 Agenda agreements, including The Paris Agreement on Climate Change, The Addis Ababa Action Agenda on Financing for Development, the New Urban Agenda, and the Sustainable Development Goals. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR), and advocates for: *The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.* (<https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030>).



state and local government, the private sector and other stakeholders in reducing disaster risk. The SDGs provide opportunities for new forms of governance fostering multistakeholder initiatives, public private partnerships, or cross sector collaborations across governments, civil society, and the private sector. Hence, re-establishing the institutional rules and developing innovative institutional mechanisms that address the challenges described above will foster governments and organizations to develop pathways towards these goals. (Florini & Pauli, 2018). Achieving these goals and targets also requires policy integration, which involves the management of cross-cutting issues that cross the boundaries of “established policy fields” beyond the institutional responsibilities of individual departments (United Nations, 2018). The SDGs demand policymakers to take such strides in policymaking and implementation by deriving innovative institutional mechanisms. Further, citizens would only benefit when SDGs are localized and contextualized through practical solutions targeted for communities. Typically, localization involves defining, implementing and monitoring national strategies at the local level by using indicators for measuring and monitoring, which would help achieve global, national, and subnational development goals by cascading to the local level (Oosterhof, 2018).

The management of ENR is guided primarily by SDG 12 on sustainable consumption and production together with SDG 16 on just, peaceful, and inclusive societies by building effective and accountable institutions with improved governance. The targets aim to decouple economic growth from environmental degradation, increase resource efficiency, promote sustainable lifestyles, for a transition towards low-carbon and green economies (Environment, 2017). Given the fragility of the natural eco-system with high social dependencies recognizing interrelations within SDGs are crucial, in particular, SDG 11 targeting to make cities inclusive, resilient, safe and more sustainable; SDG 6 on clean water and sanitation; SDG 7 on clean energy; SDG 9 on resilient infrastructure to promote inclusive and sustainable industrialization fostering innovation; SDG 12 on sustainable consumption and production patterns; SDG 13 on climate action and; SDG 14 on life below water. The Philippine Statistics Authority (PSA), identified 103 SDG

global indicators, 28 proxy and 25 supplementary indicators – a total of 156 indicators. The PDP cascades to the local level through the Executive Order 27, s. 2017. Nationally determined 2030 targets were identified, and reflected in the results matrices, which accompany the PDP (NEDA, 2019) .

Literature Review

Environment governance plays an important role in the sustainable development of a country as discussed in this literature review. Ostrom (Ostrom, 2008), refers to the “environment” as the immediate area surrounding a particular setting or to the global atmosphere. Environmental governance encompasses both legal and non-legal issues, extending beyond environmental law to multidisciplinary issues like ecology, ethics, sociology, politics and economics. Environmental problems are interdisciplinary in nature therefore solutions to these extend beyond the scope of environment law and regulation. Kotze (2012) suggests “Governance can act as a bridging concept between law, political science, environmental sciences, management theory and sociology” (p. 13). Martin (2012) highlights that environment governance comprises the rules, practices, policies and institutions that influence how humans interact with the environment. It also takes into account the role of all actors, from governments to nongovernment organizations (NGOs), the private sector and civil society. Environment governance encompasses mechanisms and procedures to protect and restore natural resources and distribute resulting costs and benefits. Laws and policies enable balancing interests of various sections of society to contribute towards sustainability (Martin, 2012).

Environmental governance requires an understanding of the complexity of nature and the multidimensional processes of governance itself, especially because environmental goods are common pool resources such as marine and forest resources, which need to be managed to ensure that benefits are accrued for future use. The absence of governing structures and rules to access and regulate the unsustainable use of such common property resources results in irretrievable risk of depletion (Ocampo-Salvador, 2002). Environmental problems are



transboundary within nations and between economies of other countries as well as local communities, highlighting the need and importance of multi-level governance. This characteristic of environmental governance forms the basis to derive an effective architecture of global environment governance. Three broad tendencies emerge such as to regulate everything at a global level to create harmonized conditions and political viability; address policy problems at the community level through stakeholder participation; and create and enable conditions in which private and other non-governmental actors can participate in the process of governance more actively. In all situations, for environment governance to be effective and lead to a sustainable future, cooperation is critical (Saunier & Meganck, 2009).

Ocampo-Salvador (2002) describes governing the environment as that which requires an understanding of the complexity of nature together with the multidimensional processes of governance itself. Governance, in turn, is defined broadly as “the establishment and operation of social institutions, roles, rules, decision-making procedures, programs and social practices to guide the interactions of those participating in these practices” (North, 1990, as cited in Ocampo-Salvador, 2002, p. 1). The concept of governance, though, is not synonymous with government, which is responsible for formulating and implementing public policy at national or local level. The lead actor is the state together with its various instruments, with the primary objective of maximum utility and development. Governance includes the private sector, non-government entities, and local communities as enablers of achieving policy outcomes. This process of decision-making uses participatory methods such as consultations, community mapping, social and livelihood analysis. The governance of the environment extends beyond the boundaries of the nation-state or of local subdivisions. Environmental governance aims for the sustainable use of natural resources and centers participatory arrangements to ensure the welfare of the populations who rely and use these resources. Additionally, environment governance imbibes local and traditional knowledge vis-à-vis external expertise advocating that traditional resource management systems can strengthen achieving sustainability enabled by monitoring and

enforcement rules. Environmental governance cannot be undertaken without understanding its link with livelihood, power, intergenerational equity, social justice and welfare, for which an understanding of tradeoffs to address conflicts between preservation and sustainability of resources and consumption and efficiency are equally necessary. The latest report of the Asian Development Bank (ADB) series on climate change—its science and implementation challenges (ADB, 2020a)—establishes causal links between environmental protection, biodiversity, and climate change. It emphasizes on the increasing severity of impacts from climate change due to weak environmental governance. For example, the fragility of ecosystems increases the exposure of communities to the impacts of climate change as mangrove forests are an effective protection from storm surges. Environmental degradation increases the vulnerability of indigenous, agrarian and island communities towards homelessness from displacement. Nonetheless, balancing development needs and prioritizing environmental protection and low emission development continues to remain a challenge for low and middle income countries (ADB, 2020a). Systematic evaluation of the effectiveness of policies and measuring performance of ecosystem services is an imperative for sustainable growth.

Key Milestones in Environment Governance in the Philippines

The emergence of community-based approaches to natural resource management in the mid-1970s⁹ was the beginning of environment governance in the Philippines. Community-based resource management was a means to address the accelerated loss in forest cover, depletion of fishery resources, degradation of coastal environment, loss in species and biodiversity together with loss of livelihood and displacement of communities. Thereon, environmental management has been influenced by political and leadership paradigms with the evolution of regulation and environment policies to manage forestry, fishery and protected areas,

⁹ Community-based approaches are a participative means of environmental management. Related approaches are communal or collective ownership which assume that local rules of resource use, both enforcement and monitoring exist at the community level (Ocampo-Salvador, 2002)



through the use of multiple tools and strategies including command and control instruments and civil society response (Ocampo-Salvador, 2002).

The Department of Environment and Natural Resources (DENR) is the policy-making arm of the national government in forestry and wildlife management. The function of managing fishery and coastal resources is shared with the Department of Agriculture (DA), through the Bureau of Fisheries and Aquatic Resources (BFAR). The DENR through the Parks and Wildlife Bureau (PAWB) is in charge of managing protected area sites in the Philippines. From the 1980s, central government agencies included NGOs in policy implementation, such as the management of the national government's socially oriented forestry and coastal resource management projects (Ocampo-Salvador, 2002).

The Philippines Agenda PA 21¹⁰ aligned with Rio¹¹ in 1992 to alter the country's development direction toward broad-based development that considered the earth's carrying capacity, "environmental security" and concern for local communities. PA 21 aimed to resolve the diverse, conflicting environmental, demographic, economic and natural resource and included principles such as (1) integration of environmental considerations in decisionmaking; (2) proper pricing of natural resources; (3) property rights reform; (4) establishment of an integrated protected areas system; (5) rehabilitation of degraded ecosystems; (6) strengthening of residuals management in industry (pollution control); (7) integration of population concerns and social welfare in development planning; (8) inducing growth in rural areas; (9) promotion of environmental education; and (10) strengthening of citizen's participation and constituency building. It led to the formulation of codes for environmental governance which included: the Local Government Code of 1991 (Republic Act [RA] 7160), the Fisheries Code of 1998 (RA 8550), the National Integrated

and Protected Areas System (NIPAS) Act of 1992 (RA 7586), and the Indigenous People's Rights Act of 1997 (IPRA) (Ocampo-Salvador, 2002).

Decentralizing environmental protection to local government units (LGUs) was a shift from command and control towards increasing accountability for resource management, recognizing the governments limited enforcement capacity to address rapidly increasing resource depletion. The 1991 Local Government Code vested LGUs with local jurisdictions over forestry and fishery laws. They could partner with other LGUs and NGOs to optimize economies of scale and improve service delivery. LGUs were also given the responsibility to protect, manage, maintain and rehabilitate communal forests with areas not exceeding 5,000 ha; community-based forestry projects; small watershed areas, tree parks, greenbelts and other such areas identified by the DENR; and manage their municipal waters at 15 kilometers from the coastline. Decentralization further enabled institutionalizing community-based resource management, increased collaboration between the state-LGU and LGU-NGO-community. Decentralization also enabled a framework for participatory methodologies in forest, fisheries, and biodiversity management with changes in national legislative instruments, such as the Fisheries Code of 1998 and the National Integrated Protected Areas System Act of 1992.

In 1993, a landmark decision was taken by the Supreme Court of the Philippines for a case known as *Oposa v. Factoran* (G.R. No. 101083), or *Minors Oposa v. Factoran*. This catalyzed the recognition of intergenerational responsibility within the Philippine legal system. As counsel to 43 Filipino children, Mr. Oposa initiated an action against the Philippine Government for the misappropriation of the country's forest resources, for which the Supreme Court upheld the legal standing and the right of the children to initiate the action on their behalf and on behalf of future generations. It is now known in Philippine and global jurisprudence as the "Oposa Doctrine" ("The Philippines," 2014).

The "bottom-up" approach to managing natural resources in the forthcoming decades was further implemented through the National Forestry

¹⁰ <https://sustainabledevelopment.un.org/content/documents/1033philippines.pdf>

¹¹ The United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit', held in Rio de Janeiro, Brazil, from 3-14 June 1992, developed a new blueprint for international environmental action. The interdependence of social, economic and environmental factors was highlighted and that success in one sector required action in other sectors to be sustained over time. <https://www.un.org/en/conferences/environment/rio1992>



Program (NFP) funded by the Asian Development Bank (1988) and Overseas Economic Cooperation Fund (OECE); contract reforestation as an implementing program of the NFP; the Community Forestry Program (CFP) (1989); and the Lingayen Gulf Coastal Area Management program (1986–1992) of United States Agency for International Development (USAID) and Association of Southeast Asian Nations (ASEAN). Additionally, NGOs advocated the use of rapid rural appraisal, community profiling, and community-based resource management techniques amongst others towards environmental protection.

