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Access to water and payment for environmental services, Jequetepeque Watershed, Peru

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**ACCESS TO WATER AND PAYMENT FOR
ENVIRONMENTAL SERVICES, JEQUETEPEQUE
WATERSHED, PERU**

A stakeholder analysis undertaken in support of the project "Payment for Environmental Services
as a mechanism for promoting rural development in the upper watershed of the tropics"

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DIIS Working Paper no 2007/10

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Abstract

The project “Payment for environmental services as a mechanism for promoting rural development in the upper watersheds of the tropics” is a research and development project running in four pilot catchments in the Andes region. Its overall objective is to alleviate poverty and enhance sustainability in upper catchments by increasing the flow of resources from governments and civil society to poor rural producers, reducing the negative impact of environmental externalities and strengthening the competitive capacity of the poor. DIIS has been given the task to carry out an institutional analysis in order to identify key stakeholders in the management of watersheds, their priorities and interests, their mutual relations and issues contributing to conflict and cooperation among them. The present Working Paper presents the findings from the institutional analysis carried out in Jequetepeque watershed, Peru.

The paper argues that the introduction of PES schemes takes place in a context of already existing institutions and competition over access to land and water. Moreover, the introduction of PES schemes itself represents the creation of new forms of rules and regulations (or PES institutions), which might shape existing property institutions. The design of PES schemes has to be considered with a view to how it might influence the existing institutions governing access to irrigation water and the actual distribution of access to irrigation water and vice versa.

The national water legislation for irrigation constitutes the framework which shapes access and management of water for irrigation and thereby also influences the circumstances under which PES schemes can be implemented. Two types of water titles can be established. Either water users can possess a *licencia*, which gives a permanent and secure right to water, or a *permiso*, which only gives rights to water if total available quantities exceed the needs of the holders of permanent water rights (*licencia*)

Based on an analysis of rural inhabitants’ access to irrigation water, the paper concludes by listing the challenges associated with the wish to establish pro-poor PES in the watershed:

- The administration and enforcement of the formal regulations on water rights and use is weak and in several cases non-existing. In many villages, water users do not pay fees for the water they are allocated, or they withdraw water to which they are not entitled according to existing water rights. The illegal use of water and lack of payment of fees for legally endorsed water use indicate great risks for implementing a PES system based on individual payments. A better understanding of who enjoys illegal access to water – i.e. the poor or the non-poor; farmers with secure water rights (*licencia*), with insecure water rights (*permiso*), or without any water rights – is fundamental to assess the poverty impact of strengthening water rights administration in general and introducing PES schemes in particular.
- Secure rights are a pre-condition for the PES market on the supply and the demand site. On the supply side, it should be considered to which extent the current land tenure rights, of which many remain without legal documents, will affect negatively the possibility of establishing schemes. On the demand side, it should be considered how a more secure delivery of water to water right holders will improve the security of their rights. Unclear tenure rights constrain the establishment of contracts.
- The current system where some hold *licencias* and others *permisos* might cause some water right holders to be willing to participate while others do not wish to be involved. As all water users benefit from the same source a free-rider problem might occur.
- Pro-poor impacts of a PES scheme are questionable in the case of Jequetepeque watershed as the poorest cannot be targeted as providers or beneficiaries of water services.
- It should be expected that streams of benefits (cash to providers and improved environmental services) are likely to create incentives for elites to take over land or strengthen their water rights. Thus safeguards need to be included to guard against elite capture.

I. Introduction

In the Andes region, water resources are becoming increasingly scarce and contested as a growing number of industries, rural and urban populations require more water for consumption, agricultural and industrial purposes. As scarcity grows, the social and biophysical interdependencies become more apparent as natural resource management decisions taken upstream to an increasing extent produce downstream outcomes or externalities. The obligation to ensure the provision of environmental services often fall on the local natural resource managers, whereas beneficiaries of such services might not be aware of the land use practices that are essential for their provision (Kerr, 2002; Zbinden and Lee, 2005). Payment for environmental services (PES) is an environmental management instrument that uses economic incentives to promote conservation of the environment and the environmental services it provides. PES aims at establishing benefit streams, whether in cash or kind, flowing from beneficiaries of improved environmental services to the providers of these services.

