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Catalysts and barriers in the development and implementation of payment for water ecosystem services in the Philippines: Retrospects and prospects

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ABSTRACT

The Philippines has been experiencing water-related crises affecting millions of Filipinos in recent years. In the quest for viable solutions to better manage water resources, Payment for Ecosystem Services (PES) has received significant attention because of its positive impacts on improving water provision and natural resource conservation. However, many PES-related initiatives in various watershed areas in the Philippines were short-lived. This paper assessed the implementation of PES-related initiatives in various parts of the country and identified the catalysts and barriers in developing and implementing Payment for Water Ecosystem Services (P-WES). The paper also addresses the dearth of literature on PES in developing countries. Based on the Preferred Population, Interest, Context, Scope, and Time (PICoST) approach, the literature review was complemented with field research in seven (7) sites. Increasing demand for water while there is a decreasing water supply was the primary factor that led to the PES and PES-like initiatives. Catalysts and barriers were further analyzed based on the three

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KEYWORDS

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pillars – science, economics, institutions, and governance. A well-defined framework, data for decision-making, functional markets, buyer-seller satisfaction, participatory/collaborative approaches, and capacitated stakeholders were identified as some of the catalysts. Among the barriers were issues related to site specificity, data, communication, administration, monitoring and evaluation, markets, valuation, policies, and enforcement. Prospects include PES as tools for natural resource conservation, sustainable financing mechanisms, localized modalities, knowledge enhancement, and institutionalized schemes. To realize the full potential of PES, its development and implementation should go beyond the local levels, and the enactment of a national PES policy is recommended to support this.

INTRODUCTION

Since 2015, the Global Risks Report has consistently highlighted water-related crises as one of the leading intercontinental threats (WEF 2021), which can even trigger future migration (WEF 2022). Similarly, the Intergovernmental Panel on Climate Change (IPCC) report revealed that approximately half of the global population suffers from severe water scarcity annually, driven by climatic and non-climatic factors (Caretta et al. 2022). In the Philippines, rudimentary and unsustainable water sources are responsible for nine million Filipinos experiencing water shortages (Palanca-Tan 2020).

The increasing imperative to effectively manage the country's water resources has spurred the development of innovative strategies. Among these, one solution that has received substantial global attention is an incentive-based instrument for conservation known as Payment for Ecosystem Services (PES), which first gained prominence in the 1980s (Gómez-Baggethun et al. 2010; Sattler and Matzdorf 2013; Wunder 2015). It works on the principle that the beneficiary will compensate the provider of a well-defined ecosystem service (ES) for the sustainable provision of the ES (van Noordwijk et al. 2012; Sattler and Matzdorf 2013; Wunder 2015; Engel 2016). Studies have shown its positive impacts on all five asset types of the sustainable livelihood framework— financial, natural, physical (Alix-Garcia et al. 2014), human, and social assets (Leimona et al. 2015).

PES-like activities in the Philippines may be traced back to the 1930s (i.e., the Balian Subwatershed in Laguna) (Rosales 2003). Over the years, PES has gained acceptance as a feasible strategy for advancing environmental conservation in the Philippines (Macandog 2016).

Despite the value of PES in the Philippines, implementation proves to be a challenge (Rosales 2003; Macandog 2016). Literature analysis reveals the dearth of assessment of PES implementation of PES or PES-like schemes in the country. This study aims to assess the implementation of the PES-related initiatives in various parts of the country to identify the catalysts and barriers to improving the development and implementation of Payment for Water Ecosystem Services (P-WES). Further, the study seeks to address gaps in the literature concerning PES in developing countries.

METHODOLOGY

The study was conducted from February 1, 2022, to January 31, 2024. The assessment of PES-related initiatives was carried out in two phases: first, the collation of P-WES-related literature, followed by the synthesis of field data and a systematic literature review -- a proven methodology for consolidating information from various sources (Sirelkhatim and Gangi 2015). Field research yields additional information and validates the accuracy of findings presented in the literature (Tmušić et al. 2020).

Phase 1: Collation of P-WES-Related Literature

Two open-source search engines were utilized – Google Scholar and ScienceDirect. Google Scholar is one of the most inclusive databases for a wide range of disciplines (Martin-Martin et al. 2021), while ScienceDirect covers peer-reviewed publications from at least 256 disciplines (Mengist et al. 2019). The boundary of the review was defined based on the Population, Interest, Context, Scope, and Time (PICoST) approach, which determined the criteria for selection (Table 1). The keywords used in the search were "payment for ecosystem services," "payment for environmental services," "compensation," "rewards for watershed services," "water ecosystem services," "PES-like," "Southeast Asia," and "Philippines." Literature without direct reference to PES/PES-like initiatives in the Philippines was excluded from the analysis.

Table 1: Scope of the literature review following the PICoST approach (adopted from Thomas et al. 2021).

PICoST Elements	Operationalized Definition based on the Review
Population (P)	PES and PES-like initiatives in the Philippines focusing on water ecosystem services
Interest (I)	Empirical evidence capturing the catalysts and barriers in the implementation of PES and PES-like schemes in the Philippines
Context (C)	Nexus of PES and water ecosystem services in the Philippines
Scope (S)	Peer-reviewed (i.e., journals, books, and book chapters) and grey literature (i.e., proceedings; policy brief; conference papers; reports and working papers)
Time (T)	Published from 2000 to 2022

The fundamental tenet of PES is that there is a provider and beneficiary of ES, wherein the beneficiary pays the ES provider for the sustainability of ES provision. PES may either be based on the Coasean or Pigouvian theorem, where the former fosters discussion among stakeholders to reach an agreement (consensus-building), while the latter favors the implementation of taxes or subsidies to alleviate negative externalities. Coasean-based definitions are voluntary, whereas payments in Pigouvian-based definitions are mandatory.

Phase 2: Synthesis of Data from Field Research and Literature

Guided by the current discourse on PES in the Philippines, focus group discussions (FGDs) and key informant interviews (KIIs) were conducted in seven sites (see Table 2) to broaden the findings from the review by capturing the realities on the ground. These sites were chosen based on (1) representation from the three major islands (Luzon, Visayas, Mindanao); (2) presence of enabling legal mechanisms; (3) clearly defined tenure and P-WES actors; (4) site maturity where the site is beyond piloting or inception stage; and (5) data availability. The FGDs and KIIs inquired about the PES arrangement, science aspects (e.g., state of the ecosystem, changes that occurred after PES implementation), economic aspects (e.g., valuation of water ecosystem services, payment vehicle), and institutions and governance aspects (enabling mechanisms, jurisdiction and accountability). The collated materials and outputs of the

discussions were then analyzed using NVIVO 12 Plus, a qualitative data analysis software for various qualitative methodologies (Hilal and Alabri 2013).

Table 2: Selected case study sites and summary of results of FGD and KII

Sites (watershed, province)	Respondents	Summary of Findings
Balian sub-watershed, Laguna *(Site 1)*	Samahang Balian sa Pagpapauwi ng Tubig Inumin (SBPTI), Barangay Balian community, Metropolitan Waterworks and Sewerage System (MWSS)	Balian sub-watershed is being managed by community organization SBPTI since 1925; SBPTI lobbied the local government to allow the establishment of the water system in Balian. It was in 1992 when SBPTI was recognized as the governing body of the Balian spring and water system. For maintenance, SBPTI collects monthly water fees from households with 15% commission. Monthly charge is agreed through a general assembly. Meanwhile, contribution to sub-watershed management is on a voluntary basis. Around 30% of the household beneficiaries refuse to pay monthly fees.
Angat-Ipo watershed, Bulacan and La Mesa sub-watershed/ Manila Water, Manila *(Site 2)*	MWSS, Manila Water Foundation, Manila Water Company, Inc., Maynilad Water Services, Inc., National Power Corporation (NPC/NAPOCOR), Indigenous peoples (Dumagat), Bantay Gubat personnel,	The Angat-Ipo and La Mesa dams are managed by the MWSS by virtue of a public-private partnership (PPP) arrangement between the national government and two concessionaires, Manila Water Company, Inc. (East Zone) and Maynilad Water Services, Inc. (West Zone) awarded in 1997. This resulted in the creation of Manila Water, a joint venture among business groups. The Angat-Ipo and La Mesa water reservoirs are interconnected. Ipo and La Mesa dams depend on the health of the Angat Watershed Reservoir which is managed through the watershed rehabilitation and management funds provided by NPC. Meanwhile, Manila Water and Maynilad each contribute to the forest protection fund, which is ultimately charged against water fees paid for beneficiary households in Metro Manila and surrounding provinces. As part of the initiative to ensure that government policies (i.e., banning of kaingin, logging, and wildlife poaching) are implemented, a Bantay Gubat (Forest Watch) Program was established, involving the Dumagat indigenous peoples.
Bago River watershed, Negros Occidental (*Site 3)*	Department of Environment and Natural Resources (DENR), City Environmental Office of Bago City, Bago City Water District (BACIWAD), Kanlaon Green Brigade (KGB)	In 2011, PES was introduced by virtue of a local ordinance, as a sustainable source of funding for upland farmers' watershed protection services. Payment is made through water fees collected by the water district, irrigation fees collected through water irrigation associations, and 5% annual business tax. A Bago River Watershed Management Council (BRWC) was organized to serve as a local governance body and to provide oversight supervision and direction over the management and development of the watershed. To sustain environmental initiatives, the city local government also enacted an ordinance on 2016 imposing an Environmental Protection Fee (EPF).
Baticulan watershed, Negros Occidental (*Site 4)*	Planning, City Waterworks, and Environmental Offices of San Carlos, DENR-Cadiz City	In 2002, local organization San Carlos Development Board, Inc. (SCDBI) commissioned a comprehensive study on the status of water in San Carlos City and found that the water in the city is becoming insufficient. As a response, the San Carlos City local government enacted a local ordinance in 2004 imposing an environmental protection fund which is added to the water bill of the users. The environmental fee is used in watershed rehabilitation and management. The

