

# Regional Study



## Practical experiences of compensation mechanisms for water services provided by forests in Central America and the Caribbean



# Contents

Introduction .....	1
Executive Summary .....	3
Resumen .....	3
1. The chosen cases .....	5
2. Lessons learned from the compensation experiences in Central America and the Caribbean .....	11
3. Conclusions .....	17
4. References .....	18
5. Appendixes .....	18



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## Introduction

The economic growth and well-being of human populations are strongly associated with the appreciation of the benefits provided by forests. These benefits include the provision of water and food, the regulation of climate and floods, and the enhancement of recreational opportunities, to name just a few. In general terms, these types of benefits enjoyed by human beings, is known as environmental services (ES) from forests.

Although forests do provide a diverse array of products and ecosystem services, wood has traditionally been regarded as the most important benefit for people since wood can be sold and can produce a direct monetary return. Nevertheless, there are a now several promising mechanisms which would allow forest owners to be compensated for already marketable products, as well as for the conservation of environmental services, such as provision of water (hereinafter referred to as water environmental service -WES-). The basic goal of these mechanisms is that the beneficiaries of the water (consumers), or the State on their behalf, provide a periodic compensation to forest owners who have adopted appropriate land use practices and conservation measures for the management and/or restoration of forests so they may positively contribute to water availability or quality for different purposes. In some cases, these payment compensation mechanisms are known as Payment for Environmental Services (PES). In these cases, those receiving payments from water consumers acquire obligations to develop proper land management practices on their farms or plots of land which are subject to periodic verification. However, most compensation cases showed in this document are less consistent with the aforementioned definition, especially with respect to the conditionality of payments and the proper prioritization regarding generation of WES.

The recognition or compensation of the ES implies a fundamental change in the management of natural resources. Therefore, in an environment in which water problems are becoming more acute – as is the case in Central America and the Caribbean where populated density is high-, is essential to emphasize the need to incorporate the conservation and regeneration of forests as part of the investments in infrastructure related to water provision (reservoirs, pipelines, treatment and cleansing structures). Proper management of forest lands, both in water catchment areas and in riparian corridors, is essential for the long-term feasibility of water projects.

Historically in this region, water has been seen as a free and endless resource. Such perception is changing as human pressure increases, and also as insufficient planning for using natural resources leads to the rapid deterioration of resources, the increasing vulnerability of populations to natural disasters, and increased difficulties in accessing water resources. In response to this situation, during the last decade, innovative mechanisms have emerged to finance the environmental component of water provision projects. These mechanisms seek self sustainability so as to reduce dependence on external financing from national and municipal budgets, or from international aid.

The work presented in this document is part of a process implemented by the National Forestry Program Facility (NFP Facility). The process started in 2008 in response to a request made by Technical Committee on Forests (CTB) within the Central American Commission for Environment and Development (CCAD). The goal of the process is to identify the key elements that explain the emergence and continuation of efforts to compensate for the provision of WES in Central America and the Caribbean, encouraging the exchange of experiences, documenting the most relevant cases that exist in the region and making known their potential and limitations, so as to advance the search for comprehensive models that link water and forests administration. Considering that they represent a crucial element in the regional sustainable development agenda, such models must be sustainable and viable in the long-term.

The first part of the document displays the key information from 27 cases of compensation for WES. The cases were selected by a group of more than 80 experts from different countries in the region, who discussed the issue electronically over several weeks in 2008. The second part of the document shares the results of the analysis of the case studies and presents the analysis made during an FAO-Facility Regional Workshop, held in March of 2009 in Guatemala, in which the key variables that characterized the mechanisms were identified. The last part of the document outlines the main findings regarding the importance and significance of the compensation mechanisms for WES in Central America and the Caribbean.



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# **Practical experiences of compensation mechanisms for the hydrological services provided by forests in Central America and the Caribbean**

## **Executive Summary**

This paper summarizes a qualitative analysis of 27 experiences of compensation mechanisms for the hydrological services provided by forests throughout Central America and the Caribbean. Most of the compensation mechanisms studied are taking place at a local scale in response to problematic water supply situations. External actors such as NGOs and government agencies have played the important role of facilitators of these processes. In general, the cases analyzed reflect social and political negotiation processes that need to be strengthened; the need to find suitable permanent financial schemes seems to be the critical issue for the long-term sustainability of the initiatives. Although national governments do not participate directly in many of the initiatives, they are playing an important role for the advancement of the issue since they carry out public policies that both regulate and provide incentives for natural resource use. Finally, conclusions are drawn from the global analysis of the cases and some areas for action are suggested in order to strengthen the issue in the region.

## **Resumen Ejecutivo**

Este trabajo muestra un análisis cualitativo de 27 experiencias de mecanismos de compensación de servicios hidrológicos proporcionados por los bosques en la región de América Central y el Caribe. La mayoría de los casos se desarrollan a escala local, en respuesta a problemas con el abastecimiento de agua, para lo cual se aplican diferentes mecanismos de compensación. Actores externos como ONG y agencias de cooperación internacional han sido importantes catalizadores de estos procesos. En términos generales, los casos analizados reflejan procesos de negociación social y política que necesitan consolidarse, resaltando la necesidad de encontrar fórmulas de financiamiento permanente (lo cual constituye el tema crítico para el sostenimiento a largo plazo de las iniciativas). Se identificó que aun cuando los Gobiernos nacionales no participan en muchas de las iniciativas, el Estado juega un papel importante en su desarrollo al incentivar y regular el uso de los recursos naturales por medio de las políticas públicas. Finalmente, el documento presenta conclusiones del análisis global de los casos evaluados y plantea algunas áreas de acción que se requieren para apoyar el proceso en la región.



## 1. The selected cases

A total of 27 initiatives of compensation for WES in the region, in various stages of development and implementation, were documented by different authors. A complete list of the cases developed is shown in Annex 1. A synthesis of the main characteristics of the cases is presented in Annex 2. Table 1 describes the most relevant characteristics of each of the cases studied. All case information is available at [www.nfp-facility.org](http://www.nfp-facility.org). In general, it is notable how some of the initiatives show important degree of advancement and seem to be consolidated processes. Others give the impressions of being quite weak processes and require a comprehensive external support to achieve sustainability.

The analyzed case studies were selected by a team of more than 80 professionals from countries throughout Central America and the Caribbean, who participated for several weeks in an electronic forum discussing the issue. The criteria for selection of the cases were related primarily to geographical representation, diversity of management models, and the spatial scale of operation. No cases were identified in the English-speaking Caribbean. In the English-speaking islands, the Government has established and maintained a forestry administration whose mandate includes the protection and management of forests; the provision of water is part of that mandate. Similarly, national authorities are responsible for a state water supply system. Both of these services are financed through taxes. In these countries, water supply is perceived by consumers as a right for which the government is obliged to provide.

The documented cases were presented at a regional workshop led by the FAO-Facility in Guatemala in March of 2009. The analysis and recommendations in this document are largely based on the discussion held during the workshop.

**Table 1. Relevant characteristics of the case studies**

Case Study	Relevant characteristics
<p><b>Costa Rica</b> National PES Program and the Water Canon</p>	<p>Compensation for environmental services provision on forested areas and other land uses. The main source of income is a tax on vehicle fuels. Recently, the Water Canon set a fee on all water consumers to compensate for the environmental cost of water provision. Part of the funds generated is channeled through the National Program for PES.</p>
<p><b>Costa Rica</b> Monte Alto Forest Reserve, Nosara River, Hojancha, Guanacaste</p>	<p>Administered by a local foundation with external support, aimed at acquiring lands for conservation of the water catchment zone. In addition to water, it intends to conserve biodiversity and scenic beauty, as a basis for community-based ecotourism.</p>
<p><b>El Salvador</b> Micro basin La Poza, Usulután</p>	<p>Water consumers pay a fee for environmental compensation to producers in the upper side of the basin; providers and consumers of water are organized and supported by an NGO. The mechanism has local coverage.</p>
<p><b>El Salvador</b> PES for conservation and management of coffee forest in the municipal district of Tacuba, Ahuachapán</p>	<p>Municipal water company charges an environmental fee as part of the canon. Funds are given to producers in the catchment zone. Municipal coverage.</p>
<p><b>El Salvador</b> Protected Area El Playon, La Libertad</p>	<p>Water companies compensate the State through investments in forestation projects in the water catchment zone of San Salvador, within a Protected Area administered by the National Government.</p>
<p><b>El Salvador</b> Joateca, Morazan</p>	<p>Local organization in charge of administering potable water service charges a fee to water consumers for investment in the conservation of the catchment zone.</p>
<p><b>El Salvador</b> Association for the reconstruction and municipal development of Cinquera, Cabañas</p>	<p>Domestic water consumers compensate the municipality with payment in cash and with labor in the catchment zone.</p>
<p><b>Guatemala</b> Municipality of Pachalum, Quiche.</p>	<p>Water consumers created a committee in charge of administering water catchment and distribution of potable water; environmental compensation is still in the negotiation phase.</p>
<p><b>Guatemala</b> Farm Santa Elena, Tecpan, Chimaltenango</p>	<p>Rural communities benefiting from water compensate the farmer who owns the lands on the upper side of the watershed through labor in forests and soil conservation.</p>
<p><b>Guatemala</b> San Jeronimo river basin, Baja Verapaz</p>	<p>Local committee is trying to start running a PES scheme to compensate producers in the upper basin; the lack of political support of the municipality has halted the start of the mechanism.</p>
<p><b>Guatemala</b> Water Fund, Motagua-Polochic rivers system</p>	<p>A process lead by Defensores de la Naturaleza -a National NGO- which manages the Protected Area, Sierra de las Minas, one of the largest of Central America. Multiple water users contribute voluntarily to create a compensation fund intended to compensate producers in the middle of the watersheds.</p>
<p><b>Guatemala</b> Towns of Chiantla and Huehuetenango</p>	<p>Two Municipalities finance, with their own funds, compensation to agricultural producers for the conservation of the water catchment areas. Water consumers do not pay for environmental compensation.</p>