The NIPAS Act was a landmark legislation that mainstreamed biodiversity protection within protected areas management. The 1993 National Integrated Protected Areas Program (NIPAP), a project of the DENR PAWB with the European Union (EU) carried out the provisions of the NIPAS Act, particularly the formation of protected area management boards (PAMBs). PAMBs notably brought communities together through an informal forum for resolving differing perceptions. During this time, local governments, people's organizations (POs) and NGOs advocated co-management mechanisms. Co-management principally calls for communities to be organized to optimize their capacities to address and implement integrated, multisectoral, and multidisciplinary approach to environmental management and protection. Types of co-management arrangements in the country include those where LGUs or the government exercise more authority to engage in the management tasks defined by the activities of formulation, resource estimation, access rights, harvesting regulations, market regulations, monitoring, control and enforcement.

The Medium Term Philippine Development Plan 1999–2004 recognized the challenges of balancing the objectives, of economic development with increase in productivity, profitability, and improved competitiveness of the agricultural and fisheries sector aligned with the requirements of sustainable development, rural development, and poverty alleviation. The plan recognized the need for integrated development and resource management programs that addressed poverty alleviation by involving all stakeholders, adopting indigenous cultural practices, and developing

programs, which balanced the basic needs of the people with the need to restore natural resources.

The Philippine Environmental Impact Statement System (PEISS) – the PD 1586 requires projects that are classified as environmentally critical or operating in an environmentally critical area (ECA) to secure an environmental compliance certificate (ECC) prior to commencement of construction. The ECC also guides other agencies and LGUs on environmental impact assessment (EIA) findings and recommendations, which need to be addressed during respective decision-making processes. Projects are classified based on the screening guidelines such as: Category A projects are environmental critical projects (ECPs); Category B – projects are those that significantly affect the quality of the environment or located in an ECA; Category C projects are those neither in Category A or B, which intend to directly enhance the quality of the environment or directly address existing environmental problems; Category D projects are unlikely to cause significant adverse impact on the quality of the environment. These projects are not covered in the PEISS, do not require an ECC but need to comply with other environmental laws and government permitting requirements (ADB, 2020b).

Environment Governance in the Philippine Development Plan (PDP) 2017–2022

Ecological integrity and a clean environment underscore the three main pillars of the current PDP 2017–2022, which include: (1) enhancing the social fabric, (2) reducing inequality, and (3) increasing potential growth. Improving the socioeconomic conditions of resource-based communities is envisaged through sustainable integrated area development and is essential to achieve the objectives of the PDP. An additional 8.3 million Filipinos are estimated between 2017 and 2022, with Metro Manila remaining as the densest region, exceeding the national population density average. Increasing populations directly lead to a higher demand for food and shelter, which in turn stressing ENR. Further, urban areas are additionally stressed due to the increased demand for food, social services, infrastructure and transport facilities, electricity and power, and other basic needs. These

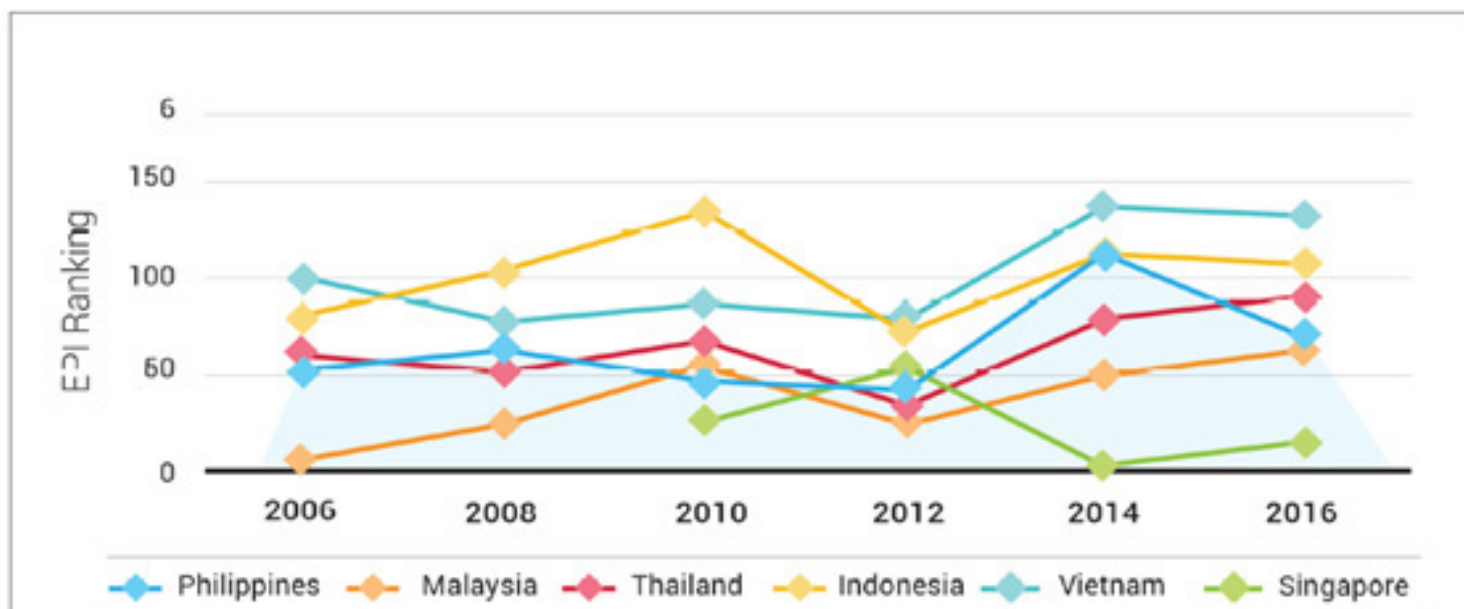
together contribute to increased air and water pollution and waste generation. Together with the proliferation of inefficient industries, rapid urban development could also hasten the conversion of prime lands in urban fringes, and increase greenhouse gas (GHG) emissions aggravating the impact of climate change (NEDA, 2017).

The 2020 EPI ranked the Philippines at 111 with an the Environmental Performance Index (EPI) score of 38.4 and a regional standing of 9. The Philippines' EPI ranking over the past decade, dropped from 55th in 2006 to 114th in 2014, but recovered to rank 66 out of 180 countries in 2016. As shown in Figure 1, the EPI ranking of ASEAN-6 (2006–2016), the Philippines' performance is poorer compared with Singapore and Malaysia but is consistently better than Indonesia and Vietnam. Improvements occurred in ENR management particularly in the reduction of open and denuded forest lands as well as the management of key terrestrial and marine protected areas. This resulted in the improvement of critical habitats arresting the extinction of threatened flora and fauna. These accomplishments were facilitated by the implementation of key environmental laws and policies such as: (1) Executive Order 23 on the Moratorium on Logging in Natural Forest and Executive Order 26 on the Implementation of the National Greening Program; (2) National Integrated Protected Area System Act; (3) Wildlife Resources Conservation

and Protection Act; (4) Amended Fisheries Code; and (5) other governance modality in establishing conservation areas such as the local conservation areas and indigenous community conserved areas.

Slight improvements in environmental quality are noted but monitoring of environmental compliance remains weak. National ambient air quality for particulate matter measuring 10 micrometers in diameter or smaller (PM₁₀) improved over the last five years, from 76 micrograms per normal cubic meter ($\mu\text{g}/\text{Ncm}$) in 2011 to 46 $\mu\text{g}/\text{Ncm}$ in 2015. This is a result of effective management of air quality in strategic areas in the country, including close monitoring of industries and stricter implementation of anti-smoke belching campaign. However, pollutant sources continue to increase, in particular, the rapidly growing number of privately owned vehicles (44% increase from 2006 to 2015), which remains the largest contributor of emissions in the country. With respect to water quality, many of the classified water bodies are unfit for their intended uses (e.g., public water supply, food production, and recreation) due to rapid population growth and expansion of residential and industrial areas. Untreated domestic wastewater discharges (33%), agriculture and livestock (29%), industrial sources (27%) and non-point sources such as agricultural farms (11%) are the primary sources of water pollution. Approximately only five percent of households are connected to

Figure 1: EPI Ranking of ASEAN-6 (2006–2016)



Source: Environmental Performance Index Reports, Yale University, 2006–2016 as cited by NEDA, 2017, p. 20–2

sewerage network and treatment facilities. The waste management problem has persisted despite 38% compliance of LGUs with the provisions of the Ecological Solid Waste Management Act or RA 9003. The greater majority of LGUs fall short on compliance primarily due to the lack of funds to establish infrastructure facilities required by RA 9003. In addition, only few households practice 3Rs (reduce, reuse, and recycle) in waste management.

Despite sufficient rules and regulations for the protection, proper management, and sustainable use of resources, their implementation and enforcement are constrained by weak and fragmented institutional arrangements. For instance, while the Laguna Lake Development Authority (LLDA) is responsible for the protection and development of Laguna Lake, regulation of other sources of pollutants, such as household and industrial wastes, are essential to maintain the lake's water quality. However, these functions are the mandate of LGUs or other agencies and out of the jurisdiction of the LLDA.

Mainstreaming disaster risk reduction (DRR) and climate change adaptation and mitigation (CCAM) remains inadequate due to institutional fragmentation. The Philippines is highly vulnerable to natural hazards, in particular, typhoons, storm surges and rising sea levels. These are attributed to its geographic location in Southeast Asia. It is ranked third worldwide among countries with the highest risk according to the World Risk Report 2018, with an index value of 25.14%¹². Since 1990, the Philippines has encountered 565 disaster events which caused an estimated US\$ 23 billion in damages. Additionally, 85.2% of the sources of the country's production are susceptible to disasters, 50.3% of the total land area is economically at risk, about 60% of total land area is exposed to multiple hazards, and 74% of the population is vulnerable. Further, as the islands are located within the "ring of fire" between the Eurasian and Pacific tectonic plates, earthquakes, fires and volcanoes pose equally serious risks (UNDRR & ADPC, 2019) Measures that help prepare for, prevent,

and mitigate the impact of disasters include: (1) mainstreaming CCA and DRR into policies, plans, programs and budget; (2) risk and vulnerability analysis and assessments, including the development of multi-hazard maps; (3) strengthening institutional and financial mechanisms; (4) improving early warning systems; and (5) continuing information, education and communication (IEC) campaigns. Not all LGUs have mainstreamed CCAM and DRR measures in their comprehensive land use and development plans (CLUP and CDP) due to: (1) lack of capacity to use the available geospatial information; (2) unavailability of appropriately-scaled probabilistic multi-hazard maps; and (3) coarse spatial resolutions of available maps.

Private sector engagement in ENR management, including investment in CCAM and DRRM actions, is limited. The potential of private sector investing in ENR management, including risk transfer mechanisms, remains largely untapped due to the lack of a clear mechanism to guide the private sector in complementing government efforts. This policy gap has undermined the sector's potential to significantly contribute to employment creation, poverty reduction, and CCAM and DRRM. For instance, the private sector can provide support in product development and improving the export potential of forest (timber and non-timber) and marine-based products by investing in processing technology that will add value to the product.