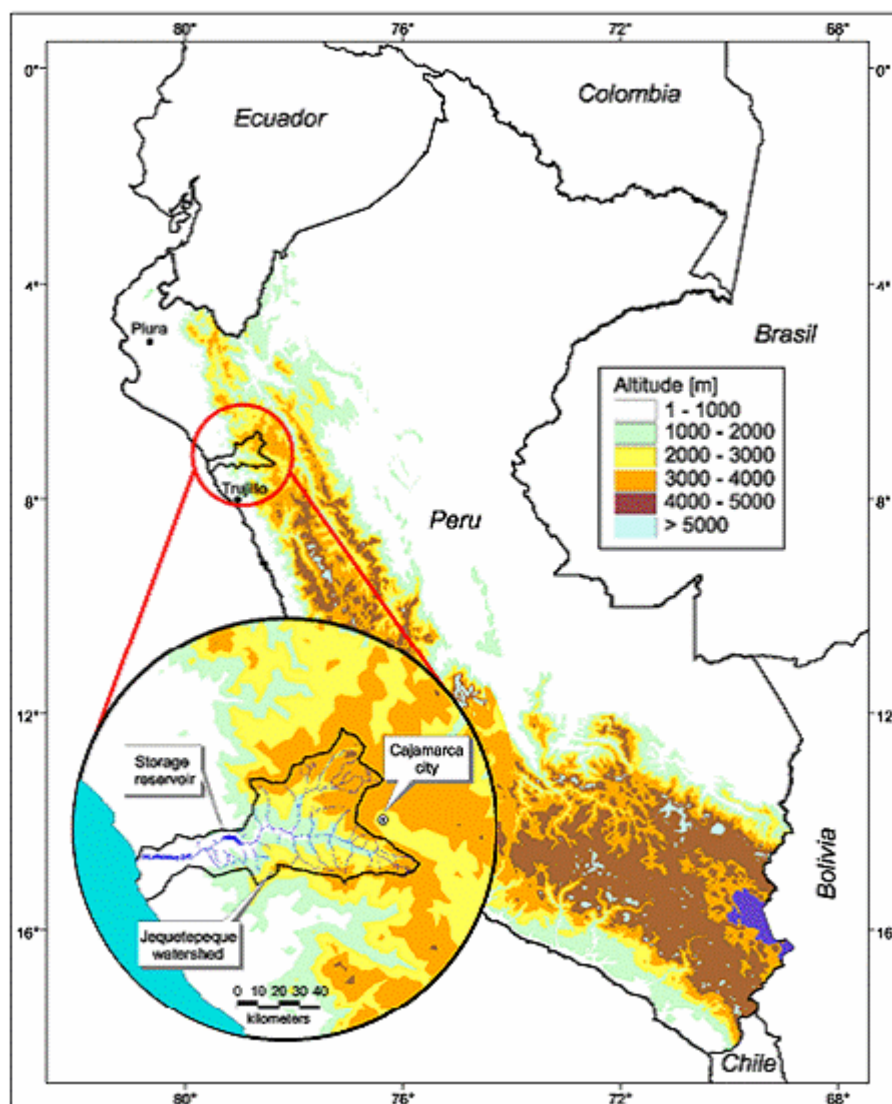
The project “*Payment for environmental services as a mechanism for promoting rural development in the upper watersheds of the tropics*”¹ is a research and development project, funded by the Global Water and Food Challenge Programme and implemented by GTZ-CONDESAN in collaboration with the International Centre for Tropical Agriculture (CIAT) and the Danish Institute for International Studies (DIIS). The first phase of the programme is running from 2004 to 2007 in four pilot catchments (Fuquene, Colombia; Ambato, Ecuador; Jequetepeque, Peru; and Tunari, Bolivia).

Its overall objective is to alleviate poverty and enhance sustainability in upper catchments by increasing the flow of resources from governments and civil society to poor rural producers, reducing the negative impact of environmental externalities and strengthening the competitive capacity of the poor through greater food security, higher incomes, and better administrative and organizational skills (GTZ-CONDESAN, 2004). As part of the partnership, DIIS has been given the task to carry out an institutional analysis in order to identify key stakeholders in the management of watersheds, their priorities and interests, their mutual relations and issues contributing to conflict and cooperation among them. The present paper constitutes a first attempt to meet this objective for Jequetepeque watershed, Peru (see map 1) by analysing the institutions through which access to irrigation water is established. It is argued that the design of PES schemes has to be considered with a view to how the PES scheme might influence the existing institutions governing access to irrigation water and the actual distribution

¹ <http://www.condesan.org/cuencasandinas/>

of access to irrigation water and vice versa how the institutions shaping access to irrigation water might influence the design options for a PES scheme.

The rest of the paper is organized as follows: The next section presents the research questions and methodology of the study. This is followed by a third section describing Jequetepeque watershed and the three areas where field research was carried out. The fourth and core section of the paper, analyses access to irrigation water and discusses the implications for the design of PES schemes. Finally, section five concludes by listing the challenges associated with the wish to establish pro-poor PES in the watershed.



Map 1. Jequetepeque watershed

2. Research objectives and methodology

RESEARCH OBJECTIVES

Watershed environmental services are linked to certain upstream land areas with high ability to recharge aquifers, high storage potential or riparian areas and hillsides of importance to the reduction of erosion (see Box 1). Land property institutions contribute to shape the use and management of such areas. Hence, the introduction of PES schemes takes place in a context of already existing institutions and competition over access to land. Moreover, the introduction of PES schemes itself represents the creation of new forms of rules and regulations (or PES institutions) that might shape existing property institutions (Swallow *et al.*, 2005).

Downstream beneficiaries of watershed environmental services can be e.g. factories, municipal water utilities and rural or urban water users. As regards rural beneficiaries of irrigation and consumptive water the ability to benefit depends, among other things, on access to land and water.

Box 1

Among environmental services for the provision of freshwater and its quality and quantity are:

- *Water regulation:* The timing and magnitude of run off, flooding and aquifer recharge. Water regulation is influenced by changes in land cover, including alterations that change the water storage potential of the system e.g. conversion of wetlands or the replacement of forest with croplands.
- *Erosion regulation:* Vegetative cover plays an important role in soil retention and the prevention of landslides and sedimentation of streams and rivers.
- *Natural hazard regulation:* Ecosystems play an important role in modulating the effects of extreme events on human systems. E.g. soil stores large amounts of water, facilitate transfer of surface water to groundwater, and prevent or reduce flooding.

(Millennium Ecosystem Assessment, 2005).

The aim of this study is to understand how access to water is established in order to point to how these access mechanisms might affect the introduction of PES arrangements and vice versa. A better understanding of the linkages between PES and other rural institutions is a prerequisite for better designs of PES schemes and more equitable outcomes.

The following research questions have guided the study:

- Which formal and informal institutions regulate access to water and land and how might that influence the introduction of PES schemes?
- Which conflicts over access to water and land exist?
- Who are the potential participants (environmental service providers and buyers) in PES schemes in Jequetepeque watershed?
- What are the constraints and opportunities for the involvement of poor people in PES schemes?

METHODOLOGY

The present paper is based on research carried out between May and July 2005 to identify institutions shaping access to land and water and the competition and conflict over access to land and water. Three sites were chosen for field work in Jequetepeque watershed, based on criteria of variation that should reflect divergence with respect to agricultural activities, altitude and ecological conditions. These factors were *a priori* assumed to determine the presence of different interests and practices in relation to water and land management.

The study was delimited to focus on the provision of water ecosystem services for irrigation purposes. Semi-structured interviews were conducted with key informants from regional to local water management institutions and ordinary local inhabitants². Additionally, meetings and workshops on resource management in Jequetepeque watershed held by local NGOs were attended. Finally, secondary sources of information from Jequetepeque watershed were consulted.