Case Study	Relevant characteristics
<p><b>Guatemala</b> Las Escobas river, Cerro San Gil Reserve, Izabal</p>	<p>Water company who holds the concession for water provision allocates part of its income to finance conservation of the watershed located within the Protected Area. Water consumers do not pay for environmental compensation. The water company is forced to make the compensation by the Municipality who provided the concession for the water service.</p>
<p><b>Guatemala</b> Micro basin of Xaya river, Tecpan, Chimaltenango</p>	<p>A civil organization is trying to create a PES to compensate landowners of the upper basin of the river that provide an important proportion of domestic water in Guatemala city. There is no compensation scheme yet since the Municipal Water company is not willing to make an environmental payment.</p>
<p><b>Guatemala</b> Watershed of Ixtacapa river, Solola and Suchitepequez provinces</p>	<p>Civil organization made up of water consumers in the lower side of the watershed –including agro industrial, agricultural producers and municipalities- are already compensating, in cash and in kind, indigenous communities that protect the upper side of the basin.</p>
<p><b>Guatemala</b> National Forest Incentives Program (PINFOR)</p>	<p>National Program financed and implemented by the Forest Service. The program will make payments for up to a maximum of 10 years for implementation of forest conservation practices; Other environmental services provided by forests such as carbon sequestration and biodiversity conservation are also considered for payments.</p>
<p><b>Honduras</b> Micro basin Las Dantas, Yuscaran, El Paraíso</p>	<p>Water users gathered into several water associations make payments to landowners in the upper basin. The mechanism is facilitated by two local organizations and the municipality; since funding is insufficient to cover all the conservation needs, additional funding from external sources is needed.</p>
<p><b>Honduras</b> Neteapa river watershed, Moroceli and Potrerillos, El Paraiso</p>	<p>Nine autonomous water associations in two municipal districts, with a portion of the fee charged to water consumers, created and managed an environmental fund to finance the conservation of the upper side of the watershed.</p>
<p><b>Honduras</b> PES micro watershed of river Cumes, municipal district of Jesus de Otoro, Intibuca (JAPOE)</p>	<p>A Local civil organization with, the support of the municipality, is administering a PES fund to support conservation in the upper basin; the fund is supported through the charge of a fee to water consumers in the municipal town and additionally from municipal funds and private donations.</p>
<p><b>Honduras</b> National Committee of environmental goods and services of Honduras (CONABISAH)</p>	<p>National government organization created to coordinate the efforts of different sectors of society to influence public policies to incorporate environmental compensation, including payments for forest conservation, for water production.</p>
<p><b>Honduras</b> Public-Private Alliance, La Soledad river watershed, Valle de Angeles, Francisco Morazan</p>	<p>Compensation to agricultural producers to protect the watershed through reimbursed loans and donations; funding has been provided by International donors.</p>
<p><b>México</b> Natural resources committee of the high Chinantla (CORENCHI),</p>	<p>Six indigenous communities are protecting the water catchment zone of the river and receiving environmental compensation from the Federal Government; the mechanism is expected to receive funding from payments</p>

Case Study	Relevant characteristics
Papaloapan river, State of Oaxaca	from water users in the future.
<b>Nicaragua</b> PES public-private alliance basin of Gil Gonzalez river, municipal district of Belen, province of Rivas	Public-private alliance between the municipality and the sugar industry, which, supported by international cooperation, created a fund to finance reforestation and protection of forests in the upper basin.
<b>Nicaragua</b> Environmental fund for the protection and conservation of the micro basin La Golondrina, Blanco river, Matagalpa	Environmental municipal fund created with an increase of 10% of the water fee to finance the PES to compensate producers to protect water springs and the water catchment areas of the watershed.
<b>Nicaragua</b> PES micro basin El Mal Paso, El Regadio, Estelí	The municipality is compensating agricultural producers in the upper basin with funds provided by International Cooperation; in the future is expected that local consumers of water for different purposes will start paying to support the water PES.
<b>Cuba</b> Comprehensive forest farms, Cauto river, province of Granma	National government pays forestry workers of the Río Cauto Municipality for managing the riparian forested corridors that regulate the flows of water of the watershed.
<b>Dominican Republic</b> PES in the upper basin of the Yaque del Norte river	Environmental fund in the largest watershed of the country compensates agricultural producers in the upper basin to do reforestation and improvement of agroforestry systems. Funding is provided, in the first stage of the project, by the Government Company of Electricity.

The cases analyzed show high variability, principally in terms of scale (size of area) covered, the management model and the collection and payment mechanisms. In Annex 2, in Table 2 and Graphs 1 and 2, the differences among the cases can be seen based on their characteristics. The wide variability in the characteristics of the cases analyzed suggests a strong adaptation to the local conditions and demonstrates the feasibility of implementing compensation for environmental services under differing natural and social settings.

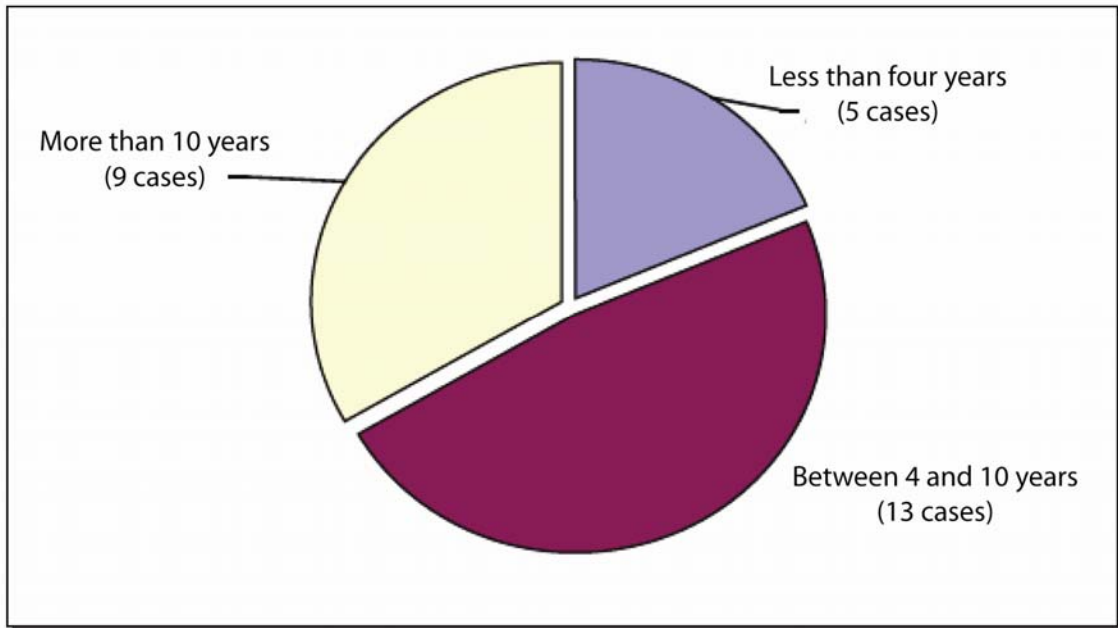
**Table 2. Forested area of the case studies by country**

Country	Total number of cases	Number of cases < 100 km <sup>2</sup>
Guatemala	9	5
Honduras	5	4
El Salvador	5	5
Nicaragua	3	3
Costa Rica	2	1
México	1	0
Cuba	1	0
Rep. Dominicana	1	0
<b>Total cases</b>	<b>27</b>	<b>18</b>

Table 2 presents an analysis of the spatial coverage of the cases studied by country. The first column indicates the country; the second one shows the total number of cases studied and the third column shows how many of the cases have

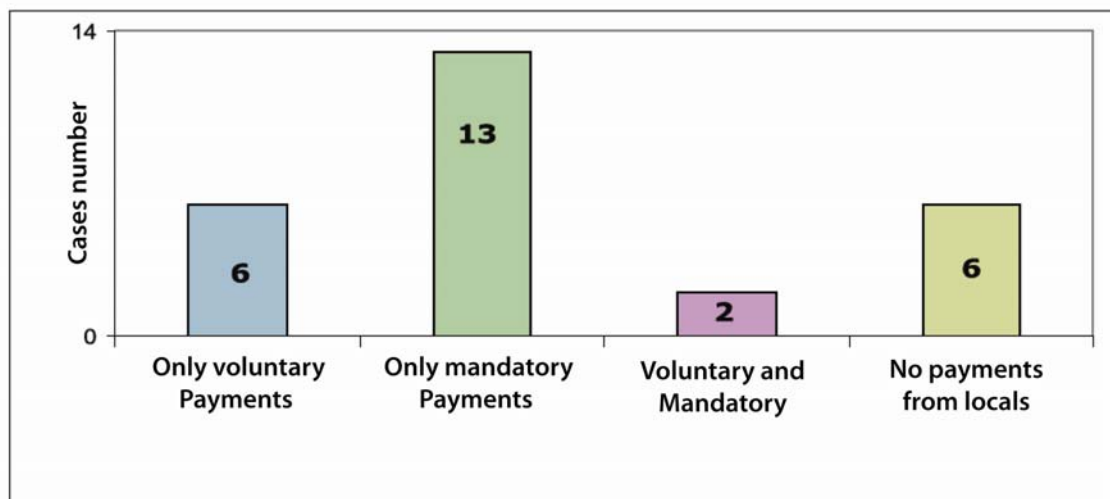
an area of less than 100 square kilometers (10,000 hectares). From that information, it can be deduced that two thirds of the cases can be regarded as small in geographical scale with solutions viable at the local level.

**Graph 1**  
**Years in operation of the documented compensation mechanisms**



Graph 1 shows the distribution of the case studies in terms of the number of years in operation of the mechanisms. The vast majority of the cases (22 out of 27) have four or more years of being implemented. Since the viability of the mechanisms is the result of social processes that take time to be consolidated, it is very likely that those initiatives that go beyond a period of ten years might be more consolidated than the ones with only a few years of operation.

**Graph 2**  
**Type of support provided by the water beneficiaries of the mechanisms**



Graph 2 shows the type of contribution made by water beneficiaries in the different compensation mechanisms documented in this initiative. It highlights the fact that in 13 out of 27 cases, the contributions are compulsory; which suggesting that it is common that water consumers make payments for the environmental component of a service that is understood to have a cost. On the other hand, it also highlights that in 6 of the 27 cases, water consumers do not contribute at all for

environmental compensation, which might be the result of incipient mechanisms which require consolidation, a reduced capacity for making payments from beneficiaries, a poor job of raising awareness or the displacement of the responsibilities of locals as a result of subsidies or external donations.

The majority of the initiatives were born and are administered at the local level run by civil organizations or the municipalities (exceptions are the National PES Program of Costa Rica, the National Program of Forest Incentives in Guatemala and the Program of subsidies to forest faros in Cuba). The relatively small scale of most of the initiatives (only 8 out of 27 cases cover more than 100 square kilometers), and the involvement of the communities affected by diverse problems of water supply, have facilitated the rise of these compensation initiatives.

