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Assessment of the Institutional Arrangements for the Payments for Environmental Services (PES) Implementation for Watershed Conservation: The Case of Mount Hamiguitan Range Wildlife Sanctuary (MHRWS)

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ABSTRACT

This study examined institutional factors that may facilitate or constrain the implementation of Payments for Environmental Services (PES) for watershed conservation in the Mount Hamiguitan Range Wildlife Sanctuary (MHRWS). Focusing on sustaining the water supply from MHRWS watersheds to nearby communities, the assessment drew from key informant interviews and secondary data. Enabling factors for PES implementation include supportive national environmental laws and programs implemented locally; stakeholder engagement, which has waned but has the potential to be revitalized; and clear property rights for the Mandaya indigenous community and farmers in the watersheds. However, key constraints, such as limited institutional capacity and the effects of the absence of PES institutionalization, were evident. Institutional challenges include limited PES knowledge, inadequate water management data, weak representation of indigenous people and tenured farmers in the PAMB, and declining funds for protected area management. The lack of a national PES law or framework has disrupted conservation efforts due to government leadership transitions and can similarly affect PES initiatives. The findings suggest prioritizing capacity building, stakeholder engagement, and sustainable funding as management directions. At the same time, policies should emphasize institutionalizing PES, strengthening tenure rights, and aligning local actions with national environmental laws. Participation by MHRWS lead bodies in the ongoing national Payment for Water Ecosystem Service (P-WES) institutionalization process can catalyze PES implementation. This involvement can enhance their capacity to address current challenges while inspiring stakeholders to adopt PES—particularly P-WES—for effective watershed management and sustainable water supply.

Keywords: Institutional arrangements, Mount Hamiguitan Range Wildlife Sanctuary, Payment for Environmental Services, stakeholder engagement, watershed management

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INTRODUCTION

The concept of payment for environmental services (PES) has been recognized as a viable instrument for fostering sustainable development, especially in the context of watershed conservation. PES (Figure 1), as a market-based mechanism, rewards communities or landowners (the "sellers" of environmental service) for their efforts in protecting natural resources, employing sustainable farming practices, and rehabilitation of degraded areas to provide critical ecological services, including watershed protection, biodiversity conservation or landscape beauty. These services benefit various users, such as water districts and tourism industries (the "buyers" of the environmental service), who in turn provide compensation (in cash or in-kind) to the service providers. This directly links conservation efforts and their beneficiaries, providing a financial incentive for environmental stewardship (International Institute for Environment and Development [IIED], 2024; Wunder, 2005; Engel et al., 2008). While specific implementation details may vary, PES programs offer a promising strategy to promote environmental conservation and sustainable development.

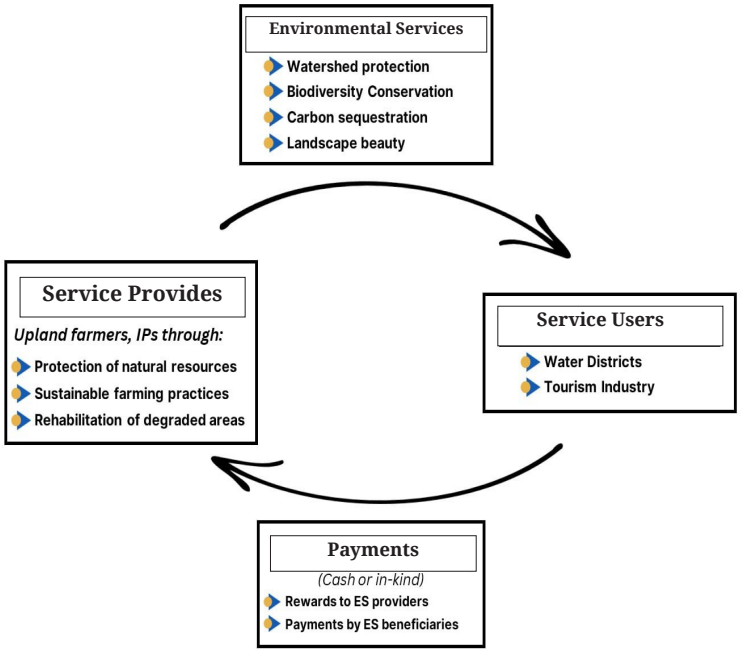

Figure 1. Diagram of payment for environmental services (PES) mechanism.
Source: Information from IIED (2024), Wunder (2005) and Engel et al. (2008).

Institutional arrangements have been indicated in several studies as indispensable in the implementation and success of PES programs (Paudyal et al., 2018; Kim et al., 2016; Grima et al., 2016; Fripp, 2014; Fauzi et al., 2013; Tulyasuwan, 2012). PES as a market-based mechanism for environmental conservation cannot be separated from its institutional facet. Institutional arrangements encompass the logistical arrangements for contracting participants, monitoring compliance, making payments, the program's rules, and the broader legal and policy frameworks (Pagiola, 2019).

Pham et al. (2013) conducted a study on PES in Vietnam focusing on the institutional setting; similarly, Feng et al. (2018) and Mamedes et al. (2023) reviewed PES schemes in China and Brazil, respectively. The studies reported the existence of laws that support PES and provide eco-compensation. However, it was a national law/decree for PES that established a nationwide PES scheme and hastened PES implementation in the three countries. The active engagement of intermediaries between providers and users of environmental services, such as local and international NGOs, research institutions, and civil society, has also been found to result in better opportunities for PES implementation in Asia, Latin America, and Tanzania (Huang and Upadhyaya, 2007; Southgate and Wunder, 2009; Montoya-Zumaeta et al., 2021; Branca et al., 2011). The same was observed in PES projects in the Philippines (Reyes-Boquiren, 2005, as cited in Macandog, 2016). The intermediaries helped raise awareness, provided expertise and co-funding, negotiat-

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ed agreements, and helped ensure equitable distribution of benefits. In addition to these, Cremaschi et al. (2013) and Macandog (2016) included as beneficial for PES for watershed protection the involvement of upland settlers, Indigenous communities, water users (domestic, agricultural, and industrial), as well as water supply companies, local water districts, and People's Organizations. Macandog (2016) further added specifically the supportive engagement of the DENR, the Protected Area Management Board (PAMB) and the Protected Areas and Wildlife Bureau (PAWB) for protected areas, the Department of Science and Technology (DOST), the Department of Agriculture (DA), and state colleges and universities in implementing PES. Xavier University of Cagayan de Oro City, through the Xavier University Science Foundation, served as an enabler for PES in Mt. Kalatungan (Emata and Sinogba, 2016), while Silliman University of Dumaguete and UP Los Baños, through ICRAF, were enablers for PES in the Apo Protected Landscape and Seascape and Mt. Kitanglad Natural Park in Bukidnon, respectively (Pulhin et al., 2024). Cremaschi et al. (2013) indicated the involvement of indigenous peoples in PES in Mt. Guiting-Guiting Natural Park, highlighting the importance of recognizing IP rights and integrating their knowledge into programs like PES.

