

■ ■ ■ DESIGNING PAYMENTS FOR WATERSHED PROTECTION SERVICES PROGRAMS: THE REECS/PREM EXPERIENCE ¹

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Abstract

Payments for environmental services are an innovative approach in resource management that attempt to achieve any or all of the following goals: environmental integrity, poverty alleviation, and financial sustainability. In watershed protection, the basic concept in payments for environmental services is to establish, through a payment system, a connection between the providers of water-related services who are the upland dwellers, and the downstream users or beneficiaries of the environmental service. The study explored the possibility of implementing payments for environmental services in two northern Luzon sites by examining the science, economics, and institutions aspects of payments for environmental services. The two sites were the Peñablanca Protected Landscape in Cagayan, and the Kalahan Forest Reserve in Nueva Vizcaya. The findings revealed some strengths and weaknesses in these aspects at each site. The results of the study are most useful to the local governments, water districts, non-governmental organizations and others that may wish to explore this mechanism as one strategy to improve watershed management in their localities.

1. Introduction

In recent decades, there has been growing interest among resource decision-makers in developing countries in market-based instruments (MBIs) as a strategy to address the twin goals of resource management and poverty alleviation. This development is attributed to the poor performance of command and control policies in resource management in the absence of complementation from MBIs. A recent and innovative MBI that is gaining importance globally is payment or compensation for environmental services (ES). PES seek to promote forest conservation activities by recognizing and compensating forest owners or dwellers for the environmental services they provide, and making the beneficiaries of these services pay for them. The basic idea behind PES is to create a market for environmental services by linking the providers and users of these services

and creating incentives for both groups to protect the integrity of the forests.

This brief paper draws from a research project funded by the Institute of Environmental Studies of the Vrije University in the Netherlands under its Poverty Reduction and Environmental Management Program and jointly implemented by the Resources, Environment & Economics Center for Studies (REECS) and Vrije University. The project aimed to explore the potential of PES in two Philippine watersheds that would address forest conservation and poverty alleviation in the uplands. This paper focuses on the conceptual approach and methodology of PES development and only briefly summarizes the salient findings and recommendations of the case study.

¹ Special paper prepared for the National Conference-Workshop on Payments for Environmental Services: Developing Incentives for Biodiversity Conservation and Poverty Alleviation. This paper is part of a larger project document that is undergoing final evaluation. Co-authors of the final paper include: Anabeth Indab and Arlene Amponin of Resources, Environment & Economics Center for Studies (REECS), ; Rex Cruz and Renato Folledo of the UP College of Forestry; and Pieter van Beukering, Luke Brander, Sebastiaan Hess, Arnout Soesbergen, Kim van der Leeuw and Jaap de Jong of Vrije University, Amsterdam.

1.1 Conceptual Approach

In the design of a PES for watershed protection in the two sites, the study considered and examined the following important aspects: (1) the science, e.g. the land-water linkages; (2) the economics, e.g. the theoretical basis and economic valuation; and (3) the institutional environment, e.g. the set of governing rules and policies to support PES. The science aspect provides the scientific evidence that is necessary to establish the link between land use and environmental services. The lack of good information on this relationship is considered the Achilles' heel of the markets for watershed protection (Pagiola and Landell-Mills 2002). The existing case studies on PES reveal that very little attention has been given to this aspect, specifically with respect to PES in watersheds. This observation is particularly relevant given the ongoing debate among forestry and watershed specialists about the role of forests in hydrology, with some challenging the conventional wisdom that forests protect water supplies.

The basic economic premise in PES in the context of watershed protection is there are upland communities that produce watershed protection services, at an opportunity cost, and there are consumers that benefit from such services for which no payments are made. In economics, such benefits are called positive externalities as these are produced external to the service provider, thus, to the market. As a market-based instrument, PES aims to internalize these external benefits by capturing their values and to channel these to the upland communities as incentive to pursue their watershed conservation and protection practices.