In several cases, external actors, such as NGOs, international cooperation agencies and national government organizations have played an important role in catalyzing these processes. However, in general, the cases reflect processes of social and political negotiation that need to be strengthened. In order to achieve that goal, secure, permanent financing mechanisms are needed. Also necessary is a legal framework that allows the execution of different actions and a clearer demonstration of the linkages between the protection and restoration of the forests and the provision of water.

## 2. Lessons learned from the experiences of compensation in Central America and the Caribbean.

To identify the most relevant variables that influence the initiatives of compensation for WES, the authors of the case studies, as well as other professionals working on the issue, gathered at a regional workshop held in March 2009 in Tecpan, Guatemala. The workshop was financed by the NFP Facility. Based on the analysis of the cases presented, participants identified six elements that seemed to have more impact on the success of the cases studied. The key conclusion of the qualitative analysis is the emergence and permanence of the initiatives does not depend on a single factor but rather on a set of internal and external interrelated elements. The principle elements identified were the following:

***Effective Local Participation:*** the initiatives that show the greater achievement of their goals and that seem to have a higher probability of remaining in operation are those characterized by effective local participation which includes the involvement of the stakeholders in the design and operation of the mechanism and a continued willingness to pay.

The effective participation of the stakeholders in the decision making process related to the design of the compensation mechanism is necessary to minimize potential conflicts during the operational phase. Is essential, in turn, that these actors (or their representatives) receive continuous information on the advances of the initiative and that they are able to make decisions regarding administrative and financial matters in general. As long as these elements are included, it is more likely that the actors will achieve the goals they set. In fact, in communities such as Joateca in Morazan and La Poza in Usulután, in El Salvador, the need of the communities to improve their potable water systems encouraged them to take the control of the administration of the compensation mechanisms. (See Table 1).

### **Box 1. Feasibility of an effective local administration: the experience at Joateca, El Salvador**

In the municipal district of Joateca, in the province of Morazán, in El Salvador, a local organization, the Association of potable water of the municipal district of Joateca (ASAMPESA), in 1994 took responsibility for managing the service for potable water. The Association became actively involved in raising funds for investment into the infrastructure for the capture and distribution of water to the households in the district. Additionally, the Association acquired the property of the water catchment zone, an area of 11.2 hectares. That allowed the Association to control the entire water provision process. The system of household potable water has 234 consumers, of which 207 are members of the Association. Members, in addition to paying fees for water use, make environmental compensation through the provision of two labor days per year in duties related to the conservation of the water catchment zone.

Considering that the local scale is the most typical type of scale in the region, and based on the analysis of this experience, some remarkable elements can be identified for replication elsewhere in Central America and the Caribbean: (i) The limited geographic expanse and the small number of beneficiaries facilitated the formation of the organization that not only administers the infrastructure for water catchment, treatment and distribution, but also takes care of the water catchment zone, which incorporates the environmental compensation to the Project; (ii) External aid received did not supplant local responsibilities during the project, thus enabling the project to remain sustainable over time; (iii) The beneficiaries of water contribute directly to the financing of the scheme, in this case on a mandatory basis; and, (iv) The property of land is secured in the water catchment zone since the lands were bought by the Association who controls the system.

One of the indicators of effective participation, that represents a necessary condition for the permanence of the mechanism in the mid and long term, is that

the beneficiaries of the initiative contribute directly (either voluntarily or compulsorily) with the financing of the scheme. As it was stated previously, 21 of the analyzed initiatives receive some sort of contribution by beneficiaries. An example of this is the Fund of the Motagua-Polochic Water System in Guatemala, which was created in 2003 on the basis of voluntarily participation of different water users and that has collected around US\$ 230,000. Other schemes, such as the National Program for PES of Costa Rica, have diversified sources of income, coming from, amongst others, a tax on vehicle oil, specific agreements with different kinds of companies and a mandatory payment made by all of the water consumers of the country to cover the environmental cost of the water provision.

Although in several of the cases, Governments (Central or Municipal), on behalf of water beneficiaries, provide subsidies for environmental compensation using funds from their own general budgets, such an option will always be at risk from political shifts, which increases the financial vulnerability of the investment proposals. This is the situation of the National Forest Incentives Program and the Municipal schemes in Pachalum, Huehuetenango, San Jeronimo and Las Escobas River, all located in Guatemala; the CORENCHI case, in Mexico; the forestry farms in Cuba; and the Yaque river basin in the Dominican Republic.

***Organizational structure and monitoring:*** the effective coordination of interests between water beneficiaries and potential suppliers of the environmental services, requires a functional organizational structure capable of dealing with administrative and management duties, effectively and transparently. Even more important, is that such organization has credibility among the different stakeholders, and that the organization makes an ongoing effort to minimize transaction costs.

From the information in Annex 2, it can further be deduced that the structure does not necessarily have to come from the central Government since other models are also able to generate the necessary conditions; in fact, more functionality is observed in decentralized management schemes that are able to respond more effectively to the local needs. However, there are also situations in which local organizations have proven ineffective in implementing compensation mechanisms due to conflicts of interest or local relationships, as in the cases of Pachalum and San Jeronimo in Guatemala. On the other hand, there are some examples in which the management of the mechanisms is carried out by private entities, something atypical in the region, such as in Finca Santa Elena and Las Escobas river, both in Guatemala. In these two experiences, private schemes seem to be effective in the administration of the initiatives, but they do raise an issue of social inclusion since management is done without the participation of local communities. Finally, there are some mixed management arrangements in which public-private alliances are created, such as the case of the river basin of Gil Gonzalez in Rivas, Nicaragua, and also the case of Ixtacapa River, in Guatemala.

Though it is not always necessary to create new administrative structures (rather the environmental offices of the municipalities, for example execute the main coordination tasks), because of the limited capabilities and the tendency to politicize processes within municipal governments, some local civil society organizations have taken responsibility for administering the mechanisms. Some of these situations have been a success, such as in the Monte Alto reserve in Costa Rica and La Poza in El Salvador, where local associations have articulated effective compensation mechanisms for the landowners in the water catchment areas.

Adequate awareness of the actors involved with respect to the costs and benefits of the mechanism is a very important task that the organizational structure must do in order to increase acceptance and interest in participating in the mechanism. The stagnation of some of the cases studied clearly shows the lack of work in this regard, as occurred in Pachalum, San Jeronimo and the Xaya river, all in

Guatemala. By contrast, where awareness raising has been more intense, voluntary contributions may be observed and greater synergy between the water consumers and providers. Examples of this situation are the cases of Ixtacapa River in Guatemala (where private companies and municipalities are compensating indigenous communities in the upper basin through provision of social services) and the case of Belen-Rivas, in Nicaragua (where an alliance between a private enterprise and the local municipality administers an effective compensation mechanism, see box number 2). In both cases, payments made by water consumers are voluntary and there are provisions established to maintain payments into the future.

**Box 2. A public-private alliance has being able to implement an effective compensation mechanism for agricultural producers in the upper basin. The case of the municipal district of Belen, province of Rivas, Nicaragua.**

In 2007, a mechanism was created to compensate land owners in the upper basin of the Gil Gonzalez watershed in the municipal district of Belen, in the Rivas province in Nicaragua. The aim of the initiative was to compensate land owners for carrying out management practices that enhanced the conservation of water resources. Until 2008, it had achieved coverage of 104 hectares under management, of a planned total of 800 ha in the upper basin. Water has diverse uses including agricultural irrigation, domestic use and industrial consumption by the sugar industry. The purpose of the mechanism is for the various water consumers to make payments to the land owners in the upper basin for the conservation measures that maintain and improve water availability downstream.

Currently, 29 land owners receive incentive payments; the sugar industry is the main consumer of water and has been incorporated into the mechanism. A gradual increase in the number of water consumers and land owners in the upper basin is expected for as long as these increases continue to strengthen the mechanism, which is jointly administered by the Municipality of Belen and the Sugar Industry of the South of Nicaragua (CASUR). The mechanism has received strong initial financial and technical support from the German Cooperation.

Although this is a relatively recent experience, still in the process of consolidating, in which water consumers only make voluntary contributions, it is likely that in the near future payments become compulsory for the various water consumers, including domestic, agricultural, and industrial uses. Currently, water providers are already being compensated through monetary payments, making the initiative attractive to other land owners. There are well defined technical criteria for defining the areas to be incentivised, for assigning the collection and payment amounts and for monitoring the implementation of the commitments acquired by the land owners set to receive the incentive.

This experience highlights several lessons: (i) It is possible to achieve agreement between the private sector and the local government for the management of the compensation mechanisms that link forest conservation and water provision; (ii) A positive response can be received from providers and consumers of water if adequate outreach and communication work is done; this can be made easier by ensuring that updated technical information is gathered and made available to support the efforts to set amounts for charging and paying environmental compensation; (iii) To achieve success and sustainability in the long term, the initiatives require the creation of trust amongst participants so as to enhance their gradual incorporation into the mechanisms.

Despite the difficulty of quantifying the generation of the WES provided by forests and other ecosystems in general, some minimal tasks must be carried out to verify the compliance of conservation and/or restoration measures for different land uses. In fact, 13 of the 27 initiatives have a level of organization capable of monitoring, with differing degrees of precision and frequency, the commitments made by the providers of the environmental services. This element seems to positively influence transparency and credibility that the different actors involved expect. In addition to this effort, there is still the need to define more and better performance indicators to allow a more precise assessment of the performance of the initiatives. Simultaneously to this field monitoring process, it is important to insist upon the need

for informing and educating various members of society about the benefits of conserving and restoring the natural spaces as a means of enhancing water quality and availability for different uses.

**Proper external support:** one of the most distinctive characteristics of the cases analyzed was the presence of external aid in terms of financial and technical support (see table of Annex 2), provided mostly by NGOs, but also by Research Centers and International Donors. Such support is often useful and necessary to the development of the compensation mechanisms during their initial stages. More precisely, this support is often used to establish a seed fund or to finance the total costs of the mechanism. An example of this is observed in the case of the Protected Area of El Playon, in El Salvador, where the NGO that co manages the area along with the National Government has received strong support, among others, from the Canadian Government, CARE and World Vision; another example may be found within the micro watershed of Las Dantas in Yuscaran, Honduras, where the Agricultural School of Zamorano and the International Cooperation have supported the process with technical assessments, general advice and funding.

