Chapter 12
Towards a More Responsive Water Policy and Practice: Challenges and Prospects

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Abstract This final chapter discusses key findings of the book; one significant finding, among others, is that the Philippines will suffer from an impending water crisis if institutions were not strengthened. Sectoral issues are also summarized. Challenges and ways forward are discussed.

Keywords Water sustainability • Water planning • Science- based water management • Water pricing • Integrated Watershed Management

12.1 Introduction

Distilling from the key messages given and the challenges described in previous chapters, this concluding chapter synthesizes the context, key issues, and sectoral performance of water policy and practice in the Philippines with focus on domestic, agricultural, aquaculture/marine, integrated water resource utilization, and environmental protection to ensure the sustainability of water resources. The ways forward are discussed in the last section.

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12.2 Key Findings

This section summarizes the key findings.

12.2.1 An Impending Water Crisis in the Philippines Is Real

Available data show that water demand is increasing and water supply is dwindling. Some water resource regions are already experiencing water shortage, especially during dry months. Majority of the major river basins are undergoing massive land conversions to other uses, threatening the sustainability of water supply and recharge from this precious resource. Projections indicate that the situation is likely to worsen in the future in the absence of appropriate intervention.

The 1998 JICA-NWRB study projected that, by the year 2025, there will be water availability deficit in major river basins in at least six of the 12 water resource regions, even under the low economic growth scenario and not even considering the likely adverse impacts of climate change (JICA/NWRB 1998).

Many of the major rivers and lakes are heavily polluted. Domestic wastewater is the main contributor of bacterial contamination to groundwater supply. Water-borne diseases such as diarrhea, cholera, dysentery, hepatitis A, and others can be caused by the presence of coliform bacteria in drinking water. An estimated 2.2 million tons of organic pollution is produced annually by the domestic (48%), agricultural (37%), and industrial (15%) sectors. Groundwater has been contaminated with coliform in 58% of the areas sampled. The adverse impact of water pollution costs the Philippine economy an estimated PhP 67 billion (more than US$1.3 billion) annually *(World Bank* 2003**).** Saline water intrusion has emerged as a problem in some areas, reducing the availability of groundwater supply. This is caused by overexploitation or excessive withdrawal of groundwater. The rapid decline of the forest cover in the Philippines is also a cause of concern as this directly affects surface water supply.

Urbanizing, highly populated, and high-economic-growth areas were observed to have negative surface water balance. While these areas are mostly served by formal water providers, non-revenue water remains high, especially in the cities. Climate change also threatens long-term water supply as longer dry spells would induce further stress on the agricultural, domestic, and energy sectors. In addition, the available data only capture users attached to formal water providers and do not include informal users or those who engage in self-provisioning. Most domestic water users are informal.

12.2.2 Institutional Mechanisms Remain Weak and Fragmented

Formal authority over water matters is dispersed among many government agencies and between the national and local levels of government. The national government agencies have overlapping or competitive mandates. Regulatory power is given to three different agencies, each with its own capability and personnel deficits. Agencies collect their own data in keeping with their mandates, be it water quality, resource management, or supply. Interagency coordination platforms exist for flood control, water crisis, and sector planning, but these are weak and focus only on these singular dimensions. Water apex bodies are institutionally weak and are structured as subline agency bodies that are intermittently transferred, depending on the political mood of the executive branch. The decentralization of decision making on water is limited, with local governments not having the ability to supervise water organizations operating within their administrative jurisdiction and being highly dependent on financial transfers from the national government for water development projects.

Formalization of the water sector through the state apparatus is incomplete. Formal institutional arrangements are more prevalent in urban areas and town centers serviced by water districts. In remote locations, informal water governance schemes based on indigenous and customary rules prevail rather than water laws set by the government. In these places, the state's exclusive claim on water (legal rights) is contested or not observed. The state's regulatory reach is weak; the more numerous private water providers, rural and barangay (village) water and sanitation associations, and local-government-run water utilities are operating without permit and not observing standards on tariff setting.

There is poor compliance with water rules, including permit-based access and withdrawal, as well as pollution. Sanitation is neglected by the government in favor of public investments toward water provisioning (irrigation and domestic).