		implementation of the watershed management initiatives is guided by the San Carlos City Master Development Plan.
Mt. Banahaw watershed, Quezon (*Site 5)*	Pinagdanlayan Multi-Purpose Cooperative (PMPC), Barangay Pinagdanlayan, Municipality of Dolores, DENR	In 2000, Barangay Pinagdanlayan local government initiated the collection of voluntary payments for the extraction of water from Niño and Lagaslas springs as a contribution for the maintenance of public pumping areas. From 2000-2019, the estimated 1000 households experienced intermittent water supply. This was addressed only in 2020 when the PMPC took over the management of the water system. PMPC has the right to increase the water tariff provided that there is an evident improvement in the water supply with a reasonable basis for the price increase, as agreed by the Barangay local government and PMPC,
Mt. Kitanglad Range Natural Park / Manupali watershed, Bukidnon (*Site 6)*	Mt. Kitanglad Range Natural Park (MKRNP) Protected Area Management Office (PAMO), Provincial Environment and Natural Resources Office (PENRO)-Bukidnon, Bukidnon Environment and Natural Resources Office (BENRO), Kitanglad Guard Volunteers (KGV), Provincial Government of Misamis Oriental, Cagayan de Oro Bulk Water Inc., Samdhana Institute, Cagayan de Oro City Water District, DENR Region 10, Cagayan De Oro River Basin Council	The MKRNP is the headwaters of the Manupali watershed which provides water for agri-business industries, agriculture and for household use. The implementation of the conservation initiatives in Mt. Kitanglad has several funding sources, including local governments, commercial users, corporate social responsibility and environmental fees and penalties, channeled through the PAMO. Involved in the implementation are non-government organizations. indigenous peoples and peoples organizations.
Mt. Matutum Protected Landscape, South Cotabato (*Site 7)*	Municipal Environment and Natural Resources Office (MENRO)-Tampakan, MENRO-Tupi, MENRO-Polomolok, MENRO-Malungon, National Irrigation Authority, Office of the Provincial Agriculturist of South Cotabato, Barangay Tablu, PENRO- South Cotabato, PENRO-Sarangani, Provincial Planning and Development Office Sarangani, Provincial Agriculturist-Sarangani, Sitio Lasang community, Barangay Maltana community, and Protected Area Management Board (PAMB) – Mt. Matutum Protected Landscape, Municipal Planning and Development Office (MPDO)-Tupi, MPDO-Malungon, Local Government of Malungon, Tupi Water District, Barangay Acmonan and Barangay Miasong communities, Dole Philippines, Mahintana Foundation Inc., Provincial Agriculture Office, Polomolok Water District, Barangay Palkan, Barangay Maligo, and Barangay Landan communities, Barangay Datal Batong community	The PAMB under the DENR leads in the management of the Mt. Matutum Protected Landscape. In 2019, the PAMB issued a resolution establishing a PES scheme in Region 12. Various private enterprises pledged to provide voluntary contributions for the protection of local watersheds. In Polomolok, the private sector coordinates with the PAMB in order to contribute to environmental protection and conservation. The Polomolok Water Districts and the DOLE Philippines conduct their own tree planting activities three times a year, as well as other environmental protection and forest regeneration activities. In Tampakan, the PES scheme is underway during the time of the field visit. Their draft ordinance indicates charging of 50-centavos per cubic meter of water used. In Tupi, PES has been discussed for over 12 years but is yet to be approved. Payment mechanism will be through environmental fees that will fund rehabilitation and protection efforts. The same is the case for Malungon LGU, where PES ordinance is seen as a solution to fund water conservation efforts. However, they face numerous challenges such as regulating groundwater extraction, and possible conflict over fund distribution/ allocation.

An identification of catalysts and barriers for PES development and implementation (Figure 1), was conducted using an inductive approach guided by thematic analysis – an effective method for synthesizing and interpreting multiple datasets (Kiger and Varpio 2020).

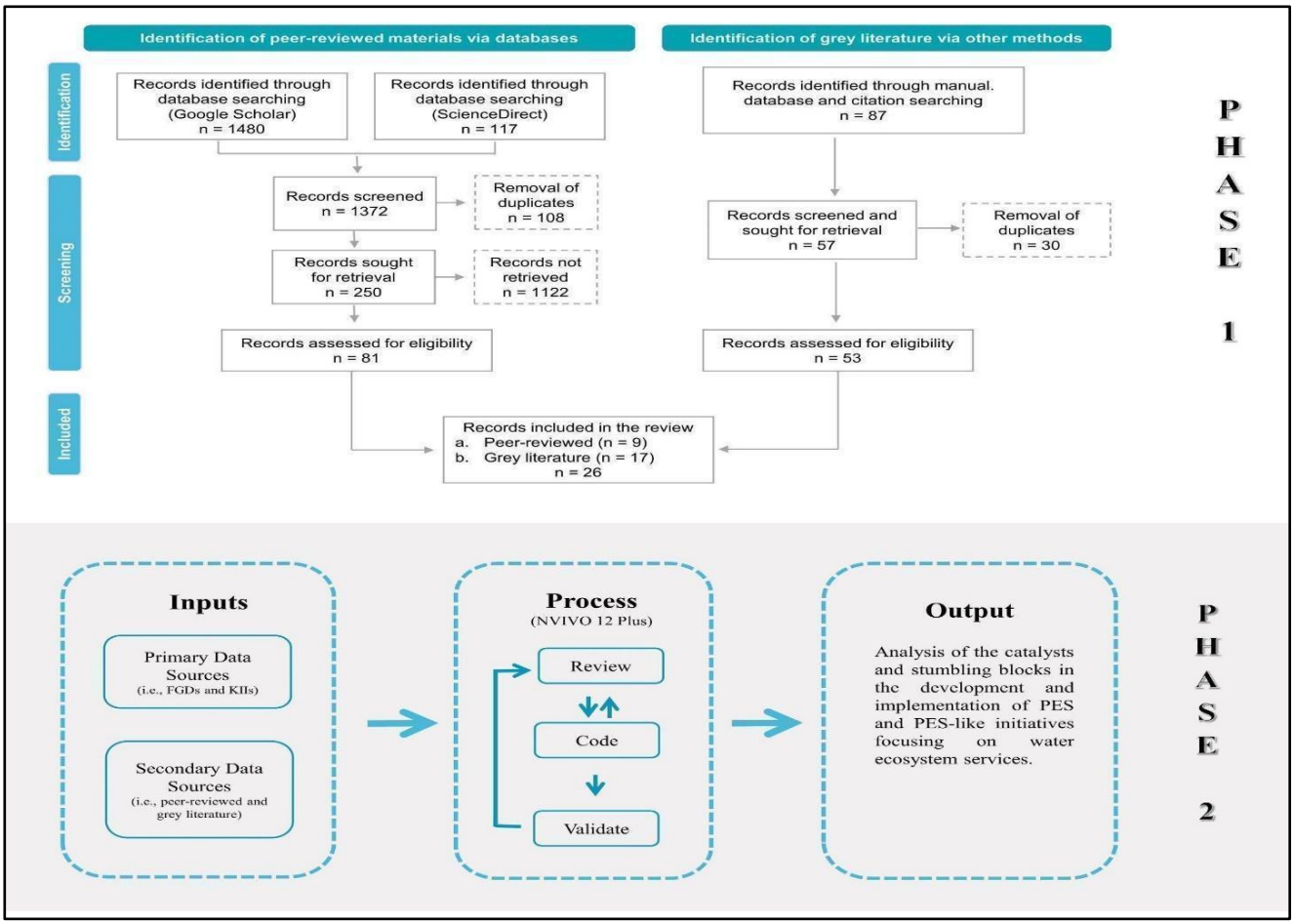

Figure 1: Methodological framework of the paper modified from Thomas et al. (2021)

RESULTS AND DISCUSSION

Retrospects of PES

Status of PES and PES-like Initiatives in the Philippines

Wunder (2008) defines PES as a *voluntary* transaction where a well-defined service (or corresponding land use) is being 'bought' by at least one ES *buyer* from at least one ES *provider* if and only if ES provision is secured (conditionality). From this definition, the study derived the three pillars of a PES scheme – science, economics, and institutions and governance. The essential factors required of PES are: "(1) a voluntary transaction; (2) a well-defined service (or a land use likely to secure that service); (3) is being 'bought' by a (minimum one) ES buyer; (4) from a (minimum one) ES provider; (5) if and only if the ES provider secures ES provision (conditionality)" (Wunder 2008). If any of these factors are absent, the scheme is identified as "PES-like."