Unfortunately, in some of the initiatives the external support seems to produce perverse incentives that threaten the sustainability of the initiatives. In particular, this occurs in cases where the external help substitutes the local responsibilities of administering the mechanisms, reducing effective participation by stakeholders. Moreover, the external funding, with no local counterpart, appears to reduce the incentives to generate local resources to ensure self-sustainability of the compensation mechanisms. Examples of this are found in the cases of Huehuetenango (see box 3) and Las Escobas River, both in Guatemala, where local municipalities have assumed the cost of environmental compensation using funding from their own budgets, so that water consumers continue to receive subsidized water services, without having to deal with the environmental costs. A similar situation is taking place in El Regadio, Nicaragua, where the support of the International Cooperation made possible the creation of a compensation mechanism but, at the conclusion of this aid, it is unclear whether or not the process can continue (above all, due to lack of buy-in from local actors). The cases of CORENCHI in México, Forestry Farms in Cuba and the Yaque river in the Dominican Republic, are clear examples in which subsidies are provided by National

**Box 3. The experience of Chiantla and Huehuetenango, in Guatemala:  
Municipal governments subsidize the water PES**

Since 2004, an initiative promoted by the Guatemalan NGO FUNDAECO, with the support of the Dutch Government, has led to the creation of an environmental compensation program implemented by the municipalities of Chiantla and Huehuetenango, in the western highlands of the country. The mechanism is intended to compensate agricultural producers in 39 rural communities that apply conservation practices in the upper basin of the Selegua River, which provides water for domestic use in the two municipal towns.

To calculate the amount of the environmental service, an economic assessment was carried out. That study also determined that the water consumers should pay much more for the service than the current fee they are paying in order to assure the sustainability of the service including both infrastructure and environmental investments, and to cover the operational costs of water provision. The two Municipalities acknowledged the magnitude of the problem, however did not want to transfer the additional costs to water consumers. For that reason, the Municipalities decided to create a fund with their own resources to pay for the environmental compensation to landowners in the upper basin. The compensation payments acts as an incentive for water producers to carry out reforestation, management of natural forests, planting of trees in agroforestry systems and soil conservation.

By financing the environmental compensation using their own general budgets, the Municipalities continue to subsidize the service of potable water to consumers who are not made to take responsibility for paying for the environmental cost of the service. The financial sustainability of such a mechanism appears uncertain since it relies heavily on the political will of the day to obtain its resources, since they are not provided by the beneficiaries of the water. This case shows a situation that occurs frequently in the region and is mainly a result of external intervention that creates perverse incentives that supplant the local responsibilities of caring for the design and operation of the mechanism.

Governments and local and regional beneficiaries of the water do not contribute to the financing of the environmental compensation.

**Security about land tenure:** the cases which have been in operation for longer periods of time and with a higher level of geographic coverage seem to have greater levels of success in areas in which landowners have security about land tenure. The way in which the existence of well defined property rights affects compensation mechanism is diverse. However, it is remarkable how property rights increase the possibilities of being able to make decisions for the medium and long term use of land, something essential within the context of conservation and restoration of natural spaces. Additionally, the existence of secure property rights allows for contracts for WES provision and reduces transaction costs to monitor the compliance of contracts by the beneficiaries of the environmental compensation. In general, credibility of a compensation system increases in these situations since payers have a greater level of certainty that their payments are indeed allocated to land owners obligated to comply with a contract.

Nevertheless, it is important to note that the lack of formal titles to land ownership can deny access to the scheme to certain persons or communities, even when they carry out sustainable management on their farms or protect forest resources. These cases demonstrate the need for other more flexible to establish a different type of contractual relationships, provided they are credible and socially acceptable.

**Legal framework and public policies:** the majority of the initiatives analyzed are taking place at the local level, without there necessarily being a national law that explicitly supports the compensation mechanisms. This is not meant to minimize the relevance of a national legal framework.

What is important to emphasize is that, in many cases, it is enough that the constitutional frame provides effective rights to the different stakeholders so that they can assume the rights and responsibilities of administering the natural resources in their jurisdictions. For example, the pioneer initiatives developed in Honduras and Nicaragua did not need of a constitutional framework (say a forestry law or a water law) to carry out the schemes. It was sufficient, with the declaration of a regulation by the municipalities and the creation of a fund, to start up the mechanisms under an acceptable juridical framework.

Finally, is also very important that compensation mechanisms may be inserted within a comprehensive policy framework for environmental management that includes direct regulations and diverse incentives. Strengthening the capacities of national governments to move forward in the creation of modern legal frameworks that allow the implementation of environmental policies with a long-term vision is an element that can contribute substantially to the strengthening of local and regional compensation mechanisms. The complementary articulation of local initiatives with national programs or general policies from the central Government is necessary.

**The political context:** In many of the cases analyzed, the initiation and the permanence of the initiatives depends upon the will and continuity of the political decision makers at different scales. That is particularly important in Central America and the Caribbean because of the political cycles and the relative social and political instability of the region.

In turn, the priority given to environmental issues within the development agenda in the countries of the region plays a major role when negotiating and implementing compensation initiatives at the national level. A good example of this is the National Program of WES in Costa Rica (see box 4), the National Forest Incentives Program in Guatemala and the Playon Protected Area in El Salvador. All

of these are Central Government Programs that have been operating effectively for more than ten years.

In comparison, an example of how an unfavorable political context may affect the compensation mechanisms is the municipal district of San Jeronimo in Guatemala, where, due to the change of municipal authorities, the compensation mechanism is not advancing even though it has ample local participation and strong external support.

**Box 4. The National Program of PES in Costa Rica: a successful initiative of the Central Government, a product of adaptive management**

This is a national program promoted by the Government of Costa Rica. It was created in 1996 as a means of consolidating government efforts towards applying economic tools as a complement to the traditional mechanisms of command and control for the conservation of natural resources. Its main source of revenue is a tax to vehicle fuels.

The constant search for alternatives to finance the Program, especially associated with the identification of potential applicants for the protection of water resources, has expanded the coverage and diversified the sources of income. The water Canon, a law enacted in 2006, is a parallel initiative of the Costa Rican Government meant to complement the National PES Program that permits users to obtain a secure source of income for the medium and long term. The Water Canon sets a mandatory charge to all water consumers (including individuals, commercial entities, and public and private entities) for the use of water and for the environmental cost of its protection. Of the total amount of money raised by the Water Canon, 25% must be transferred to FONAFIFO (the entity that administers the National Program of PES) so that payments can be made to private landowners located in zones defined as important in terms of environmental protection for water resources. After a period of gradual implementation, the Water Canon promises to raise around six million US dollars annually for the benefit of the National Program of WES.

Due to an investment nearing 120 million US dollars over a period of ten years, the Program has made 7,242 contracts for environmental service provision, covering an area of 599,061 hectares. Additionally, efforts have been made for the planting of 1.945,552 trees in agroforestry systems. The Program also aims to contribute to poverty reduction by prioritizing payments to less developed areas of the country.

The case demonstrates that the success of a Governmental initiative depends on the logistical and administrative capacity available, the previous history of intervention on the environment, political and economic stability and on prioritization of environmental goals in the political agenda.

### 3. Conclusions

Although the compensation mechanisms for the generation of WES are not sufficient to solve all the problems of managing water resources and maintaining and recovering the forests in the region, they can be an important part of a comprehensive strategy for the sustainable use of ecosystems. As such, PES is an option that must be complemented by other public policy tools, including mechanisms of direct regulation and incentives and global initiatives of conservation and use of natural resources.

The compensation mechanisms studied in the region show a broad range of scales, actors, forms of compensation and degrees of success. The majority of the cases emerged spontaneously in response to specific needs, unfortunately many of them without defining verifiable objectives. The most successful experiences have all had the effective involvement of beneficiaries in the design and implementation of the mechanism, and have directly contributed to the operation of the scheme. The issues of achieving financial sustainability in the medium and long term seem to be the determining factor in the permanence of the initiatives analyzed, many of which have a sufficient number of water environmental service providers, but few applicants willing to make significant and relevant payments. That increases the need for greater efforts to raise contributions. This means that, in many cases, there remains a need to design mechanisms that force water users to make mandatory payments, proportional to the benefits they retain from the resource. This requires a change of attitude amongst the various stakeholders and a process of social negotiation since traditionally, the environmental component has not been included in the costs of water supply systems for different uses.

Although the State does not participate directly in the administration of an environmental compensation scheme for water, the emergence and permanence of these initiatives is the result of actions taken by national Governments. These actions are expressed through the national legal and institutional framework, complementarity amongst various public policies, a lack of perverse incentives in those policies, and the existence of a well defined and secure property rights system. This implies that, although the central Government lacks a national program of compensation for WES, the Government still has a direct responsibility for creating a favorable environment for other actors (Municipalities, Water Associations, communities, and private companies) to design and implement actions of this kind.

In parallel, other external actors such as the International Cooperation, Universities, NGOs, and others, can play a positive role as catalysts for environmental compensation at different levels. The forms of support can be diverse and are not mutually exclusive. Some possible areas for receiving external support to start or to strengthen compensation schemes might be: (i) Document and disseminate good examples of what works, where and under what types of conditions; (ii) Facilitate self-management models; (iii) Support forums for negotiation and (iv) Share knowledge about simple and practical methods of assigning value to water coming from forested areas. The most important support might be provision of funding for the initial stages (seed capital), training, research, raising the awareness of different actors and the facilitation of processes. However, the initiatives analyzed in the region showed one fundamental lesson in particular: external support is useful provided it does not supplant local responsibilities of administering the initiatives or produce incentives to reduce local ownership and empowerment.

The variability of scenarios and enabling conditions makes it difficult to create a one size fits all formula for the design and implementation of compensation mechanisms. There should be a careful balance between the minimum technical criteria needed and the pragmatism necessary to achieve implementation in the short term. It should be remembered that even though scientific uncertainty can

present a barrier to the quantifying of benefits achieved through these mechanisms, the precautionary principle must prevail in the majority of cases.

For those readers interested in the design and implementation of these mechanisms, Annex 4 provides a practical guide.