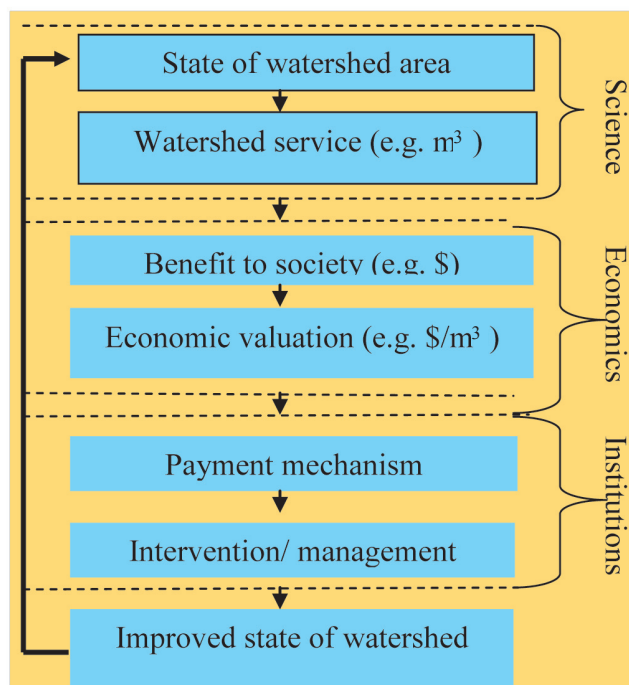
Lastly, the implementation of a PES program will involve institutional reforms that may require changes in existing legal and regulatory framework and that may affect the various stakeholders with different interests.² It is therefore necessary

to examine the institutional environment, e.g. set of social norms or rules that govern human behavior, as well as the institutional arrangement, e.g. organizational forms, for PES. Among the institutions that are relevant to PES, property rights over the environmental services are of critical concern since it is property rights that define who owns what resource. In the context of PES for watershed protection, it is important to have well-defined property rights in terms of, for example, who owns the water flowing in the river or the carbon sequestered in the forests to facilitate market creation (Pagiola and Landell-Mills 2002). It is likewise important to examine the roles and interests of different organizations that constitute the actors in PES — people's organizations and NGOs, government organizations (all levels), water districts, tour operators, etc. — to formulate effective and equitable management interventions. Finally, there are different modes of payments to support a PES (i.e., cash vs. non-cash).

The integrating framework for these three aspects of PES design is shown in **Figure 1**. At any given time, a well-managed watershed provides environmental services that are measurable in both physical and monetary terms. For instance, the water-related service, such as providing irrigation water to rice farmers, can be measured in volume, e.g., cubic meters per hectare of irrigated land (SCIENCE). This environmental service can be valued in terms of pesos or dollars using economic valuation techniques and the values derived can be used as basis for the payment scheme (ECONOMICS). Thereafter, institutional reforms in the form of watershed management interventions that will bring about an improved state of the watershed will need to be undertaken (INSTITUTIONS).

² Institutions in this study is broadly defined to include the sets of rules or constraints that govern human interactions in society and the actors that work within the sets of rules.

Figure 1. Integrating Framework for Science, Economics and Institutions Dimensions of PES.



2. Methodology

2. 1. Site Selection Process

The following criteria were applied in the selection of project study sites: (a) fairly good and stable watershed condition; (b) well-defined environmental services in both supply and demand aspects; (c) adequate institutional capacity; and (d) accessibility, peace, and order.

On the suggestion of some environmentalists implementing conservation work in the Northern Sierra Madre Natural Park (NSMNP) in Isabela Province, Region 2, certain portions of the park were originally considered as potential study sites. Three major watersheds in Mariano, Palanan and Tumauni within the Park or buffer zone of the Park were identified, visited and evaluated using the site selection criteria. With information from key informant interviews (KIIs), focus group discussions (FGDs) and secondary documents, all three sites were rejected for any one of the following reasons: (1) highly degraded watershed;

(2) ES supplier is also ES beneficiary; (3) local officials and other personalities active in illegal logging; (4) inaccessibility; (5) peace and order problems; and (6) land tenure conflicts.

The project team proceeded to evaluate two additional sites in Region 2 — the Peñablanca Protected Landscape (PPL) in Cagayan Province and the Kalahan Forest Reserve (KFR) in Nueva Vizcaya Province, which were subsequently selected as the study sites. The field visits revealed that the watershed conditions of the two sites were fairly good and stable. In Peñablanca, the volume and quality of the water in the Pinacanauan River, which is the main river that traverses the watershed, impressed the project team. In addition, based on the KIIs and FGDs conducted in the sites, both suppliers and beneficiaries of the environmental services in the watershed were well defined. The environmental service being examined in the PPL was watershed protection.