A primer on PES by Forest Trends, the Katoomba Group, and United Nations Environment Programme (2008) identifies resource tenure clarity as vital for PES, requiring service sellers to have control over the implementation area. Naeem et al. (2015) stress that secure land tenure is essential for landholders to maintain the provision of ecosystem services and fulfill PES contracts. Duchelle et al. (2014) and Pagdee et al. (2021) similarly argue that tenure security ensures meeting the payment conditionality. Rosales (2003) described the option to recognize customary tenure in implementing PES in the Philippines. Meanwhile, despite its new idea, community, local administration, and governmental authorities' openness to PES was also indicated as helpful in implementing it (Pagdee et al., 2021).

On the other hand, several studies highlight barriers to the growth of PES. Weak institutional capacity, reflected in low awareness of PES, scant data, and lack of technical expertise, has been reported in Thailand, the Philippines, and Tanzania (Thompson and Harris, 2021; Pagdee et al., 2021; Domingo et al., 2022; Namirembe et al., 2018; Branca et al., (2011). These weaknesses hinder fund generation, causing insufficient assessment and poor benefit quantification, constraining PES progress.

Rakotomahazo et al. (2023) noted that PES design requires funding, technical skills, and external capacity-building support in Madagascar. Leadership changes also destabilize PES programs in the absence of mandated PES policies. Thompson and Harris (2021) observed momentum loss in Thailand when PES advocates were reassigned to other positions; Onestini (2016) echoed similar concerns about frequent leadership changes in the Philippines, affecting resource management sustainability. Domingo et al. (2022) also reported that Philippine political leaders disregarded earmarked funds for PES, undermining trust; this is similar to the erosion of trust found by Montoya-Zumaeta et al. (2021) in incentive-based conservation projects in Peru due to a lack of transparency in financial and decision-making processes. While the literature highlights various enabling factors for PES implementation, it also suggests that such factors are not without limitations, such as inadequate environmental laws vis-à-vis the absence of a national law for PES. These limitations increase the impact of significant constraining factors that have also been identified in previous studies. Therefore, there is a need to understand how these enabling factors, saddled with limitations and coupled with constraints, affect potential PES implementation in specific contexts. This study, focusing on MHRWS, a protected area with potential for PES but also facing numerous challenges, addresses this research gap by assessing how previous findings manifest locally and suggesting ways to overcome challenges for effective PES implementation. Macandog (2016) has pointed to the growing acceptability of PES, and this study may serve as one of the references in determining the PES readiness of a targeted protected area.

The study generally aimed to assess the existing institutional arrangements that may facilitate or constrain the implementation of a PES program for watershed conservation in MHRWS for a continuous water supply in its surrounding area in Davao Oriental, Mindanao, Philippines. Specifically, it aimed to examine legal and policy frameworks supporting PES;

identify institutions and intermediaries involved in MHRWS' protection and sustainable water provision; determine current land rights arrangements in MHRWS that are essential for PES implementation; assess institutional capacity for PES in terms of familiarity with PES, availability of technical data for water management, participation and representation in the PAMB, and availability of funding for MHRWS protection and management; and identify effects of the lack of PES institutionalization.

Conceptual framework

Institutional arrangements are the systems, policies, and practices that make organizations plan and act effectively (United Nations Development Programme [UNDP], 2009). Institutional arrangements, along with their enabling and constraining facets (Figure 2), influence the success or failure of PES (Corbera et al., 2009; Vatn, 2010). Literature review indicates that PES success is more likely when enabling laws and policies are in place, when stakeholders actively participate and collaborate to provide the expertise and initial funds to implement PES effectively, and when property rights are well-defined. Conversely, implementation becomes challenging when there is weak institutional capacity and when institutionalization is wanting, making PES vulnerable to changes in government leadership that may lead to changes in priorities.

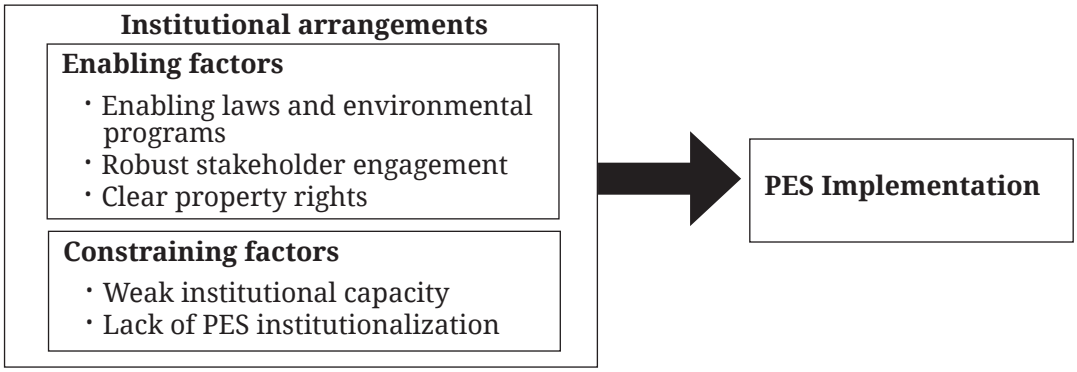

Figure 2. Diagram of the conceptual framework of the study.

MHRWS: Location, Delineation and Ecological Importance

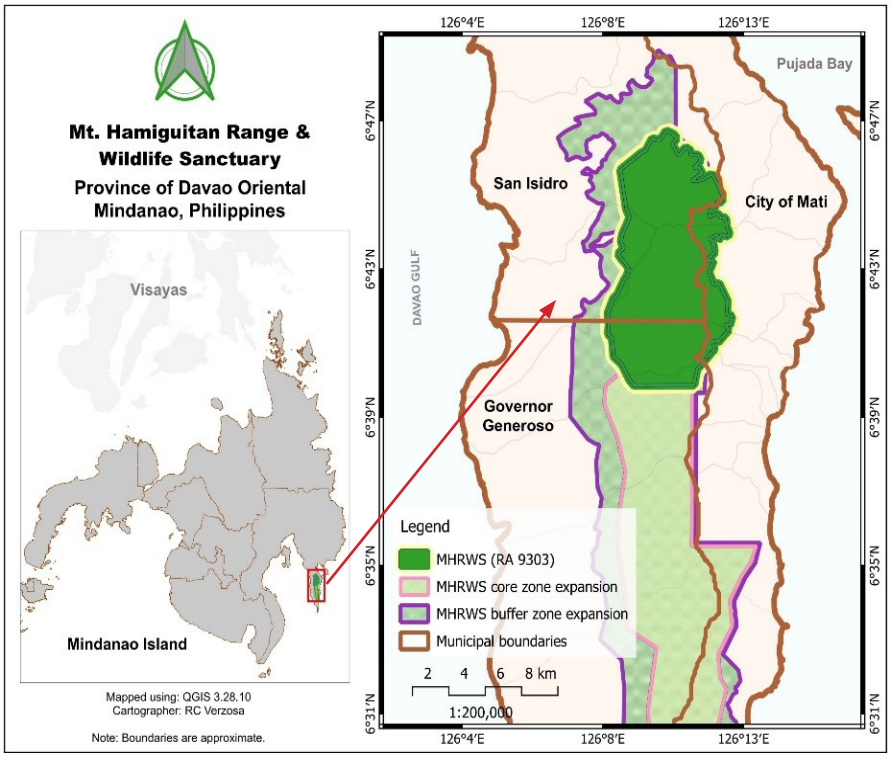

Figure 3. Location map of the Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS).