#### **4. References.**

- CANARI. 2004. Markets for Watershed Protection Services: Challenges and Opportunities. CANARI Policy Brief No. 4: 4pp. (146 Kb)
- Porras, I; Grieg-Gran, M; Neves, N. 2008. All that glitters. A review of payments for watershed services in developing countries. IIED. 138 p.
- Wunder, S. 2006. Pagos por servicios ambientales: Principios básicos esenciales. CIFOR Occasional Paper No. 42(s)

#### **5. Annex.**

Annex 1. List of prepared case studies and authors

Annex 2. Matrix of the analysis of the of the regional case studies

Annex 3. Synthesis of each case study

Annex 4: Practical guide of principles for designing and implementing compensation mechanisms

## Annex 1

### Table 3. List of prepared case studies and authors

The full version of all of the cases is available at: [www.nfp-facility.org](http://www.nfp-facility.org)

COUNTRY	CASE STUDY	AUTHOR	EMAIL
Costa Rica	National Program of PES and the Water Canon	Roger Madrigal	<a href="mailto:rmadriga@catie.ac.cr">rmadriga@catie.ac.cr</a>
	Monte Alto Forest Reserve, Nosara river, Hojancha, Guanacaste	Carolina Baker	<a href="mailto:cbaker@catie.ac.cr">cbaker@catie.ac.cr</a> ; <a href="mailto:caro_baker@hotmail.com">caro_baker@hotmail.com</a>
El Salvador	La Poza micro-basin, Usulután	Rene Rivera	<a href="mailto:rene@funde.org">rene@funde.org</a> <a href="mailto:rensilva@hotmail.com">rensilva@hotmail.com</a>
	Tacuba Municipal District, Ahuachapán	Rene Rivera	<a href="mailto:rene@funde.org">rene@funde.org</a> <a href="mailto:rensilva@hotmail.com">rensilva@hotmail.com</a>
	El Playon Protected Area	Hugo Zambrana	<a href="mailto:hzambrana@MARN.GOB.SV">hzambrana@MARN.GOB.SV</a>
	Joateca, Morazan	Hugo Zambrana	<a href="mailto:hzambrana@MARN.GOB.SV">hzambrana@MARN.GOB.SV</a>
	Cinquera, Cabanas	Lidia Serrano y Lucia Gomez	<a href="mailto:serranolidia@yahoo.com.mx">serranolidia@yahoo.com.mx</a> ; <a href="mailto:luciagomezsv@yahoo.com">luciagomezsv@yahoo.com</a>
Guatemala	Pachalum Municipal District, Quiché	Boris Mendez	<a href="mailto:bmpaiz@yahoo.com">bmpaiz@yahoo.com</a>
	Santa Elena Farm, Tecpan Municipal District, Chimaltenango	Boris Mendez	<a href="mailto:bmpaiz@yahoo.com">bmpaiz@yahoo.com</a>
	San Jeronimo Municipal District, Baja Verapaz, in the Sierra de las Minas	Oscar Nunez	<a href="mailto:onunez@defensores.org.gt">onunez@defensores.org.gt</a> ; <a href="mailto:coconunez@gmail.com">coconunez@gmail.com</a>
	The Water Fund, influencing the Biosphere Reserve of the Sierra de las Minas	Oscar Nunez	<a href="mailto:onunez@defensores.org.gt">onunez@defensores.org.gt</a> ; <a href="mailto:coconunez@gmail.com">coconunez@gmail.com</a>
	Chiantla and Huehuetenango Municipal Districts	Bayron Villeda	<a href="mailto:b.villeda@fundaeco.org.gt">b.villeda@fundaeco.org.gt</a>
	Cerro San Gil, Puerto Barrios municipal District, Izabal	Bayron Villeda	<a href="mailto:b.villeda@fundaeco.org.gt">b.villeda@fundaeco.org.gt</a>
	Xaya River micro basin, Tecpan, Chimaltenango	Francisco Lopez	<a href="mailto:paco_lopez77@hotmail.com">paco_lopez77@hotmail.com</a>
	Ixtacapa River micro basin	Francisco Lopez	<a href="mailto:paco_lopez77@hotmail.com">paco_lopez77@hotmail.com</a>
	National Program of Forest Incentives (PINFOR)	Boris Mendez	<a href="mailto:bmpaiz@yahoo.com">bmpaiz@yahoo.com</a>
	Honduras	Las Dantas, Yuscaran, El Paraiso	Jose Espinal, Orlando Ortiz, Isaac Ferrera
Neteapa River, Moroceli and Potrerillos, the Paraiso		Isaac Ferrera, Orlando Ortiz, Nelson Posas	<a href="mailto:isaac_ferrera@fundacionvida.org">isaac_ferrera@fundacionvida.org</a>
Cumes River micro basin, Jesus de Otoro Municipal District, Intibuca (JAPOE)		Manuel Martinez	<a href="mailto:mmartinez@cablecolor.hn">mmartinez@cablecolor.hn</a>
National Committee on environmental goods and services of Honduras (CONABISAH)		Juan Blas Zapata	<a href="mailto:jbzapata15@yahoo.com">jbzapata15@yahoo.com</a>
Valle de Angeles, Francisco Morazan		Jose Manuel Gonzalez & Hans Kammerbauer	<a href="mailto:manueljgonzal@gmail.com">manueljgonzal@gmail.com</a> ; <a href="mailto:direccion.focuecas@multidata.hn">direccion.focuecas@multidata.hn</a>
Mexico	CORENCHI initiative in Oaxaca	Fernando Mondragon	<a href="mailto:famg_1999@yahoo.com">famg_1999@yahoo.com</a> ; <a href="mailto:geoconservacion@prodigy.net.mx">geoconservacion@prodigy.net.mx</a>
Nicaragua	Gil Gonzalez River basin, Belen, Rivas Municipal District	Maria Eugenia Baltodano	<a href="mailto:meb@cablenet.com.ni">meb@cablenet.com.ni</a>
	The Golondrina micro basin, Blanco River, Matagalpa	Maria Eugenia Baltodano	<a href="mailto:meb@cablenet.com.ni">meb@cablenet.com.ni</a>
	The Regadio region, Esteli	Abdon Espinoza	<a href="mailto:abdon.espinoza@fao.org">abdon.espinoza@fao.org</a>
Cuba	Integrated Forest Farms, Cauto River, Granma	Elias Linares	<a href="mailto:elias@minag.cu">elias@minag.cu</a>
Dominican Republic	Upper basin of the North Yaque River	Ramon Diaz & Sol Teresa Paderes	<a href="mailto:rdramondiaz@gmail.com">rdramondiaz@gmail.com</a> ; <a href="mailto:solteresapm@gmail.com">solteresapm@gmail.com</a>



**Annex 2. Table 4. Matrix of the analysis of the regional case studies**

Performance Indicator	Case Studies																										
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Time in operation (years)	13	18	4	7	11	15	6	25	19	3	4	5	11	3	3	12	4	6	7	8	5	5	2	6	9	11	1
Beneficiaries make voluntary contributions	X			X		X					X				X							X	X				X
Beneficiaries make mandatory payments	X		X		X	X	X		X			X	X				X	X	X		X			X	X		
Suppliers receive monetary compensation	X	X	X	X	X	X	X		X		X	X	X		X	X	X	X	X		X	X	X		X	X	X
There is monitoring of suppliers	X		X								X	X	X		X	X	X	X	X		X		X		X	X	X
External financial support is available		X	X			X	X				X			X	X	X	X	X	X		X	X	X	X	X		
There is external support in terms of advice and training		X	X			X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X
Spatial scale (sq km)																											
Small (S) < 100																											
Medium (M) Between 100 and 1000	L	S	S	S	S	S	S	S	S	M	L	M	S	S	S	L	S	S	S	n.a.	S	M	S	S	S	M	L
Large (L) >1000																											
Management Model (municipal, M; local, L; private, P; central Government, G)	G	L	L	M	L	L	M	L	P	L	P	M	P	L	L	G	L	L	L	G	L	L	M	M	M	MG	G
Technical criteria define the amount to charge and/or to pay	X	X			X	X			X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X
Technical criteria for prioritizing water catchment areas	X									X	X	X		X	X	X							X	X		X	X

1	National Program of PES, Costa Rica	2	Monte Alto Reserve, Costa Rica	3	La Poza micro basin, El Salvador
4	Tacuba Municipal District, El Salvador	5	El Playon Protected Area, El Salvador	6	Joateca, El Salvador
7	Cinquera, Cabanas, El Salvador	8	Pachalum Municipal District, Guatemala	9	Santa Elena Farm, Guatemala
10	San Jeronimo Municipal District, Guatemala	11	The Water Fund, Sierra de Las Minas, Guatemala	12	Chiantla and Huehuetenango, Guatemala
13	Cerro San Gil, Guatemala	14	Xaya River micro basin, Guatemala	15	Ixtacapa River micro basin, Guatemala
16	National Program of Forest Incentives, Guatemala	17	Las Dantias, Yuscaran, Honduras	18	Neteapa River, El Paraiso, Honduras
19	Jesus Otoro Municipal District, Honduras	20	Environmental Goods and Services of Honduras	21	Valle de Angeles, Honduras
22	CORENCHI, Oaxaca, Mexico	23	Gil Gonzalez River Basin, Belen, Rivas, Nicaragua	24	La Golondrina micro basin, Blanco River, Nicaragua
25	El Regadio Region, Esteli, Nicaragua	26	Forestry Farms, Cauto River basin, Granma, Cuba	27	Upper basin of the North Yaque River, Dominican Republic

### Annex 3. Synthesis table of each case study

**Table 5. Costa Rica, Case: National Program of PES and its relationship with the Water Canon**

Time in operation <sup>1</sup>	Forest area of the case; scale; and uses of the water <sup>2</sup>	Participants <sup>3</sup> (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of compensation; and responsibilities and activities <sup>4</sup>	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1996	<p><b>Area:</b> Projects implemented across the country</p> <p><b>Scale:</b> Country</p> <p><b>Uses:</b> Drinking water, hydroelectricity, industrial, and agricultural irrigation</p>	<p><b>Providers:</b> private owners on lands in priority regions for water resources protection</p> <p><b>Beneficiaries:</b> Water consumers for different purposes in the country.</p> <p><b>Administrator:</b> National Government through the fund for forestry financing (FONAFIFO).</p> <p><b>Facilitator:</b> National Government</p>	<p><b>Organization:</b> All the funds raised are concentrated in the FONAFIFO and then allocated through contracts.</p> <p><b>Amount:</b> US\$ 120 million invested during the last ten years.</p> <p><b>Responsibilities and activities:</b> Incentives payments are conditional on the implementation of conservation and improved land use practices. Not all payments are related to water environmental services.</p>	<p><b>Legal framework:</b> Law 7575 created the National Program of PES. The 2006 Water Canon was a complementary Government initiative which established an additional environmental fee for use of water resources.</p> <p><b>Institutional:</b> FONAFIFO administers the National Program of PES.</p>	<p><b>Cost:</b> 7% of the annual budget of FONAFIFO (US\$ 12 million) equivalent to US\$ 840,000 per year has been used to cover the operative costs of the mechanism (administration and monitoring of projects).</p> <p><b>Sources:</b> Tax to vehicle fuel, 25% of the Water Canon, donations and loans, specific agreements with private companies</p>	<p><b>Achievements:</b> 7242 contracts, coverage of 599,000 ha and, additionally, 1.9 million trees planted in agroforestry systems</p> <p><b>Limitations:</b> Requires financial consolidation; Improve prioritization of geographic areas and land owner producers to achieve goals most effectively</p>	<p><b>Governance:</b> The Program is lead and run by the central Government, primarily with public funds</p> <p><b>Financial sustainability:</b> Viable</p>