There remains a serious gap in mechanisms for transfers between sectors and across administrative jurisdictions. The lack of clarity regarding these mechanisms generates conflicts among actors and, subsequently, political mobilization by losing groups for favorable outcomes. Poor legal grounding has also produced conflicts involving local government units (LGUs) over water transfers reaching the courts. Social agreements among multiple users of a common water source provide a temporary fix to the tensions arising from incoherent water rights claims.

Water pricing policy is vague in the Philippines. Seemingly, water is not treated as a commodity. There are several schemes for subsidies, which reveal that Philippine policy treats water as a social good and should be accessible to all as a human right. The pricing policy covers payment for the delivery and other maintenance services but does not include a definite bulk water price. From this, it is inferred that, since water is an abundant resource, then it should be free. Increasingly, water transfers, competition for multiple uses, and payments for environmental services are emerging issues as water scarcity becomes real.

12.2.3 Sectoral Issues: Key Findings

12.2.3.1 Domestic Water

Low domestic water service coverage and high tariffs are observed among water districts. Water districts with level III piped-in water connections only service less than 50% of the households. The remaining households either self-provide or are served by the informal sector such as community-based systems or LGUs that are neither registered nor regulated by state authorities. Water district tariffs are high because all their capital expenditure requirements are funded from loans.

LGU-operated systems have the worst performance among all the utilities benchmarked. Water provision is simply politically motivated, thus, no emphasis is made on skills development, professional buildup, or financial sustainability. Most LGU systems are not ring-fenced; hence, revenue is not linked to expenses. Most LGU-run systems have operations and maintenance costs heavily funded by the LGU internal revenue allotment. Level II or level III water system infrastructure is also mostly provided under the national water agencies' water programs or through Congressional funds. Dole-out mentality practices still exist. LGUs have also shown little interest in pursuing water supply projects due to leadership uncertainties brought about by the 3-year electoral term.

Water cooperatives need a lot of technical and financial support as the Cooperative Development Agency provides only administrative support. Community-based-organizations do not have access to commercial funds for expansion. They also need a lot of technical and financial support as no national agency effectively assists them, even if, on paper, they are technically under the supervision of LWUA.

Financing packages tend to cater only to credit-worthy utilities with no concessional financing for the non-credit worthy or those that are still in the process of becoming credit worthy. Subsidy policies for LGU systems are not strictly implemented.

12.2.3.2 Industry Sector

The industry sector wastewater is not being strictly monitored. Based on case studies presented in Chap. 5, aside from silver, lead, and nitric acid contaminants, water samples in public areas around one area studied showed contaminations of copper and chromium, while plant samples showed the presence of manganese, lead, and copper. In samples taken from pilot sites, cadmium, nickel, zinc, and manganese were present and exceeded the limits set by the Philippine drinking water standards. Heavy metals were found in fish and shellfish samples, exceeding the limits set by the Bureau of Fisheries and Aquatic Resources.

There is no ambient water quality data collected from agencies that monitor industry sector water quality. It was observed that data are being gathered regularly, but these have not been encoded and analyzed for regulatory purposes.

Policy instruments also exist to mitigate the behavior of firms not to pollute. As cited earlier, an "environmental user's fee" is imposed on establishments that discharge their wastewater into Laguna Lake. In spite of this, the Laguna lake ecosystem, in general, is in a sorry state.

On a bright note, on the other hand, there are available technologies in the country that convert wastes into beneficial assets. One of these is the agro-recycling of biodigester effluent through land application. Aside from nitrogen, phosphorus, and potassium, the bio digester effluent contains a wide array of nutrients such as calcium, magnesium, sodium, chloride, copper, iron, manganese, and zinc, which are essential for plant growth and development.

12.2.3.3 Agriculture Water Management

In spite of the huge irrigation investments, data showed that the rate of irrigation system deterioration is faster than the establishment of new systems. The deterioration of the systems, coupled with reduced surface water for big dams due to both high sedimentation and watershed degradation, lead to water scarcity, resulting in a decline in irrigation water supply and a reduction in irrigation service area. This water scarcity can also be attributed to several factors beyond the control of the National Irrigation Administration (NIA), such as sectoral water allocation (priority for domestic use over irrigation in cases of water crisis) and climate change. On the latter, reduced precipitation or overly long dry spells have resulted in serious deficit in surface water, on which many irrigation systems depend.