The Mt. Hamiguitan Range, located in Davao Oriental, spans the municipalities of San Isidro, Governor Generoso, and the City of Mati (Figure 3). Declared a protected area under the Mt. Hamiguitan Range Wildlife Sanctuary Act of 2004 (Republic Act No. 9303), it is part of the National Integrated Protected Areas System (NIPAS), which was expanded by Republic Act 11038, also known as the Expanded National Integrated Protected Areas System (ENIPAS) Act of 2018). In 2014, it was inscribed on the UNESCO World Heritage List (UNESCO World Heritage Centre, 2014) for its biodiversity, role in carbon sequestration, and water supply (State Party of the Philippines, 2014). This study is interested in providing water supply from its watersheds, which supports nearby communities and highlights its potential for PES.

The MHRWS, under RA 9303, has a ground delineated area of 7,132.76 ha, 6,348.99 ha of which are designated as core zone and 783.77 as buffer zone. Regarding management zones, a total of 5,792.36 ha is designated as a Strict Protection Zone (SPZ), while the remaining 1,340.40 ha are assigned as a Multiple Use Zone (MUZ). To further protect the remaining biodiversity in the MHRWS buffer zone and strengthen its core zone established under RA 9303, the Sanctuary was expanded to 26,652.54 ha, with 16,923.07 ha as the core zone and 9,729.47 hectares as the buffer zone (UNESCO World Heritage Centre, 2024). Timberlands in the expansion, designated as local conservation areas (LCAs), were established through ordinances by San Isidro, Governor Generoso, and Mati (State Party of the Philippines, 2014). This study focuses on the watersheds under RA 9303 and their vicinities, including the contiguous LCAs and 17 barangays benefiting from their water supply.

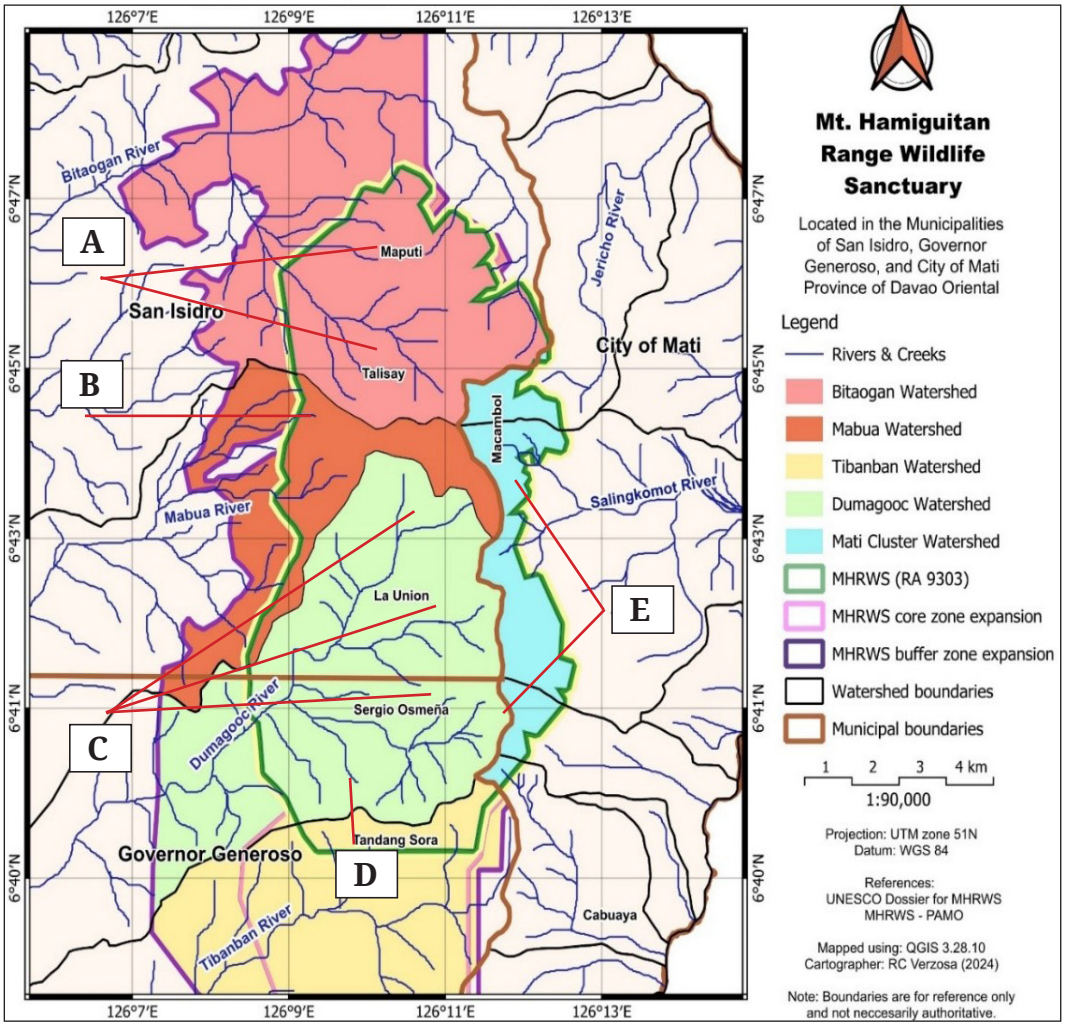

Figure 4. Watershed and drainage map of Mt. Hamiguitan Range Wildlife Sanctuary (MHRWS) and its respective headwaters.
Source: State Party of the Philippines, (2014)

Only scientific studies are allowed in the core or strict protection zone. At the same time, agro-forestry, sustainable use of minor forest products such as Almaciga resin and rattan, gathering of fallen branches and driftwoods, as well as ecotourism activities are permitted in the buffer zone or MUZ (DENR, 2017). The MHRWS watersheds (Figure 4), spanning the original RA 9303 delineation and its expansion, supply potable water for domestic and agricultural use in nearby communities (State Party of the Philippines, 2014). The map indicates the watersheds A, B, C, D, and E. The Bitaogan watershed (A) serves Brgy. Maputi and Brgy. Talisay via the Bitaogan River, while the Mabua watershed (B) provides water to parts of San Isidro. Brgy shared the Dumagooc watershed (C). La Union and Brgy. Sergio Osmeña, and the Tibanban watershed (D) in Brgy. Tandang Sora feeds the Dumagooc and Tibanban Rivers, respectively, supporting Governor Generoso. Meanwhile, the Mati cluster watersheds (E), including the Salingkomot and Jericho Rivers, supply Brgy. Macambol and Brgy. Cabuaya. These watersheds also recharge aquifers, ensuring groundwater availability for wells and springs in surrounding areas.