<sup>1</sup> The year in which the mechanism was launched, or the approximate number of years in operation

<sup>2</sup> «Uses of water» is defined here as: domestic use (for human consumption); agricultural irrigation, industrial (specify the type of industry), hydroelectric and others

<sup>3</sup> The provider(s) of the service are landowners in the water catchment zone (primary providers of the service); consumers are the ones who use the water. The administrator of the Mechanism is the entity that makes it possible for the water service to be provided and who raises funds or makes arrangements for the compensation of providers; facilitators are government organizations, NGOs, or others who support the establishment and operation of the Mechanism

<sup>4</sup> Obligations and activities promoted by the Mechanism are, for example, forest protection (not logging), limiting use of the forest, and planting trees

**Table 6. Costa Rica, Case: Fundacion Pro Reserva Forestal Monte Alto, upper basin of the Nosara River, Hojancha, Guanacaste.**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Community initiative since 1991	Area: 924 ha as protected zone.	Provider: Foundation for the Monte Alto Forestry Reserve  Consumers: 96 families of the Pllangosta rural community in the upper side of the Nosara River basin; additionally water users of Hojancha Centro with 1100 families	Organization: Local residents of Hojancha got 228 donors so they could purchase 276 ha of the Monte Alto natural reserve (at a cost of US\$ 1.000,000) and around US\$ 500,000 with other donors for its consolidation  Amount: it has not been calculated  Responsibilities and activities: Community of Pllangosta compensates the provider (Foundation for the Monte Alto Forestry Reserve) in kind by working on the conservation of the upper basin of the Nosara River	Legal framework: - The water law of 1942 (outdated); - The forestry law 7174 (1990) that created incentives for forest protection; - Forestry law 7575 (1996) that created payment for environmental services and prohibits change of forested lands for agricultural purposes  Institutional frame: formal agreement for co-administration of the area by the Monte Alto Forestry Reserve and the Ministry of Environment, with defined roles and backed by local participation	Cost: Annual cost for operation of the reserve is US\$ 80,000  Sources: 70% of the operational costs are covered by funds from the community tourist program of the Foundation; PES for 152 ha within the reserve covers 30%.	Achievements: - Restoration of water resources; - Land ownership with legal clarity; - Local organization strengthened with the creation of the Monte Alto Forestry Reserve; - Recovery of forest cover in the upper basin; - Community tourism provides income and employment for locals.  Limitations: - Water production and consumption do not have proper controls; - Government regulations restrict community participation in the mechanism; - Insufficient technical base to implement agroforestry practices.	Governance: Co-administration of the Reserve between the local Foundation and the central Government  Financial sustainability: Uncertain as long as water consumers do not pay for the environmental component of the service.
The Foundation for the Monte Alto Forestry Reserve was created in 1992.	60% of the protected zone with forest regeneration						
The protected zone of the upper basin of the Nosara River was established in 1994	276 ha (30%) of the protected zone acquired for protection and was defined as the Monte Alto Natural Reserve  152 ha with PES for forest conservation  Scale: Local  Uses: Domestic use	Administrator: Foundation for the Monte Alto Forestry Reserve  Facilitators: Donor program, local residents and municipality, CACH, ICE, Fundacion Tropico Verde, INBIO, Colegio Agropecuario de Hojancha, COOPILANGOSTA, IFAM, US Challenger, PPD/PNUD, Coopeguanacaste, German Embassy in Costa Rica, European Union, various universities.					

**Table 7. El Salvador, Case: PES in micro basin La Poza, Ozatlan and Usulután Municipal Districts, Usulután**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2005	<p>Area: 75.7 ha of forest land</p> <p>Scale: Local, with support of an NGO</p> <p>Uses of water: Domestic and agricultural irrigation</p>	<p>Providers: Santa Ines and Las Nieves Cooperatives and several independent agricultural producers</p> <p>Consumers: 2000 families in seven communities Usulután and Ozatlan Municipal Districts, with a total of 8000 persons</p> <p>Administrator and facilitator: ADESPROMIPO and five water committees</p>	<p>Organization: The mechanism is lead by ADESPROMIPO, made up of community leaders and representatives of the water committees. The charges of PES are carried out by the water committees and invested in coordination with board of directors of ADESPROMIPO</p> <p>Amount: The mechanism has collected around US\$ 36,500 during the last four years including PES and donations from international donors</p> <p>Responsibilities and activities: providers carry out reforestation and forest protection in coordination with ADESPROMIPO</p>	<p>Legal framework: Backed by Municipal Law and Environment Act</p> <p>Institutional frame: - The mechanism works based on mutual trust between providers, water committees and ADESPROMIPO; - The watershed management plan supports the mechanism</p>	<p>Cost: US\$ 36,500 was invested until 2008 for the operation of the mechanism and for compensating providers. Data on the costs for operation is lacking</p> <p>Sources: - During 2005-2008 US\$ 7500 was collected; - International Cooperation has donated US\$ 29,000</p>	<p>Achievements: - Expansion of the forest cover due to reforestation and incorporation of environmentally friendly practices; - Timber and fuelwood availability for the communities had increased as a result of forest conservation and management; - Awareness has been raised on the need for planting trees; - Water availability and quality have increased</p> <p>Limitations: - There is no formal regulation (e.g. municipal ordinance) to support the mechanism; - The payment for PES needs to be expanded; - Central government has provided little support</p>	<p>Governance: -The watershed management plan is the guiding document for the mechanism; - Funds management is transparent; -FUNDAMUNI has provided technical advice and support</p> <p>Financial sustainability: - The mechanism depends heavily on international donors; - Collection of charges from water users has been inconsistent due to changes in the Water Board; - Other water users must be incorporated so they may also contribute resources to the mechanism (city of Usulután and agricultural irrigators downstream)</p>

**Table 8. El Salvador, Case: PES for the conservation, protection and management of the Coffee Forest in the Tacuba Municipal District, Ahuachapán**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2002	<p>Area: 543 ha of land with shaded coffee plantations</p> <p>Scale: Local</p> <p>Uses: Mainly domestic and some agricultural irrigation</p>	<p>Provider: Las Colinas Cooperative</p> <p>Consumers: 4439 families, totaling 22,295 persons; 32% (1,420 families) receive water through EMSAGUAT</p> <p>Administrator and Facilitator: EMSAGUAT</p>	<p>Organization: EMSAGUAT is the company in charge of administering the mechanism; it has an office in the city of Tacuba</p> <p>Amount: -During 2003-2008 US\$ 10,200 was collected as PES; Each water consumer pays US\$ 0.12/month</p> <p>-International Cooperation has provided US\$ 2000.00 through the PASOLAC program</p> <p>- A total US\$ 12,200 has been collected as PES in the last five years; agreement has not been reached on how to use these funds</p> <p>Responsibilities and activities: Providers carry out conservation practices and produce organic coffee; greater clarity is needed about water suppliers' commitments under the PES</p>	<p>Legal framework: Municipal Law and two municipal ordinances on environmental protection and water resources</p> <p>Institutional frame: - The recovery of PES is legal</p> <p>- EMSAGUAT has credibility</p>	<p>Cost: There is no data on the operational costs of the Mechanism</p> <p>Sources: - PES US\$ 10,200 - PASOLAC US\$ 2000</p>	<p>Achievements: - Creation of a fund for PES inputs from consumers; - Coffee producers Cooperative has incorporated environmental friendly practices as part of its production process; - Remarkable improvement of water quantity, quality and availability; - Coffee plantations' management supplies timber and fuelwood to the communities</p> <p>Limitations: - Agreement must still be reached between providers and consumers on how to incorporate the PES within the watershed management plan; - Other water beneficiaries need to be incorporated into the Mechanism; - EMSAGUAT needs to revamp its administrative scheme</p>	<p>Governance: - An agreement between EMSAGUAT and providers is needed to decide on how to transfer collected funds to the Coffee Cooperative; - Water users convinced on the relevance of the PES.</p> <p>Financial sustainability: -Funding is still insufficient to assure long-term conservation of the upper basin; - The fund has been growing and there is willingness to continue strengthening it; - Other water users must be incorporated into the PES mechanism</p>

**Table 9. El Salvador, Case: El Playon Protected Area, La Libertad Province**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1998	<p>Area: 60 ha.</p> <p>Scale: Local</p> <p>Uses: Water is used by private water companies that then compensate the government</p>	<p>Provider: Central Government and an NGO co-administer the El Playon Protected Area</p> <p>Consumers: Private water companies</p> <p>Administrator: An NGO co-administers the Protected Area</p> <p>Facilitator: Canadian Government Cooperation Agency, CARE, World Vision, CHF</p>	<p>Organization: Water companies compensate through investments into the catchment area of the State-owned El Playon Protected Area that supplies part of San Salvador water</p> <p>Amount: US\$ 270,000 invested over a period of five years</p> <p>Responsibilities and activities: Companies compensate by financing the establishment of forest plantations in the protected area</p>	<p>Legal framework: Environmental Act provides compensation for work or projects that affect water availability</p> <p>Institutional frame: Ministry of Environment</p>	<p>Cost: -Around US\$ 5000/ha for a five year period; -Financial support only covers the establishment of the plantations</p> <p>Sources: The Mechanism is financed using funds provided by water companies as a mean to compensate the state</p>	<p>Achievements: Funds invested in the improvement of the water catchment zone as compensation for the harvesting of natural resources.</p> <p>Limitations: The Mechanism only covers the initial stage of the plantations</p>	<p>Governance: - Agreement between Ministry of Environment, private companies providing compensation and the NGO that co-administers the Protected Area; - The Ministry of Environment controls the process</p> <p>Financial sustainability: The investment only covers the initial stage of the plantations</p>