Twenty-four PES and PES-like efforts related to watershed ecosystem services were found through a literature search, and two were identified by snowball sampling (Figure 2). These were classified into three Millennium Ecosystem Assessment (MA) ES categories (i.e., provisioning, regulatory, and cultural) (Millennium Ecosystem Assessment 2005) and their core implementers (i.e., government, civil society, private sector) (Table 3/ Appendix of Supplemental Data). The review of the 24 P-WES-related initiatives in the Philippines showed that none of the said initiatives comply with the five conditions or factors required of PES. The observed missing factors included: (1) the nature of the transaction – where the majority of the P-WES-like initiatives were paid through taxes of users; and (2) conditionality – either the provision of ecosystem services cannot be accounted for, or there is no way to monitor that the ES provider can provide ES.

Figure 2 shows the dominance of government-led initiatives and provisioning services – specifically, water supply – in the PES-like initiatives. Since PES is a market-based instrument, it can be assumed that it is highly driven by demand. Hence, in the context of P-WES, existing schemes align with the apparent resource depletion and rising demand for WES.

Modifying Engel's et al. (2008) beneficiary-based classification of PES made by this paper defines core implementers as the individuals/institutions with decision-making power over the site's activities. The dominance of local government-led initiatives, or the public sector, highlights its invaluable role as a catalyst. Scherr and Bennett (2011) describe the government as a buyer, regulator, and enabler in ecosystem service markets. They support the development of a national eco-compensation policy framework, indicating that market-based instruments could complement environmental policies.

Civil society-led initiatives exemplify PES for environmental conservation and socio-economic development. Emata and Sinogba (2016) stress that people-centered resource governance protects indigenous peoples' territorial rights, involves local users in ecosystem management and ensures inclusive decision-making processes. Furthermore, the private sector is usually a civil society and government partner rather than an implementer. According to Thompson (2021), several PES options can be made available for private corporations depending on their industrial sector, operating practices, and business practices.

Table 3: PES initiatives in the Philippines

	Site	MA Classification	Payment Mechanism
1	Angat-Ipo watershed, Bulacan and La Mesa sub-watershed/ Manila Water, Manila (National Capital Region)	Provisioning, Regulating (water supply and quality)	Monthly water bill (water tariff)
2	Bakun watershed, Benguet (Cordillera Administrative Region)	Provisioning, Regulating (water supply for domestic, industrial – energy generation), and agricultural uses, reduced sedimentation, improved dry-season flow)	Tax, levy, CSR (Electrification, Development, and Livelihood Fund as well as the Reforestation, Watershed Management, Health and/or Environmental Enhancement Fund, non-monetary incentives)
3	Sablan watershed, Benguet (Cordillera Administrative Region)	Provisioning, Regulating (water supply – energy generation), reduced sedimentation, improved dry-season flow)	Tax and CSR
4	Santo Tomas Forest Reserve, Benguet (Cordillera Administrative Region)	Provisioning (water supply)	Tax
5	Tulgao Minkagcro-hydro Power Project, Kalinga (Cordillera Administrative Region)	Provisioning (water supply – energy generation)	Tax
6	Pinacanauan watershed, Cagayan (Region 2)	Cultural, Provisioning, Regulating (water supply and quality, aesthetic beauty)	Non-monetary (training)
7	Bataan National Park and Mariveles watershed, Bataan (Region 3)	Provisioning (water supply)	Unspecified
8	Balian sub-watershed, Laguna (Region 4A)	Provisioning (water supply)	The operations of SBPTI and Lingap Kalikasan largely subsist on the voluntarism of its members.
9	Mt. Banahaw, Quezon (Region 4A)	Provisioning (water supply)	Water Bill
10	El Nido-Taytay Managed Resource Protected Area, Palawan (Region 4B)	Provisioning (water supply)	Unspecified
11	Mt. Mantalingahan Protected Landscape, Palawan (Region 4B)	Cultural, Provisioning, Regulating (water supply – lowland irrigation downstream domestic and industrial use, flood control, ecotourism)	Water bill/ Water revenue of LGU, Levy
12	Cantingas and Panangcalan watershed, Sibuyan Island, Romblon (Region 4B)	Provisioning, Regulating (water supply, flood mitigation, water for hydropower, farm and fishery production)	Levy (Environmental Fee), Water fee (Panangcalan Watershed)
13	Tubbataha Reef, Palawan (Region 4B)	Cultural (ecotourism)	User Fee System (for tourists only) Non-monetary payments (i.e., livelihood projects, coastal management program, etc.)
14	Puerto Princesa Subterranean River National Park, Palawan (Region 4B)	Cultural (ecotourism)	Unspecified
15	Bago River watershed, Negros Occidental (Region 6)	Cultural, Provisioning, Regulating (water supply, watershed protection, aesthetic beauty)	Water bills (through the Water District), Irrigation fees (through the Irrigators' Association), Business tax / licenses
16	Baticulan sub-watershed, Negros Occidental (Region 6)	Provisioning, Regulating (water supply for domestic, industrial, and agricultural uses; and water quality)	Levy (Environmental Fee)
17	Maasin watershed, Iloilo (Region 6)	Provisioning, Regulating (water supply, flood mitigation via water flow regulation)	Tax (real estate tax), User fee system
18	Mt. Kanlaon Natural Park, Negros Occidental (Region 6)	Provisioning, Regulating (water supply, biodiversity conservation, water flow regulation)	Non-monetary benefits (livelihood opportunities, community development, support for rehabilitation)

	Site	MA Classification	Payment Mechanism
19	Apo Island Protected Landscape and Seascape, Negros Oriental (Region 7)	Cultural, Provisioning (ecotourism, food, fish)	User Fee
20	Pasonanca Natural Park, Zamboanga City (Region 9)	Provisioning (water supply)	Protection and management budget of Zamboanga City Water District (ZCWD); Entrance Fee (through PAMB resolution); Charges for activities within the PA (through PAMB Resolution); Zamboanga City LGU fund allocation for conservation program
21	Mt. Kitanglad Range Natural Park / Manupali watershed, Bukidnon (Region 10)	Provisioning, Regulating (water supply for domestic, industrial, and agricultural uses, energy generation, water quality, sedimentation control)	Irrigation service fee (money or rice), non-monetary payment (livelihood assistance, employment, community conservation projects), CSR (i.e., maintenance of road system and funding for tree-planting activities along the small creeks), Tax / Levy
22	Mt. Kalatungan National Park/ Batang watershed, Bukidnon (Region 10)	Provisioning (water supply)	CSR
23	Mt. Matutum Protected Landscape, South Cotabato (Region 12)	Cultural, Provisioning, Regulating (water supply, source of food, fiber, medicine and raw materials, recreation, ES related to soils)	Voluntary PES Contribution (including CSR Fund), Water charges (cost per cubic meter)
24	Bud Bongao Local Conservation Area, Sulu (Bangsamoro Administrative Region of Muslim Mindanao)	Unspecified	Unspecified