There are no residents in the strict protection zone; this may be owing to the rough terrain, steep slopes, and the metallic components such as nickel, magnesium, and iron found in the soil, making the soil unfit for agriculture (San Isidro LGU, 2003 as cited in State Party of the Philippines, 2014). However, there are about 45 households in the MUZ, 43 located in Brgy. Sergio Osmeña; Brgy. La Union and Brgy. Tandang Sora has one household each (DENR, 2017). Households in the MUZ derive most of their income from agriculture; significant crops grown are coconut, corn, banana, cacao, fruit trees, and root crops.

There are a total of 12 984 households (PSA, 2021) in the seventeen (17) barangays surrounding MHRWS, all of them users of water supplied by its watersheds. Household water sources are varied and categorized as Level I, II, and III following the NEDA classification. NEDA (2019), as cited in Velasco et al. (2020), classifies water source as Level I if it consists of a developed spring with an outlet but no distribution system; Level II if it has a network of pipes with communal faucets, each faucet serving typically four to six homes; and Level III if it is characterized as a waterworks system having a source, a reservoir, a piping network for distribution, and individual metered taps for each dwelling.

Some households have wells that fall under the Level I water supply category and are managed by the Barangay Water and Sanitation Association (BWSA) (A.C. a, personal communication, July 24, 2020; R. L. Bantolinao, personal communication, October 30, 2024). Households enjoying Level II and III water supply are often organized as small-scale waterworks associations – the BWSA and the Rural Waterworks and Sanitation Association (RWSA) – with leaders who manage water supply in their communities. Member households with Level II and III water sources have varying monthly water tariffs depending on their location and the water utility or association to which they belong (Table 1).

Table 1. Monthly water tariffs in some barangays in the vicinity of Hamiguitan Range Wildlife Sanctuary (MHRWS).

Water supplier	Location	Level of service	Water used payments (Php)
Poblacion Water System[1] –LGU Run utility	Brgy. Poblacion, Gov. Generoso	Level III	150 / 10m^3
Sergio Osmeña Community and Development Association[2] – BWSA	Brgy. Sergio Osmeña	Level III	50 / 5m^3
Manuel Roxas Water System[3] – RWSA	Brgy. Manuel Roxas	Level III	150 / 15m^3
BWSA[4]	Brgy. Macambol	Level II	30 (fixed rate)

Sources:
[1] C. E. Gaduan, personal communication, February 5, 2024
[2] A. S. Caleza, personal communication, January 21, 2024
[3] V. O. Alfornon, personal communication, January 20, 2024
[4] B. M. Rama, personal communication, January 10, 2024

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Most local water utilities around MHRWS are privately owned, with only the Governor Generoso Municipal Waterworks managed by the LGU. Its rates are lower than those of Water Districts in Region 11, with average rates for 10 cubic meters as follows: Php 218.42 in Compostela Valley, Php 184.69 in Davao Oriental, Php 211.48 in Davao del Norte, and Php 203.41 in Davao del Sur (Local Water Utilities Administration, 2024). PES may lead to higher water rates to fund conservation expenses, but it could reduce infrastructure costs, potentially lowering long-term water supply expenses.

Degradation of forests in MHRWS vis-à-vis increase in demand for water Amoroso and Aspiras (2011) reported forest degradation, agricultural conversion, shifting cultivation, and over-collection of resources in MHRWS, threatening its biodiversity. The 2015-2023 Comprehensive Land Use Plans (CLUPs) of Governor Generoso and San Isidro, Davao Oriental, also identified issues like inappropriate farming, soil erosion, landslides, and illegal resource exploitation resulting in deforestation. Flooding incidents in 2023 and 2024 in Governor Generoso, San Isidro, and Mati affected hundreds of families and damaged infrastructure, affecting barangays dependent on watershed water supply (Deloso, 2023; Reliefweb, 2024; Trozo, 2024).

The municipality of Governor Generoso also revealed in its 2015-2023 CLUP shortfalls in water supply, with a deficiency estimated to be 1,619,340 liters/day in 2014, owing to the growing population. The 2015 and 2020 population posted by PSA (2016) and PSA (2021) revealed population growth rates of 11.26% and 10.57% in Governor Generoso and Mati, respectively, inevitably leading to increases in water demand. However, deforestation resulting from population growth takes place to make way for agriculture and infrastructure development, leading to soil erosion, reduced water infiltration, and decreased water quality and supply. Interviews with local officials (A.C. Andas, personal communication, July 24, 2020; N.P. Pondias, personal communication, July 23, 2020; C.R. Baldago, personal communication, July 24, 2020) revealed water supply shortages that are more pronounced during drier seasons. The dwindling water supply indicates that watersheds are under stress, and water extraction exceeds the watersheds' replenishment rates.

The foregoing situation coincides with the general issues of watersheds in the Philippines (Evangelista and Billones, 2024). Climate change further disrupts ecosystems, complicating efforts to secure water supply. The degradation of watersheds, including those of the MHRWS, is a pressing concern needing intervention to address the dwindling water supply. This study explores PES as an intervention to adopt.

MATERIALS AND METHODS

The research setting for this study is MHRWS, established under RA 9303, and its surrounding 17 barangays across three administrative areas: the Municipality of San Isidro, the Municipality of Gov. Generoso, and the City of Mati in Davao Oriental. The study focuses on the MHRWS watersheds for potential PES application, primarily through an assessment of institutional arrangements.

This study employs a descriptive case study approach focused on MHRWS and its institutional arrangements for PES. In environmental studies, case studies provide critical transdisciplinary perspectives to address ecological issues (Scholz et al., 2006), and they are effective in developing recommendations and policy prescriptions and identifying relevant variables for further research (Burns, 2017). In this context, the case study focuses on environmental challenges, opportunities, or decisions organizations or societies face. Specifically, this study objectively examines the institutional arrangements and stakeholders significant to potential PES implementation in MHRWS. While many qualitative case studies emphasize interpretive methodologies, Burns (2017) emphasizes that case studies also serve as practical tools for descriptive and analytical exploration, particularly in environmental contexts where the interaction of several factors can be identified.