**Table 10. El Salvador, Case: Joateca, Morazan Province**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1994	<p>Area: 11.2 ha in the water catchment zone</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: Association of potable water of the municipal district of Joateca (ASAMPSPA)</p> <p>Consumers: 234 water users, of which 207 are members of ASAMPSPA; 920 persons</p> <p>Administrator: ASAMPSPA Association</p> <p>Facilitator: Government of Canada, CARE, World Vision, CHF</p>	<p>Organization: Associates pay US\$ 3/month for up to 20 m<sup>3</sup>/month. Each associate provides two days of labor per year in the upper basin. Water users not associated pay US\$ 6/month with no labor compensation. Above 20 m<sup>3</sup>/month, an additional US\$ 1.50/m<sup>3</sup> is charged.</p> <p>Amount: Average consumption per family is 15m<sup>3</sup>/month. The association collects US\$ 9400/año in fees and US\$ 2340/year in labor (US\$ 11,740/year as a total).</p> <p>Responsibilities and activities: Water consumers make monthly payments; association members provide additionally two labor days/year.</p>	<p>Legal framework: Both the Environmental and Forestry Laws give special treatment to water catchment zones</p> <p>Institutional frame: Ministry of Environment owns the lands surrounding the lands of the association</p>	<p>Cost: -Around US\$ 12,000/year; -US\$ 2600/year deficit; -Considering labor as a payment there is financial balance for operation of the projects</p> <p>Sources: Mostly from labor of water beneficiaries; a much lower amount comes from a governmental subsidy that is coming to an end</p>	<p>Achievements: - Water users aware of water problems created their own solution; - External support has been successfully capitalized; - Integrated view on water management</p> <p>Limitations: The needed investment for infrastructure renovation in the long-term has not been considered yet</p>	<p>Governance: Association members elect the Board of Directors, an administrative committee, and a supervisory group</p> <p>Financial sustainability: Viable for the utility life of the infrastructure</p>

**Table 11. El Salvador, Case: Municipal Association for the reconstruction and development of Cinquera, Cabañas Province**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2003	<p>Area: 155 ha in the water catchment zone</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: Municipal Association for the reconstruction and development of Cinquera (ARDM)</p> <p>Consumers: 1467 persons in Cinquera municipality</p> <p>Administrator: Cinquera Municipality</p> <p>Facilitator: ARDM</p>	<p>Organization: Community members compensate providers through labor focused on conservation of the water catchment zone</p> <p>Amount: -Water consumers pay US\$1.43/month/household for water provision; -Funding collected covers only 50% of maintenance costs for infrastructure; -Environmental compensation is made in kind (labor) and was not quantified</p> <p>Responsibilities and activities: Water users compensate through labor by planting trees, performing maintenance, carry out protection and harvesting operations in the woods owned by the water provider</p>	<p>Legal framework: Forest law acknowledges the environmental relevance of forests in the water catchment zone</p> <p>Institutional frame: different governmental entities and International Cooperation agencies support the mechanism in different ways</p>	<p>Cost: 50% of the operational costs of water provision are covered with payments made by consumers; the rest is provided by the municipality from its own funds</p> <p>Sources: The environmental compensation mechanism is financed entirely with labor of water consumers</p>	<p>Achievements: Various stakeholders are aware of the relevance of the Mechanism</p> <p>Limitations: -Environmental compensation is only in-kind; -50% of the infrastructure maintenance cost for water provision continues to be subsidized by the Municipality</p>	<p>Governance: The Municipality controls the Mechanism with approval of providers and consumers</p> <p>Financial sustainability: Funds are insufficient to expand protection in the water catchment zone and to keep the infrastructure operational in the long-term</p>

**Table 12. Guatemala, Case: Pachalum Municipal District, Quiche Province**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1984	<p>Area: 20 ha of forest land in the upper watershed</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: Association for the development of Pachalum</p> <p>Consumers: 715 families from the urban part of the Pachalum Municipal District; 3500 persons</p> <p>Administrator: Association for the development of Pachalum</p> <p>Facilitator: There has not been a facilitator</p>	<p>Organization: Water consumers collect funds for land and aquifer purchase and to invest in infrastructure</p> <p>Amount: There is not yet a particular payment for environmental compensation</p> <p>Responsibilities and activities: Water consumers only pay for the right of access to water; an increase in the fee for water is being considered to finance the environmental component of the project</p>	<p>Legal framework: The forest law acknowledges the need for protecting forests in the water catchment zone; the provider collected (US\$ 25,000) for land and aquifer acquisition in the upper basin</p> <p>Institutional frame: There has not been external support for the Mechanism</p>	<p>Cost: Operative costs are aimed at the maintenance of the infrastructure; there are no funds allocated for environmental compensation</p> <p>Sources: The mechanism is financed exclusively with payments made by water consumers</p>	<p>Achievements: Local initiative to solve the problem of acquiring lands and aquifers in the catchment zone</p> <p>Limitations: There is no environmental compensation to assure the provision of water in the long term</p>	<p>Governance: The administrative entity is made up of water users</p> <p>Financial sustainability: Uncertain</p>

**Table 13. Guatemala, Case: Finca Santa Elena, Tecpan, Chimaltenango**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1990	<p>Area: 1,000 ha of forest cover</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: BIFASA company, owner of the water catchment zone</p> <p>Consumers: 16 rural communities of 24,000 persons, 90% indigenous</p> <p>Administrator: Company BIFASA</p> <p>Facilitator: There has not been a facilitator</p>	<p>Organization: Community members compensate the provider by providing labor for forest conservation in the water catchment zone (in-kind support)</p> <p>Amount: Two labor days/year/family, equivalent to US\$ 54,000/year</p> <p>Responsibilities and activities: Water consumers provide labor for tree planting, road and plantation maintenance, and harvesting operations in the forests owned by the company providing the water</p>	<p>Legal framework: -Forest law establishes incentives for forest conservation; -The provider has received (US\$ 27,000) during the last ten years</p> <p>Institutional frame: The Forest Service has administered subsidies to the provider</p>	<p>Cost: -Data on the operation costs is lacking; -Costs are minimal and limited to covering the costs of coordination between the Farm and the communities for the labor required in the forests</p> <p>Sources: The Mechanism is financed primarily with the labor provided by the communities, and a small proportion with government subsidies that will end soon</p>	<p>Achievements: Rural communities that benefit from the water value forests for their hydrological role</p> <p>Limitations: Government subsidies for forest conservation related to water are not permanent</p>	<p>Governance: The Mechanism is established by the provider and accepted by water consumers; there is little space for negotiation</p> <p>Financial sustainability: Uncertain, not permanent</p>

**Table 14. Guatemala, Case: San Jeronimo River watershed, Baja Verapaz**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
The structure was created in 2006 but the Mechanism is still not operational due to a lack of will of the current municipal authorities	<p><b>Area:</b> The watershed has 11,200 ha of forest cover, representing 49% of the total area</p> <p><b>Scale:</b> Local, but integrated into a regional scheme</p> <p><b>Uses:</b> Domestic, hydroelectricity, agricultural irrigation, aquaculture, tourism</p>	<p><b>Provider:</b> Land owners in the upper basin, which is part of the Sierra de las Minas biosphere reserve</p> <p><b>Consumers:</b> 14,300 persons from eleven communities for domestic use, 657 users of agricultural irrigation grouped by AURSA Association, one aquiculture farm and three hydroelectric users</p> <p><b>Administrator:</b> Watershed Committee of the San Jeronimo River, supported by the San Jeronimo Municipality and the NGO Defensores de la Naturaleza</p> <p><b>Facilitator:</b> NGO Defensores de la Naturaleza</p>	<p><b>Organization:</b> Providers of the service will be compensated with funds collected and administered by the watershed committee supported by The Water Fund</p> <p><b>Amount:</b> The Mechanism is still not operational; currently it is only a voluntary payment by AURSA (association of agricultural irrigators) and it is in the negotiation phase with the Hydroelectric Company ENEL</p> <p><b>Responsibilities and activities:</b> Contracts between the Mechanism and providers for reforestation and aquifer protection</p>	<p><b>Legal framework:</b> Regulation for the sustainable management of water resources in the municipal district have been approved based on the Municipal code and Decentralization Law</p> <p><b>Institutional frame:</b> The Mechanism is still not in operation due to a lack of will of the Municipal Government</p>	<p><b>Cost:</b> The Mechanism has a defined structure but is not in operation</p> <p><b>Sources:</b> The Mechanism will begin its operation when the Municipality starts charging water users for environmental compensation</p>	<p><b>Achievements:</b> - Actors are aware of the economic and environmental value of water; - Regulation approved for water use, including the PES</p> <p><b>Limitations:</b> The Mechanism depends on the political will of the Municipal Government which is subject to periodic shifts</p>	<p><b>Governance:</b> Watershed Committee includes providers and consumers of water; charging procedure controlled by Municipality of San Jeronimo</p> <p><b>Financial sustainability:</b> Uncertain</p>

**Table 15. Guatemala, Case: The Water Fund of the Motagua-Polochic Rivers system**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2005	<p><b>Area:</b> 423,000 ha on the northern side of the lower basin of the Motagua River and the medium and lower parts of the Polochic River basin</p> <p><b>Scale:</b> Regional</p> <p><b>Uses:</b> Domestic, agricultural irrigation, hydroelectricity, aquaculture, industrial</p>	<p><b>Provider:</b> Four watershed Committees, NGO Defensores de la Naturaleza, CONAP, Municipalities and private land owners</p> <p><b>Consumers:</b> Two associations of agricultural irrigators, four industrial companies, two hydroelectric companies, several Municipalities and various rural communities; 300,000 water users in total</p> <p><b>Administrator:</b> The Water Fund, managed by the Defensores de la Naturaleza Foundation (NGO)</p>	<p><b>Organization:</b> The Water Fund is looking to raise funds from voluntary payments from water consumers and additionally from an international donor; the Fund aims to compensate the water providers of the water catchment zone through various actions</p> <p><b>Amount:</b> The Water Fund, up through 2008, had collected US\$ 230,000 and has set a goal of raising an annual revenue of US\$ 600,000/year from payments made by the various water consumers</p> <p><b>Responsibilities and activities:</b> The Mechanism is looking to coordinate actions among the different consumers and providers of water to invest the funds to promote the sustainable management of the water catchment areas</p>	<p><b>Legal framework:</b> The Law of Protected Areas acknowledges the co-administration of the Sierra de las Minas Biosphere Reserve by the Central Government through CONAP and the NGO Defensores de la Naturaleza; there is no law of water in Guatemala; the Municipal Code (a law) allows some regulation for water use to the Municipalities</p> <p><b>Institutional frame:</b> CONAP and the NGO Fundacion Defensores de la Naturaleza co-administer the water catchment zone; the Water Fund is a new entity aimed at bringing together consumers and providers of water in the zone</p>	<p><b>Cost:</b> During 2007, the Mechanism provided support to three initiatives for the sustainable management of natural resources in the water catchment zone for an amount of US\$ 45,000</p> <p><b>Sources:</b> Donations by some of the consumers of water and international cooperation; in the future it is hoped that water consumers will provide most of the financial resources</p>	<p><b>Achievements:</b> Incorporation of the main providers and consumers of water into the Mechanism; the Mechanism complements efforts for the conservation of the Protected Area in the water catchment zone</p> <p><b>Limitations:</b> The financial component needs to be strengthened; there is no law for water in Guatemala; poor technical and scientific data exists to support the management decisions of the Protected Area</p>	<p><b>Governance:</b> The Mechanism is lead and administered by the NGO, Defensores de la Naturaleza, with the participation of different water providers and consumers</p> <p><b>Financial sustainability:</b> Although a significant amount has been raised, funding could be insufficient due to an increase in the demand of the resources</p>