The KFR was suggested as a study site as it was one of the pilot sites of the International Center for Research in Agro-forestry under its program on Rewarding the Upland Poor for Environmental Services (ICRAF/RUPES) and demonstrated strong potential for PES. The KFR is part of the ancestral domain of the Ikalahan indigenous people and is covered by a legal agreement between them and the government. The Ikalahan practiced traditional and sustainable farming technologies and protected the watershed throughout the period of their occupancy of the KFR in early 1970s and continue to do so. A major problem with the KFR that the team identified was the wide distance between the KFR watershed and the ES beneficiaries that made the evaluation of the land-water linkages more difficult.

2.2 Science

Understanding land-water linkages

Land use in the uplands, such as agriculture, grazing, forestry, mining, and urbanization and the accompanying land management practices, has

impacts on watershed services by affecting water availability and water quality. **Figure 2** shows land-use and water linkages in a rural watershed (FAO 2002). Land use and management practices of upland agricultural farmers, for example, can impact both surface and ground water supplies and, in turn, affect annual run-off and seasonal distribution of surface water availability as well as ground water recharge. Water quality is affected by the amount of erosion sediment load, nutrients and organic matters, and pesticides arising from the farmers' agricultural land management practices and other domestic activities. In addition to human-induced activities and their interactions, some of these impacts can also be brought about by natural processes, including natural disasters such as earthquakes. The evaluation of land use and water linkages for purposes of establishing watershed protection services can, therefore, be an extremely difficult task. The study examined the land-water linkages connected by solid (blue) lines in **Figure 2**.

2.3 Method of land-cover/land-use classification

The land-cover/land-use classification of the study sites was determined from the processing of land satellite images guided by a series of field observations, ground validation and secondary reports. Since the required images of the two watersheds were not available in the national mapping office, the project acquired them directly from foreign sources. Satellite images for the years 1990, 1998 and 2002 were obtained from the U.S. Geological Survey and the GISTDA in Bangkok, Thailand. A Geographic Information System (GIS) specialist implemented the image analysis and the ground verification. The classification process consisted of combined unsupervised classification and manual classification techniques. The analysis resulted in the classification of six land classes for the Peñablanca watershed and five land classes for the Imugan watershed.