The decreasing dependable flow of surface water sources and the inability to control sedimentation are exacerbated by the prevalence of damaged or dilapidated dams, headworks, and control structures. Some of these are caused by typhoons, but others are simply due to faulty design and poor operation and maintenance.

Irrigation water pricing does not aim to recover the full cost of building the dam but to be able to provide for operations and maintenance (O&M). Like pricing for domestic water, irrigation fees also do not reflect the bulk price of water, only conveyance. The rate of payment per hectare cultivated, rather than actual use, is enshrined in a national law that is difficult to amend. Intermittently, the Philippine president declares waivers of irrigation fees for farmers (as did former President Estrada and current President Duterte), thus making the national government absorb all O&M costs. The impact of this policy decisions on farmer productivity and income remains to be seen.

Discharge of both domestic and agricultural wastewater and agricultural run-off has caused extensive pollution of receiving water bodies such as rivers and lakes. Domestic wastewater contains raw sewage and detergents; agricultural wastewater has fertilizers and chemicals; and industrial wastewater can have heavy metals and oils.

12.2.3.4 Aquaculture

Just like in the industry sector, worsening water quality is a serious concern for aquaculture. In Metro Manila alone, nine river sub-basins are used as dump sites. Almost 90% of wastewater being discharged in water bodies (rivers, lakes, and the sea) have little or no primary treatment. The loss in fishery production due to pollution has been estimated to be PhP 17 billion (World Bank 2003).

In spite of the presence of legal frameworks and institutions, there is evidence that points to the operation of informal systems and networks for land and water access/use. Typically, households or communities closer to water bodies with secure rights to use the water and land resources have better chances of setting up cages or ponds and generating income from aquaculture than households who do not have such rights. Several communities in the coastal areas have traditional rights to use coastal waters, which could be formalized to favor the entry of the poor into aquaculture. Traditional rights to use water were upheld by virtue of their profession and/or residence that was closer to the water bodies or by formal permits from the local government. The local government regulates the number of fish pens and cages that can maintain the carrying capacities of the lake and other bodies of water. But the number of fish pens/cages and feeds/feeding practices in lakes, rivers, and coastal waters has increased more than what is provided for in the law. The "carrying capacity" of such water bodies has been exploited, resulting in "fish kills."

12.2.3.5 Multiple/Integrated Water Resource Utilization

The primary issue in multiple/integrated water resource system is the absence of rules for water allocation and concrete policies for water use and water quality standards. In the country, very limited systems have agreed upon water allocation rules. This is not yet available in most multi-use systems, such as natural lakes or reservoirs. This is observed to cause conflicts. In addition, serious gaps in understanding the interactions of hydrology, geomorphology, and ecology in watersheds, rivers, wetlands, and estuaries inhibit effective water planning of multi-use systems.

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12.2.3.6 Watersheds and Water

In a watershed from where freshwater supply commonly emanates, soil, climate, forest cover, land use, and land use practices largely influence the attributes of water. Environmental protection as provided for in various policies and programs is bound to positively impact water resources owing to the inherent connection of water with other natural resources and the environment in general. There are three major reasons for the limited positive impacts of environmental policies on water: asynchrony and disunity of policies, ineffective policy implementation, and inadequate infusion of science in policy formulation.

The perennial lack of interconnection of various environmental policies and programs is attributable primarily to the absence of institutional mechanisms to compel linkaging between policies and programs of various government agencies, including those agencies with closely related mandates and functions. Sector-based and commodity-based planning and budgeting system does not facilitate inter-sectoral and interagency policies and programs and perpetuates the silo mentality of various government agencies.

A common constraining factor is the limited and inefficient use of financial resources that are available for the proper implementation of environmental policies and programs. Associated with this constraint is the unavailability of adequate human resources and facilities that are necessary to enforce regulations and to execute program of action.

Many environmental policies in the country are at best founded on knowledge and information that are too general and are generated in areas under different circumstances. What is worse is that some of these policies are grounded on institutions shaped by partial knowledge or truths, myths, and personal prejudices that give birth to flawed assumptions and unrealistic expectations. These are consequences of lack of access to correct information and knowledge that could be due to either absence of locally specific knowledge and information or absence of mechanisms to bring available knowledge and information to policymakers.