Although, the Philippines has a strong institutional framework that mandates public participation in environmental concerns, persisting constraints to implementation and policy enforcement remain. Engagement of civil society organizations (CSOs) across multiple levels has significantly influenced environmental policies and programs. Although public participation in policymaking is high, it continues to remain weak in monitoring, enforcement, and implementation, particularly in challenging violations of environmental legal provisions, either by government or by private entities. CSO participation remains contingent on state priorities leading to shortfalls in inclusion. These weaknesses are also largely due to the lack of institutional mechanisms to foster mutual learning among CSOs through dialogue and consensus

12 "The World Risk Report is published annually since 2011 by Bündnis Entwicklung Hilft... As a member of the Network on Humanitarian Action (NOHA), the IFHV ensures the international consolidation of the index in science, and jointly pursues the goal of maintaining and increasing the utility of the World Risk Report as an instrument for decision-makers in politics and society" (Day, et al., 2019. p. 3).

building leading to fragmentation between them. This fragmentation allows vested state interests to dominate and affects collaborative governance in particular on the boundaries of environment matters and displacement of people. NGOs and CSOs can overcome this challenge by improving their partnerships with the government and communities by first developing harmonized frameworks among themselves for public deliberations such that informed sectoral decisions can be taken on critical and persisting environment issues (Gera, 2016).

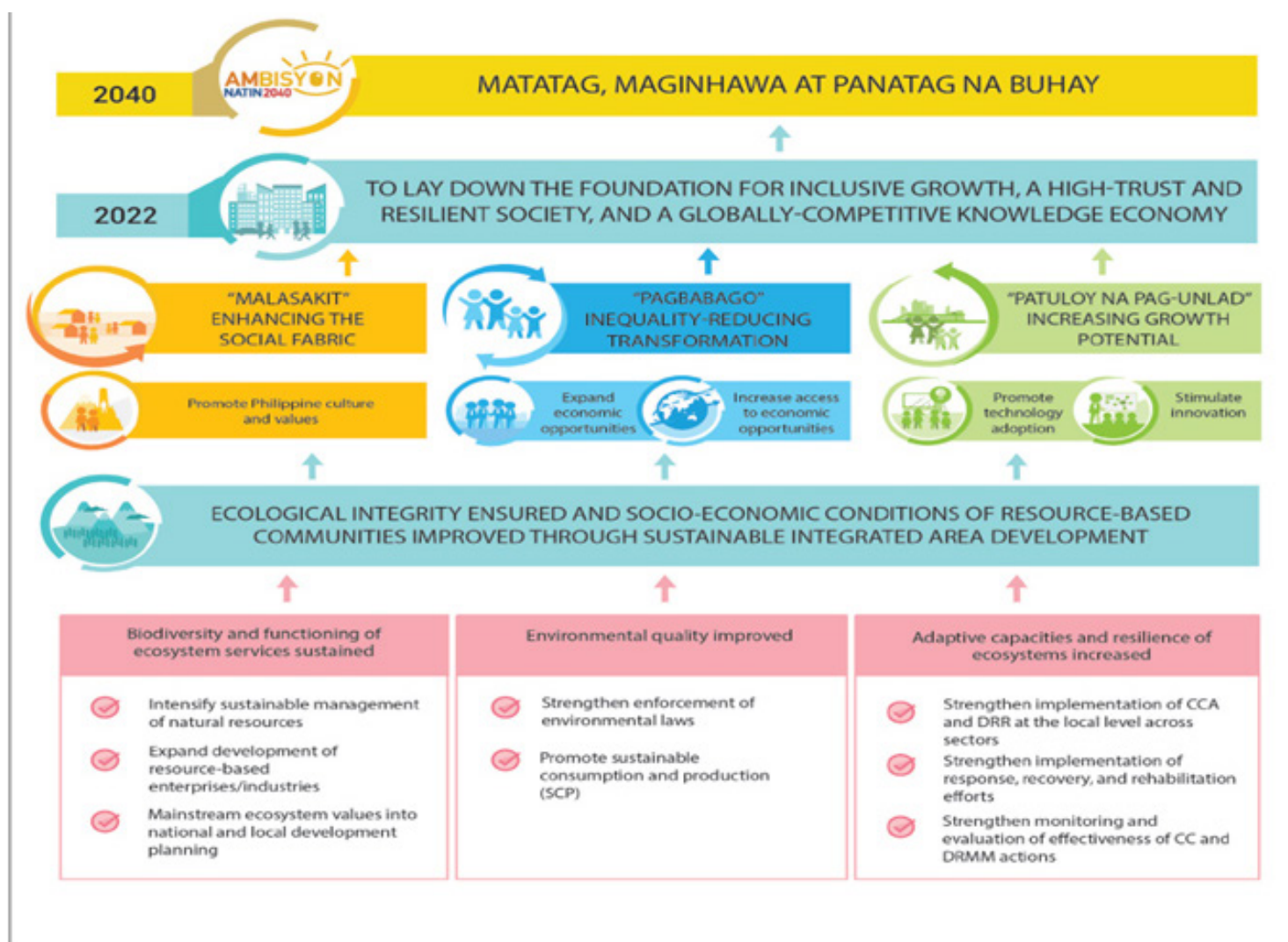
The PDP guides sustainable integrated area development (SIAD) and participatory environmental governance as an overarching strategic framework to address ecological, economic, political, cultural, societal, human, and spiritual challenges and

opportunities in a specific area as shown in Figure 2 on Strategic Framework to ensure ecological integrity, clean and healthy environment. This will be implemented in an integrated manner to ensure social justice to improve the quality of life of people. To strengthen the implementation and effectiveness of the strategic framework, the PDP proposes an outcome based legislative action summarized in Figure 3.

The National Water Security Challenge

The Philippines is committed to the Global Agenda 2030 and SDG 6— ensure availability and sustainable management of water and sanitation for all. The targets by 2030 (United Nations Department of Economic and Social Affairs, Division for Sustainable Development, 2015), include:

Figure 2: Strategic Framework to ensure ecological integrity, clean and healthy environment.



Source: NEDA, 2017, p. 20-6

Figure 3: Legislative Agenda to Ensure Ecological Integrity, Clean and Healthy Environment

LEGISLATIVE AGENDA	RATIONALE
Subsector Outcome: Biodiversity and functioning of ecosystem services sustained	
Delineation of the Specific Forest Limits	Provide a clear and solid basis on the limits of the forest line.
Comprehensive Forestry Law	Institutionalize the development of an effective and sustainable forest management strategy based on the allocation of forestland uses (i.e. production and protection zones). This will also enhance private sector participation and develop systems on Forest Certification and Forest Monitoring, Assessment and Reporting.
Integrated Coastal Management Strategy	Institutionalize ICM as a strategy for the sustainable development of coastal and marine areas.
Land Administration Reform Act	Streamline standards, processes and regulations for property rights, valuation and taxation.
Amendment of Water Code	Provide a legal framework for the institutionalization and operationalization of Integrated Water Resources Management to respond to current trends and challenges such as climate variability affecting water supply and availability, as well as address institutional gaps and weaknesses.
Expanded National Integrated Protected Areas System Act	Finalize/hasten establishment of around a hundred national protected areas since only 13 have been established since 1992.
Subsector Outcome: Environmental quality improved	
Electronic waste (e-waste) recycling	Address improper disposal of e-waste and facilitate the advancement of existing efforts to strengthen solid waste management.
Amendment to RA 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act)	Address the emerging toxic and hazardous wastes which are not covered by the current provisions of the law.
Subsector Outcome: Adaptive capacity and resilience of ecosystems increased	
Further strengthening the Philippine DRRM system and institutionalizing the Framework Plan	Create a National Disaster Risk Reduction and Management Authority and integrate new policies on disaster preparedness, response, mitigation/prevention and rehabilitation/recovery to address existing implementing gaps and challenges.
Cross-cutting	
National Land Use Act	Address the urgency to provide rationalized land use planning in the country, consolidate national laws on land uses and address long-standing land use conflicts.
Philippine Environmental Assessment System	Ensure that possible environmental consequences of policies, plans and programs are fully-accounted at the earliest stage of decision-making consistent with economic and social considerations. This will also strengthen the use of Environmental Impact Statement System as a planning and monitoring tool.

Source: NEDA, 2017, p. 20-15

achieving universal and equitable access to safe and affordable drinking water for all; access to adequate and equitable sanitation and hygiene for all, and ending open defecation, in particular for women, girls and vulnerable populations; improving water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials; substantially increasing water-use efficiency across all sectors; implementing integrated water resources management (IWRM) at all levels, including through transboundary cooperation; protecting and restoring water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes (ADB, 2016a). The Asia-Pacific region is the world's global hotspot for water insecurity (Chellaney, 2011). This is further exacerbated by risks from extreme weather events and water-related disasters. Six out of ten Asian countries are included in the top 10 most affected countries from climate change in the last 20 years with the Philippines ranked as fifth (Eckstein et al., 2018). The ADB's Asia Water Development Outlook¹³ (AWDO) 2020 highlights that ensuring national water security is an imperative for improving quality of life and needs to be prioritized by all countries as a development agenda. This agenda is a key enabler of economic growth and underscores efforts to recover from the setback caused by COVID-19. Investments in water, sanitation and other water management, and related infrastructure and services need to be significantly increased together with coherent policies, monitoring and evaluation of progress, transparent stakeholders engagement, and innovative financing with public and private sector (ADB, 2020c). In recognition, the PDP 2017-2022 (Figure 3) proposes the provision of an amendment to the water code towards the outcome indicator - "biodiversity and functioning of ecosystem services sustained" (NEDA, 2017, p. 20-5). It proposes the provision of a "legal framework for the institutionalization and operationalization of integrated water resource management to respond to current trends and challenges such as climate variability affecting water supply and availability as well as addressing institutional gaps and weaknesses" (NEDA, 2017, p.).

¹³ The [Asian Water Development Outlook \(AWDO\)](#), is a flagship publication by ADB and the Asia-Pacific Water Forum. It describes in detail the water security status of Asia and the Pacific since 2007 and highlights critical water management issues facing the region. This 2020 fourth edition provides is strongly aligned with the Sustainable Development Goals (ADB, 2020d)

State of Water Resources in the Philippines: Water Availability

The total renewable freshwater availability is about 146 billion cubic meters (BCM) per year. About 86% of this amount is in the form of surface run-off (126 BCM/year) and the remainder is below the ground (20 BCM/year). The average rainfall is about 4,000 mm per year (see Figure 4).

Surface water

The bulk of these water resources are distributed among the country's 421 river basins, 18 of which are defined as major, i.e., river basins with a floor area of over 1,400 square kilometers (Figure 4). There are 79 lakes, mostly utilized for fish production. Ten of these are major hosts for aquaculture production.