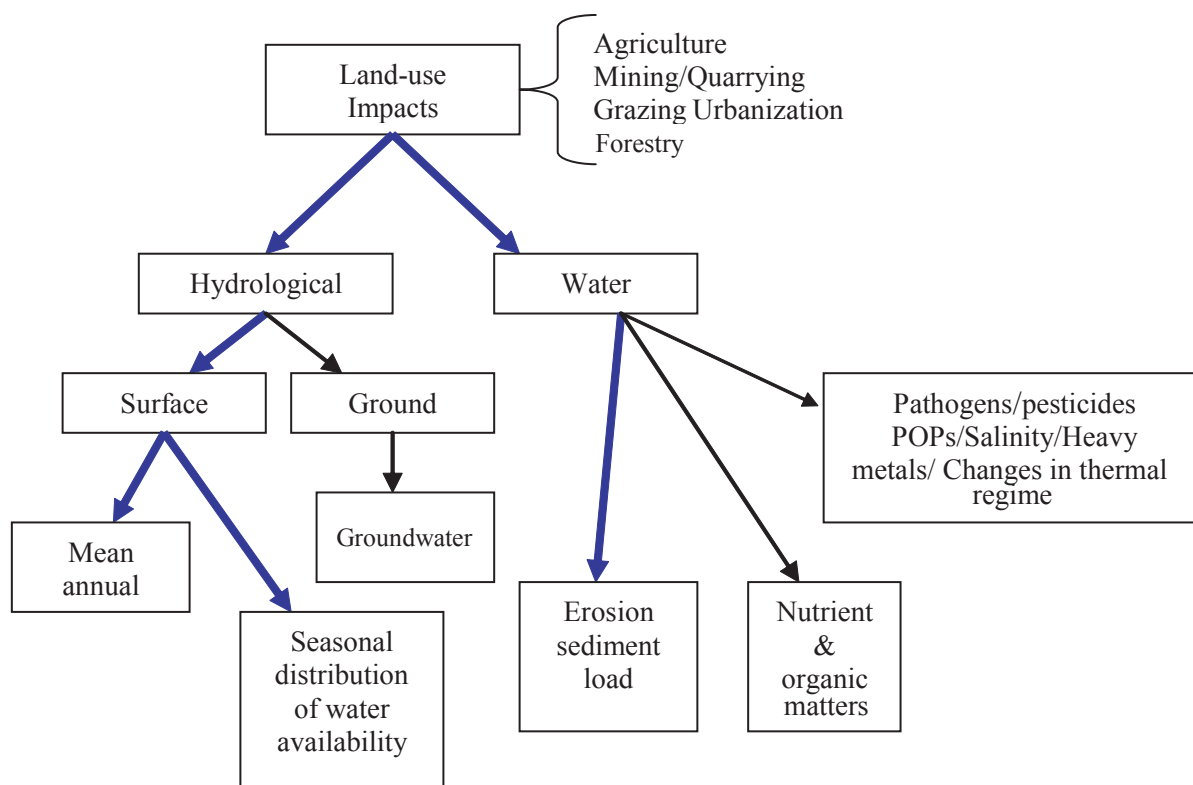


Figure 2. Land-use and water linkages in a rural watershed

2. 4 Assessment of watershed hydrologic functions

The hydrological functions of the two watersheds were assessed by a combination of analyses of historical hydro-meteorological data and land cover/land use change over time, and a simulation of hydrological processes under varying land cover, land use and rainfall conditions. The analyses were supplemented by relevant information gathered through KIIs, FGDs and community surveys that were used to fill in gaps and affirm the results of the analytical processes.

For the Peñablanca watershed, available historical stream flow and rainfall data for both dry and wet seasons were analyzed to examine any correlation using simple statistical trending techniques. These were used in the simulation model. This analysis was not done for the Imugan watershed as historical stream flow data was not available. Instead, the hydrological functions of this watershed were assessed mainly by simulation of the hydrological processes under varying land cover, land use and rainfall conditions. The historical stream flow records of Magat watershed — where Imugan is a sub-watershed — together with rainfall data around the Imugan watershed, were used in the model.

For the simulation model, the BROOK 5 hydrologic model was used to simulate stream flow under five land use and land cover scenarios, namely: Scenario A – 1990 land cover and land use; B – 2002 land cover and land use; C – 10% increase in forest cover and 10% decrease in grasslands; D – 10% decrease in forest cover and 10% increase in grasslands; and E – 20% decrease in forest cover and 20% increase in grasslands. Scenarios C to E were based on 2002 land use and land cover conditions.

Estimation of the sediment yield of the stream flow was based on the potential surface soil erosion in the watershed. Stream flow-sediment yield consists of the suspended load and the bed load that could come from soil erosion, mass wasting,

and erosion of the stream channels and gullies. To get some indication of the extent of influence of land cover and land use on the quality of the stream flow in both watersheds, the Universal Soil Loss Equation (USLE) was used with the aid of GIS to estimate the rate of surface soil erosion under different land-cover and land-use types. The USLE predicts the average annual soil loss per unit area as influenced by such factors as rainfall and runoff, slope, steepness, land cover and others. However, since there was no field data on sediment measurements, the USLE was used to predict the impacts of land-use change on the quality of the stream flow in the two watersheds.

2. 5 Economics

Valuation of water-related benefits

The Pinacanauan River watershed supplies water to Peñablanca and partly to adjacent Tuguegarao City for irrigation and domestic use. The watershed also provides recreational benefits to local tourists (e.g. swimming and picnicking) and to adventure tourists from Manila for white-water rafting, kayaking, swimming and bat watching. The protected area boasts of its famous multi-chambered caves of Callao that draw local as well as some foreign tourists.

These hydrologic-related benefits were valued using a contingent valuation method (CVM). Three sets of CVM surveys were conducted to collect socioeconomic data and determine the willingness to pay of beneficiaries for watershed protection. These beneficiaries included domestic water users, rice farmers with irrigated lands, and tourists. For domestic water use, local residents, connected and not-connected to the local water district, were included in the survey. Among the beneficiaries of the Imugan watershed, only lowland rice farmers were included in the survey. A combination of random and systematic random samplings was used in the survey design, and personal interviews using questionnaires were conducted.