12.3 Challenges

12.3.1 Need for Data for Water Planning

Lack of more updated and reliable data/information on water supply and demand is one of the major constraints that limit the effectiveness and efficiency of water management in the Philippines. Such information is crucial for policy and decision making both at the national and local levels to develop more appropriate and strategic policies and programs to advance water resource management and sustainability. Planning at all levels is hampered by lack of reliable data and the absence of a systematic and regular monitoring of sector activities at the LGU level. Unless the country can overcome this lack of a water data base, future generations will inherit a legacy of declining and degraded water resources that threaten their livelihoods and well-being, particularly the poorer segments of society.

12.3.2 Institutional Reforms and Political Capital to Carry Them Out

There is no centralized regulatory agency for the water and sanitation sector. The existing national regulator, the NWRB, does not have the authority and resources to do economic regulation on water and sewerage on all water service providers.

Some agencies have several functions that should not be housed in one agency—i.e., service provider and regulation, financing, supervision, and regulation. There are also no consequences for government utilities that perform poorly.

LGUs have no regulatory capacity, except on business permitting. LGU-run utilities are not required by any agency to submit regular reports. DILG, which exercises authority over LGU-run utilities, is unable to monitor the performance of LGU-run water utilities mainly because of lack of resources.

No one is clearly accountable for implementing water reforms–there is a multitude of agencies involved in the water sector. Each agency has its respective role in the sector and because the reform process cuts across the mandates of all agencies, they must all be involved. This means that all decisions are made by a committee, and the responsibility for implementation is often diluted. This lack of accountability for implementing reforms has affected most reform initiatives in the sector. For example, regarding reform proposals on sector financing, no single agency has had the responsibility of ensuring that financing is available to the sector and the mandate to make sure that policies are in place to make this a reality. The institutional arrangements and mechanisms to promote synergy among the various water-related agencies and overall efficiency in the water sector remains a challenge.

To effect further reforms on institutional arrangements would require enormous investment in political capital to bring not only agencies with entrenched bureaucracies that may not want their mandates challenged but also water service providers and local communities on board. Legitimacy or widespread acceptance of policy changes is a good starting point.

12.3.3 Sectoral Challenges

12.3.3.1 Domestic Water

The domestic water sector suffers from persistent low level III coverage, especially in rural areas, and very low investment toward sanitation systems. This is in large part due to the policy assigning the provision of water and sanitation systems to LGUs that have neither the funds nor the fiscal incentive to finance such an undertaking. Given the 3-year terms of local executives, local governments cannot be relied upon to provide satisfactory and sustainable service levels for water and sanitation as the project cycle of water and sanitation infrastructure usually takes longer than 3 years.

Tariff setting for LGU-run utilities tends also to be politically sensitive. As such, LGUs should be tasked with providing the services, but they should not be the service providers themselves, unless it is a last recourse. Using IRA funds for subsidizing water and sanitation operations does not motivate LGUs to improve service delivery and collect the proper tariffs. Most of the IRA funds should instead be used for capital expenditures.

There is a need to form a planning and monitoring body at the provincial level to oversee the water and sanitation sector within their boundaries. Having plans made at this local-government level allows for nuancing, taking into account the specificities of hydrological conditions. It also brings greater accountability to the water service provider performance and subsequent decisions on public investments or financing.

12.3.3.2 Industrial Water

The challenges related to water use policy for the industrial sector in the Philippines reveal further the need for improved water governance. The backyard smelting and other polluting industries around river systems demonstrate the necessity of establishing reliable baseline data on which subsequent monitoring of water pollution can be based. The mining companies' case illustrates the challenge of imposing legal and political remedies for violations of industrial standards to minimize water pollution and associated environmental destruction. On the other hand, agro-recycling of industrial wastewater presents the importance of tapping the support of a research institution in finding technical solutions to the wastewater problem. It also highlights the need to incentivize the reuse of water in the industrial sector and to scale up initiatives using economic instruments.