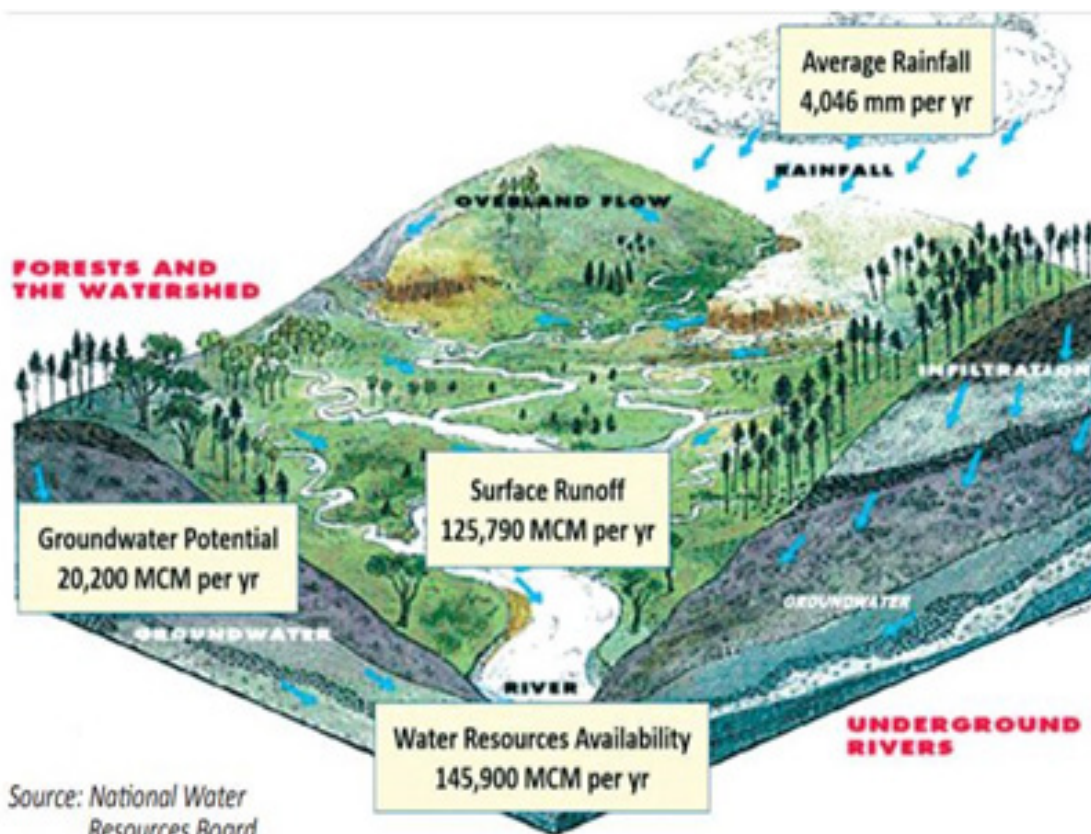
Ground water

There are four major groundwater reservoirs in the Philippines, namely; Cagayan with 10,000 sq. km., Central Luzon with 9,000 sq. km., Agusan with 8,500 sq. km., and Cotabato with 6,000 sq. km. When combined with smaller reservoirs, these groundwater reservoirs would aggregate to an area of about 50,000 sq. km. (Alikpala & Ilagan, 2018).

As regards water consumption, hydropower is the largest user of water (non-consumptive), followed by irrigation, industry and municipal use, consuming about 81 BCM together¹⁴. Unauthorized water use, which is difficult to estimate, is believed to be quite a substantial amount.

Water does not recognize political boundaries or jurisdiction of LGUs. Each LGU views water resources within its own political boundaries and jurisdiction. Figure 5 on political vs. hydrological boundaries in the Philippines, shows the potential areas of conflicts because the country's political regions are not aligned with the water resource regions (based on natural/river basin/ hydrological boundaries). This conflict adds to the challenge of water management and many times counterproductive decisions due to political and local vested motivations (Alikpala & Ilagan, 2018). Reducing supplies (at source) and a rising demand are the key reasons for water

¹⁴ This does not include all other water uses, which do not have water permits issued by NWRB.

Figure 4. Water Resources Availability in the Philippines

Source: Alikpala & Ilagan, 2018, p. 6

insecurity and a primary challenge for water governance. Main reasons for this imbalance are: (1) population growth and economic development; (2) climate change, with more frequent and intense El

Figure 5. Political vs. Hydrological Boundaries

Source: Alikpala & Ilagan, 2018, p. 8

Niño leading to drier dry seasons; (3) groundwater over-abstraction, causing multiple problems such as groundwater contamination, land subsidence, and subsurface thermal anomalies; (4) pollution, limiting the availability of water and increases the risks to human health; (5) fragmented institutional and legal water resource management framework, with over 30 agencies supervising various aspects of water resources, leading to tight silos and overlaps causing counterproductive decisions; (6) forest denudation, due to illegal logging activities in the watersheds leading to large volumes of water run off during the monsoon season due to reduced soil absorption capacity (Alikpala & Ilagan, 2018).

The classification of water bodies serves as a benchmark for water bodies and tributaries to maintain water quality within the guidelines to conform with the water body's classification or even improve its quality to a higher classification¹⁵. As of 2016, only 761 water bodies have been classified. The projection by Department of Environment and

¹⁵ DENR-EMB, http://water.emb.gov.ph/?page_id=849. For the water quality standards by water body classification, see DENR Administrative Order No. 2016-08, Water Quality Guidelines and General Effluent Standards of 2016.



Natural Resources – Environment Management Bureau (DENR-EMB) is that 1,019 water bodies in the country will have been classified by the end of 2019.

Addressing the Water Governance Challenge through the Philippine Administrative System

The Philippine Administrative System (PAS) is the vehicle to deliver the SDG 6 and the country's national goals. The SDGs, including SDG 6, have been mainstreamed to national development goals and localized through the PDP in the previous section. Key measures include institutional reforms such as streamlining processes to guide investments in water supply, sewerage, and sanitation; formulation of an irrigation master plan; continuation of flood management initiatives; creation of an apex body to address the fragmented structure of water resources in the country (Alikpala & Ilagan, 2018; NEDA, 2017), and the devising of the Ambisyon Natin 2040.

Organization and Management, Personnel Administration, and Policy Analysis

The National Water Resource Board (NWRB) is the main coordinating and regulatory body for all water resource-related development. This is an interagency board that regulates water distribution, resolves issues and conflicts, such as inconsistencies in fees and charges. It also approves projects involving appropriation, utilization, exploitation, development, control, conservation, and protection of the country's water resources. The NWRB was transferred from the Department of Public Works and Highways (DPWH) to the Office of the President through Executive Order 123 of 2002. While it does not have regional or field offices, it is authorized to deputize any official or agency of the government to perform any of its specific functions or activities (Rola et al., 2015).

The Metropolitan Waterworks and Sewerage System (MWSS) is responsible for ensuring water security and is the service provider for water supply, sewerage and sanitation services in the National Capital Region and neighboring provinces. In this regard, the MWSS, in 2011 charted the seven-point Water Security Legacy Program, which aims for

sustainable water supply for the next 25 to 50 years within Metro Manila and other parts of Rizal, Cavite and Bulacan provinces (MWSS, 2017). This includes: (1) water resources and infrastructure development; (2) water distribution efficiency; (3) sewerage and sanitation; (4) water rates review and rationalization; (5) organizational excellence legacy; (6) partnership building and development; and (7) communication and knowledge management (MWSS, 2017).

Institutional Mechanisms in Managing Water in the Philippines

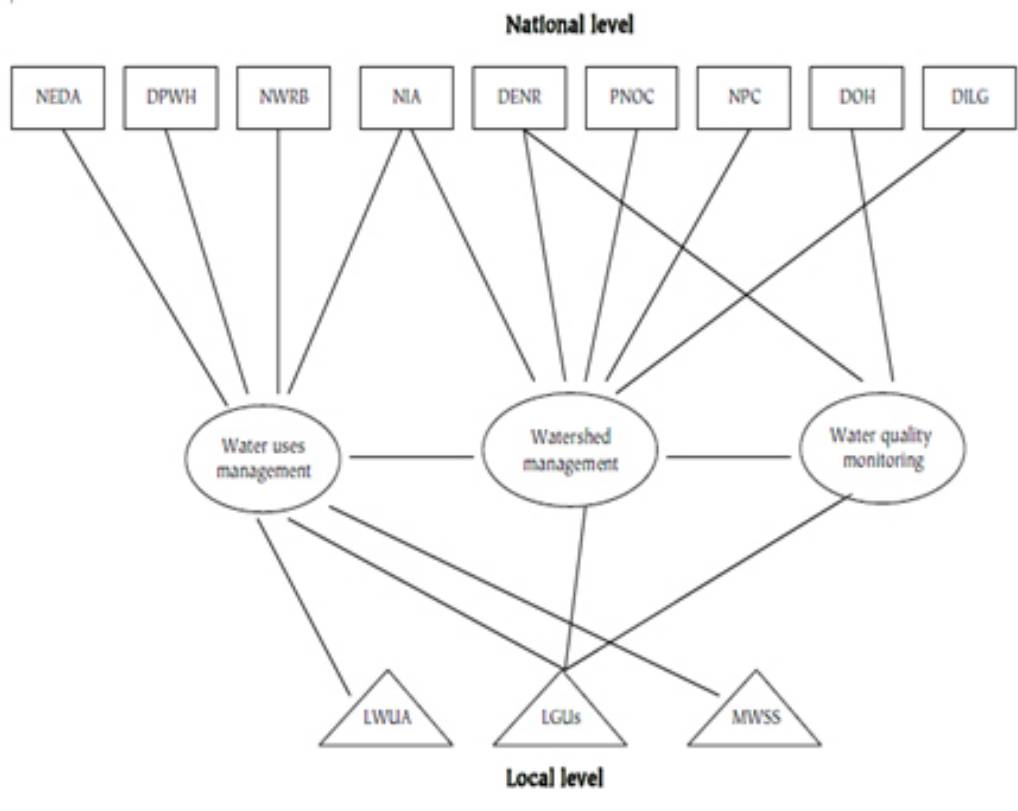
For Malayang (2004), “[w]ater governance refers to the collection of institutional controls on human conduct relating to water” (p.59). On the other hand, Roger and Hall (2003 as cited by Malayang, 2002, p. 59) defined water governance as “the range of political, social, economic, and administrative systems that are in place to allocate, develop and manage water resources and the delivery of water services at different levels of society” This covers shared decision making and actions regarding water management to ensure its continuing supply and quality and how its consumption as a resource shapes the state and conditions of water resources and their availability (Malayang, 2004).

Figure 6 shows institutions at the national and local level with their functions. These are categorized based on supply and demand. The supply side is provided through watershed management as the watershed is a resource that provides for multiple uses. This responsibility rests primarily with the DENR, in particular, the Forest Management Bureau (FMB).

The demand side is covered by the functions of water regulation, utilization and monitoring. The Environmental Management Bureau (EMB), under DENR, is responsible in this regard. Additionally, other government-owned and controlled corporations (GOCCs), source their water supply requirements from watersheds. These GOCCs have complete jurisdiction and control over watersheds surrounding their plants and/or projects. These include the National Power Corporation (NPC) for power generation, the Philippine National Oil Company (PNOC), and the National Irrigation Administration (NIA) for water supply to agriculture. The Local



Figure 6. National and Local Institutional Mechanisms of Water Governance



Source: Elazegui, 2004, p. 89

Government Code of 1991 requires GOCCs involved in any project that may cause pollution and depletion of nonrenewable resources to consult with the LGUs concerned, and implement mitigation measures to

prevent or minimize pollution and/ or depletion of these resources (Elazegui, n.d.). Figure 7 (Rola et al., 2015) shows all the government agencies and their functions, highlighting the overlaps.