A survey of upstream farmers residing in one of the three large villages in the Pinacanauan watershed was conducted to collect information on agriculture and forest use practices. The data on the cost of watershed protection and rehabilitation was collected through benefit transfer. Specifically, the average cost of watershed protection in the four reservoirs providing water to Manila was used.

2. 6 Institutions

The study conducted the following activities in examining the institutional aspects of PES in the two study sites. First, the institutional requirements for PES were identified and assessed in each site vis-à-vis the legal and regulatory environment, property rights, cooperative mechanisms and the role of government. Second, given the multi-stakeholder nature of PES, a stakeholders' analysis was implemented to identify the stakeholders in the two sites, their interests and their roles in PES. Third, at project end, consultation workshops were conducted with key stakeholders on the salient findings of the project and the proposed PES institutional structure.

A comprehensive list of stakeholders and their interests was drawn based on project documents, field surveys, FGDs, and KIIs for purposes of implementing the stakeholders' analysis. Based on this list, their impact on the watershed resources as well as their roles in the establishment of PES were deduced — whether they were likely to facilitate or hinder its establishment. Finally, the stakeholder analysis examined how each stakeholder might participate in sustaining protection and conservation efforts, poverty reduction programs, and management of funds accruing from the PES.

2. 7 Simulation Model and Multi-criteria Analysis

A dynamic simulation model was designed primarily to investigate the potentials of PES programs in the two sites and to compare the monetary benefits and costs to different stakeholder groups under alternative designs of PES programs.

The scenarios, plus the baseline scenario, were designed based on the following criteria: (1) level of forest conservation; (2) inclusion or exclusion of carbon benefits; (3) type of intermediary institution; and (4) means of payment.

Besides the output of the simulation modeling briefly described above, there are other criteria relevant to making decisions on the design of PES schemes that cannot be easily quantified in monetary terms. To support such a decision-making process in which criteria cannot be expressed in a common unit of measurement, a multi-criteria analysis (MCA) was implemented. An MCA has the additional advantage of allowing a more participatory approach to decision making by taking inputs from experts and stakeholders. MCA was facilitated by using the DEFINITE computerized MCA software developed at the Vrije University.

3. Summary of Findings

3.1 Imugan Watershed, Kalahan Forest Reserve

Science

- Land use and land cover in Imugan Watershed appears to be adequate in relation to the maintenance of good hydrologic functions, specifically maintaining stream flow all-year round.
- Land use and land cover of Imugan watershed seem to exhibit stability, particularly the forest cover that shows more or less the same net values for 1990 and 2002, suggesting that the management in place is able to regulate the uses of the lands inside the watershed.
- The estimated potential soil erosion in the watershed indicates that the land cover condition of the watershed is sufficient to keep the rate of potential sedimentation at a very low level.

Economics

- There is willingness-to-pay for watershed protection among the respondent-rice farmers.
- Land use practices of the Ikalahan farmers are sustainable and support watershed services.

Institutions

- The property rights over the environmental services provided by the Imugan farmers are well defined.
- There is an existing and stable institution that can serve to facilitate the PES establishment in the Reserve.

Simulation Model

- A PES program with high conservation, with Kalahan Educational Foundation (KEF) as the intermediary and investments in carbon crediting, is the most beneficial option in the KFR.
- A PES program with a high conservation option is beneficial to the service providers because of its employment enhancing component.
- The administrative costs of running a PES program are considerably lower if the KEF will manage the program.
- The marginal benefits from carbon credits are offset by the increased monitoring and verification costs of carbon sequestration projects.

Multi-criteria Analysis

- The key stakeholders in the KFR consider financial factors more important than the economic, social, and environmental factors in designing a PES program.

- A PES program with high conservation, with KEF as the intermediate institution and investments in carbon crediting, is the most beneficial option in the Reserve.

3. 2 Pinacanauan Watershed, Peñablanca Protected Landscape

Science

- Land use and land cover in the watershed are moving along a trend where forests and brush lands are decreasing and agricultural and grassland areas are increasing. This is likely due to the rising demand to increase agricultural productivity to meet the growing needs of dependent communities.
- Rapid assessment of the stream flow behaviour of the watershed seems to indicate that the increasing variability in the annual flow as well as the increase in wet season flow and decrease in dry season flow over the last decade are likely associated with the decreasing forest cover and increasing areas used for agricultural purposes.
- Likewise, results of the estimation of potential soil erosion and sedimentation appear to suggest possible link between reduction in forest cover and expansion of agricultural areas in the watershed, and the increase in potential soil erosion and sedimentation.