Document reviews of existing information on the MHRWS and key informant interviews (KIIs) were done to determine enabling and hindering factors for PES. Thirty-one key informants (KIs) were purposively selected based on the significant information they have to implement PES for watershed conservation in the MHRWS. The KIs comprised three barangay chairpersons, five barangay secretaries, 11 barangay

councilors, 11 water association leaders from different barangays, and a forest technician designated as the Protected Area Superintendent Office caretaker. The interviews were done face to face using the local dialect, guided by questions prepared appropriately for the office represented by the KIs. Interviews were recorded when allowed; otherwise, note-taking was employed. Data triangulation was done by comparing the responses of KIs with information found in MHRWS documents. Clarifications and updates on data gathered from MHRWS documents were obtained from KIs.

Thematic analysis was applied to qualitative data obtained from key informant interviews. This method, acknowledged for its ease and flexibility, is not tied to specific theoretical perspectives (Braun and Clarke, 2006) and is widely used in case studies to condense data into "themes" that represent participants' explicit responses (Gray and Densten, 1998). A deductive and semantic approach was taken based on the theoretical interests of the researcher and explores themes within the data's explicit meanings without interpreting beyond the participants' statements (Boyatzis, 1998, as cited in Braun and Clarke, 2006). This study identified some themes during the literature review and served as constructs for the deductive approach. The KIs' objective responses were developed directly from the explicit meanings expressed in their statements, reflecting their knowledge. These were then reconnected with literature. The themes based on the MHRWS context were subsequently used as organizing frameworks to categorize and analyze the enabling and constraining factors identified in the data gathered related to the potential implementation of PES for watershed conservation in the MHRWS.

This research endeavor adhered to established protocols for accessing offices and participants. Informed consent from key informants was obtained using the Mindanao State University-Iligan Institute of Technology Institute of Ethics Review Committee (MSU-IIT IERC) form.

RESULTS AND DISCUSSIONS

PES offers a promising solution to MHRWS watershed degradation, providing an additional revenue stream for conservation, preventing further damage, and ensuring a sustainable water supply. Viani et al. (2018) found that PES programs in the Piracicaba-Capivari-Jundiaí watershed in Brazil help protect water resources and reverse ecosystem service deterioration. Pulhin et al. (2024) also identified PES as a feasible approach to improving water resource management and enhancing water provision and conservation in the Philippines. Below are the significant findings about the legal and policy frameworks supportive of PES, institutions, and intermediaries involved in protecting MHRWS, current land rights arrangements in MHRWS, institutional capacity for PES, and effects of the lack of PES implementation.

Legal and policy frameworks supportive of PES. Numerous national laws in the Philippines contain provisions that can enable PES in MHRWS. A study by Macandog (2016) reported that established PES schemes in other regions in the Philippines are anchored on some of these standard provisions (Table 2). Supreme Court of the Philippines (2004) Executive Order 318, which emphasizes sustainable forest management and endorses the appraisal and valuation of forest resources, sets a precedent for recognizing the economic value of environmental services, a principle central to PES. This aligns with the findings of Pagiola et al. (2002), which underscore the importance of recognizing the economic value of environmental services as a foundation for market-based conservation mechanisms, such as PES. Further, Republic Act 7160, also known as the Local Government Code, underscores the shared responsibility among LGUs for ecological balance. This legal framework is crucial for integrating local governance into environmental protection efforts and promoting local engagement in PES. Similarly, the National Integrated Protected Areas System (NIPAS) Act of 1992, Republic Act 7586, amended by RA 11038 (Expanded NIPAS Act of 2018 or ENIPAS Law), establishes the PAMB and the Integrated Protected Areas Fund (IPAF), offering financial support for the management of protected areas and PAMB projects. This provision aligns with the need for economic sustainability in protected areas implementing PES, as Namirembe et al. (2018) highlighted the need for sustainable financing mechanisms to support PES in low-income countries. ENIPAS' mandate on the involvement of LGUs in protected area management also complements provisions of the Local Government Code.

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The recent Philippine Ecosystem and Natural Capital Accounting System (PENCAS) Act of 2024 (Republic Act 11995), which integrates the valuation of ecosystem services in government planning, is a significant step towards institutionalizing natural capital accounting, which can be utilized as input in the design for financing schemes such as PES. The Roadmap supports this institutionalized Natural Capital Accounting (NCA) in the Philippines by the National Economic Development Authority (2022), which provides guidelines to incorporate natural capital accounting, including the valuation of ecosystem services, in government planning, investment, and policy formulation. This framework aligns with the literature highlighting the importance of integrating ecosystem valuation into policy for successful PES implementation, as discussed in a study by Domingo et al. (2022). These laws, among others, provide a strong foundation for implementing PES in MHRWS, as Macandog (2016) noted that existing PES schemes in the Philippines are anchored on such laws.

Table 2. National laws that support payments for environmental services (PES) schemes.

National laws	Supportive provisions for PES
Executive Order 3181	emphasizes sustainable forest management and endorses the appraisal and valuation of forest resources
Executive Order 263 and its IRR (Department Administrative Order 2004-29)[2]	support Community-Based Forestry Management which grants local communities access to and responsibility for forest resources
Republic Act 7160 (Local Government Code of the Philippines)[3]	underscores shared responsibility among Local Government Units (LGUs) for ecological balance
Republic Act 11038 (Expanded National Integrated Protected Areas System or ENIPAS Act of 2018)[4]	amends RA 7586 (NIPAS Act of 1992); establishes 94 protected areas (PAs) in the country and provides for the environmental and natural resources offices and protected area management offices where protected areas are located. It emphasizes the full involvement of LGUs in PAs and expands the PAMB membership; reiterates the retention of 75% of Integrated Protected Area Fund (IPAF) collection for the direct use of protected areas at the site and provides for tax exemption on all grants and endowments made to the protected area fund.
Republic Act 9303 (Mount Hamiguitan Range Wildlife Sanctuary Act of 2004)[5]	directs the surrounding LGUs to adopt approved management plans for the protected area
Republic Act 11995 (an act institutionalizing the Philippine Ecosystem and Natural Capital Accounting System or PENCAS Act of 2024)[6]	establishes the natural capital accounting which can be utilized as input in the design for a financing scheme such as PES

Sources:
[1] Executive Order No. 318, (2004)
[2] Executive Order No. 263, (1995); DENR Admin. Order No. 2004-29, (2004)
[3] Local Government Code 1991 (Phil)
[4] ENIPAS Act of 2018 (Phil)
[5] Mt. Hamiguitan Range Wildlife Sanctuary Act 2004 (Phil)
[6] PENCAS Act 2024 (Phil)

A draft of a DENR administrative order for PES, as cited by Domingo et al. (2022), outlines a structure for PES schemes involving watersheds. The P-WES (Payment for Water Ecosystem Service) initiative is a recent national effort to institutionalize PES for sustainable water resource management through proposed legislation (Tolentino and Tasico, 2024).