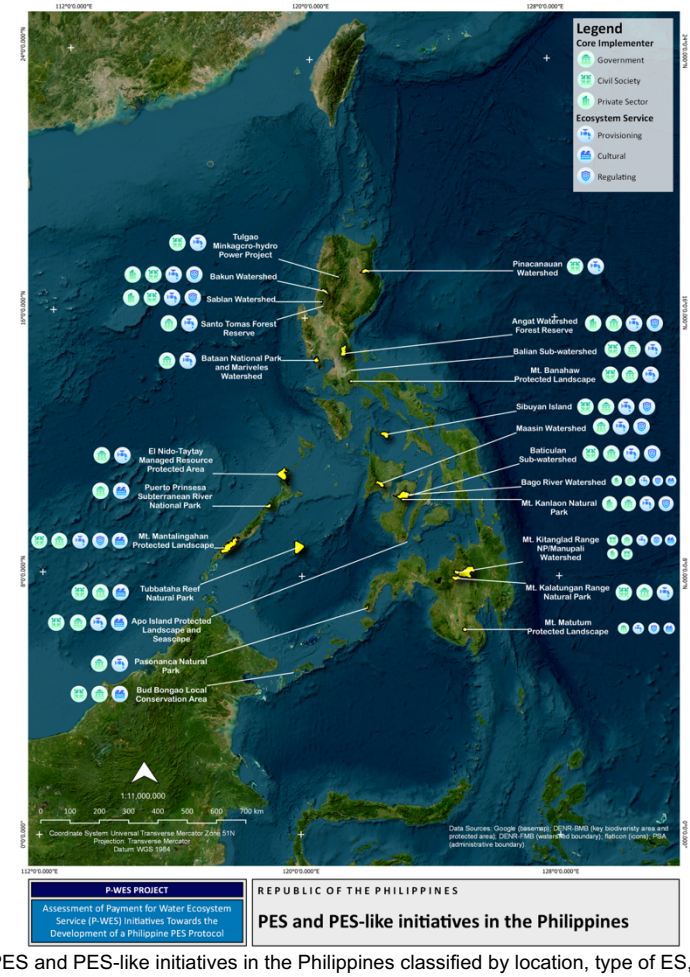

Figure 2: List of the PES and PES-like initiatives in the Philippines classified by location, type of ES, and core implementers

An example of this in the Philippines is the participation of the Bakun Indigenous Tribe Organization in the P-WES in the Bakun and Sablan watershed in Benguet (Villamor and Lasco 2009). The community supposedly receives a share from revenues from Hedcor Hydroelectric Power Plant which is the main beneficiary of the PES scheme.

In the case of the Cantingas and Panangcalan watersheds in Sibuyan Island in Romblon, non-governmental organizations like the WWF-Philippines, CARE, the International Institute for Environment and Development, and the local government unit of San Fernando initiated the establishment of the Cantingas Water Fund for watershed management in 2006. Currently, the Sibuyan Mangyan Tagabukid indigenous communities provide WES for hydropower companies, farmers, and local water consumers. Payment is made through a special levy or an environmental fee and water fee dues.

In Palawan, the majority of the PES-like initiatives for famous ecotourism sites, including Mt. Matalingahan Protected Landscape and Tubbataha Reef, were co-developed and are being co-implemented by the Palawan Council for Sustainable Development (PCSD), the Department of Environment and Natural Resources (DENR), and non-governmental organizations. There is limited data about the development of the PES initiative in the Puerto Princesa Subterranean River National Park (Puerto Princesa Underground River). However, for the three sites, the scheme is payment for cultural services through entrance fees to the sites. For Mt. Matalingahan's water supply, the end users pay for ES through their water bills.

Catalysts of PES Development and Implementation

Current literature identifies three main pillars for a successful PES scheme (Wunder 2008, Thompson 2021). These are science for the geographical scale and scope of the PES scheme, economics for the valuation and market system, and institutions and governance for the legal and social aspects of the PES scheme and its stakeholders.

The science pillar involves a well-defined framework, an association of ES with Land Use/Land Cover (LULC), and sufficient baseline data. These three factors play a major role in setting the geographic scale and scope of PES initiatives. A well-defined framework and association of LULC ensure quantification of ES and development of management, and monitoring and evaluation (M&E) strategies. Meanwhile, the third factor enables planners or managers to make evidence-based decisions, like in the Baticulan Watershed in Negros Occidental, where the San Carlos Development Board, Inc. (SCDBI) commissioned a study to address issues towards developing water management schemes.

Economically, a functional market that satisfies the demands of buyers and sellers in terms of ES delivery, adequacy and timeliness of payment, and additionality, may catalyze in the development and implementation of PES. The Environment Protection Fund (EPF) of Bago City in Negros Occidental, for example, was used to legalize and support the city's charcoal-making industry, which was both economically and environmentally sustainable.

The pillar for institutions and governance deals with the legal and social aspects of the PES. These include participatory and collaborative approaches involving capacitated stakeholders with ample knowledge and positive attitudes towards the scheme. The enabling environment consists of an appropriate socio-political and legal institutional framework or arrangement, favorable peace and order situation, harmonized plans, clear boundaries, tenurial security, and the presence of organized communities or champions. The Balian watershed in Laguna is an example of people organizing themselves to conserve water resources and the watershed through a PES-like initiative.

Fripp (2014) describes an "institution" as a local community group, an individual, a government body, or an intermediary body (e.g., a non-governmental organization or NGO). It must have adequate administrative and technical capacity to manage and sell the ecosystem service. Implementors and users should understand the complexities inherent in the links between the governance system and the legal administrative requirements of the local government unit or LGU (Fripp 2014).

Figure 3 shows the catalysts of P-WES development and implementation. A detailed blueprint of the P-WES Scheme is essential, with the P-WES actors having clear roles and responsibilities towards sustaining the provision of ES. Furthermore, what constitutes a P-WES scheme is vital in establishing a national protocol for P-WES in the Philippines, especially since a strict Coasean definition may rule out other P-WES-like initiatives like San Carlos City's environmental fee, which leans towards the Pigouvian definition.

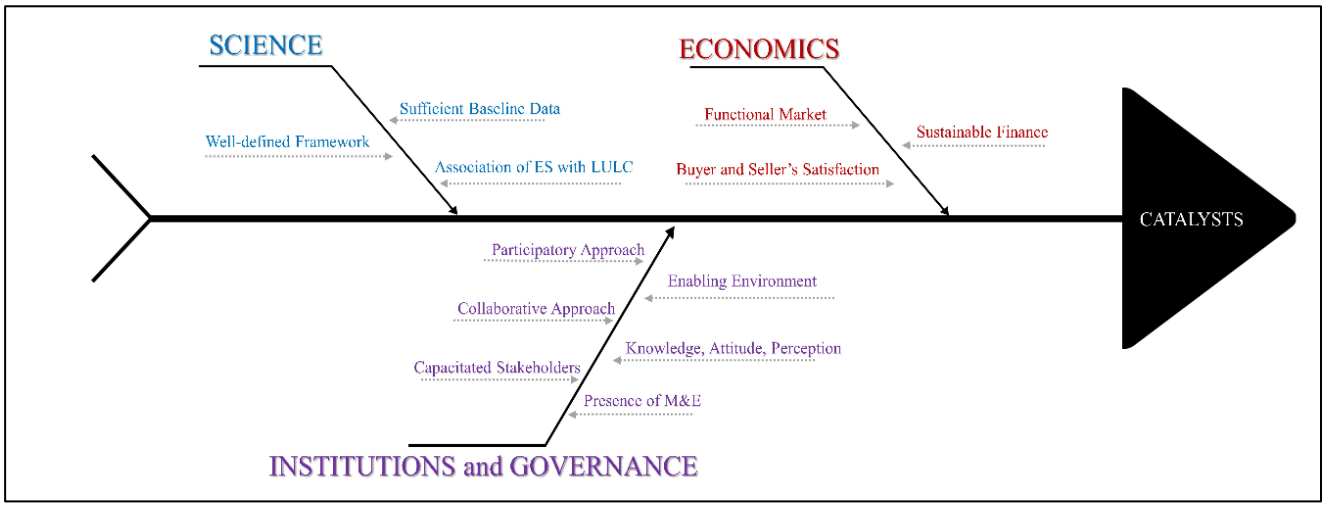

Figure 3: Catalysts in P-WES Development and Implementation.

Socioeconomic objectives are pursued along with environmental objectives. Pre-assessments, valuation studies, and willingness-to-pay (WTP) surveys are needed to generate biophysical and socioeconomic data for decision-making (e.g., spatial targeting). The PES actors must be aware of how LULC influences the provision of ES. The cases of Mt. Kitanglad Range Natural Park in Bukidnon, Balian Watershed in Laguna, and Mt. Banahaw in Quezon, showed how the stakeholders' awareness led to more sustainable environmental practices.

In the case of Mt. Matutum Protected Landscape in South Cotabato and Mt. Kitanglad Mountain Range or the headwaters

of the Manupali watershed in Bukidnon, establishing baseline data on the ecosystem services and the LULC is challenging because of the wide scope of the site itself with Mt. Matutum measuring 15,600 hectares and Mt. Kitanglad at 40,176 hectares. These areas provide services for a wide range of stakeholders under different government sub-units. For these protected areas, the involvement of the DENR and Protected Area Management Board (PAMB), together with local government units is critical, not only in the science aspect but also in institutional and economics.