Economics

- There is some dependence of upstream farmers on the forests for non-timber forest products and fuelwood, partly for their subsistence. Some of the farmers also practise agro-forestry and engage in tree planting at the same time.
- There is positive willingness to pay for watershed protection among the respondent-beneficiaries.

Institutions

- A PES mechanism in the Pinacanauan watershed will have to reckon with the provisions of the NIPAS law since it is within the Peñablanca protected area.
- There is a continuing and increasing occupancy of the watershed by landless farmers.
- The environment department is among the least preferred agencies to manage PES funds according to the service beneficiaries.
- There are some key stakeholders both upstream and downstream that could hinder the establishment of a PES in the protected area.
- There is a preference for a private foundation or corporation to handle the PES funds.

Simulation Model

- A PES program with high conservation, cash payments and investments in carbon crediting is the most beneficial option in the Peñablanca Protected Landscape.
- A PES program with high conservation is beneficial to the service providers because of its employment enhancing component.
- The administrative costs of running a PES program are considerably reduced when payment schemes involve cash rather than in-kind payments.
- The marginal benefits from carbon credits are offset by the increased monitoring and verification costs of carbon sequestration projects.

Multi-criteria Analysis

- The key stakeholders in the Peñablanca Protected Landscape consider financial, economic, social,

and environmental factors of equal importance in designing a PES program.

- The concern over the loss of biodiversity ranks very high among the stakeholders.
- A PES program with high conservation, cash payments and investments in carbon crediting is the most beneficial option in the Peñablanca Protected Landscape.

4. Proposed PES Institutional Structures

4.1 Kalahan Forest Reserve

Figure 3 presents the proposed institutional setup for a PES scheme within the KFR. It is a relatively simple setup that does not require the creation of any new body. The KEF is a people's organization that represents the interests of the Ikalahan. As intermediary, it facilitates the negotiation of any transactions with prospective buyers of the environmental services being provided by the Ikalahan as well as manages the PES fund. In the stakeholders' consultation conducted by the project that included some prospective beneficiaries, the KEF was generally accepted as an intermediary by the participants.

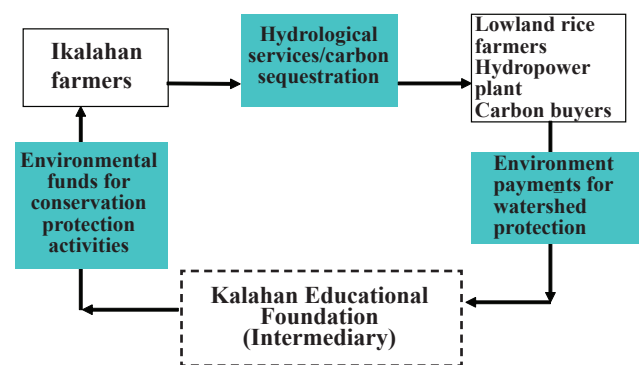


Figure 3. Proposed Institutional Setup in the Kalahan Forest Reserve

4.2 Peñablanca Protected Area

As shown in **Figure 4**, the proposed institutional structure for the PPL requires the creation of a new organization to manage the PES scheme. Being a protected area, the PPL is under the NIPAS law and any funds generated from the use of environmental services are required to be placed into the Integrated Protected Area Fund or IPAF. However, the stakeholders within the PPL feel that an independent body that is not regulated by government would perform a better job managing the PES. At the stakeholders' consultation, it was proposed that a private foundation be established to serve as intermediary between service providers and service beneficiaries, and as fund manager.

5. Lessons and Recommendations

Methodological Lessons

- In the design of PES programs, such elements as science, economics and institutions should be examined to assess their potentials for implementation. All three elements are of equal importance.
- It is crucial to establish linkage between land use and the level of environmental services in determining the sustainability of a PES program.
- Part of the PES design process is the importance of determining first if there is demand for environmental services.
- Key stakeholders in the PES program should be involved and consulted as part of the design process.