The focus on applying national environmental laws locally is evident in the MHRWS. RA 7586 (NIPAS Act) provided for the establishment of the PAMB and the MHRWS-IPAF, funded by trekking and research fees in MHRWS and an annual ₱200,000 allocation from the Mati LGU, which remains insufficient for managing the protected area. Allocations from the LGUs of San Isidro and Governor Generoso still need to be requested from the new leadership (Protected Area Superintendent Office caretaker, J. Franco, personal communication, October 14, 2024). RA 9303 (MHRWS Act) empowers PAMB to review and approve development proposals from LGUs and other agencies and research proposals from academic institutions, ensuring alignment with conservation goals. In tandem with the ENIPAS Law, it supports PAMB and PASO activities, such as stakeholder meetings for collaborative management.

The active engagement of stakeholders is crucial to the success of PES. The Protected Area Management Board (PAMB), as the top policymaking body of MHRWS, oversees ecological planning, sustainable management plans, fees, and donations. These functions help address funding gaps for MHRWS protection and management and possible PES implementation (Protected Area Superintendent Office caretaker, J. Franco, personal communication, October 14, 2024). The PAMB's role in ecotourism and community development, backed by RA 7160, EO 318, and RA 9303, empowers communities to pursue sustainable initiatives.

Also, at the local Level, Governor Generoso passed Municipal Ordinance No. 4, a 2014 series supporting the MHRWS Act, by declaring certain timberlands as critical habitats and local conservation areas, now MHRWS expansion areas. The ordinance establishes a legal framework for sustainable conservation, ecotourism development, and fee collection, allocating 10% of fees to stakeholder barangays and another 10% to PAMB/PASu operations. It emphasizes participatory governance and stakeholder involvement, aligning with PES principles of engaging communities and allocating funds to incentivize ecosystem service provision.

The National Greening Program (NGP), which jumpstarted nationwide reforestation, was also implemented in Brgy. La Union, San Isidro in 2021 (DENR Davao, 2021). The barangays operated a nursery for seedlings, producing massive high-quality planting materials. Farmers involved were compensated based on their accomplishments. The Provincial Government of Davao Oriental launched the "Trees for Livelihood" program in 2018 alongside the National Greening Program (NGP) to restore forests while providing sustainable livelihoods. Farmers received technical and financial support to plant falcata, earning income from harvests (Golez, 2020). In 2013, Governor Generoso LGU implemented the Barangay Forest Program under the NGP, supported by DENR-DILG Joint Memorandum Circular No. 2013-03 (Duallo, 2013). However, a provincial leadership change led to the waning of the program.

These cash-for-work schemes earlier implemented in the MHRWS are similar to a PES program where those in conservation-related tasks are compensated for their efforts. This experience suggests that upstream farmers are willing to accept payment for watershed conservation and protection in exchange for their services.

Robust stakeholder engagement. Studies on PES cite a range of literature (Pagiola et al., 2002; Wunder, 2005; Fripp, 2014; Grima et al., 2016; Paudyal et al., 2018; Kim et al., 2016) indicating robust stakeholder engagement in PES programs. In the Philippine context, these programs involved the DENR, the central government agency involved in the management of protected areas through their respective PAMBs, the LGUs, the indigenous communities, and other stakeholders through their representations in their respective PAMBs. The participation of specific stakeholders, including LGUs and Indigenous peoples, as well as intermediaries, such as NGOs and universities, are similarly cited in various studies (Macandog, 2016); Cremaschi et al., 2013; Reyes-Boquiren, 2005 (as mentioned in Macandog, 2016); Southgate and Wunder, 2009; Montoya-Zumaeta et al., 2021).

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The PAMB in MHRWS includes the DENR XI Regional Executive Director as chair, the Davao Oriental Governor, mayors of Mati, San Isidro, and Governor Generoso, barangay captains within MHRWS, and other stakeholders. IP representatives have been absent since the third quarter of 2023 due to pending municipal resolutions appointing representatives. Farmers under CBFMAs are represented, but not those with other tenurial contracts, as they are not organized. NGOs in the PAMB include the Philippine Eagle Foundation (PEF) and Kalumonan Development Center. Considered as a partner university of the Sanctuary is Davao Oriental State University (DOrSU), and its president is a PAMB member. Represented POs include the Macambol Lindog People's Organization, Nagkahiusang Kristohanong Mag-uuma sa Maputi (NAKRISMA), Siete Altares Farmers Association (SAFA) and Bitaogan Irrigator's Association.

The Mandayas, the indigenous people (IP) in MHRWS, have long displayed a collaborative disposition towards conserving the protected area. Their inclusion in the PAMB enables them to participate in policymaking. Their continuing efforts to preserve their culture, historical ties, and reliance on MHRWS watersheds align with their role as natural stewards supporting watershed conservation and PES implementation. Indigenous communities have been shown to support PES development in other protected areas (Cremaschi et al., 2013; Emata & Sinogba, 2016; Arocena-Francisco, 2003). Together with the tenured farmers living in the buffer zone, they are the suppliers of environmental services in a PES project.

The Philippine Eagle Foundation (PEF) primarily protects the Philippine Eagle in MHRWS but also contributes to safeguarding other wildlife in the area. It engages in education campaigns for conservation and has an ongoing livelihood program in Brgy. Cabuaya in the City of Mati. The Kalumonan Development Center, funded by the Critical Ecosystem Partnership Fund (CEPF), initiated several alternative livelihood projects, assisted in coastal and river clean-ups, established a nursery of indigenous species, conducted agro-forestry training, and promoted the unique features of bonsai field and other flora of Mt. Hamiguitan (State Party of the Philippines, 2014; CEPF, 2006). DOrSU engages primarily in research and extension services on conservation; it implements alternative livelihoods, capacity building in healthcare, and training in agricultural science and technology for farmers (DOrSU Research, Innovation and Extension Files).

Other NGOs previously active in the protected area for conservation and alternative livelihood projects were the Interfaith Movement for Peace Empowerment and Development (IMPEDE), funded by CEPF, and the Subang Foundation, sponsored by the Forest Foundation Philippines (Forest Foundation Philippines, 2024). Among other universities that earlier conducted biodiversity assessments and environmental research in MHRWS were the Central Mindanao University, University of Mindanao, University of the Philippines- Mindanao, and University of Southern Mindanao. Leveraging Davao's environmentally engaged academic institutions, the active involvement of universities in PES development, monitoring, and evaluation elsewhere can be replicated in MHRWS. International donor agencies currently engaged in the MHRWS are the United Nations Educational, Scientific and Cultural Organization (UNESCO) and ASEAN Heritage Parks. UNESCO downloaded ₱2 million to DOrSU, the project implementor, to enhance camps and trails inside MHRWS for ecotourism, digital interaction, and education initiatives related to UNESCO World Heritage in Davao Oriental. ASEAN Heritage Parks, via the ASEAN Center for Biodiversity Conservation (ACB), gives annual funding to PAs, including MHRWS, through the DENR-Biodiversity Management Bureau (DENR-BMB). Other international donors that previously provided funding and capability building in the PA include UNDP and GEF (DENR-BMB, 2024), the CEPF, the European Union, Fondation Hans Wilsdorf, the government of Japan and World Bank (CEPF, 2025).