3. Description of Jequetepeque watershed and the research areas

Jequetepeque watershed is located in the Northern part of Peru within the departments of Libertad (provinces of Pacasmayo and Chepén) and Cajamarca (provinces of Cajamarca, Contumazá, San Pablo

² A total of 82 interviews were carried out in the three areas where field research was conducted. 19 interviews were made with inhabitants in the areas of Comisión de Regantes de Tecapa and Comisión de Regantes de San Pedro, 21 interviews were made in the area of Comisión de Regantes de Magdalena and 29 interviews were made in the area of Comisión de Regantes de San Pedro. 13 interviews were made with key informants.

and San Miguel), comprising a total of 45 districts. The watershed covers 5,136 km² and altitudes range from 0 and 4,188 m.a.s.l. In the coastal parts annual precipitation is less than 200 mm while it ranges between 500 - 1,100 mm in the upper part of the watershed. Based on the 1993 population census, the 2006 population of the watershed is estimated to be approximately 306,000 persons.

A reservoir named Gallito Ciego was constructed in 1987. With a storage capacity of 400 million m³ it increased considerably the reliability of water supply to the valley. However, the capacity of the reservoir has gradually decreased due to sedimentation. The reservoir marks the division of the watershed into an upper and a lower watershed management unit (referred to as the “upper part” and “lower part”)³.

The upper part of the watershed covers 80% of the area, while the lower part covers the remaining 20%. In the upper part, 25% of the land is cultivated or under pasture, 25% is forest and the rest either urban areas or unused land. In the lower part of the watershed, 54% is cultivated, 44% is classified as unused land and remaining 2% is urban areas. Of the cultivated area, 60% is estimated to be under irrigation in the upper part of the watershed. In the lower part of the watershed, all agricultural activities are based on irrigation. In general the supply of water for irrigation is higher than the demand during the rainy season from January to May and lower than the demand during the dry period from June to December (Echeverry, 2003). Only sporadic data exists on access to potable water, but households in the upper part do, in general, have less access to piped and treated water compared to residents in the lower part of the watershed.

The largest gold mine in South America is located in the highest part of Jequetepeque watershed. The presence of the mine plays an important role in the economic development of the urban economy. However, it has negative impact on the environment, including a reduced water quality in some areas of Jequetepeque watershed.

The three selected research areas have the following characteristics. The first area is a micro-watershed located between 3,100 and 3,900 m.a.s.l., which forms part of the páramo ecosystem. Field work was conducted in the communities Jamcate, Shinshilpampa, Alto Chetilla and Maraypapmpa belonging to the Comisión de Regantes de Magdalena. The population density of the area is estimated to be 20 per km². Inhabitants are dedicated to milk production and agricultural activities (e.g. barley, wheat and Irish potatoes) under irrigation or rain fed. The micro-watershed is among the areas that has the highest

³ The official name of watershed management units for irrigation are, in the lower part, ‘Junta de Usuarios de Jequetepeque Regulado’ and in the upper part, ‘Junta de Usuarios de Jequetepeque Non-regulado’.

levels of poverty within the watershed. The area is estimated to have a high water holding capacity which makes it relevant for the provision of environmental services to improve water regulation and natural hazard regulation. Furthermore, a reduction of erosion through restoration and maintenance of the vegetative cover is expected to reduce sedimentation of water bodies, particularly of the reservoir.

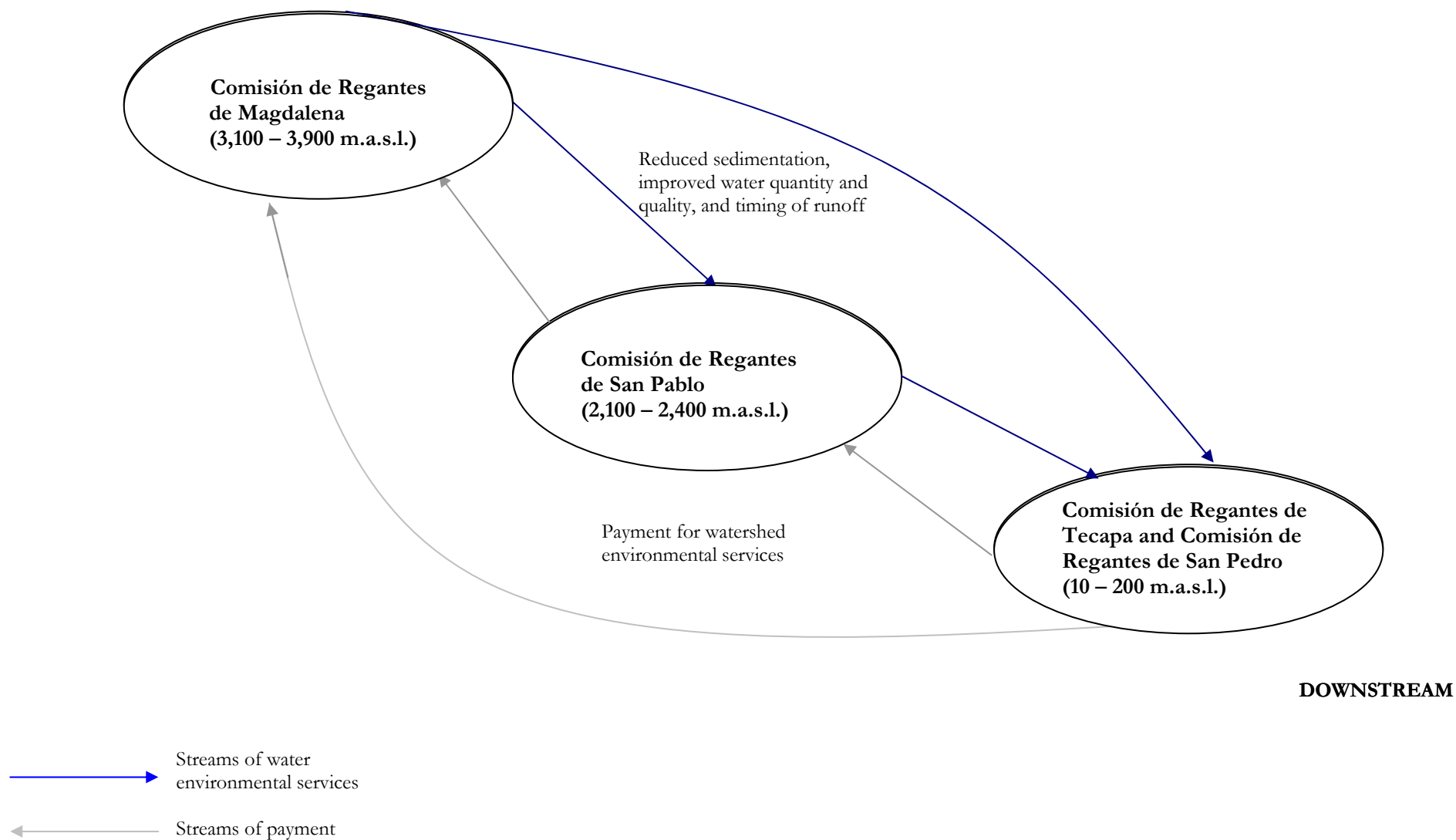
The second area covers the administrative unit of Comisión de Regantes de San Pablo in the lower part of the upper Jequetepeque watershed. The area is located between 2,100 and 2,400 m.a.s.l. The population density is 85 per km². The site forms part of the sub-watershed formed by the rivers Yaminchad and Puclush. Main crops include sugarcane, maize and pasture. At higher altitudes within the area, local farmers are dedicated to milk production. The area provides environmental services in terms of erosion regulation that decreases the sedimentation of the canals and the reservoir. At the same time, people in the area benefit from water regulation and erosion control provided in upstream areas.