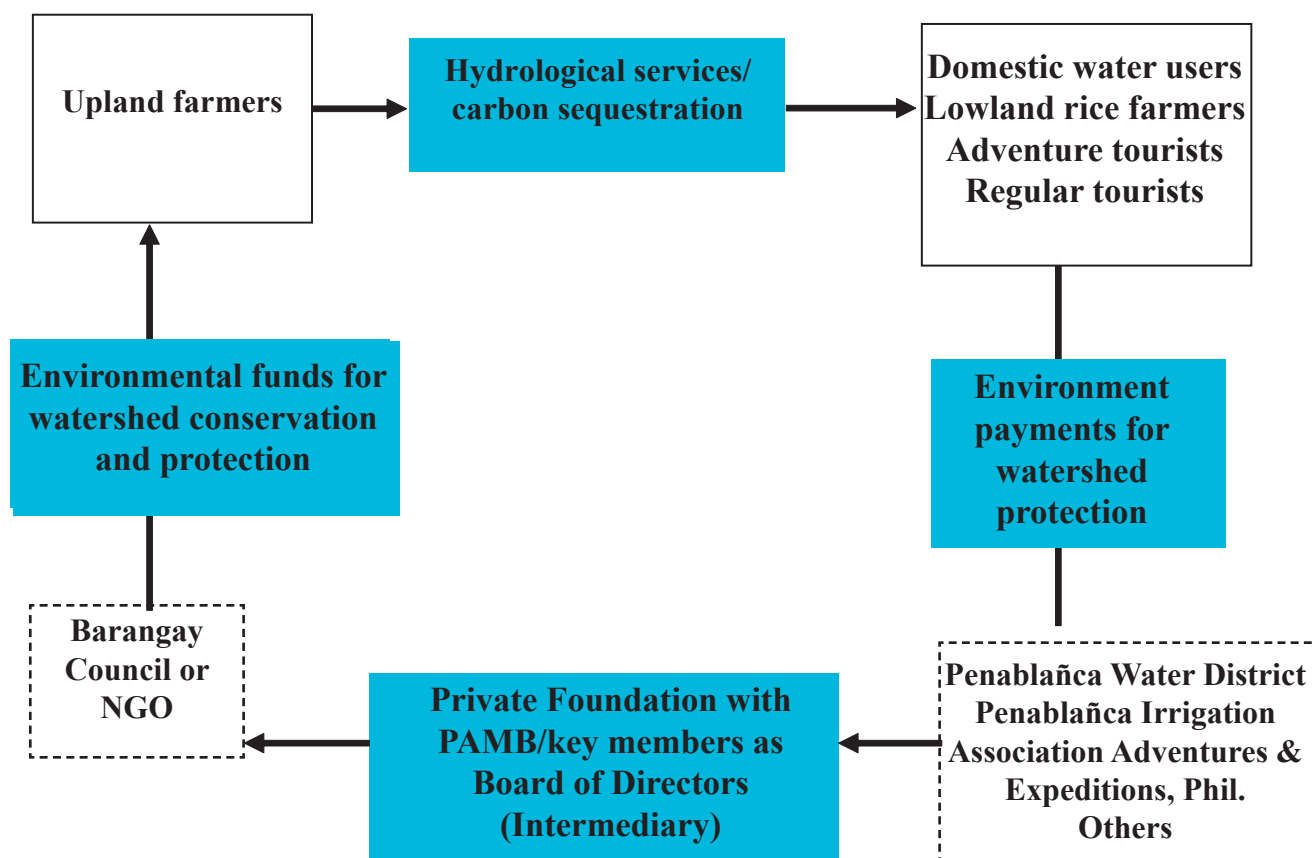


Figure 4. Proposed Institutional Setup in the Peñablanca Protected Landscape

General Policy Recommendations

- (1) PES should be explored by the concerned governmental and non-governmental organizations in areas where it is proven by the science, economics and institutions that environmental services are being provided by the local communities and there are downstream communities that benefit from the services.
- (2) Similarly, global donors (i.e., GEF, ICRAF) should continue supporting communities that, by their sustainable conservation practices, have contributed global environmental benefits. This could serve as an incentive for other communities to adopt similar practices.
- (3) PES should be promoted as a policy reform to specifically address illegal activities within critical watersheds since it provides incentives to upland dwellers to protect them by giving them a stake in the resources and in the process to alleviate their poverty.

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