Barriers to PES Development and Implementation

A major factor that impedes PES development and implementation is the site specificity of P-WES because it is affected by calamities, disasters, and natural processes. This is also where the disparity between the theoretical PES definition and actual PES implementation is observed. Planning, management, and M&E may be challenging due to unsustainable practices, species selection issues, poor spatial and social targeting, non-monitoring of impacts, and vague attribution and conditionality.

Data constraints hamper the science-based decision-making process, thereby affecting the economic aspect. These results in inadequate or inaccurate WES valuation and often underestimation of WES. Market failure hinders the establishment of a PES market. Conversely, drawbacks of incentives include the bandwagon effect, the presence of free riders, crowding out, high opportunity costs, and human displacement. Other bottlenecks include the lack of funding or financial management and the mismatch between stakeholders' interests, willingness to pay, and the costs of ecosystem services. The negative perception of "payment" may be a barrier as well.

FOREST EUROPE (2016) emphasizes that the final selection of a valuation method will depend on the services to be valued and their context, as well as on geographical scope, data and time availability, financial resources, and experience of the valuation team.

Jack et al. (2008) stress that the rationale for a PES approach is that the recipients of the services have some measurable value or "willingness to pay" for those services and that converting the demand into funding that reaches the suppliers of ecosystem services is a central challenge of PES schemes. They compare the beneficiaries' actions when services are linked to an excludable and non-excludable good. With climate stabilization or biodiversity, for example, there will be an incentive for not paying on the part of the beneficiaries, as people are unlikely to pay for something they can receive for free. Thus, placing a value on an ES may not necessarily lead to payments from beneficiaries.

High transaction costs for implementing PES schemes may also be a constraint. Jindal and Kerr (2007) describe that transaction costs can be divided into two broad categories: (1) ex-ante or initial costs of achieving an agreement, and (2) ex-post or costs of implementing an agreement. According to them, PES programs face costs related to searching for program partners, negotiating/complying with contracts, obtaining necessary approvals, monitoring program activities, and insuring against the failure to secure the ES. For instance, they found that transaction costs for carbon sequestration projects ranged from 6% to 45% of the total PES cost.

For the institutional aspect, five impediments were identified: (1) policy issues that may include unclear and overlapping political boundaries, tenurial insecurity, and institutional fragmentation; (2) lack of capacity among stakeholders leading to distrust, unfavorable attitudes, low levels of knowledge and skills, low motivation and the lack of tangible assets; (3) weak enforcement and inadequate monitoring and evaluation; (4) participation issues which include non-inclusive decision-making and benefit-sharing, presence of too many actors or conflict among them, and unclear link between buyers and sellers; and (5) weak administration system that includes politics, transparency, and accountability concerns.

Illustrated in Figure 4 are the barriers to PES development and implementation. These demonstrate the significance of more inclusive systems, such as a bottom-up approach that can address the many issues through effective communication. Given the interconnectedness of the three pillars — science, economics, and institutions and governance — designing the PES schemes calls for a holistic approach to sustainability. Considering the catalysts and barriers of each pillar can allow the government, civil society, and private sector to create efficient and effective PES schemes. Although PES renders potential benefits or solutions that cut across environmental, economic, and institutional aspects, the findings of this paper remind us that PES is not a panacea for all environmental services (Engel 2016, Muradian et al 2013). It is not easily implementable but requires proper planning, implementation, monitoring, and evaluation.

Prospects of PES

The study points to five prospects for PES and PES-like initiatives in the country. These are (1) PES as a tool for natural resource conservation, (2) PES as a sustainable financing mechanism, (3) PES modalities driven by core implementers, (4) PES as knowledge enhancers, and (5) institutionalized PES schemes.

Natural Resource Conservation

PES may play a pivotal role in ecosystem health conservation and sustainability by promoting efficient and viable land use systems through economic incentives (Turpie et al. 2008; Waage et al. 2008; Wilson 2014). PES can also facilitate science-based programs. Kawasaki et al. (2020) showed that adopting nature-based approaches, such as timber-based farming systems in the Philippines, can contribute to flood mitigation. The suitability of tree species to certain areas, profitability, and ability to reduce surface run-off motivated farmers to adopt tree-based farming systems. Also, the research found existing laws that govern natural resources must be compatible with PES initiatives to avoid conflict.

Towards the sustained provision of ES, the stakeholders of the Angat Watershed Forest Reserve in Bulacan conserve Angat's natural resources through the management of the National Power Corporation (NPC), which caused an upturn in the area's forest cover. This case depicts how PES strengthens the link between ecosystem health and ES provision.

In the case of the Bago River Watershed in Negros Occidental, the city government of Bago was able to delineate the watershed with the help of the DENR. It also collaborated with various NGOs to develop a PES-like scheme for sustainable watershed rehabilitation. On this site, PES became an instrument in which an illegal and destructive activity transitioned to a more ecologically sound practice.

The case of Baticulan Watershed in Negros Occidental emphasizes the financial support that PES can provide for science-based plans and programs. The study commissioned by the local organization SCDBI on the water situation of San Carlos City provided important information on the local issues and solutions. Further, the collected funds contributed to formulating the San Carlos Watershed Management Program (SCWMP) and the San Carlos City Master Development Plan

(SCC-MDP), which aim to achieve sustainable management of the watershed and its resources.

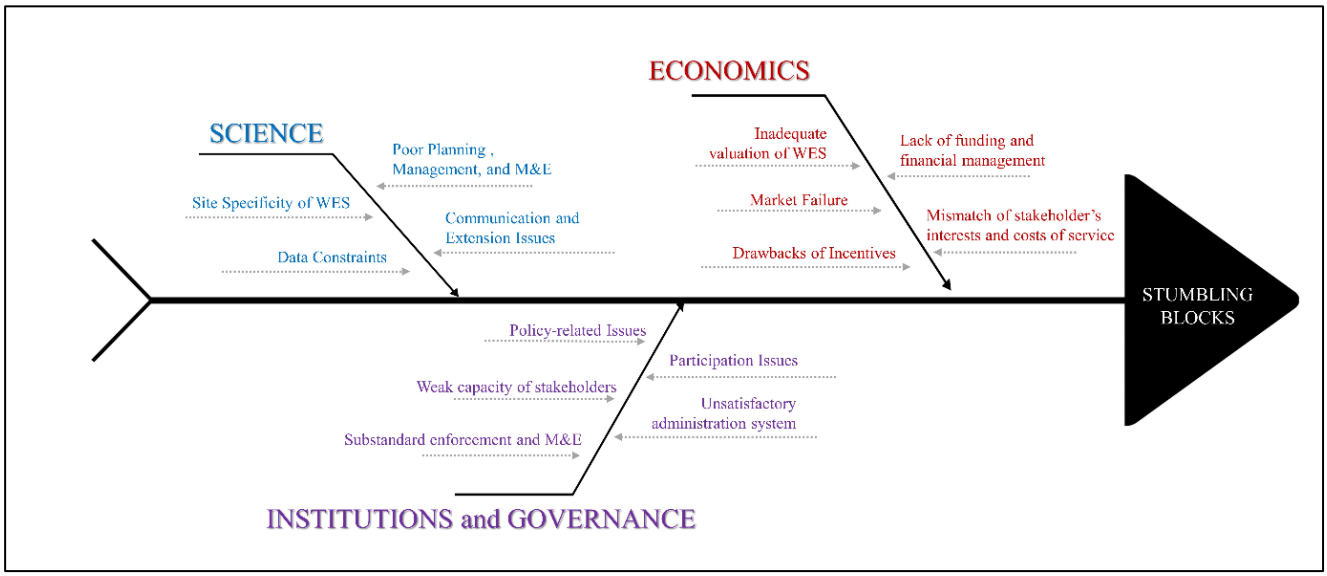

Figure 4: Barriers of P-WES development and implementation.

Overall, the selected cases demonstrate how PES reinforces science and has the potential to bridge the economic gap by implementing natural resource conservation strategies.

Sustainable Financing Mechanism

With worsening ecosystem degradation, the government can no longer shoulder the cost of its rehabilitation alone (Aryal et al. 2019). PES has the potential to future-proof conservation by making such efforts financially viable (Celeste et al. 2018). Moreover, dependency on external benefactors can consequently be reduced (Clements et al. 2020).