Figure 7. Fragmented and Overlapping Range of Functions of Key Water-related Agencies

GOVERNMENT AGENCIES															
Functional Area	N W R B	L W U A	D E N R	L G U S	D P W H	D O H	N I A	N P O C	P A G A S	D O F	M M S S	D I L G	D O E	M M D A	L D A
Policy Planning	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Data Monitoring	●	●	●	●	●	●	●	●	●		●	●	●	●	●
Scientific Modeling									●						●
Infrastructure and Program Dev't	●	●	●	●	●	●	●	●	●		●	●	●	●	●
Operations of Water Facilities				●	●		●	●			●		●		
Regulatory Functions	●	●	●	●		●					●		●	●	●
Financing		●	●	●						●					
Public Relations, Capdev't and IEC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Local RBO Dev't			●												

Source: Rola et al., 2012, p. 202

Governance Challenge of the National Level Policy Framework

The water sector in the Philippines is governed by eight legal frameworks. These comprise the Presidential Decree 1067 Water Code (1976); Presidential Decree 198 Provincial Water Utilities Act (1973); Presidential Decree 522 (1974) Prescribing Sanitation Requirements for the Travelling Public; Republic Act 7586 National Integrated Protected Area System Act (1992); Republic Act 8041 National Water Crisis Act (1995); Republic Act 8371 Indigenous Peoples Rights Act (1997); Republic Act 9275 Clean Water Act (2004); and Republic Act 8435 Agriculture and Fisheries Modernization Act (AFMA). The Water Code of the Philippines (NWRB 1976) is the overarching law that governs water access, allocation, and use. It stipulates rules on appropriation and utilization of all waters; control, conservation and protection of waters, watershed and related land resources; and administrative and enforcement of these rules. It defines requirements for application of water permits and conditions of its use. It also sets charges per rate of withdrawal based on the permits. During periods of drought or water scarcity, the Water Code prioritizes the use of water for domestic use, followed by irrigation, and other uses (Rola et al., 2015).

The laws and codes can sometimes lead to ambiguity and conflicts during implementation. For example, while the Water Code stipulates that the state owns all the water in the country, the Indigenous Peoples Rights Act protects the rights of indigenous peoples with respect to resources contained in their ancestral domain. In parallel, The National Integrated Protected Area System (NIPAS) Act provides for watershed protection so water supply can be sustained. The NIPAS, however, overlaps with the provisions of the Indigenous Peoples Rights Act (Rola et al., 2015).

Local water governance

The LGUs perform the functions covering community-based forest management, waterworks systems, and water quality monitoring. However, the decisions and actions by LGUs are bound by national level authorities which sometimes cause conflicts between the national and local water governance. For instance, the domestic water supply in Metro

Iloilo (one of the city centers south of Metro Manila) is sourced from a watershed that contains a smaller watershed, which is a protected area and managed by the national government. The larger watershed is managed by the watershed management board at the local level, which comprises of more than 20 representatives of government, non-government, and the academe. The final responsibility of the governance of the watershed is ambiguous due to the relationship between the Protected Area Management Board of the smaller watershed, established by an Act of the national government, and the watershed management board, established under the Local Government Code (Rola et al., 2015). This adversely affects the sustainable supply of water in the province. Such conflicts or ambiguity in decisionmaking also results in: (1) deforestation of the upper watershed, which in turn leads to landslides, flooding or drying up of water sources especially during the summer months; (2) social conflicts due to the competing uses of water; (3) degradation of the riverbed due to sedimentation and quarrying which is improperly regulated; and (4) conflicts between customary rules and formal state laws (Rola et al., 2015).

Supporting governance improvements through private enterprise in water management

MWSS, until 1997, was the only agency responsible for the provision of water and sanitation services. At the time, MWSS had a debt of US\$880 million with inefficient and ineffective operations, with only two-thirds of households covered with piped water connections. The remaining households sourced water from vendors, self-owned deep wells, and/or private water works. Service levels were low with low water pressure and intermittent supply of 17 hours a day on average. Additionally, there was very high NRW (non-revenue water) of more than 60% of water production, compared to 20-30% on average for developing countries and 7% in Singapore. MWSS was also considered over-staffed with 9.8 employees per 1,000 connections, compared to 7.7 in Jakarta and 4.6 in Bangkok. At the time in the mid-1990s, the Philippines was undergoing El Nino and a water crisis. All of these factors, together with the success of privatizing the power sector, prompted the government to spearhead a similar



model for water. This action showed positive results based on the increased numbers for water coverage, quality, and availability (Chia Pei Lin et al., 2007).

Supporting governance through voluntary sector management

Civic engagements help revive or recreate a vision through initiatives that address issues across jurisdictions (Lontoc, 2013). To name a few, the Philippines and Manila benefit from such engagements such as: Manila Water Foundation (MWF) which was established in 2005 by the Manila Water Company, to catalyze social development aspects by serving waterless and toilet-less communities in the Philippines and other neighboring countries¹⁶. Leveraging on the enterprise's business expertise in water and sanitation, the MWF's outreach extends beyond the business' concession area (Metro Manila East Zone) and serves the entire archipelago of the Philippines. In the same token, the Philippines Center for Water and Sanitation (PCWS) aims to improve the water supply, sanitation and hygiene (WASH) situation of the poorest communities in the Philippines¹⁷, through gender sensitive and culturally acceptable capacity building approaches. Additionally, "Waves for water", a humanitarian non-profit, provides clean water solutions to remote communities and areas that have been affected by natural disasters¹⁸. Given the length and breadth of the outreach that is required for water to serve as a source of life, formal institutions need to be supported by a web of informal institutions as extended arms, which needs to be enabled by the government.

Complementing governance with spatial information management

Manila Water became the east concessionaire of MWSS through a public-private-partnership on 1 August 1997 as a solution to the shortfalls of water supply being faced by citizens. Three major steps were taken. First of all, an enterprise geographic information system (GIS) was developed as a one-stop shop for all geographic information needs. Secondly, all water meters were mapped and information on all

service pipes was captured digitally. Thirdly, a single topographic map was developed to align all existing assets. These technology-led initiatives resulted in an exponential positive impact. In 2006, the 24-hour water supply increased to 99%, cutting 50% of the system losses, and doubling the number of sewerage connections. In 2012, NRW dropped to 11%. With service coverage area of about 1,400 sq km, Manila Water now serves an estimated population of six million in 23 cities and municipalities (Manila Water, 2013). Given the large amount of spatial and non-spatial data generated by Manila Water a major bottleneck was the lack of integration. This lack of integration was overcome through the creation of the Manila Water Web-GIS that resulted in positive changes, such as the availability of geospatial visualisation and analysis platform with applications on phone and other interfaces; data captured by field-staff being used for evaluations; ensuring valve isolation feature (VIF) that enabled technical support staff to easily identify affected valves within a network outage; and pairing hydraulic analysis by modellers with data; providing interface with district metering area (DMA) Management to link NRW and pressure at DMA level hence eliminating duplicated tasks between separate platforms. This action also increased the efficiency of customer relationship management (CRM). Integrating CRM with GIS allowed Manila Water to accurately identify the customer location by using GPS coordinates. The implementation of topographic mapping, the GPS data of existing assets and network information was integrated seamlessly with built plans resulting in a fully functional asset information management system which is used regularly for network efficiency management and decisionmaking (Manila Water, 2013).

Key Learnings

Although the PAS provides a good framework for governance and delivering a social need, a public good and service in this case, water, transformations through continuous reforms are needed to improve service delivery and sustainability of water resources for the future. Issues such as inconsistencies in policy implementation, overlapping jurisdictions and roles and responsibilities of institutions towards

¹⁶ <https://manilawaterfoundation.org/>

¹⁷ <http://www.itnphil.org.ph/>

¹⁸ <https://www.wavesforwater.org/>



national and local goals, among others need to be addressed. Finding solutions should be based on learnings from reviews and evaluations of water sector operations and impacts (benefits and adverse) on all communities. The bureaucracy and its PA systems, to be responsive to fast paced growth especially urbanization and globalization, need to shift business planning and management paradigms. Beginnings have been made with the roundtable discussion conducted by the Arangkada Philippines Project (TAPP) in January 2018 (Alikpala & Ilagan, 2018) and the momentum can be built on.

A key learning from the Manila water crisis of March 2019 on improving governance (Sabillo, 2019) is the need for establishing feedback loops within the PA system for minimizing or preventing crisis. When 52,000 households, supplied by Manila Water were out of water, a blame game reaction was triggered among the multiple agencies involved in managing water including the El Nino as one of the causes. The main cause of the crisis was attributed to old infrastructure that constrained the evacuation of large volumes of water; delayed projects, such as the treatment plant in Cardona, Rizal, designed to draw up to 100 million liters of water a day from Laguna Lake to augment supply; the Kaliwa Dam benefitting both Manila Water and Maynilad companies, to provide additional 600 million liters that was delayed due to opposition from environment groups on its adverse impacts. These considerations, however, are important as recommendations from environment impact assessments help to minimize irreversible environment damage and safeguard resources for future generations. Extensive project delays can further exacerbate water shortages. The solution foreseen by MWSS was a crossborder agreement of transfer of water allocation as emergency water from Maynilad to Manila Water. Such emergency reallocations are reactive and would fall short in meeting future water demand.

Several attempts in the past decade, e.g., the Pasig River rehabilitation project, point to a need for major governance improvements across all jurisdictions and mandates of the PA system in this regard. The strategic location of the Pasig River makes it and its tributaries—San Juan River, Taguig-Pateros River and Marikina River—integral to the

economic conditions of Manila. These provide a means of transport, and water source for domestic and industrial use. Efforts to revive the Pasig River started in 1973, via the creation of the Pasig River Development Council and implementation of the Pasig River Development Program, which were abolished in 1987 due to lack of support. In 1993, an environmental partnership was created as an incentive for the industrial and business sectors to engage in environmental improvement activities and advance self-monitoring and mandatory compliance with environmental standards. In 1999, Pasig River Rehabilitation Commission was created to supervise and monitor plans, programs, projects and activities, and enforce rules and regulations towards the rehabilitation of the river. However, even with these initiatives—management programs and strategies of the Philippine government—the water quality in the rivers of Metro Manila, specifically the Pasig River, continue to deteriorate and / or show limited improvement. The problem is mainly attributed to insufficient funding, weak institutional implementation and capacity, outdated plans and diagnostics and insufficient and inadequate water and sewage infrastructure (Gorme et al., 2010).

Proposed Solution

A total asset management (TAM) approach for decisionmaking is recommended to for advancing water governance within the PAS for achieving national water security. This approach aims to improve governance through institutional convergence from an environment, sociocultural and economic perspective. TAM builds on and enhances the conventional asset management procedures that most often focus on operation and maintenance of built infrastructure. TAM builds further on the integrated water resources management (IWRM) approach, the key pillars of which are: (1) enabling environment (policies and legislation); (2) institutional framework; (3) management instruments (assessment, information, and allocation; (4) investments. All these collectively lead to increasing water security.