The MHRWS has experienced periods of strong stakeholder participation, which provides a valuable foundation for establishing PES. Stakeholder engagement, however, has diminished over time. Nonetheless, it holds the potential for revival and renewed collaboration.

The above findings in the context of the MHRWS emphasize that stakeholder involvement is crucial for the success of conservation efforts that can serve as a precursor to implementing a PES program, aligning with findings on PES from other protected areas. This involvement includes

diverse actors, often through their representation in the PAMBs. This is consistent with the literature, which suggests that PES programs are more effective when they include the participation of multiple stakeholders. Literature from Pagiola et al. (2002), Wunder (2005), and Fripp (2014) provide foundational concepts of PES that involve various stakeholders. Grima et al. (2016) and Paudyal et al. (2018) underscore the need for active participation, drawing from case studies in Latin America and Nepal, respectively. Specifically, Cremaschi et al. (2013) and Macandog (2016) highlight the necessity of involving upland settlers, indigenous communities, and water users. The MHRWS conservation also points to the importance of intermediaries such as NGOs, research institutions, and academic partners like Xavier University and UP Los Baños. These intermediaries play a crucial role in raising awareness, providing expertise and co-funding, as also supported by Reyes-Boquiren (2005) as cited in Macandog (2016), and Huang and Upadhyaya (2007) and Southgate and Wunder (2009). However, challenges such as waning engagement, inadequate representation, and the need for re-engagement are also acknowledged.

Clear property rights. Tenurial instruments, such as CBFMAs held by POs (e.g., NAKRISMA, SAFA, Nagkahiusang Maguuma sa Talisay Coop (NMTC)) and Certificates of Stewardship Contracts (CSCs), recognize the rights of POs and individuals/families to manage specific areas within the MHRWS expansion, providing land tenure security. Unorganized tenured migrants are issued certificates of recognition to acknowledge their occupancy in the PA pending Protected Area Community-Based Resource Management Agreement (PACBRMA) issuance. In the Philippine context, Rosales (2003) mentioned the option to recognize customary tenure in PES implementation. The PASu, however, points to DENR AO 2004-32, which mandates assistance from PASu, CENRO, LGUs, and NCIP to help the unorganized tenured migrants into POs to fulfill requirements for PACBRMAs (the designated tenurial instrument granted to POs of tenured migrants and IPs inside protected areas), strengthening tenure security. These instruments establish property rights critical for PES participation, as indicated by Forest Trends et al. (2008), which identifies resource tenure clarity as vital for PES, requiring that service providers have control over the implementation area. This is supported by Naeem et al. (2015), who stress that secure land tenure is essential for landholders to maintain the provision of ecosystem services and fulfill PES contracts. Similarly, Duchelle et al. (2014) and Pagdee et al. (2021) emphasize that tenure security ensures meeting the payment conditionality, a critical aspect of any PES agreement.

Challenges include inactive POs, expired CBFMAs, and the lack of tenured migrant representation in PAMB. However, PAMB allows inactive POs to re-engage through written intent, and CBFMAs/CSCs are renewable under DENR AO 2004-29. These findings highlight that while property rights are recognized in MHRWS, legal requirements for full participation must be met. Connecting local findings with established literature emphasizes that transparent and secure property rights are not just a local need but a fundamental requirement for the effectiveness and success of PES programs globally.

Institutional capacity. The assessment of institutional capacity focused on (1) familiarity with PES, (2) availability of data for effective water management, (3) representation in the PAMB, and (4) financial support for MHRWS.

Familiarity with PES. Key informants from LGU officials, government agency personnel, leaders of POs, and water associations expressed absence or limited knowledge about PES. Nonetheless, they expressed openness and interest in PES implementation in the MHRWS watersheds to ensure a sustainable water supply after some exposure to PES principles and benefits. The significant lack of familiarity with PES and the notable openness and interest in adopting PES for watershed conservation presents both a challenge and an opportunity for PES implementation. The lack of understanding is consistent with findings from other studies, as low awareness of PES has been reported as a barrier to its implementation in Thailand, Tanzania, and other protected areas in the Philippines (Thompson and Harris, 2021; Namirembe et al., 2018; and Domingo et al., 2022). The positive reception to PES conforms with the findings of Pagdee et al. (2021), which noted the importance of openness to new ideas as a helpful factor in implementing PES. This suggests that while there is a need for targeted capacity-building, the willingness to adopt PES provides a

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strong foundation for its successful implementation. This openness to PES also confirms Macandog's (2016) assertion that PES is growing in acceptability. In conjunction with the expressed openness, the identified knowledge gap underscores the importance of institutionalizing PES at the National Level to expand awareness, streamline implementation, and provide necessary training and resources to local stakeholders.

Availability of data for effective water management. Water associations near MHRWS lack data helpful to support a payment scheme for continuous water supply and water supply management in general, such as volume of water supplied, volume billed for the year, per capita water consumption, and percentage of non-revenue water. This deficiency in technical data is a significant obstacle to integrating water management considerations into the planning of PES, which is necessary to support a sustainable approach to conservation and environmental service provision. This lack of data is a recurring challenge, as Thompson and Harris (2021), Domingo et al. (2022), and Namirembe et al. (2018) have also identified sparse data as a constraint to PES progress, particularly in the ability to generate funds and make sufficient assessments. This lack of necessary data also echoes findings by Rakotomahazo et al. (2023), who noted that PES design requires technical skills, which may include data collection and analysis. The findings suggest that assistance is needed to enable the water associations to collect and manage relevant data, as the absence of such technical information severely limits the ability to plan and implement a sustainable PES program.

Representation in the PAMB. The MHRWS-PAMB faces significant challenges regarding stakeholder representation, specifically the lack of Indigenous Peoples (IP) representation and the limited participation of tenured farmers. The PAMB has lacked an IP representative for a year due to pending municipal resolutions from LGUs. This absence means IPs have no voice in decision-making, as evidenced by their lack of participation in quarterly PAMB meetings. This lack of representation is a critical issue, as Cremaschi et al. (2013) and Macandog (2016) emphasize the importance of involving indigenous communities in PES for watershed protection.

The importance of recognizing IP rights and integrating their knowledge into programs like PES was demonstrated by the involvement of IPs in PES in Mt. Guiting-Guiting Natural Park. Moreover, only farmers with Community-Based Forest Management Agreements (CBFMAs) organized into POs are represented in the PAMB. However, some POs are inactive and absent from meetings, suggesting a diminished interest in participating in MHRWS protection. Although inactive POs can request re-engagement, unorganized tenured migrants remain unrepresented, which may be traceable to a weak organizational capacity. The DENR's mandate to organize these farmers for PACBRMA issuance is essential to broaden PAMB participation and identify potential PES participants. This lack of representation of IPs and tenured farmers undermines the principles of participatory governance. It limits the potential for effective PES implementation, given that these groups are key stakeholders and potential suppliers of environmental services. This suggests efforts to ensure that all relevant stakeholders are actively involved in decision-making and contribute to the success of PES initiatives in the MHRWS.