PES can be implemented sustainably as a financing mechanism for environmental and local resources management, with a clear governance framework and clarity of roles among all stakeholders (Emata and Sinogba 2016; Domingo et al. 2022). Bago City's local government's desire for a more sustainable funding source for watershed management led to its PES program through the Environment Protection Fund (EPF) (Table 4). The EPF was used to legalize charcoal-making while ensuring economic and environmental sustainability. The city designated a tree-production site, supplied seedlings of *Fabaceae* species, scheduled harvest, arranged permits, provided transportation, and coordinated with the DENR to reduce transaction costs.

Table 4: Collected EPF of Bago City from 2018 to 2021 (Mesias 2022).

Year	Amount Collected in Pesos
2018	2,134,417.68
2019	2,496,898.32
2020	1,594,462.42
2021 (as of June 2021)	1,733,107.66

Note: Collection has been affected by the COVID-19 pandemic in the year 2020

As to the Baticulan Watershed in Negros Occidental, the environmental fee (EF) is automatically deducted by the City Waterworks Department (CWD) and deposited into a special account called Watershed Development and Environmental Protection Fund (WDEPF), which enables stakeholders to carry out the SCWMP, a multi-year watershed rehabilitation and conservation plan managed by the SCDBI. Through the SCWMP, SCDBI provides indigenous tree seedlings, and the tree planting site has been regularly maintained for three consecutive years. From 2005 to 2017, 687 hectares were reforested under the SCWMP.

Moreover, Mt. Kitanglad Range Natural Park in Bukidnon involves a well-defined framework with a contextualized PES definition of "Protection of Ecosystem Services." These range from Corporate Social Responsibility (CSR) to environmental fees that serve as funds for ES rehabilitation and conservation.

The above initiatives illustrate PES as a sustainable financing mechanism for watershed management institutionalized through local ordinances. San Carlos City has had a stable source of funding for its water conservation activities, amounting to at least two million pesos annually since 2012. Similarly, PES in Bago City and Mt. Kitanglad Range Natural Park provided the funds to sustain water protection and rehabilitation.

Modalities driven by core implementers

The three main core implementers of PES and PES-like initiatives in the Philippines are the government (as a core implementer), the private sector, and civil society. The government and the private sector led the initiatives in the Angat Watershed Forest Reserve in Bulacan and the Bago River Watershed in Negros Occidental. The LGU of Bago City worked with the Bago City Water District (BACIWAD) and PrimeWater to develop its PES scheme.

The civil society and government core implementers can be seen in the Balian Watershed, Mt. Banahaw, Baticulan Watershed, and Mt. Kitanglad Range Natural Park. In the case of Balian Watershed, a local organization, Samahan ng Balian para sa Pagpapauwi ng Tubig, Inc. (SBPTI), collaborated with the LGU. The case of Mt. Banahaw was a management change from LGU to a local organization called Pinagdanlayan Multi-Purpose Cooperative (PMPC). On the other hand, conserving the Baticulan Watershed and its ES is a combination of efforts of various government institutions and NGOs.

Knowledge Enhancement
The implicit and explicit knowledge of stakeholders on PES provides insight into their perspectives. Awareness and desire to conserve the environment and its resources exist among the stakeholders in Angat Watershed Forest Reserve, Balian Watershed, Mt. Banahaw. However, they did not know PES and were unaware that their initiatives were under PES. On the other hand, the stakeholders of the Bago River Watershed, Baticulan Watershed, and the Mt. Kitanglad Range Natural Park were knowledgeable about PES and intended to develop PES schemes. The cities of Bago and San Carlos partnered with NGOs to develop PES schemes. These illustrate how PES mechanisms become knowledge enhancers fostering innovations as the core implementers adapt PES under varying conditions.

Institutionalized Schemes
Field research findings indicated that appreciation for PES led to institutionalizing it through local ordinances. With or without awareness of PES, it can be seen how the core implementers innovated to sustain it. These experiences, combined with global practices, can provide input for developing a hybrid PES scheme suited for the Philippine setting.

The growing interest in national capital accounting in the Philippines, as reflected in the passage of the Philippine Ecosystem and Natural Capital Accounting System (PENCAS) law (Republic Act No. 11995) on May 22, 2024, may lead to institutionalizing PES in the country.

CONCLUSION

The assessed PES-like initiatives implemented in the country are seen as promising and sustainable to some extent. While these initiatives do not comply with the PES as defined by Wunder (2008), the initiatives as illustrated by the selected sites can ensure that ecosystem services are obtained by the beneficiaries. Literature review and field research revealed that the catalysts and barriers for PES and PES-like initiatives are related to the framework, data, markets, valuation, management, M&E, communication, participation, capacities, and policies. Creating an enabling environment for PES will lead to realizing prospects for PES indicated in this study, with awareness-building and knowledge sharing providing the facilitating conditions.

Further, the development and implementation of PES entails numerous challenges. Nevertheless, it opens avenues for new research at the interfaces of governance and ecosystem services. Sustainable financing for watershed management and conservation should be explored further. Moreover, clear policy direction and national, regional, and local level commitment, are needed to implement an effective PES program. Enacting a national PES policy is recommended to institutionalize PES at various levels of governance.

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CONFLICT OF INTEREST

The author(s) declare(s) that there is no conflict of interest.

CONTRIBUTIONS OF INDIVIDUAL AUTHORS

Dr. Juan M. Pulhin (JMP) led the overall development and implementation of the study. He was supported by Dr. Canesio D. Predo (CDP) for science, Dr. Asa Jose U. Sajise (AJUS) for economics, as well as Marlo D. Mendoza (MDM) and Atty. Fritzielyn Q. Palmiery (FQP) for institution and governance aspects of the study. Dr. Catherine S. Anders (CSA), Dr. Rosario V. Tatlonghari (RVT), and Farah Y. Sevilla (FYS) aided in the analysis, editing and proofreading of the manuscript. For the data gathering, the following authors conducted the necessary activities: JMP, CDP, AJUS, FQP, CSA, MDM, RVT, Sheerah Louise C. Tasico (SLCT), Mary Beatrice S. Evaristo (MBSE), and Joylyn Bon O.L. Yu (JBOLY). All authors contributed to the data analysis and manuscript writing.

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SUPPLEMENTAL INFORMATION

Supplemental Table 1: Expanded version of Table 3 -- PES initiatives in the Philippines

	Site	Description of initiative	MA Classification	Buyer/ Beneficiaries	Providers	Enablers/ Intermediaries	Enabling Policy/ies	Payment Mechanism	References
1	Angat-Ipo watershed, Bulacan and La Mesa sub-watershed/ Manila Water, Manila (National Capital Region)	Water users in Metro Manila and surrounding provinces under the Manila Water Company and Maynilad are paying for ES through their monthly water bills. Manila Waterworks and Sewerage System a government-owned and controlled corporation spearheads the management of the watersheds with its concessionaires, and other partners.	Provisioning, Regulating (water supply and quality)	Water users	Manila Water Company, Inc. (East Zone) and Maynilad Water Services, Inc. (West Zone)	Philippine Government, Ayala Corporation, Bechtel Enterprises Inc., Mitsubishi and United Utilities	25-year concession contracts, Republic Act (RA) 6234 (Creation of MWSS), RA 6957 (Build-Operate-Transfer Law), and RA 8041 (Water Crisis Law)	Monthly water bill (water tariff)	Horbulyk and Price 2019, Hoque and Wichelns 2013, Rivera Jr. 2014
2	Bakun watershed, Benguet (Cordillera Administrative Region)	Hydroelectric companies are paying for the water ecosystem services (WES) of Bakun watershed through tax/ levy and corporate social responsibility (CSR) initiatives. Tax payments are paid and shared among LGUs, and social development and livelihood assistance is provided through CSR.	Provisioning, Regulating (water supply for domestic, industrial – energy generation), and agricultural uses, reduced sedimentation, improved dry-season flow)	Hydropower Companies (Hedcor, Inc., LFS, Lower Labay and Lon-oy, Bakun A/C Hydro, Northern MiniHydro Corporation, Luzon Hydropower Corporation)	Indigenous/ Upland Communities (Kankaney–Bago, Kankana-ey, Bago)	Bakun Indigenous Tribe Organization (BITO), LGU, Project Stakeholders (Rewarding Upland Poor for Environmental Services Project (RUPES)), NAPOCOR	National Wealth Policy, RA 7638 (creation of the Department of Energy), Certificate of Ancestral Domain Title (CADT), RA 8371 (Indigenous Peoples Rights Act), RA 9136 (Reforms in the Electric Power Industry), RA 7160 (Local Government Code)	Tax, levy, CSR (Electrification, Development, and Livelihood Fund as well as the Reforestation, Watershed Management, Health and/or Environmental Enhancement Fund, non-monetary incentives)	Boquiren 2004, Leimona et al 2015, Macandog 2016, Villamor and Lasco 2009