The third area is constituted by the administrative units of Comisión de Regantes de Tecapa and Comisión de Regantes de San Pedro, which are located in the lower part of Jequetepeque watershed at 10-200 m a. s. l. The population density is 122 per km². The water sources stem from the outlet of the Gallito Ciego reservoir, and the main crop cultivated is irrigated rice. The area is, in general, characterised by high levels of well-being among the inhabitants compared to the rest of the watershed, although landless people or people possessing only a few hectares also reside in the area. The rice producers are beneficiaries of ecosystem services in terms of erosion regulation in the upper part of the watershed that decreases the sedimentation of the reservoir and prolong its life. The area does not provide any water environmental services that are relevant for the programme.

The three areas, in which field research was carried out, are *a priori* assessed to have the following streams of environmental services, forming the basis for potential payment schemes (Figure 1.):⁴

⁴ A water and soil assessment will determine which areas in the watershed are most relevant to restore due to their high ability to provide watershed environmental services.

UPSTREAM



DOWNSTREAM

Figure 1. Illustration of potential PES schemes in the three field research areas.

4. Access to irrigation water

NATIONAL LEGISLATION ON IRRIGATION

The national water legislation for irrigation constitutes the framework which shapes access and management of water for irrigation and thereby also influences the circumstances under which PES schemes can be implemented.

The current organisation of larger irrigation systems is done by ‘sub-organisations’ at different levels (see Figure 2). Starting at the lowest level (tertiary canal), the general assembly of all water users at the level of each canal elects a board of *comité de canal*. The board’s main tasks are the water distribution and canal maintenance of the tertiary canals. A general assembly of water users at the level of the secondary canals chooses a board of *comisión de regantes*. The board of *comisión de regantes* carries out the water distribution and the maintenance of secondary canals and oversees tasks and obligations of the water users as well as the punishment for non-compliance. Not all *de facto* water users have an official vote in these general assemblies as it is required to be registered and the water user has to make use of the water him or herself. Finally, at the level of the main system is the *junta de usuarios* which is not elected directly by the waters users but consists of the heads and two delegates of each *comisión de regantes*. The board of directors of the *junta de usuarios* manage the main infrastructure and receive payment of the water fees from water users at the level of an irrigation system.

Local governmental organisations are also important in the management of the irrigation water. The local irrigation office of the Ministry of Agriculture, *Administración Técnica* (ATDR) is responsible for the overall allocation of water in the irrigation system. The organisation *Autoridad Autónoma de Cuenca Hidrográfica* is mandated to coordinate water use at basin level and is independent from the local irrigation office.

In the case of Jequetepeque watershed, the watershed is divided into two irrigations systems. Junta de Usuarios de Riego Regulado Jequetepeque, which is constituted by 10 comisiones de regantes (> 1000 irrigations canals) and Junta de Usuarios del Alto Jequetepeque non-regulado”, which is made up by 13 comisiones de regantes (>3000 canals).