12.3.3.3 Agricultural Water Management

The very low dry-season irrigation intensity is due to design shortcomings at the headworks, including underestimation of flood flows and sediment loads, inadequate provisions for sediment control, and underestimation of reservoir inflow and outflow hydrographs. These problems are more evident in the case of the communal irrigation system, where most dams are already old, with exposed rock cores, damaged spillways, and silted storage area. Possibly due to limited funds, there is apparent neglect in the estimation of dependable flow and sediment discharge, relying on old design criteria or adopting design parameters from other systems.

NIA can also make irrigator associations (IAs) accountable for the rehabilitation of existing systems. A progressive transfer of rehabilitation responsibilities can be facilitated through an agreed-upon schedule of reduction in the share of costs.

With the expansion of IA roles and downloading of responsibilities from NIA to IAs, NIA can focus on the higher level role of supervising the devolution, managing the headwork (reservoirs, dams, and main canals), implementing volumetric charges to IAs at the head gate, and providing technical support to IAs. The IAs will take care of transferred assets, collect water fees to cover their O&M costs, and manage water efficiently and equitably. NIA has to provide financial support for asset rehabilitation, if not done before the transfer; and technical support for O&M. As a transition arrangement, the IAs may need to hire professional support. Sediment management control measures must be implemented to maintain at the minimum the sediment inflow scenarios.

12.3.3.4 Aquaculture

Unclear water rights for aquaculture result in extensive farming, even unto areas where no fish pond licenses and leases have been awarded. The number of fish pens/cages and feeds/feeding practices in lakes, rivers, and coastal waters should be regulated within the "carrying capacity" of such water bodies to prevent "fish kill." This would entail intergovernmental coordination and multi stakeholder efforts to come up with evidence-based indicators for lake/river/coastal health, as well as a monitoring system and enforcement mechanism that is efficacious.

There is a need to review the fees and basis for awarding fishpond leases and permits to consider the traditional rights of fishers and fishing communities and within shorter time periods that will allow for a more rational way of accessing water resources. Strengthening institutional mechanisms and sustaining multi sectoral participation in water quality management are essential to promote water quality management. Although the responsibility for monitoring may be delegated to provincial or local government agencies, support must be shared for maximum results.

Good aquaculture practices such as the use of settling ponds, recirculating water systems, and probiotics for preventing shrimp diseases and "self-pollution" of brackish water ponds should be applied. Integrated multi trophic aquaculture is an ecosystem approach in integrated marine aquaculture that can be explored.

There is an urgent need to address climate change concerns and their impacts on aquaculture, water resources, and the diverse communities that rely on them.

12.3.3.5 Multiple/Integrated Water Resource Utilization

For this multisector or integrated water resource utilization, the policy challenge is to develop a framework to be able to continuously monitor and periodically review and assess strategies to plan and manage major water resources. It should be capable of describing and capturing the hydrologic, geomorphologic, and ecologic interactions of these systems. The understanding is that, while a science-based, computerized DSS is needed when dealing with complex, large-scale, and dynamic water systems, this tool will not replace humans (i.e., stakeholders and actors) in the ultimate planning and management decision making.

For large-scale, complex, and dynamic multi-use water resource systems, managing these systems require an understanding of the physical system (natural processes, climate, weather), social system (societal, political, economic), and human system (cultural, behavioral, lifestyles). Since there are definitely various stakeholders as well as private and government institutions involved in the governance of such multi-use water systems, there is the need to strengthen the synergy and coordination of these various stakeholders and institutions to efficiently and effectively manage such water resource systems.

12.4 Prospects and Ways Forward

12.4.1 Science-Based Water Management

Water is a fluctuating resource, making it difficult to measure in time and in space. This means that coordinating and harmonizing data collection on both spatial and temporal scales is critical. As information needs may differ at local, regional, and global levels, indicators developed for one spatial scale may not be applicable to another (UNESCO 2006).

The mandate for monitoring requires collection of standardized data for surface water quality and safety, especially for drinking water. These data are currently lodged with the DENR and DOH, respectively. There are also data collected on erosion, land movement (slides), and sedimentation in rivers currently undertaken by the DENR Mining and Geosciences Bureau in select localities, but they have not been analyzed in conjunction with their effects on water flows. Spatial-scale data collection (i.e., river basins, watersheds, lakes) has also been noted in some areas. Water-related concerns require long-term horizons. Meeting future water demand in light of climate change supply projections and pollution scenarios necessitates longitudinal data.