	Site	Description of initiative	MA Classification	Buyer/ Beneficiaries	Providers	Enablers/ Intermediaries	Enabling Policy/ies	Payment Mechanism	References
3	Sablan watershed, Benguet (Cordillera Administrative Region)	Hydroelectric power companies pay for the WES provided by indigenous communities through tax and social development and livelihood assistance. The municipal government serves as the intermediary for this PES agreement.	Provisioning, Regulating (water supply – energy generation), reduced sedimentation, improved dry-season flow)	Hydropower Companies (Hedcor, Inc.)	Indigenous communities	LGU (Municipal)	RA 9136	Tax and CSR	Abansi et al. 2014
4	Santo Tomas Forest Reserve, Benguet (Cordillera Administrative Region)	During mid-1990s, the LGU signed an MOU with the Baguio Water District (BWD), the buyer of water. The LGU receives funding from the national wealth and ensures watershed rehabilitation and management.	Provisioning (water supply)	Baguio Water District	TEAMCI (peoples organization) / local community	Agri-Communities Development Center, Inc. (NGO), DENR, LGU	Unspecified	Tax	Boquiren 2004
5	Tulgao Minkagcro-hydro Power Project, Kalinga (Cordillera Administrative Region)	The micro-hydro power was supported by the Kyosato Experimental Education Project. Electricity users pay a tariff set by the local peoples organization. Tariff is set by the cooperative's Board, also to cover the honorarium of	Provisioning (water supply – energy generation)	Unspecified	Tulgao-Dananao Micro-Hydro Power Cooperative (TDMHPC)	Episcopal Diocese of Northern Philippines (EDNP), SIBAT Inc.	Unspecified	Tax	Boquiren 2004

	Site	Description of initiative	MA Classification	Buyer/ Beneficiaries	Providers	Enablers/ Intermediaries	Enabling Policy/ies	Payment Mechanism	References
		operators and collectors, expenses for repair and maintenance, and savings for other projects and repairs.							
6	Pinacanauan watershed, Cagayan (Region 2)	REECS facilitated the establishment of the PES scheme where tour operators provide trainings in exchange for upland farmers' forest regeneration efforts and maintenance of agroforestry farms.	Cultural, Provisioning, Regulating (water supply and quality, aesthetic beauty)	Households, farmers with irrigated lands, tourists and tour operators	Upland farmers	Resources, Environment, and Economics Center for Studies, Inc. (REECS)	Unspecified	Non-monetary (training)	Amponin 2008
7	Bataan National Park and Mariveles watershed, Bataan (Region 3)	Water users pay for WES provided by the watershed. The PES initiative is coordinated with LGU and private sector stakeholders.	Provisioning (water supply)	Private Sector, Local Government Unit (LGU)	Unspecified	LGU	Unspecified	Unspecified	DAI Global et al. 2021
8	Balian sub-watershed, Laguna (Region 4A)	SBPTI collect fees from water users to be used for the management of the water system, as well as watershed protection and rehabilitation activities.	Provisioning (water supply)	Local households	Samahan ng Balian para sa Pagpapauwi ng Tubig, Inc. (CBFM-PO), Lingap Kalikasan	Samahan ng Balian para sa Pagpapauwi ng Tubig, Inc. (SBPTI); local government; Lingap Kalikasan (NGO), Southern Tagalog Rural Assistance Programs or STRAP (NGO), DENR	w/ tenure (CBFMA)	The operations of SBPTI and Lingap Kalikasan largely subsist on the voluntarism of its members.	Contreras 2004, Macandog 2016, Rosales 2003
9	Mt. Banahaw, Quezon (Region	Household water users pay for WES	Provisioning (water supply)	Water users in Brgy.	Pinagdanlayan Multi-Purpose	Brgy. Pinagdanlayan,	Unspecified	Water Bill	Field research

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	4A)	through their water bills. The fund is collected and managed by the PMPC.		Pinagdalayan (i.e., at least 1000 households), Brgy. Manggahan (i.e., around 300 households), and Brgy. San Mateo (i.e., about 10 households)	Cooperative (PMPC)	Department of Environment and Natural Resources (DENR) (including the Protected Area Management Board (PAMB) of Mt. Banahaw), Municipal and Provincial Government, Department of Social Welfare and Development (DSWD)			
10	El Nido-Taytay Managed Resource Protected Area, Palawan (Region 4B)	The DENR established the El Nido Taytay Managed Resource Protected Area Management Board. They impose a conservation fee for visitors in the area. The Board also accepts donations.	Provisioning (water supply)	Unspecified	Unspecified	Unspecified	Palawan Council for Sustainable Development (PCSD) Resolution	Unspecified	DAI Global et al. 2021
11	Mt. Mantalingahan Protected Landscape, Palawan (Region 4B)	Indigenous communities collect water use fees of downstream users through the water bills, which is intended for watershed conservation. Further, they also receive a share from the tourist entrance fees. The mechanism was	Cultural, Provisioning, Regulating (water supply – lowland irrigation downstream domestic and industrial use, flood control, ecotourism)	Water Users / Waterworks customers	Brooke's Point Rural Waterworks and Sanitation Association, Incorporated (BPRWSAI), LGU-run Brooke's Point Waterworks System (BPRWS), Upstream Communities	LGUs, PAMB, Project Stakeholders (Protect Wildlife)	PAMB Strategic Environmental Clearance, PCSD Resolution, PAMB Resolution, LGU Ordinances, LGU Revised Revenue Code	Water bill/ Water revenue of LGU, Levy	DAI Global et al. 2021

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		facilitated through the support of Protect Wildlife.							
12	Cantingas and Panangcalan watershed, Sibuyan Island, Romblon (Region 4B)	The hydropower companies and water consumers pay for the WES through environmental and water fee. Part of the fund to be collected is supposed to support the implementation of the Mangyan Tagabukid's Ancestral Domain Management Plan.	Provisioning, Regulating (water supply, flood mitigation, water for hydropower, farm and fishery production)	Local Water Consumers / Water Users (Hydropower Companies, Industries, Lowland Inhabitants, Irrigation Communities)	Indigenous/ Upland Communities (Mangyan Tagabukid Tribe, Sibuyan Mangyan Tagabukid)	LGU, Kabang Kalikasan ng Pilipinas (NGO), WWF, CARE International, PANLIPI, DENR, National Commission on Indigenous Peoples (NCIP), International Institute for Environment and Development (IIED) secured funds from DGIS and DANIDA	Local Ordinance, CADT, R.A. 8371	Levy (Environmental Fee), Water fee (Panangcalan Watershed)	Cremaschi et al. 2013, Macandog 2016, Villamor and Lasco 2009,
13	Tubbataha Reef, Palawan (Region 4B)	Fee-sharing agreement was institutionalized after a series of consultation meetings with the WWF-Philippines, government officials, NGOs, boat operators, diver groups, and the communities in Cagayancillo. Tourists, mostly composed of SCUBA divers, are required to pay for a conservation fee for every visit. There is also a fee for vessel	Cultural (ecotourism)	Recreational scuba divers; Philippine Navy	Palawan Council for Sustainable Development (PCSD); DENR or Tubbataha Protected Area Management Board (TPAMB); local government and fisher folk of Cagayancillo	WWF-Philippines; UNDP-GEF, Packard Foundation, JICA, Marine Parks Center of Japan, local and international conservation organizations, and UNESCO	Tubbataha reefs was declared a World Heritage Site on 11 December, 1993 by UNESCO	User Fee System (for tourists only) Non-monetary payments (i.e., livelihood projects, coastal management program, etc.)	Macandog 2016

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		entry. This collected fund is expected to cover the costs in protecting the reefs.							
14	Puerto Princesa Subterranean River National Park, Palawan (Region 4B)	The visitors in Puerto Princesa Subterranean River National Park pay a fee to enjoy cultural services.	Cultural (ecotourism)	Unspecified	Unspecified	Unspecified	Unspecified	Unspecified	DAI Global et al. 2021
15	Bago River watershed, Negros Occidental (Region 6)	Watershed beneficiaries, including households, business establishments and industries, pay for various ES through the water bills, irrigation fees, and business tax. The water fee for the business sector was institutionalized through the Local Revenue Code of Bago City and incorporated in the business permit at a rate of 5% of the business tax due per year.	Cultural, Provisioning, Regulating (water Supply, watershed protection, aesthetic beauty)	Agricultural, commercial, industrial, households, hotels and tourism establishments	Upland farmers (Farmers of Kanlaon Green Brigade)	LGU	Local Ordinance (Local Revenue Code of Bago City)	Water bills (through the Water District), Irrigation fees (through the Irrigators' Association), Business tax / licenses	Field research
16	Baticulan sub-watershed, Negros Occidental (Region 6)	The local government of San Carlos initiated the PES scheme in Baticulan watershed. Water users pay for the	Provisioning, Regulating (water supply for domestic, industrial, and agricultural uses; and water quality)	Domestic, Industrial, and Agricultural Water Users	Upland Communities, Upland Private Landowners, San Carlos Development Board, Inc (SCDBI)	Genesys Foundation, San Carlos LGU, San Carlos Development Board, Inc (SCDBI)	Local Ordinance (Ordinance Nos. 2004-37, 2012-08)	Levy (Environmental Fee)	Almaden 2014, Macandog 2016, Villamor and Lasco 2009