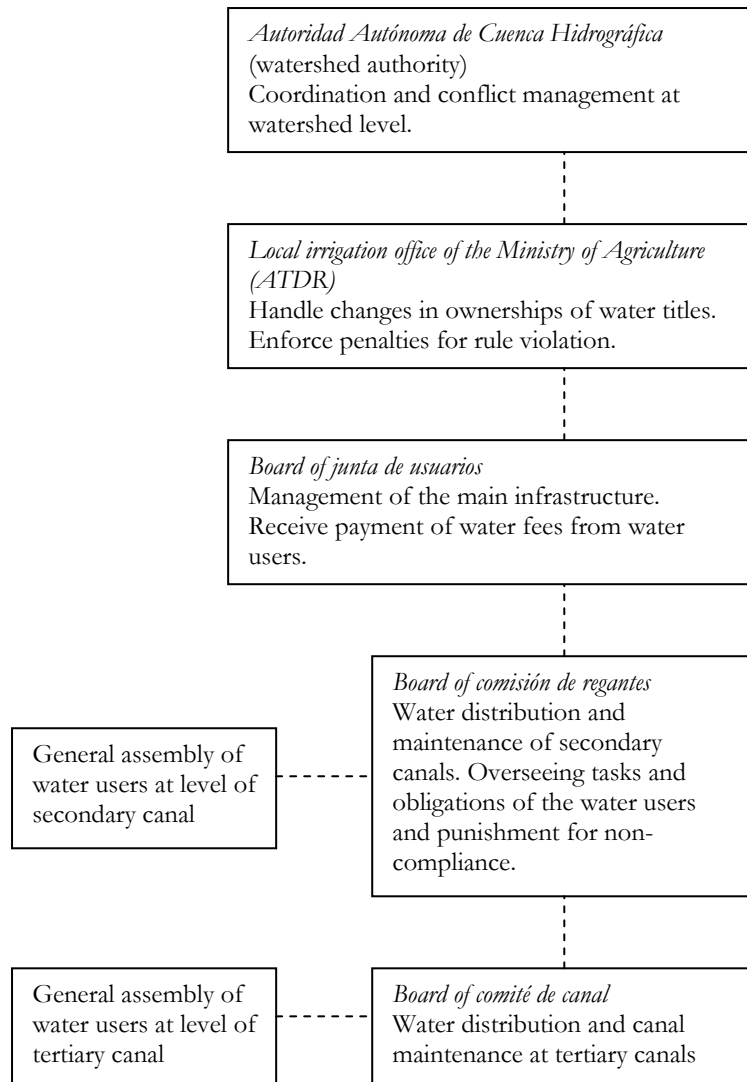


Figure 2. Different layers of the water users' organisations and the local governmental organizations

The current management system of irrigation water is built upon the Peruvian water law, *Ley General de Aguas*, introduced in 1969. Despite changes and additions, the water law still forms the major framework for water access and management. The main features are:

- All kinds of water sources belong to the state, which works towards a water allocation for the general benefit of the society. In order to take advantage of water sources for irrigation purposes, users should possess a water title. As stipulated in art. 29, two types of water titles can be established. Either water users can possess a *licencia*, which gives a permanent and secure right to water, or a *permiso*, which only gives rights to water if total available quantities exceed the needs of the holders of permanent water rights (*licencia*) (Consejo de Ministros del Peru, 1969).
- Changes in ownerships of water titles are handled at the local irrigation office (ATDR). A list of water right holders (*padrón de usuarios*) should be kept at the local irrigation office as well as by the irrigation commission. According to the water law, the list may change due to transfers of titles between local inhabitants, but the total area with a water title should, however, not be augmented (Vos, 2002).

From the late eighties and onwards, a number of changes in water legislation for irrigation have occurred:

- In 1989, water distribution and canal maintenance were transferred to the tertiary level (comité de canal) from the local irrigation office. Still, the control of the overall water allocation among water committees and beyond remained in the hands of the state (Vos, 2002).
- In 1998, the tie between water rights and land rights was removed and water rights could be sold separately from the land and vice versa.

In 2003, a draft of a more profound revision of the water law from 1969 named *Proyecto de Ley Orgánica de Aguas* was launched. Central aspects of the proposed revision are:

- It is confirmed that water continues to belong to the state. Water sources should serve the public interests and cannot be privatized and owned by any natural person or juridical person.

- The system of water titles (*licencia* and *permiso*) continues as under *Ley General de Aguas*.
- The importance of understanding and assessing each watershed as a hydrological unit is emphasised and so is the need for integrating water management with the management of land and other natural resources.
- The importance of involving civil society in the formulation, implementation and management of water management.
- Finally, it is emphasised that water has an economic value that should be estimated (Vos, 2002; Zegarra, 2005) .

No specific reference is made to the importance of environmental services for the provision of water sources, but the ideas of watershed management in the proposed legislation can include economic instruments such as PES. A number of attempts to approve the new law have, however, failed due to opposition from certain stakeholders, especially the agrarian unions, and a general climate of political instability. At the moment the law remains unapproved in parliament.

WATER RIGHTS IN THE FIELD RESEARCH AREAS

Formal as well as informal institutions and practises regulate the access to water for irrigation in Jequetepeque watershed. In the areas of Comisión de Regantes de Tecapa and Comisión de Regantes de San Pedro farming is based on irrigation. Following the national system of water titles (*licencia* and *permiso*) the distribution of formal water rights is as follows: In the area of Comisión de Regantes de Tecapa access to water for irrigation is established through *licencias* for 966 hectares (87% of the irrigated area), and through *permisos* for 197 hectares (13% of the irrigated area). In the area of Comisión de Regantes de San Pedro, access to irrigation water is established through *licencias* for 3,928 hectares (85% of the irrigated area) and through *permisos* for 697 hectares (15% of the irrigated area) (see Table 1). The total number of water users with *permisos* and *licencias* is 523 farmers in Tecapa and 1,670 farmers in San Pedro.

Table 1. Area with water rights in commissions of irrigators in the lower part of Jequetepeque watershed⁵

Subsector/ <i>Comisión de Regantes</i>	Number of users	Area with permanent water right (<i>licencia</i>) (ha)	Area with right to excess water (<i>permiso</i>) (ha)	Total area (ha)
Pay Pay	103	238	12	250
Ventanillas	96	296	19	315
Tolón	320	1,096	126	1,222
Huabal/Zapotal	275	592	55	646
<i>Tecapa</i>	<i>523</i>	<i>966</i>	<i>147</i>	<i>1,113</i>
San José	980	2,832	727	3,558
<i>San Pedro</i>	<i>1,670</i>	<i>3,928</i>	<i>697</i>	<i>4,625</i>
Jequetepeque	369	1,240	147	1,387
Talambo	2,250	4,596	4,041	8,637
Chepén	730	2,970	3	2,973
Limoncarro	1,288	3,365	109	3,474
Guadalupe	2,285	8,176	1,382	9,558
Pacanga	1,044	2,227	2,585	4,811
Total	11,933	32,522	10,049	42,571

Source: (Carpio and Mejía 1996 in Vos, 2002).

For the areas of Comisión de Regantes de San Pablo and Comisión de Regantes de Magdalena data on the distribution of water rights for irrigation among farmers is not available.