To this end, there is a need for an inventory, assessment, consolidation, and standardization of monitoring systems across all government agencies with built-in long-term horizons (e.g., 50–100 years), complemented by an integrated knowledge management system accessible to researchers, planners, and decision makers. Landform, aquatic, geologic, socioeconomic, and political databases (most especially local government ordinances) at applicable local spatial scale must be brought together to inform research and as bases for crafting complementary water resource plans.

Science-based data must also inform the valuation of water rights in the form of licenses and permits. To the extent that the rights to develop, extract, and distribute are determined by these permits and licenses, they must accurately reflect the current or future projected state of the resource. Much of the value of current permits/licenses do not reflect environmental services; penalties for violations of effluent standards are ridiculously outdated and do not include costs for cleanup or health impact. For example, extensive fish farming from underpriced long-term fishpond licenses and leases have resulted in fish kills; industrial and commercial discharge of untreated water into river systems have rendered many biologically dead; and uncontrolled putting up of fish cages obstructs fish migration. Without sufficient science-based data, water rights could not be an effective carrot-and-stick tool to direct behavior.

12.4.2 Governance Mechanisms

The framing of water challenges in terms of governance has allowed a broadening of the water agenda. The scrutiny of corruption, democratization processes, and power imbalances between both rich and poor countries and between rich and poor people is increasingly being accepted. Indeed, governance and politics are increasingly viewed as a part of the problem and therefore an essential part of any solution to water crises. There is enough water for everyone. The problem we face today is largely one of governance: equitably sharing this water while ensuring the sustainability of natural ecosystems. At this point in time, the Philippines has not yet achieved this balance (UNESCO 2009).

Philippine water policy suffers from lack of coherence between environmental, development, and social equity goals. The fragmentation of mandates on water among various national agencies with distinct goals (environmental preservation, agricultural productivity, population health, among others); and between levels of government (national and local) makes governance particularly challenging. A key governance reform needed is the creation of a national agenda for water and sanitation that dovetails all three goals and commits the state, regardless of changes in political-partisan leadership, to a package of policies and institutional changes. Central to these reforms is the reconstitution of the NWRB with stronger regulatory reach over all water organizations (water districts, local government-run utilities, and community-based organizations). While improvements in water district performance have been realized through the use of benchmarking tools tied to financial incentives, there is a need to extend this regulatory ambit to other types of water organizations. The rebooted NWRB must also serve as a permanent planning platform for public expenditures and investments and alternative financing on water projects. Beyond the current interagency framework chaired by NEDA, there is a need to open dialogues and decision making to those in private and non-profit sectors that have convergent interests.

The reconstituted National Water Resources Agency should have regional presence for monitoring, to be complemented by provincial-government-level monitoring of municipal water systems. In domestic water, LGUs should be discouraged as service provider; their role can be directed toward improving satisfactory and sustainable domestic water by other providers by way of supervision and policy guidance. In the same vein, NIA's role should also be streamlined toward supervising and managing headwork, setting volumetric charges at head gate and providing technical support to IAs. The move toward participatory and inclusive governance must proceed with government actors providing broad direction and steering and away from sector capture and dependency. Alternative provisioning by government in domestic, irrigation, or multi-use systems should be explored. In irrigation, public-private partnership (PPP) contractual arrangements covering management or financing or both is encouraged. Along these lines, the development of large-scale water resource systems (dams, lakes, reservoirs, river works) could be treated as public works with multi-century horizons, but which actual distribution could admit

more participation by local stakeholders with productivity, food sustainability, and social policy as entry points. To bridge national policy and local preferences, decisions on water must be a locally devolved process, giving IAs and community-based domestic water organizations (e.g., barangay and rural waterworks) the ability to adjust tariffs in line with their poverty situation.

Regulation and monitoring could only be realized with permanent science and technology support. These tasks could be given to regional water resource centers housed within local academic institutions with built-in expertise. These water resource centers can serve as data collectors and repositories. It should also have the capacity to acquire real-time data through satellite imagery and cellular network.