The TAM approach centers water as an asset at the national and local government level and can

Figure 8. Key Dimensions of National Water Security

Source: Asian Water Development Outlook 2020 (ADB, 2020c)

be enabled by developing a “Framework for Water Security.”¹⁹ For an asset to be managed and be resilient it needs to be secured from an environment, sociocultural and economic perspective. This would bring interdepartmental convergence by establishing the common goal of securing water with respect to: re-charging as natural capital and a public good (environment perspective); providing affordable and equitable services to all groups of citizens (sociocultural perspective) within efficient costs (economic perspective). Guided by the ADB’s Asia Water Development Outlook (AWDO), the TAM of water for the country can enable and institutionalize a “Framework for Water Security,”

¹⁹ Water security as defined in AWDO 2020 is the availability of an adequate quantity and quality of water to ensure safe, affordable, equitable and inclusive water supply and sanitation together with sustainable livelihoods and healthy ecosystems and manageable water-related risks. Operationalizing water security will help foster resilient rural-urban economies in Asia and the Pacific. The AWDO measures water security across five key dimensions (KDs)—rural household water security, economic water security, urban water security, environmental water security, and water-related disaster security. Water security is expressed in scores, calculated for each KD based on publicly available data on various indicators. The scores of all five KDs are added to form the multidimensional national water security score. Based on the aggregated scores, five key stages of national water security were identified progressively from nascent up to engaged, capable, effective, and model (ADB, 2020d)

with five interdependent key dimensions (KD). This can further help quantify various dimensions of water security by outlining roles of the multiple departments around KD as shown in Figure 8. (ADB, 2020c; 2016b; Sandhu & Huang, 2019).

A country’s overall national water security (NWS) is the composite result of the five KDs (KD1-KD5). The AWDO measures water security by quantifying the five KDs with measurable indicators.

The National Water Security Index (NWSI) measures the availability of adequate water to ensure safe and affordable water supply, inclusive sanitation for all, people’s livelihoods and healthy ecosystems, with reduced water-related risks toward supporting sustainable resilient rural- urban economies. The NWSI is composed of all five KDs:

KD 1: Rural household water security, which is essential for poverty reduction and measures the provision of sufficient, safe, physically accessible, and affordable water and

sanitation services for health and livelihoods. Composed of access to water supply; access to sanitation; and health impacts; affordability.

KD 2: Economic water security, which measures the assurance of adequate water to sustainably satisfy a country's economic growth and avoid economic losses due to water-induced disasters. Composed of broad economy agriculture; energy and Industry

KD 3: Urban water security, which measures the extent of provision of safely managed and affordable water and sanitation services for their urban communities to sustainably achieve desired outcomes. Composed of access to water supply; Access to sanitation; affordability; drainage (flooding); environment (water quality).

KD 4: Environmental water security, which measures the health of rivers, wetlands, and groundwater systems and measured progress on restoring aquatic ecosystems to health on a national and regional scale. Composed of catchment and aquatic system condition index; environmental governance index.

KD 5: Water-related disaster security, which measures a nation's recent exposure to water related disasters, their vulnerability to those disasters, and their capacity to resist and bounce back. Composed of climate risk (drought), hydrological risk (flood), meteorological risk (storm) (ADB, 2020b)

The Asian Development Outlook 2020 (AWDO) ranking of the NWSI shows that the Philippines improved to number 16 from 38 in the ranking of the AWDO 2016 (ADB, 2016a), among the 49 countries ranked. However, the country falls short on the KD 1, 2 and 5 and is still in the bottom half of the list of countries ranked (ADB, 2020c).

Table 1 describes a framework for applying TAM to water as a natural asset for further catalyzing improvements covering all the KDs for achieving national water security. The KDs are aligned with the country's core development issues and can drive improvements in decisionmaking and governance

within the PAS. Primary, secondary, and tertiary departments are identified, depending on their role for achieving each KD. The primary departments would be responsible for internal coordination to deliver the final outcome in consensus with other departments. This would help reduce institutional fragmentation. At the same time, institutional gaps related to individual departmental mandates and capacities can be identified to be addressed through timely feedback.

It is clear that business as usual approaches need to change. A water security audit with a near future goal of water security can form the basis for NWRB and NEDA to lead a collaboration with the DOF and DENR together with MWSS and DILG to re-visit the institutional nexus of water governance and report to the President.

National good practice examples have demonstrated success in collaboration at all levels with sustained benefits to the community such as the Gawad Kalinga model, which has evolved cooperation mechanisms between government, business, and civil society for efficient delivery of basic services. This can be extrapolated and applied to water governance. Successful examples of watershed based planning—innovative investment designs that deploy structural and non-structural measures such as nature based solutions as is done in the Netherlands and Korea—may be studied for learning and contextualizing institutional solutions. These could focus on the pressure points leading to water insecurity such as addressing conflicts between statutory and customary rights, diverging sectoral interests, development of alternate sources of water, issue and need-based equitable distribution, and appropriate costing.

The end goal is for improving governance, planning, and prioritizing investments for a sustainable water future for the Philippines, the basis for a better quality of life, the solution for which rests within the PAS and the citizens it serves.

Table 1. PAS Framework for TAM of Water as a Roadmap to National Water Security

Key Dimension	PDP/AMB 2040: Country Goal SDGs	PAS: Nodal Dept. & Input Dept./s - *pri- mary/ **secondary/ ***tertiary	Composition of Index or Measure	Key Constraint Addressed (As discussed in above sections)
National Water Security	National water security SDG 6	*DOF-NWRB and **NEDA /**DENR ***DENR – regional and local offices to coordi- nate inputs from LGUs	Combination of the KD1 to KD5 of water security measured by the KDs	-national nonver- gence on water allocation -consistency in policy implementation -prioritization or re- allocation of funds
KD 1: Rural Household Water Security	To what extent coun- tries are satisfying affordable access to water & sanitation and improving hygiene for public health. SDG Targets 6.1, 6.2	*MWSS*/ **LGU- LWUA, DILG, DENR/ ***DOH *MWSS responsible for concessionaires – Ma- nila Water and Maynilad – includes voluntary sector, e.g., – MWF, PWCS	-Access to afford- able piped water supply - – Access to improved sanitation - Hygiene index (measured in disability-adjusted life years, DALYs)	- improve measure of misappropriation, -- minimize non- revenue water - citizen engage- ment - equitable supply - environment quality - social concern - local cultural prac- tice
KD2: Economic Water Security	The productive use of water to sustain economic growth in agriculture /food pro- duction, industry, and energy SDG Targets 6.4, 2.3, 7.2 and SDG 8	*DOF-NEDA/ **DENR/Dept. of Agri- culture/ ***GOCC-DOE, NIA	Broad economic development •Water for agricul- ture •Water for industry •Water for energy	-improve coordina- tion for assessing conjunctive usage of water -prevent intersec- toral conflict -diagnose the nexus of water food and energy -Diagnose any other nexus that influences water consumption - housing, commer- cial land use and water allocation

KD3: Urban Water Security	<p>Progress toward better urban water services and management to develop vibrant, livable cities and towns</p> <p>SDG Targets 6.1, 6.2 and SDG 11.</p>	<p>*MWSS /</p> <p>**DENR /</p> <p>***DILG</p>	<ul style="list-style-type: none"> •Urban water supply •Urban wastewater collection •Flood and storm drainage •Urban river health 	<ul style="list-style-type: none"> -improve water accounting -improve water quality monitoring -reduce run-off -balance abstraction and recharge -land use conflicts and indigenous rights
KD4: Environmental Water Security	<p>How well river basins are being managed to sustain ecosystem services</p> <p>SDG 6.3 and 6.6</p>	<p>*NWRB-DENR/</p> <p>**LLDA</p>	<ul style="list-style-type: none"> -River health •Flow alteration • Environmental governance 	<ul style="list-style-type: none"> -clarity of roles -watershed management -source protection -equitable water supply -plan and develop alternate sources -re-charge water as natural capital -vulnerable populations
KD5: Water-related disaster security	<p>The capacity to cope with and recover from the impacts of water-related disasters</p> <p>SDG Target 6.4 and 11.5</p>	<p>*PAGASA /</p> <p>**DENR/ **MMDA/</p> <p>***DILG</p>	<ul style="list-style-type: none"> -Floods and wind-storms •Droughts •Storm surges and coastal floods 	<ul style="list-style-type: none"> -improve co-ordination of prediction systems (upstream and downstream) -improve trans-boundary cooperation -deploy nature based solutions in investment design as adaptation strategy -vulnerable populations

Source: Author's own, ADB (2020c)



Alternatives and Ways Forward

Building on the role of environment governance in sustainable development and understanding its multiple interrelated dimensions, exemplified through the case of water resource management in the Philippines and possible solutions for achieving national water security through total asset management of water, this section shares alternative strategies and practices using collaborative and competitive governance approaches and the importance of assessing and evaluating policy effectiveness and measure of environment performance as a means for improving environment governance for a stronger path towards sustainable development.

Competitive Governance Approach

The competitive government paradigm posits that governments are competitive in their relations with each other and in their relations with other similar institutions that supply goods and deliver services from a range of assets. These are linked with the country's capital covering: (1) natural capital such as pasture and crop land, subsoil, timber, non-timber forest resources, protected areas; (2) produced capital such as buildings, machinery, equipment, and built infrastructure; and (3) intangible capital such as raw labor, human, and social capital, capability of institutions. Especially in cities facing urbanization, the challenge of sustainable economic, social, cultural, ecological and human development rests on the provision of adequate housing, water, energy, sanitation and mobility; meeting basic needs of people; addressing poverty and inequality, pollution, congestion, infrastructure needs, waste; promoting economic growth; and protecting the environment. Achieving all these attributes can be enabled through improved environment governance.

Competitive government provides a framework for public sector and governance reform through a process of renewal. Competition is a conduit for innovation and government entrepreneurship whereby resources can be sought internally and externally from countries to enhance the quality of life of citizens through a continuous renewal process. Benchmarking and maximizing values form the basis of renewing public sector goals.

Benchmarking ensures effectiveness of government programs through a learning process from good practices within and outside the country. Maximizing values is at the core of competitive government as it ensures that services are delivered for most value addition. The Philippines imbibed this approach for improving service delivery and standards to enable the private sector as an engine of growth. Since 2012, the Philippines has been using the Cities and Municipalities Competitiveness Index (CMCI) to annually rank cities and municipalities on economic dynamism, government efficiency, and infrastructure. Social, cultural and human development concerns are measured by the human development index (HDI) and poverty incidence (PI). These can be consolidated with the addition of ecological measures as suggested by the PDP 2017-2022 (Figure 2) to enable and achieve environment governance (Villamejor-Mendoza, 2020a; McQuillan, 2017).