The type of water rights held for irrigation, influences the quantities and the probability of receiving water, and thereby farmers' ability to cultivate. Informants from the areas of Comisión de Regantes de San Pablo, Comisión de Regantes de Tecapa and Comisión de Comisión de Regantes de Tecapa perceived their opportunities to cultivate to be closely related with the type of water rights they possessed, if any, and whether it gave them secure access to adequate quantities and timing of water. According to informants from the area of Comisión de Regantes de Magdalena, water scarcity is, to a lesser extent, considered an obstacle to farming opportunities, although variations in water availability exists between villages.

In the areas of Comisión de Regantes de San Pablo, Comisión de Regantes de Tecapa and Comisión de Regantes de San Pedro, farmers who possess *licencia* have the opportunity to cultivate two crops annually, while farmers who hold a *permiso* face insecure access to water and

⁵ Please note that the table depicts the situation before the de-coupling of land and water rights.

may therefore have to limit their agricultural activities if they estimate their chances for getting sufficient water during a particular season are low. A farmer from the Comisión de Regantes de San Pablo holding a *permiso* explained the unequal access as follows:

“Aquí la distribución del agua es muy injusta. No tengo agua para dos campañas. Es imposible obtener una licencia si uno no tiene. La gente no quiere negociar sus horas de riego. ¿Qué puedo hacer?” (Farmer, Iglesia Pampa, Comisión de Regantes de San Pablo).

The quoted farmer had a large parts of his land in areas with cemented cannels and water flowing. Yet, due to only holding a *permiso*, he faced insecure access which made it difficult for him to plan his agricultural activities. The described situation is very common in the lower parts of the sub-watershed of San Pablo province and was, to a lesser extent, also encountered in the research areas in the coastal areas.

As explained by a neighbouring farmer from the same village there is a great unwillingness to renegotiate the allocated water rights:

“Es una costumbre desde antes, que venimos nosotros llevando esa forma de riego. Ya conocemos nuestros días de riego. Nos respetamos cada usuario; tenemos nuestros días de riego, regamos así cada quince días según nuestros derechos; cada terreno tiene su derecho de agua, su turno; nos respetamos y entre vecinos nos llevamos bien. Si una familia viene a pedir más agua no le puede dar. Ya no hay. Todo está distribuido, comienza y termina, termina y comienza, así da la vuelta. Todo ya está empadronado. No se pude pedir más sin quitar el agua de otro. Ya está repartida el agua según costumbre. La gente se ha posicionado fuerte y no quiere dejar esas costumbres. Por ejemplo si uno compra terreno que no tiene licencia o permiso va a tener problemas, por que los que tienen agua allí se sienten dueños del agua” (Farmer, Iglesia Pampa, Comisión de Regantes de San Pablo).

The two quotes illustrate the competition over water taking place at the local level, as farmers do face different opportunities depending on the type of water right they hold. In addition, despite the recent change in legislation, of which many apparently are unaware, in practice water rights continue to be linked to land rights and hence, water and land rights are not sold separately.

It is important to emphasise that flows of water in different parts of the upper part of the watershed vary between areas. Some areas rely only on water harvesting from rivers while other areas also benefit from infiltrations and springs on specific land plots. At the same time, the sharing of water for irrigation is not only unequal in terms of the type of right held, but also in terms of the quantities of water entailed in the right, in the sense that some pieces of land are allocated two to three times the amounts of water per land unit as compared to other pieces of land with a *licencia*. As described by the water engineer from San Pablo district, within the same village you may find a farmer with 500m² having *licencia* for six hours of water while the neighbour with two hectares of land is also limited to six hours of water.

IMPLICATIONS FOR PES OF DIFFERENTIAL WATER ACCESS

It is important to consider how existing water rights might impact the establishment of PES schemes. As illustrated, farmers do experience different access to water for irrigation according to the type and the contents of the rights they hold and thereby how secure their access to water is. The issue of secure water rights – i.e. “*the assurance that one will receive benefits in the future*” (Bruns *et al.*, 2005) – matters as it affects incentives to invest in and conserve the water resource. In the case of beneficiaries of watershed services in Jequetepeque the above-mentioned examples highlight the need for a more profound understanding of potential beneficiaries’ understandings of how secure their water rights are.

Farmers, who today face insecure access to irrigation water, may be difficult to persuade to pay for environmental services if no guarantees are made that amounts of water harvested will increase or at least be more predictable in the future. If only holders of the more secure *licencias* to irrigation water pay for the provision of environmental services, this will further strengthen their water claims *vis-à-vis* the *permiso* holders. Yet, on the other hand, the possibility exists that holders of a *permiso* might perceive participation in a PES scheme as a strategy to strengthen their claims for a more secure access to irrigation water. In other words, the launching of a PES scheme might provide an opportunity to open up for (re-)negotiations of water rights in the watershed. Both scenarios indicate that PES arrangements are likely to influence current power relations between different types of water rights holders in the watershed.

Besides carefully paying attention to the extent to which the possible introduction of PES arrangements influences the distribution and the security of water rights, it is important – from a poverty perspective – to examine the correlation between the level of poverty and the type and contents of the water rights held.

PAYMENT OF WATER FEES AND ILLEGAL USE OF WATER

The following paragraphs present the findings from the three research areas on non-compliance with the obligation to pay water fees as well as practices of illegal use of water that farmers are not entitled to. Examples are drawn from the upper part of the watershed, especially in the area of Comisión de Regantes de San Pablo, where these practices are most widespread.

A central element of the national system of water rights administration is the payment of water fees. Each water right holder should pay an annual fee to the Junta de Usuarios de Jequetepeque Non-regulado or Junta de Usuarios de Jequetepeque Regulado. In the areas below the reservoir the available volume of irrigation water is estimated on a weekly basis. In the upper part, the annual water fee is calculated on the basis of a combination of the number of hours that water is allocated to each farmer and the farmer's agricultural plan, which describes the crops to be cultivated.