Reliance on the punitive provisions of the law, in the light of serious administrative shortcomings, is not expected to generate desirable effects on water demand. Rather, a combination of market incentives (i.e., promoting devices and technologies to decrease water use and manage losses; grey water reuse and recycling) and non-price programs for inculcating "water-friendly" behavior is needed. To this end, information, education, and communication materials intended for water conservation and recycling should be based on the adaptive capacity of society as a resource.

Given these shortcomings, reforms in water policy should be directed in these areas: (1) strengthened NWRB in the form of a Water Department with robust regulatory, coordinative, oversight, conflict resolution, and overall planning capabilities for all watershed-based use and allocation decisions to meet broad national goals; (2) polycentric governance arrangements that admit informal actors, indigenous and customary rules, and conflict-resolution mechanisms, alongside those prescribed by law; (3) clarity and local grounding of state property rights to water, but with accommodation of communal and private rights claims; (4) institutional arrangements for water governance based on the physical connectivity of surface water resource (upstream, midstream, downstream) and between water, land, and forest resources; (5) substantive decentralization that puts meaningful decision making on water concerns at the local level, through inclusive and participatory platforms with government, the private sector, and civil society; and (6) science and empirics-based decision making through the institutionalization of research centers that generate accurate water data.

Water pricing as a policy instrument for water allocation in the Philippines needs a lot of improvement. Within the domestic sector, water price varies from block pricing practiced by the water districts to free water delivered by community-based water service providers. Across sectors, agriculture is the highest consumer of water. Irrigation service fee is currently proposed to be scrapped, in effect making this a free commodity. Water pricing is a complex issue because of the perception that water is not only an economic good but also a public good. Access to water is a human right, therefore governments need to ensure that this is so. Water is also an integral part of the ecosystem as a natural resource. Given these, the Philippines should be able to design a water pricing policy across sectors that will entice more efficient use by consumers and make it a self-sustaining enterprise for the water supply industry.

Furthermore, payment of environmental services as a policy instrument to pay the upland stakeholders for the conservation measures they need to conduct so there will be sustainable water supply in the lowlands was piloted in some areas of the country. Its replication to other areas will be determined by the availability of institutions that will pursue this and the availability of data that will be used in the valuation process, as resource valuation is contingent upon the community's own perception of values. This means that planning for water use should seriously consider the watershed as a unit of planning.

12.4.3 Overcoming and Adapting to Driving Forces

It is crucial to overcome or adapt to the different driving forces such as demographic factors, urbanization, land use change, and climate change for the future generations not to inherit a legacy of declining and poor quality water resources. Incidentally, many of these factors are outside the water resource sector and hence are not being taken into account by existing water policies and governance mechanisms. Meeting the water sustainability challenge requires an understanding of the complex and interrelated drivers of unsustainability and an acceptance of high-quality water as a human right (Schnoor 2015). It also requires a holistic and integrated approach that balances the economic, social, and environmental goals in the pursuit of sustainable water resources.

Reversing the tide of declining and degraded water resources to serve domestic and industrial sectors, agriculture, and aquaculture means implementing policies and the corresponding policy instruments in an integrated manner instead of the usual piecemeal approach. It also requires putting investments into human capacities in terms of regular monitoring of water bodies and being strict with sanctions, especially for polluters. In water planning, there is some sense in using the watershed as the unit of analysis.

12.4.4 Integrated Watershed Management

Forest cover loss in many watersheds in the country has been severe (Cruz et al. 2010). The ratio of forest cover to irrigated and irrigable lands is generally quite low, and this could have serious implications on soil erosion and the availability and quality of water for irrigation, domestic, and power requirements. The fight toward ensuring water sustainability in the country is therefore largely hinged on the sustainable management of watersheds, which currently are under intense anthropogenic pressure.

It is crucial to adopt an integrated approach to watershed management at the local level to address multiple demands from the watershed by the different stakeholders. This requires collective efforts from different stakeholders who should be engaged in an iterative learning process of integrated situation analysis, planning, implementation, and monitoring and evaluation, guided by an agreed upon watershed vision. It also requires a new mode of collaboration that allows breaking of disciplinary and administrative boundaries, political affiliations, and institutional mandates and promotes sharing of responsibilities, resources, and accountabilities toward the common goal of pursuing water sustainability. Realizing this requires a local champion who could catalyze the process either from the LGUs, civil society, or the national government like the DENR.

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