Collaborative Governance Approaches

Collaborative governance emerged in response to the high cost of managing regulation and ensuring accountability. Decisionmakers and leaders realized that shared problems dealing with public goods, such as the environment and ecosystem services, cannot be resolved unilaterally by one city or municipality or even by instituting national policy. Given specific local and indigenous attributes of such issues, this requires consultation, collaboration, cooperation and communication to understand and define the problem, offer solutions, and chart strategies and directions. In principle, as infrastructure demands and needs increase in complexity requiring specialized knowledge the need for collaboration is an imperative (Villamejor-Mendoza, 2020b). Innovative solutions to common and complex problems such as the management of shared public goods, environment degradation and cultural heritage is exemplified through the Galing Pook Awards in the Philippines. Galing Pook is compliant with Article 62 of the Local Government Code of 1991, which outlines the involvement with people's organizations, NGOs and the private sector in the plans, programs, activities of the local government units, helping them with resources (Brillantes & Fernandez, 2008). These innovations have led to positive results, improvements in program



service delivery, empowered communities, promoted peoples' participation, showcased innovation, and transfer of knowledge and sustainability of practices.²⁰

Siargao It Up!

This innovative solution is illustrated through the case of Siargao It Up! The Del Carmen Mangrove Management Program of the Municipality of Del Carmen in Surigao del Norte Province. The Municipality of Del Carmen depends on its mangroves for livelihood with the the largest contiguous mangrove forest cover in the Philippines covering 27 kilometers in length and approximately 500 meters in width with approximately 1,900 fishing households dependent on its ecosystem service. The mangrove is the habitat of various species, including the endangered Philippine saltwater crocodile and the Philippine cockatoo. The mangrove ecosystem is threatened by rampant mangrove cutting from the heavy reliance on marine resources, gleaning and dynamite fishing.

As solution to these issues, the Municipality of Del Carmen launched "Siargao It Up! Mangrove Management Program" in 2013. The program aimed to transform mangrove cutters into fisherfolk, and illegal fisherfolk into boat guides in order to preserve the mangrove forest, and at the same time maximize its tourism potential.

The program was informed by scientists for ensuring sustainable preservation techniques, private sector and community based organizations for enabling operations, skills training for alternate livelihoods and educational advocacy campaigns. A mangrove management plan with a monitoring and evaluation mechanism was developed for the implementation of all activities with stakeholders participation. The municipality conducted regular mangrove planting and rehabilitation in partnership with the DENR. The program developed innovative approaches to mangrove rehabilitation such as the use of mangrove propagules with coconut husks with the establishment of a nursery to ensure its stable

supply. The use of this simple innovative technology resulted in an average survival rate of 80% per area planted. The program initiated community-based mangrove tours as alternative livelihood to 248 beneficiaries, who were either illegal mangrove cutters and fisherfolk and those affected by commercial fishing. Eco-guides were trained in 2016 with the support of Shore It Up and MPIC Foundation for them to be Department of Tourism certificate holders. A Mangrove Protection Information Center (MPIC) was established to serve as the tourism receiving center and start point for mangrove forest tourism tours where educational art forms were placed throughout the mangrove forest highlighting the importance of its preservation. Plastic paddle boats made from locally sourced materials at low cost were provided to the illegal mangrove cutters that can navigate the waterways easily due to their lightweight. Strict monitoring of the implementation of the laws was combined with incentives for tree planting and securing coastal resources and penalties were given for non-compliance.

The unique program led to the achievement of results across sectors with improvements in livelihoods through ecosystem services, which is a key attribute of environment governance. These include the drastic reduction of illegal activities, 95% threat reduction of mangrove cutting as well as 90% decrease in illegal fishing, household family income rose from PhP4,000- 5,000 in 2014 to PhP8,000- 10,000 in 2018. Through the success of the program, the Municipality of Del Carmen received several key recognitions such as DILG Seal of Good Local Governance for 2016, 2017, and 2018; GGGI Climate Champion for Mangrove Management for 2015; and DOT/ATOP 2nd Best Tourism Event of Pearl Awards in 2014 (Local Government Academy, 2018)

Improved Regulatory Compliance

Boracay, part of the municipality of Malay in the province of Aklan, is a prime tourist destination known for its white sandy beaches. The island is administered by the Philippine Tourism Authority (PTA) and the provincial government of Aklan since 2005. In recent years, growth among foreign tourists has been significant particularly from South Korea and China. In 2017, Boracay had as

20 The Gawad Galing Pook (meaning excellent place) awards was launched in October 1993. These have provided benchmarks for good governance at local government level, with high potential for replication. A typical criteria for a 'Galing Pook-able' program covers positive socioeconomic and environmental impact - 35%; promotion of people empowerment - 35%; transferability and sustainability - 20%; efficiency of program service delivery and powers provided under the Local Government Code - 10%



much as 2,001,974 visitors (about half of whom were foreigners), an increase by 16% from 1,725,483 tourists in 2016. Correspondingly, tourist receipts have steadily increased from Php4.9 billion in 2001 to Php56.1 billion in 2017 or at an average rate of 16.5%. The increasing numbers of international and local tourists, together with the inadequate management of wastes and poor implementation of environmental policies and guidelines resulted in unsustainable and hazardous environment conditions (Reyes et al., 2018) the Boracay island in the province of Aklan has been a favorite tourist destination in the country. The increasing influx of both international and local tourists, coupled with the improper management of wastes and poor implementation of environmental policies and guidelines, has aggravated the island's environmental condition and sustainability. This year, the government has decided to close down the island to address these critical concerns. This study looks into the potential economic effects of this recent directive, which is intended to last for six months from May to October 2018. Using secondary data, the study employs an Input-Output and computable general equilibrium (CGE).

To address such ecological issues incurred due to major shortfalls in environment governance, the government closed the island to entry of local and foreign tourists for six months starting April 26, 2018 to prevent its further deterioration and allow it to rehabilitate and "heal naturally". This decision was based on a unanimous recommendation of an inter-agency task force (IATF) of the national government comprising the Department of Environment and Natural Resources (DENR), the Department of Local Government (DILG) and the Department of Tourism (DOT). This was implemented by way of the Boracay Medium-term Action Plan (2018 to 2022). Further, the DILG also proposed the declaration of a state of calamity for six months and a two-month commercial shutdown to speed up the rehabilitation of the island, located 315 kilometers south of Metro Manila. (Official Gazette, 2018). This action demonstrates the recognition of environment governance as a key attribute to economic growth. The re-opening of the island on 26 October 2018 led to business innovations to comply with new regulations that would allow enterprise to flourish and the environment to be preserved (Domingo, 2018).

Evaluation of Policy Effectiveness and Measuring Environment Performance

The Global Environment Outlook-6 (GEO-6) advocates policy effectiveness as central in the theory of change beyond just policy relevance for improvements in environment governance as a pathway towards

sustainability.²¹ The GEO-6 recommends the use of the rivers, pressures, state, impact, response (DPSIR) framework, which can help address responses to environmental problems across themes, assess their effectiveness and help incorporate transformative policy approaches. Policy makers can be guided on policies that have shown results in particular situations, governance arrangements and whether that experience can be translated to other contexts. Additionally, this helps to distill evaluation knowledge that improves the evidence base for feedback that can help strengthen environmental policies. Given the multiple factors and contributors to environment degradation, environment outcomes cannot be achieved through a single policy instrument. Although policy mixes have demonstrated better results, they may not always complement each other and be counterproductive or a constraint to each other. Therefore, policy coherence²² needs to be ensured to balance the policy mix to achieve its intended objective. Policy coherence can be sectoral, transnational, multilevel (from global to local) and / or across implementation. Additionally, policy synergy or integration is equally important to deepen the impact of multiple policy instruments towards the common goal.

GEO-6 recommends a combination of top-down and bottom-up policy evaluation approach. The former begins with the policy and traces the causal chain to implementation. The latter begins with the observed outcome and uses the established policy indicators to trace the causal chain back to the policy intervention. Environment governance is challenged by attribution of an outcome to a particular policy (or mix), its causal chains, and behavioral influences. Innovations in policy architecture can help address such hurdles. For example, the setting of national standards, as part of the normal command-and-control policy approach to addressing pollution, is lethargic and falls short due to the bureaucracy faced in its implementation and is limited to address the new chemicals, materials, genetically modified organisms and nanotechnologies that are released into the environment every day. Thus, periodic and systematic evaluations can recalibrate systems towards an effective policy design—one that incorporates ecosystem properties, co-benefits, temporal and spatial dynamics, and the interaction of sub-policies with the overarching policy mix. This approach would supplement current policy implementation mechanisms with governance improvements which are essential to achieve the

²¹ Mandated by the UN Environment's High Level Intergovernmental and Stakeholder Advisory Group.

²² Policy coherence is the systematic promotion of mutually reinforcing policies that can accumulate synergies in attempting to achieve agreed objectives (UN Environment, 2019)



SDGs, Paris Agreement and other global environmental and climate agreements (UN Environment, 2019).

The measure of environment performance or effectiveness of its governing policies is sought through the internationally accepted Environment Performance Index (EPI),²³ which is a composite index and ranks 180 countries on environmental health and vitality of the ecosystem by using 32 performance indicators across 11 issue categories. Data is distilled on many sustainability indicators into a single number. Advances in scientific investigation, sensing methods, and data reporting have enabled the creation of a rich and robust source of environment information. The EPI scorecard provides a measure of the achievement of country environment policy targets and practical guidance that decision makers can use as way forward by setting realistic targets, monitor trends, and identify good policy practices. This scorecard, however, relies on data collection, reporting, and validation of environment issues, which over the last two decades have required strengthening—for example, gaps in agriculture, water resources, and biodiversity persist. The key observations from the 2020 EPI rankings and indicators show that economic growth makes it possible for countries to invest in policy and programs that lead to the desired environment outcomes especially in environment health infrastructure.

Despite pressures on economic growth, attention on environment issues can help mobilize communities to partner in the protection of natural resources and wellbeing such as commitment to the rule of law and enforcement of regulations. Countries that have made targeted efforts to decarbonize their electricity sectors have had the greatest gains in addressing climate change, with co-benefits for ecosystems and health (Wendling et al., 2020).

Concluding Remarks

Environment governance can be the driver for paradigm shifts in decision making, a measure for sustainable development and a catalyst for building institutional capabilities that enable interrelated and integrated development as guided by the SDGs. The common objective of inclusive sustainable development can be enabled by advancing comprehensive decision

making based on evidence based management approaches such as TAM. For example, AWDO recommends environment governance as an underscore for national water security and highlights the importance of KD4 (healthy environment) for the people which will help to achieve reduction in pollution, stimulate a circular economy, increase terrestrial protection, and embrace nature-based solutions for improving water security of other KDs. Gradual recalibration of environment policy towards effectiveness can be institutionalized through systematic monitoring and evaluation with improvements in evidence and data gathering.

The various alternative governance approaches described in the sections above would incrementally build intellectual capital and increase intergenerational equity for lasting development impacts. Localizing development solutions by optimizing traditional knowledge and use of local resources will extend to sustainability of projects and initiatives. Engaging stakeholders through innovative participatory techniques to increase cooperation, collaboration and meaningful competition would increase ownership by beneficiaries through a deeper understanding of natural assets and the services that can be drawn from these equitably and sustainably. Mainstreaming environment governance in national development planning and infrastructure design by identifying measurable and monitorable indicators can advance the pathway for sustainable development through business unusual and doing things differently.