However, particularly in the areas of Comisión de Regantes de San Pablo and Comisión de Regantes de Magdalena, a large number of holders of *permisos* or *licencias* in registered canals actually do *not* pay the fees. Informants explained their scepticism to start paying fees for water to be a matter of unreliable delivery of water. As explained by an informant, holding a *licencia* right to irrigation water:

“Yo espero filtraciones de la parte alta. Pero si no hay filtraciones el canal queda sin agua y sería injusto que yo pague. Si hubiera agua asegurada, obligara a la gente a pagar. Debemos aportar al estado. Pero solamente cuando uno recibe algo” (Farmer, Chorro Blanco, Comisión de Regantes de San Pablo).

As explained by informants in the areas of Comisión de Regantes de San Pablo and Comisión de Regantes de Magdalena, the individuals' unwillingness to pay can be attributed to the fact that water authorities are not very present in the villages. The *comisiones de regantes* and Junta de Usuarios that hold the responsibility for regulating and controlling water use, do not possess sufficient capacity to carry out the monitoring of water users' compliance with rules and regulations. Yet, a majority of the informants acknowledged that they believed the tariff system could be beneficial if the authorities started enforcing the payment of water fees and supported further improvements of the infrastructure of the canal system.

Part of the problem can be explained by the illegal use of water that takes place in areas where people do possess rights but use more water than their right entitles them to. The problem is especially prevalent in the upper part of the sub-watershed in the area of Comisión de Regantes de San Pablo where a process of conversion of land to pasture as fodder for dairy cattle has taken place in recent years. The market for milk is, in economic terms, attractive relative to the production of agricultural products such as cereals and maize, particularly due to the reliable income obtained from milk sales to commercial companies. This has led to an increasing use of water exceeding far beyond the amounts allocated through the existing *licencia* and *permiso* rights system. Areas in the lower part of the sub-watershed therefore increasingly face a situation of water scarcity. As explained by a sugarcane producer:

“La situación de escasez de agua de San Pablo es por causa de la extensión pecuaria en la parte alta. Si el agua llegaría para nosotros no hubieran tanta pobreza, arriba se dedican a la leche. El problema es que el agua no alcanza para nosotros. Nuestras horas de riego no serviría para nada. La gente más arriba cogen la mayor parte del agua. Regamos cada veintiún día pero ya que está disminuyendo el agua, el presidente del comité de canal a veces prolonga el turno a veintiocho días. Antes la mayoría [arriba] no regaban, pero ahora todos se han puesto a regar”. (Farmer, El Ingenio, Comisión de Regantes de San Pablo)

A large number of illegal canals, i.e. canals which have never been approved (and might not be in the future), have been constructed in parts of the area, and users of these canals, therefore, do not pay water fees.

In order to respond to the weak management and control of water for irrigation, local farmers have set up their own control system. In order to secure the water flows, what is locally termed “water guardians” are found in many areas. Water users pay a guardian to control that no water harvesting upstream takes place without permission. The practice has been established as a local response to water robbery. As explained by an informant from the lower part of the area:

“Muchos nos quieren robar el agua porque se les faltan agua. Uno dice, voy a robar el agua y corta el canal o usa una moto bomba. Para que yo pueda traerlo tengo que poner guardianes en el mismo río después más acá, en la travesía y cuesta caro pues. Tenemos que pagar nuestros guardianes para que esa agua venga. Para nosotros es demasiado costoso pagar estos guardianes. Un guardián no cuesta menos de treinta

soles mensual. Ellos son personas claves para que el agua venga”. (Farmer, El Ingenio, Comisión de Regantes de San Pablo)

In conclusion, the formal regulation of water use, especially in the upper part of the watershed is weak. In many villages, water users do not pay fees for the water they are allocated, or they withdraw water to which they are not entitled according to existing water rights.

CONSIDERATIONS FOR THE ESTABLISHMENT OF PES SCHEMES

The issue of water robbery illustrates the competition that exists over scarce water sources for irrigation purposes and the weak regulation of water use taking place in the watershed. The fact that water users in many parts either do not pay water fees or withdraw water without the support of formal water use rights thus constitutes an enormous challenge for the establishment of PES schemes.

As indicated in figure 1, farmers in the area of Comisión de Regantes de San Pablo can be considered potential buyers of environmental services from areas at higher altitudes. The current situation of illegal water use and lack of payment of fees for legally endorsed water use indicate great risks for implementing a PES system based on individual payments. To assess whether this illegal access to water will affect the willingness to pay for water environmental services, it is important to understand more profoundly the motives underlying the current situation of illegal access and lack of payments for legal use of water. In particular, a better understanding of who enjoys illegal access to water – i.e. the poor or the non-poor; farmers with secure water rights (*licencia*), with insecure water rights (*permiso*), or without any water rights – is fundamental to assess the poverty impact of strengthening water rights administration in general and introducing PES schemes in particular. Just adding another environmental fee on top of an already existing but contested fee would appear to be a strategy with little scope of success.

LAND TENURE RIGHTS AND THE PROVISION OF ENVIRONMENTAL SERVICES

The micro-watershed belonging to Comisión de Regantes de Magdalena and the area of the administrative unit of Comisión de Regantes de San Pablo are potential areas for provision of environmental services in the PES programme (cf. figure 1). The following aspects in relation to land tenure are considered important for the possible implementation of PES.

Holders of private property rights often do not hold legally recognized titles and therefore consider their land rights as insecure. Many informants explained that they had not registered their titles to land when inheriting family land or by other means became *de facto* owners of land as the registration was found too expensive and complicated. This leaves people exposed to claims made by others. Some villages, especially in the area of Comisión de Regantes de Magdalena, do have land registered as *comunidad campesina*, which means that land is collectively owned by the community. In these communities, conflicts were identified between inhabitants who claim land to be collectively owned (*comunidad campesina*) and inhabitants who claim to have private property rights to land within these communities.

Unclear tenure rights might be an obstacle for the implementation of PES schemes as it constraints the establishment of contracts. It might be necessary to find ways to deal with that, e.g. through rewarding people clear and secure land rights as part of a PES scheme. For example in the Philippines a PES programme facilitated the granting of clear land titles as a part of a “reward” for entering into the scheme (Rosales, 2003). This might of course be a conflictual process and, obviously, requires the involvement and support from national institutions.