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		WES through environmental fees.							
17	Maasin watershed, Iloilo (Region 6)	The PES scheme started when Metro Iloilo Water District (MIWD) voluntarily reached out to the Maasin local government to provide funds for watershed protection, which was used for social forestry efforts.	Provisioning, Regulating (water supply, flood mitigation via water flow regulation)	Domestic, Industrial, and Agricultural Water Users, MIWD	People's Organization (CBFM-POs, KAPAWA), Upland Communities and Landowners	DENR, NEDA, ADB, Overseas Economic Cooperation Fund, JBIC, Ford Foundation, LGU (Provincial and Municipal), Katilingban sang mga Pumuluyo nga naga-Atipan sang Watershed sang Maasin (POs), Kahublagan Sang Panimalay Foundation, KSPFI (NGO), Maasin Multi-sectoral Task Force, Tigum-Aganan Watershed Management Council, Iloilo Watershed Management Council	Community Based Forest Management Agreement, R.A. 7160, R.A. 7586 (Network of Integrated Protected Areas System Act), R.A. 7638, R.A. 9136, Executive Order No. 318, Local Ordinance (Ordinance No. 200-41)	Tax (real estate tax), User fee system	Arocena-Francisco 2003, Cremaschi et al. 2013, Macandog 2016
18	Mt. Kanlaon Natural Park, Negros Occidental (Region 6)	Private company La Tondeña Distillers provide technical assistance to upstream communities as compensation for watershed protection services.	Provisioning, Regulating (water supply, biodiversity conservation, water flow regulation)	Kanlaon Spring Water Plant of the La Tondeña Distillers, Inc.	Ilijan Development Organization (IUDO, CBFM-PO), Indigenous Communities and Migrants, Private Upland Landowners,	La Tondeña Distillers, Inc., NGOs, Multi-Sectoral Alliance for the Development (MUAD), Philippine Business for Social Progress (PBSP), PAMB	R.A. 7586, CBFM, Presidential Decree No. 1005, Executive Order No. 263	Non-monetary benefits (livelihood opportunities, community development, support for rehabilitation)	Arocena-Francisco 2003, Macandog 2016

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19	Apo Island Protected Landscape and Seascape, Negros Oriental (Region 7)	Zones have been created to accommodate various economic activities, such as scuba diving and fishing. The management board collects entrance fees from scuba divers, generating a substantial amount of revenue over the years.	Cultural, Provisioning (ecotourism, food, fish)	Scuba divers, Fishermen, Tourists	LGU, PAMB	LGU, PAMB, BFAR, Siliman University (Academe), MMC, Philippine Coastguard, Philippine Constabulary-Integrated national police	PAMB Resolution, Municipal Resolution, Proclamation No. 1801, Proclamation No. 438, R.A. 7586	User Fee	Rosales 2003
20	Pasonanca Natural Park, Zamboanga City (Region 9)	Pasonanca Natural Park is the main source of water for Zamboanga City. To protect the area, the Zamboanga City Water District supported the forest protection program where blue guards are assigned to ensure that there are no illegal activities in the area. PA conservation and management fund is also raised through entrance fee and other charges when using PA facilities, and City LGU allocation.	Provisioning (water supply)	Zamboanga City Water District (ZCWD), Zamboanga City LGU	Unspecified	Zamboanga City Water District (ZCWD), DENR, PAMB, Zamboanga City LGU	DENR Policy (usage and entry fee), PAMB Resolutions, City Ordinances	Protection and management budget of Zamboanga City Water District (ZCWD); Entrance Fee (through PAMB resolution); Charges for activities within the PA (through PAMB Resolution); Zamboanga City LGU fund allocation for conservation program	DAI Global et al. 2021
21	Mt. Kitanglad Range Natural Park / Manupali watershed,	There are several PES arrangements in the Manupali watershed. The	Provisioning, Regulating (water supply for domestic,	Mt. Kitanglad Agri-Ventures, Inc. (MKAVI), DOLE, Celebrate	Manupali River Irrigation System (ManRIS), Hilltop Multi-Purpose	Project stakeholders (RUPES), PAMB, LGU (including	R.A. 8371, Presidential Decree No. 1067, CADT, Local	Irrigation service fee (money or rice), non-monetary payment	Egnar et al. 2017, Macandog 2016,

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	Bukidnon (Region 10)	farmers pay for ES through the irrigation service fee, meanwhile private companies provide non-monetary payment in the form of social development support, as well as through their taxes.	industrial, and agricultural uses, energy generation, water quality, sedimentation control)	Life Banana Company, AMS Farming Corporation, Cawayan Village Gov, Green River Gold Ranch, National Power Corporation (NAPOCOR), Palungui IV, Upland Farmers and Communities	Cooperative (MPC), Indigenous and Upland Community (Talaandig community), Migrants, Upland farmers	village officials), World Agroforestry Centre (ICRAF), Bukidnon Environment and Natural Resource Office (BENRO), DENR, Bukidnon Watershed Protected and Development Council, NAPOCOR, National Irrigation Authority (NIA), MANRIS	Ordinance (Ordinance No. 2009-114), R.A. 9136	(livelihood assistance, employment, community conservation projects), CSR (i.e., maintenance of road system and funding for tree-planting activities along the small creeks), Tax / Levy	Namirembe 2018
22	Mt. Kalatungan National Park/ Batang watershed, Bukidnon (Region 10)	There are many beneficiaries of the Mt. Kalatungan. To jumpstart the implementation of PES in the Park, the Mindanao Development Authority acted as a buyer by allocating Php 200,000 to cover the cost of reforesting 3 ha and capacity building for the seller, particularly in financial and organizational management. The payment made by some companies, (for example, Shell) falls more under their CSR, while	Provisioning (water supply)	Pilipinas Shell Foundation, Del Monte Foundation Inc., First Community Cooperative, Mindanao Development Authority, Cagayan Corn Products, Downstream Communities	Indigenous communities, Miarayon-Lapok-Lirongan-Tinaytayan Tribal Association (MILALITTRA)	Mindanao Development Authority, REECS, DENR, Mt. Kalatungan Protected Area Superintendent, Cagayan de Oro River Basin Management Council (CDORBMC), Philippine Association for Inter-Cultural Development (PAFID), PAMB, Xavier Science Foundation, Inc. (XSF), New Conservation Areas in the Philippines Project (NewCAPP),	Presidential Proclamation No. 305, R.A. 7586, R.A. 8371, CADT, PAMB Resolution	CSR	Emata and Sinogba 2016

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		others like Cagayan Corn Products are water users. The current payment rate of Php 70,000 per ha is for MILALITTRA's performance of conservation activities and supports the cost of the cultural requirements of the tribe.				Project Stakeholders, LGUs			
23	Mt. Matutum Protected Landscape, South Cotabato (Region 12)	In 2019, PAMB issued a board resolution establishing PES schemes in Mt. Matutum. Business enterprises are to provide voluntary contributions for Mt. Matutum's conservation.	Cultural, Provisioning, Regulating (water supply, source of food, fiber, medicine and raw materials, recreation, ES related to soils)	Enterprises (water service providers, resorts, irrigation association, pineapple plantation, vegetable producers, cut-flower enterprises, and fishpond operators)	People's Organization	DENR, Mount Matutum Protected Area Management Board (PAMB), LGU, Project Stakeholders, Foundation for the Philippine Environment (FPE),	PAMB Resolution	Voluntary PES Contribution (including CSR Fund), Water charges (cost per cubic meter)	Boquiren 2004, DAI Global et al. 2021
24	Bud Bongao Local Conservation Area, Sulu (Bangsamoro Administrative Region of Muslim Mindanao)	Bud Bongao is a famous mountain in Tawi-Tawi. Various NGOs supported the establishment of the Bud Bongao Management Council, however limited information is available on the current PES scheme.	Unspecified	Unspecified	Unspecified	Protect Wildlife Project Team, LGU (local officials)	Unspecified	Unspecified	DAI Global et al. 2021