References

- Asian Development Bank. (2016a). *Asian Water Development Outlook 2016*. <https://www.adb.org/publications/asian-water-development-outlook-2016>
- Asian Development Bank. (2016b). *Nature-based solutions for building resilience in towns and cities: Case studies from the Greater Mekong Subregion*. <https://www.adb.org/publications/nature-based-solutions-building-resilience-towns-cities-gms>
- Asian Development Bank. (2020a). *Climate change, coming soon to a court near you: Report series purpose and introduction to climate science*. <https://doi.org/10.22617/TCS200346-2>
- Asian Development Bank. (2020b, August 10). *EDSA greenways project: Draft initial environmental examination*. <https://www.adb.org/projects/documents/phi-51117-003-iee>
- Asian Development Bank. (2020c). *Asian Water Development Outlook 2020: Advancing water security across Asia and the Pacific*. <https://doi.org/10.22617/SGP200412-2>
- Asian Development Bank. (2020d, December 18). *Asia's water security—The glass is still half full*. <https://www.adb.org/news/features/asia-s-water-security-glass-still-half-full>

23 The EPI is a global metrics for the environment which ranks countries' performance on high-priority environmental issues related to health impact, air quality, water and sanitation, water resources, agriculture, forests, fisheries, biodiversity and habitat, and climate and energy. The 2020 data is gathered from reliable third-party sources like international governing bodies, nongovernmental organizations, and academic research centers. Credible datasets rely on established collection methods that have been peer-reviewed by the scientific community or endorsed by international authorities (Wendling et al., 2020)



- Alikpala, R. B., & Ilagan, C. A. (2018). *A policy brief on the Philippine water sector*. USAID and Arangkada Philippines. <https://www.gwp.org/contentassets/1a07d117d76940108c-0f68e671eac395/a-water-policy-brief-on-the-philippines-july2018-sept8.pdf>
- Brillantes, A. B. Jr., & Fernandez, M. (2008). Is there a Philippine public administration? Or better still, for whom is Philippine public administration. *Philippine Journal of Public Administration*, 52(2-4), 245-307.
- Chellaney, B. (2011). *Water: Asia's new battleground*. Georgetown University Press.
- Chia Pei Lin, Chua Chiaco, K., Kim Fat, C., Teo, S., & Toh Kai, L. (2007). *Water privatization in Manila, Philippines, Tale of two water concessions in Manila*. INSEAD, Economics and Management in Developing Countries. https://www.circleofblue.org/wp-content/uploads/2012/06/Insead_Water_Privatization_Manila_Philippines.pdf
- Day, J. St., Forster, T., Misereor, J. H., Korte, L., Radtke, K., Thielbörge, P., & Weller, D. (2019). *World Risk Report 2019*. Bündnis Entwicklung Hilft and Ruhr University Bochum - Institute for International Law. https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2019_Online_english.pdf
- Domingo, K. (2018, October 26). *Rejuvenated Boracay reopens with clear waters, quiet beaches*. ABS-CBN News. <https://news.abs-cbn.com/business/10/26/18/rejuvenated-boracay-reopens-with-clear-waters-quiet-beaches>
- Eckstein, D., Künzel, V., Schäfer, L., & Germanwatch. (2018). *Global Climate Risk Index 2018: Who suffers most from extreme weather events? Weather-related loss events in 2016 and 1997 to 2016*. Germanwatch. <https://germanwatch.org/sites/default/files/publication/20432.pdf>
- Elazegui, D. D. (2004). Water resource governance: Realities and challenges in the Philippines. In A.C. Rola, H. A. Francisco, J.P.T Liguton (Eds.), *Winning the water war: Watersheds, water policies and water institutions* (pp. 85-104). PIDS and Philippine Council for Agriculture, Forestry and Natural Resources Research and Development.
- Florini, A., & Pauli, M. (2018). Collaborative governance for the Sustainable Development Goals. *Asia & the Pacific Policy Studies*, 5(3), 583-598. <https://doi.org/10.1002/app5.252>
- Futurepolicy.Org. (2014, November 9). *The Philippines: Right of future generations to a healthy environment*. <https://www.future-policy.org/crimes/right-of-future-generations/>
- Galing Pook Foundation. (2018). *Galing Pook Awards 2018*. <http://galingpook.org/wp-content/uploads/2020/05/Galing-Pook-Awards-2018-Magazine.pdf>
- Gera, W. (2016). Public participation in environmental governance in the Philippines: The challenge of consolidation in engaging the state. *Land Use Policy*, 52, 501-510. <https://doi.org/10.1016/j.landusepol.2014.02.021>
- Gorme, J. B., Maniquiz, M. C., Song, P., & Kim, L.-H. (2010). The water quality of the Pasig River in the City of Manila, Philippines: Current status, management and future recovery. *Environmental Engineering Research*, 15(3), 173-179. <https://doi.org/10.4491/eer.2010.15.3.173>
- Kotzé, L. J. (2012). *Global environmental governance: Law and regulation for the 21st century*. Edward Elgar.
- Lontoc, J. A. D. (2013). *Civic engagement in urban water governance: The case of Pasig River rehabilitation in Metropolitan Manila* [Unpublished master's thesis]. Polytechnic University of Milan.
- Malayang, B. S. I. (2004). Model of water governance in the Philippines. In A.C. Rola, H. A. Francisco, J.P.T Liguton (Eds.), *Winning the water war: Watersheds, water policies and water institutions* (pp. 59-84). PIDS and Philippine Council for Agriculture, Forestry and Natural Resources Research and Development.
- Manila Water. (2013). *GIS helps Manila water come out of deep water*. GeoSpatial World. <https://www.geospatialworld.net/article/gis-helps-manila-water-come-out-of-deep-water/>
- Martin, P. (Ed.). (2012). *Environmental governance and sustainability*. Elgar.
- McQuillan, L. J. (2017, September 29). *Transcending government—A future of competitive governance driven by “governance entrepreneurs.”* The Beacon. <https://blog.independent.org/2017/09/28/transcending-government-a-future-of-competitive-governance-driven-by-governance-entrepreneurs/>
- Metropolitan Waterworks and Sewerage System. (2017). *Annual Report 2017: Building towards sustainable water security*. <https://mwss.gov.ph/wp-content/uploads/MWSS-Annual-Report-2017.pdf>
- National Economic and Development Authority. (2017). *Philippine Development Plan 2017-2022*. <https://pdp.neda.gov.ph/wp-content/uploads/2017/01/PDP-2017-2022-07-20-2017.pdf>
- National Economic and Development Authority. (2019, September 18). *The 2019 Voluntary National Review (VNR) of the Philippines*. <https://www.neda.gov.ph/voluntary-national-review-vnr-2019/>
- Ocampo-Salvador, A. (2002). Environmental governance in the Philippines. In *Philippine governance report: Studies on the management of power*. Philippine Governance Forum. <http://www.ombudsman.gov.ph/UNDP4/wp-content/uploads/2013/01/Chap2.pdf>
- Official Gazette of the Republic of the Philippines. (2018). Proclamation No. 475, s. 2018. *Declaring a state of calamity in the Barangays of Balabag, Manoc-manoc and Yapak (Island of Boracay) in the Municipality of Malay, Aklan, and temporary closure of the island as a tourist destination*. <https://www.officialgazette.gov.ph/2018/04/26/proclamation-no-475-s-2018/>
- Oosterhof, P. D. (2018). Localizing the sustainable development goals to accelerate implementation of the 2030 agenda for sustainable development. *The Governance Brief*, 14. <http://dx.doi.org/10.22617/BRF189612>



- Ostrom, E. (2008). Institutions and the environment. *Economic Affairs*, 28, 24–31. <https://doi.org/10.1111/j.1468-0270.2008.00840.x>
- Philippine Daily Inquirer. (2017). *President Duterte's 10-point socio-economic agenda*. *Philippine Daily Inquirer*. <https://business.inquirer.net/222340/president-dutertes-10-point-socioeconomic-agenda>
- Reyes, C. M., Albert, J. R. G., Quimba, F. M. A., Ortiz, M. K. P., & Asis, R. D. (2018). *The Boracay closure: Socioeconomic consequences and resilience management* (Discussion Paper Series No. 2018-37). <https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidsdps1837.pdf>
- Rola, A. C., Pulhin, J. M., & Guillermo, T. I. Q. (2015). Challenges of water governance in the Philippines. *Philippine Journal of Science*, 2(144), 197–208.
- Sabillo, K. (2019). *Explainer: Why is there a water shortage in Metro Manila?* ABS-CBN News. <https://news.abs-cbn.com/news/03/12/19/explainer-why-is-there-a-water-shortage-in-metro-manila>
- Sandhu, S. C., & Huang, J. (2019). *What makes a city livable?* Asian Development Blog. <https://blogs.adb.org/blog/what-makes-city-livable>
- Saunier, R. E., & Meganck, R. A. (2009). *Dictionary and introduction to global environmental governance* (2nd ed). Earthscan.
- United Nations. (Ed.). (2018). *Working together: Integration, institutions and the Sustainable Development Goals, World public sector report 2018*. Division for Public Administration and Development Management, Department of Economic and Social Affairs (DPADM), United Nations. <https://publicadministration.un.org/publications/content/PDFs/World%20Public%20Sector%20Report2018.pdf>
- United Nations Department of Economic and Social Affairs, Division for Sustainable Development. (2015). *Sustainable Development Knowledge Platform*. <https://sustainabledevelopment.un.org/sdg6>
- United Nations Economic and Social Commission for Asia and the Pacific, Asian Development Bank, & United Nations Development Programme. (2017). *Asia-Pacific Sustainable Development Goals Outlook*. <https://www.unescap.org/publications/asia-pacific-sustainable-development-goals-outlook>
- United Nations Environment Programme. (2017, October 2). *Goal 12: Sustainable consumption and production*. <http://www.unenvironment.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-12>
- United Nations Environment Programme (Ed.). (2019). *Global Environment Outlook – GEO-6: Healthy Planet, Healthy People* (1st ed.). Cambridge University Press. <https://doi.org/10.1017/9781108627146>
- United Nations Statistics Division of Economic and Social Information and Policy Analysis. (2001). *Environment glossary*. <https://unstats.un.org/unsd/environmentgl/search.asp>
- United Nations Office for Disaster Risk Reduction & Asia Disaster Preparedness Center. (2019). *Disaster risk reduction in the Philippines: Status report 2019*. https://www.unisdr.org/files/68265_682308philippinesdrmsstatusreport.pdf
- Villamejor-Mendoza, M. F. (2020a). Competitive cities: Implications for better public service. *Policy Design and Practice*, 3(4), 445–461. <https://doi.org/10.1080/25741292.2020.1832741>
- Villamejor-Mendoza, M. F. (2020b). Quality public service through collaborative governance in the Philippines: Focus on selected 2018 Galing Pook Awardee. In A. Nakamura & M. Kikuchi (Eds.). *Comparative Public Administration: Local Governance in the Age of Technological Transformation and Global Uncertainty* (Vol. 13, pp. 127–148). Local Autonomy College.
- Wendling, Z. A., Emerson, J. W., de Sherbinin, A., & Esty, D. C. (2020). *2020 Environmental Performance Index*. Yale Center for Environmental Law and Policy. <https://epi.yale.edu/downloads/epi2020report20210112.pdf>