Having collective rights to land, however, is not in itself problematic. As mentioned by (Swallow *et al.*, 2005) it may prove to be more efficient to enter contracts with groups of farmers rather than setting up contracts with individual farmers as the internal control is greater and might require less monitoring by third parties.

According to data from the Agricultural Ministry, land distribution is highly skewed in the watershed. Data from 32 communities in the upper part of the watershed revealed that 9% of the families own more than 10 hectares, whereas another 9% do not own any land. The majority of families in the 32 communities own less than one hectare (29%), or between one and 2.5. hectare (28%) (see Table 2).

Table 2. Land ownership in 32 communities in the upper part of Jequetepeque watershed.

Size of land	Percent families
Do not own land	9%
Own < 1 ha	29%
Own < 2.5 ha and >1 ha	28%
Own < 5 ha and > 2.5 ha	16%
Own < 10 and > 5 ha	9%
Own > 10 ha	9%
Total	100%

Source: (Echeverry, 2003)

Owning small plots might be an obstacle for entering into PES schemes. Small holders might be less willing to set aside land or change practices on land on which they base their living. Furthermore, they might lack access to sufficient resources to enter into PES schemes. For instance the need for economic resources to cover the cost of using an intermediary organisation or the time lag from submitting an application to receiving PES payments (Miranda *et al.*, 2003).

The area of Comisión de Regantes de Magdalena is located in the páramo. While people are attached to villages, those who raise cattle use the surrounding zones of state land in the páramo as a “secondary” area for grazing dairy cattle, cutting of timber and firewood collection. According to a recent study (GTZ-CONDESAN, 2004) an increasing area of the páramo is used by local inhabitants, who set up camps and thus reside with their animals outside the community part of the year. If hydrological studies confirm that these parts of the páramo are important to ensure or improve the water environmental services of the watershed, it will be necessary to better understand the impact that these activities of grazing animals, firewood collection and harvesting of timber have on water flows.

A central aspect to consider before starting to pay for changing land use of the páramo is where to draw the line between rewarding people for providing environmental services by not using land if they in fact are obligated by regulations not to cut down the forest, open up new land or graze their animals in these areas.

5. Concluding remarks

As shown through the present case study, the administration and enforcement of the national regulations on water rights and use is weak and in several cases non-existing. This means that mandatory water use fees are not paid, that illegal canals are constructed and that some farmers use more water than they are entitled to.

The weaknesses in the enforcement of the national water rights administration for irrigation water constitute a major challenge to the establishment of PES schemes in the watershed.

- The transaction costs of certification, monitoring and enforcement of contracts between buyers and sellers are at risk for being too high.

- Secure rights are a pre-condition for the PES market on the supply and the demand site. On the supply side, it should be considered to which extent the current land tenure rights, of which many remain without legal documents, will affect negatively the possibility of establishing schemes. On the supply side, it should be considered how a more secure delivery of water to water right holders will improve the security of their rights. Furthermore, the current system where some hold *licencias* and others *permisos* might cause some water right holders to be willing to participate while others do not wish to be involved. As all water users benefit from the same source a free-rider problem might occur.
- The inequality of access to water is another central obstacle to the implementation of PES schemes in the watershed. It lies outside the objectives of the programme to renegotiate the unequal water rights existing in many parts of the watershed. Yet, if PES schemes are established, it might be problematic if these legitimize the current unequal distribution and thereby create further tensions between neighbours as, often, holders of *licencias*, *permisos* and users without any rights live side by side.
- In addition, prices on land that goes with a water right are high compared to land without such rights. As a consequence, poor people's ability to access land with water rights becomes limited, not least in a context of increasing population density and competition over water. For many poor local inhabitants this means that they can only access water for irrigation if they work as sharecroppers, i.e. *partidario*, on other people's land. There seems to be indications that small parcels and lack of water rights are central aspects hindering poor people from increasing their livelihood situations. Ultimately, this will influence the possibility of involving poor people on the beneficiary side in PES schemes.
- PES is first and foremost an environmental management tool. It might have pro-poor impacts but experiences from PES schemes elsewhere document that making PES pro-poor is neither easy nor always desirable (Landell-Mills and Porras, 2002; Pagiola *et al.*, 2005). In Jequetepeque watershed the poorest landless cannot be expected to benefit from a scheme as they cannot be targeted as providers of services. To reach them as beneficiaries of improved water services is also questionable as they do not possess water rights or have access to capital to pay for improved water services. The extent to which they would become worse off (e.g. through restricted access to land in the páramo or less access to water) should be closely monitored during implementation of the programme.

- One of the major constraints for including the ‘moderately poor’ on the supply side is the higher transaction cost of dealing with many smaller land plots as compared to fewer larger landowners. However, (Swallow *et al.*, 2005) draw attention to ways to deal with the seemingly higher transaction cost when dealing with individual smallholders. For instance through the establishment of smallholder user groups or cooperatives that can assume the (higher) transaction costs of developing and enforcing contracts with more individuals than when dealing with fewer larger farmers. Moreover, one might find that opportunity costs of land belonging to wealthier farmers are so high that these farmers might not find it attractive to enter into PES schemes as suppliers, while less wealthy farmers might find it attractive.
- In Jequetepeque, the more powerful actors – for obvious reasons – appear unwilling to negotiate water rights and a changed sharing of water. It should be expected that streams of benefits (cash to providers and improved environmental services) are likely to create incentives for elites to take over land or strengthen their water rights. Thus safeguards need to be included to guard against elite capture.
- Negotiations over the establishment of PES schemes can be a conflictual process. Even when all relevant stakeholders are identified and agree to attend a common platform it is unrealistic to make everyone set aside their conflicting personal and/or institutional interests. Even if the opportunity to ‘speak out’ is equal for all, the possibilities to make claims, criticize and influence are not. Hence, careful negotiations should be cautiously facilitated when establishing PES schemes in Jequetepeque watershed. Intermediaries should play a crucial role as brokers between upstream and downstream stakeholders and the different interests among these.

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