Financial support for MHRWS. The MHRWS is also facing challenges posed by a decline in its budget, impacting its ability to manage and conserve the protected area effectively. This may also impact implementing PES as it is a conservation program requiring funding, as Rakotomahazo et al. (2023) have reported. LGU funding is currently limited to allocations from Mati, while requests for financing from Governor Generoso and San Isidro remain pending. This is possibly due to shifting priorities under new leadership, as Onestini (2016) has observed in frequent leadership changes in the Philippines that affect the sustainability of resource management. International donor support has also waned, with only UNESCO granting ₱2million to DOrSU for extension projects and the ASEAN Heritage Parks providing funds through DENR-BMB for protected areas, including MHRWS. However, key informants are unaware of the specific details regarding the allocation or basis for MHRWS funding from this source. This lack of transparency regarding funding may lead to trust issues and hinder the implementation of conservation initiatives, as was the case in the findings of Montoya-Zumaeta et al. (2021), who found that a lack of transparency in financial and decision-making processes can erode trust in

incentive-based conservation projects.

Effects of the lack of PES institutionalization. A significant constraint to implementing Payment for Environmental Services (PES) in the MHRWS is the limited familiarity with PES principles, which is not unique to MHRWS but reflects a broader trend due to the absence of PES institutionalization. This lack of awareness is a systemic issue across the country. The lack of PES institutionalization also results in varying conservation programs that political leadership transitions can impact. Leadership changes in provincial and municipal LGUs have negatively affected conservation initiatives in the study site. For instance, the Barangay Forest Program in Governor Generoso was discontinued due to provincial leadership changes. LGU transitions in Governor Generoso and San Isidro led to reduced municipal support for MHRWS. These changes exacerbated funding gaps amid declining international donor support. A PES program in the MHRWS may likely be vulnerable to similar circumstances.

While current openness among MHRWS officials and water supply leaders can be viewed as supporting early PES progress, leadership changes could stall momentum and reduce enthusiasm for conservation initiatives, including a prospective PES program. This is supported by Thompson and Harris (2021), who observed momentum loss in Thailand when PES advocates were reassigned to other positions. Furthermore, Domingo et al. (2022) reported that changes in political leadership in some protected areas resulted in disregarding earmarked funds for PES. Institutionalizing PES would broaden awareness of it and safeguard its principles against leadership transitions, ensuring continuity and resilience in conservation efforts.

Facilitating and constraining factors for PES implementation

Implementing payment for environmental services (PES) in the MHRWS is influenced by a complex interplay of facilitating and constraining factors. While several enabling conditions exist, they are often accompanied by limitations that can hinder progress and offer opportunities to address the constraints.

Supportive national environmental laws and programs exist, as evidenced by various legislations like the ENIPAS Act and the Local Government Code, whichare applied locally within the MHRWS. However, these laws are not always fully implemented or prioritized, particularly with leadership changes, which can lead to a decline in local government support and funding. Despite this, the ongoing national Payment for Water Ecosystem Service (P-WES) initiative offers a potential pathway to strengthen local implementation and integrate PES into national policies. Robust stakeholder engagement facilitates PES implementation, but it has currently diminished; nonetheless, it has the potential to be revitalized. The presence of a PAMB with diverse representatives, including indigenous communities and tenured farmers, provides a valuable foundation for collaborative management despite the current absence of IP representatives and limited participation of some POs. Including these groups is essential, as Cremaschi et al. (2013) and Macandog (2016) highlighted, and their consistent involvement needs to be ensured through proper representation and active participation in decision-making processes. Clear property rights, established through tenurial instruments like CBFMAs and Certificate of Stewardship Contracts, provide land tenure security, which is crucial for PES implementation. However, many unorganized tenured migrants remain unrepresented and are not part of the PAMB. Addressing the needs of these groups is equally critical, as emphasized by Naeem et al. (2015) and Duchelle et al. (2014), who stressed that secure land tenure is essential for landholders to maintain the provision of ecosystem services.

Key constraints include limited institutional capacity, which manifests in the lack of familiarity with PES principles among local stakeholders and a lack of technical data for water management. This echoes the findings of Thompson and Harris (2021), Domingo et al. (2022), and Namirembe et al. (2018), who cited low awareness and sparse data as barriers to PES implementation. The absence of PES institutionalization makes the program vulnerable to leadership transitions, as observed by Onestini (2016) and Thompson and Harris (2021). The lack of transparency in funding allocations also raises concerns. This parallels findings by Domingo et al. (2022) and Montoya-Zumaeta et al. (2021) regarding political leaders disregarding earmarked funds and erosion of trust due to a lack of transparency. Despite these constraints, the openness of local stakeholders to

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learn about PES and the ongoing P-WES initiatives present an opportunity to address the knowledge gaps and technical deficiencies and can spark enthusiasm to re-establish ties with international donor agencies for support. Overall, the success of PES in MHRWS depends on the ability to build upon its enabling factors while proactively addressing its constraints. As earlier pointed out, a crucial constraint to implementing PES in the MHRWS is the limited familiarity with PES principles, which is not unique to MHRWS but reflects a broader trend across the country owing to the absence of PES institutionalization.

Conclusion and next steps

Significant opportunities for PES implementation in MHRWS include supportive legal frameworks, engaged stakeholders, and clear property rights. However, these limitations and constraints need to be addressed, such as limited local knowledge of PES, inadequate stakeholder representation, unstable funding, and lack of institutionalization. The findings suggest the following:

- Prioritize capacity building for LGU officials, government personnel of government agencies, and leaders of POs and water associations. Expert assistance should be sought from academic institutions, NGOs, and government agencies with PES development and implementationexperience. Capacity-building efforts should align with P-WES for a synergistic effect and broader scope.
- Ensure active stakeholder engagement by ensuring active representation of IPs and tenured farmers in the PAMB. Address pending resolutions for IP inclusion and organize unrepresented tenured migrants—secure property rights through tenurial instruments.
- Establish sustainable funding by diversifying funding sources, including pursuing allocations from LGUs and re-establishing ties with past international donors. The funding gap can be an opportunity to pinpoint the potential of PES for sustainable financing.
- Institutionalize PES while also aligning local actions with national environmental laws and initiatives. This includes collaborating to implement the P-WES initiative through national legislation to create a policy framework to ensure a long-term, sustainable approach to PES implementation. A strengthened collaboration of PAMB-MHRWS with DENR, UPLB-INREM, and DOST-PCAARRD through the PENRO, DENR-11, and DENR Central Office and with DorSU and NGOs can build capacity and create momentum. Moreover, participation in P-WES institutionalization can propel stakeholder engagement awareness and secure long-term sustainability funding.

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