**Table 16. Guatemala, Case: Huehuetenango and Chiantla Municipal Districts**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2004	<p><b>Area:</b> 12,850 ha in the water catchment zone of the upper basin of the Selegua River</p> <p><b>Scale:</b> Local</p> <p><b>Uses:</b> Domestic use; agricultural irrigation</p>	<p><b>Provider:</b> 39 rural communities with 28,000 persons</p> <p><b>Consumers:</b> 14,800 families in the Huehuetenango and Chiantla Municipal Districts, Huehuetenango Province</p> <p><b>Administrator:</b> Huehuetenango and Chiantla Municipal Districts</p> <p><b>Facilitator:</b> NGO FUNDAECO</p>	<p><b>Organization:</b> The two Municipalities finance agricultural producers to carry out soil conservation, reforestation, management of natural forests and agroforestry systems in the water catchment zone</p> <p><b>Amount:</b> US \$300/hectare is given as a compensation</p> <p><b>Responsibilities and activities:</b> Payments are given based on verification of compliance with the contracts</p>	<p><b>Legal framework:</b> The Municipal Code and the Law of Decentralization provide autonomy to Municipalities for managing funds</p> <p><b>Institutional frame:</b> The Mechanism is administered by the two Municipalities with the support of FUNDAECO</p>	<p><b>Cost:</b> 22% of the amount given to each beneficiary is allocated for technical assistance and administration of the Mechanism</p> <p><b>Sources:</b> The Mechanism was established with a donation of US \$25,000 made by the two Municipalities</p>	<p><b>Achievements:</b> Municipalities have incorporated the concept about there being a relation between forests and water; the Mechanism is effective since it focuses investments towards sustainable land use practices in critical areas for water supply</p> <p><b>Limitations:</b> Financial support continues to be provided by the two Municipalities and is not transferred to water consumers</p>	<p><b>Governance:</b> The Mechanism is managed by the Municipalities, with the support of FUNDAECO; the technical capacity of the municipal governments is being improved</p> <p><b>Financial sustainability:</b> Uncertain since it depends on the political will of the two Municipal Governments; Environmental issues are not priority in the municipalities' political agendas</p>

**Table 17. Guatemala, Case: Las Escobas River, Cerro San Gil Reserve, Izabal**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1998	<p>Area: 707 ha of forest cover</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: NGO FUNDAECO, who administers the water catchment area</p> <p>Consumers: 5300 families, residents of Puerto Barrios and Santo Tomas de Castilla, the two main seaports on the Atlantic side of Guatemala</p> <p>Administrator: Private water company HEDASA, which holds a concession to provide the service</p> <p>Facilitator: NGO FUNDAECO</p>	<p>Organization: Water consumers compensate the provider through the payment of a fee for the environmental service</p> <p>Amount: HEDASA pays US\$ 1050/month, equivalent to US\$ 12,600/year to cover 40% of the budget for the management of the reserve</p> <p>Responsibilities and activities: HEDASA covers the environmental cost without transferring it to water consumers because that is imposed by the Municipality as a requirement to operate the water concession</p>	<p>Legal framework: The Protected Areas Law allows ownership and management of the areas by NGOs like FUNDAECO; Municipalities have autonomy to decide how to offer public services</p> <p>Institutional frame: The Mechanism might expand into other towns in the future</p>	<p>Cost: The operative costs of the mechanism are covered with funds provided by HEDASA; the management costs of the water catchment area are 40% covered in a 40% by those funds</p> <p>Sources: The Mechanism is financed using funds provided by HEDSA</p>	<p>Achievements: Collected funds are partially invested in the sustainable development of the catchment zone; water consumers understand the link between forests and water</p> <p>Limitations: Water consumers do not pay for the environmental services</p>	<p>Governance: The Mechanism was set through the pressure from the two Municipalities on the water provider</p> <p>Financial sustainability: Uncertain since the environmental costs are acquired by the water provider as a result of external pressure; water consumers do not pay for the environmental cost of the service</p>

**Table 18. Guatemala, Case: Micro basin of Xaya river, Tecpan, Chimaltenango**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2006	<p>Area: 2611 ha of forest cover out of the 5700 ha watershed</p> <p>Scale: Regional</p> <p>Uses: Domestic use</p>	<p>Provider: Tecpan Municipal District, private farms and six communal development councils</p> <p>Consumers: Municipal water company of Guatemala City (EMPAGUA) that provides potable water to 200,000 households</p> <p>Administrator: Xaya Civil Environmental Association (ACAX)</p> <p>Facilitator: Ministry of Agriculture PARPA Program</p>	<p>Organization: It is expected that EMPAGUA will start charging its customers a fee to cover the environmental cost of water provision; the Mechanism is still in the negotiation phase</p> <p>Amount: They are in the process of negotiating a fee of Q5/month/customer for water, equivalent to Q12 million/year (US\$ 1.5 million/year); EMPAGUA already invests around Q10 million into the treatment plant to clean up bad management of the watershed</p> <p>Responsibilities and activities: Providers will be compensated for reforestation and conservation of remaining forest and soils when the Mechanism starts</p>	<p>Legal framework: The forest law allowed the payment of Q 2.4 million (US\$ 316,000) during the last five years for forest incentives through different programs</p> <p>Institutional frame: The Forest Service and the Ministry of Agriculture support the initiative; the structure of the Mechanism needs to be strengthened</p>	<p>Cost: No data available of the operation costs; the Mechanism is not operating yet since an agreement between EMPAGUA and ACAX has not been reached</p> <p>Sources: The Mechanism has been financed with government subsidies that are coming to an end; the commitment of EMPAGUA is needed to make the compensation viable for the future</p>	<p>Achievements: Understanding of the environmental role of forests by local communities, land owners and the Municipality</p> <p>Limitations: The future of the Mechanism largely depends on the willingness of EMPAGUA to charge their customers for the environmental component of water service</p>	<p>Governance: The Mechanism is still in the process of consolidation as a result of the involvement of providers and the lead demander of the service</p> <p>Financial sustainability: Uncertain if EMPAGUA does not accept to charge its customers for the environmental component of water supply</p>

**Table 19. Guatemala, Case: Ixtacapa River Watershed, Solola and Suchitepequez Provinces**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2006	<p><b>Area:</b> 1800 ha of forest land in the water catchment zone</p> <p><b>Scale:</b> Regional</p> <p><b>Uses:</b> Domestic, agricultural irrigation; industrial (sugar industry)</p>	<p><b>Provider:</b> Nine indigenous maya-kiche communities in the Nahuala Municipal District in the upper basin</p> <p><b>Consumers:</b> Five Municipalities with 90,000 inhabitants, six agricultural farms and one sugar industry, all of them in the middle part of the watershed</p> <p><b>Administrator:</b> Association of friends of the Ixtacapa (AADRI)</p> <p><b>Facilitator:</b> PARPA Program of the Ministry of Agriculture</p>	<p><b>Organization:</b> Water consumers compensate providers with payments to support forest conservation work and health services in the upper basin</p> <p><b>Amount:</b> Until 2008, the PARPA Program provided Q 350,000 (US\$ 43,000) - the subsidy concluded in 2010; in 2008, water consumers provided Q 243,000 (US\$ 32,000) for reforestation and for salaries and health benefits for providers.</p> <p><b>Responsibilities and activities:</b> Providers undertake the conservation of forests and soils in exchange for compensation</p>	<p><b>Legal framework:</b> The forest law has positively influenced the Mechanism</p> <p><b>Institutional frame:</b> The PARPA Program facilitated the process and provided financial support up through 2008</p>	<p><b>Cost:</b> There is no data on the operative costs; the Mechanism is in its initial stage and will face a big challenge after the closing of the PARPA Program in 2009</p> <p><b>Sources:</b> The facility funding originates from contributions from the central Government (PARPA), and beginning in 2008, with contributions from users</p>	<p><b>Achievements:</b> Recognition of the environmental value of forests and soil conservation in the upper basin for providers and suppliers</p> <p><b>Limitations:</b> Government funding is nearing completion and an alternative funding option has not been established</p>	<p><b>Governance:</b> The Mechanism is the result of a negotiation process between providers and consumers facilitated by PARPA</p> <p><b>Financial sustainability:</b> Continued government funding is uncertain</p>

**Table 20. Guatemala, Case: National Program of Forest Incentives (PINFOR)**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1997	<p>Area: 144,158 ha of forest; projects are implemented throughout the whole country</p> <p>Scale: National</p> <p>Uses: All types of uses</p>	<p>Provider: Private land owners including communities and municipalities in areas of importance for water resources; 1130 contracts</p> <p>Consumers: Users of water for different uses throughout the country</p> <p>Administrator: Forest Service (INAB)</p> <p>Facilitator: INAB, ONG.</p>	<p>Organization: 80% of the Forest Incentives Program is aimed at plantations and 20% for projects to support natural forests including production and the conservation of forests for water production.</p> <p>Amount: 116.62 million quetzals (US\$ 14.6 millions) invested during the last 11 years in forest protection</p> <p>Responsibilities and activities: Payments subject to verification of conservation practices based on annual plans of action</p>	<p>Legal framework: The Forest Law from 1996 created the Forest Incentives Program</p> <p>Institutional frame: INAB, as the National Forest Service, is managing the Program</p>	<p>Cost: 9% of the annual amount of the Program is devoted to cover administrative duties (2.1 million quetzals/year (US\$ 260,000)/year</p> <p>Sources: The Mechanism is funded with an allocation of 1% of the budget of the central government</p>	<p>Achievements: Different types of land owners have been encouraged to conserve forests for their role in protecting water resources</p> <p>Limitations: The Program will conclude in 2017; the Program depends totally on Government support</p>	<p>Governance: The Mechanism is managed by INAB (its board of directors includes representatives from the private sector, Municipalities, universities, NGOs and the central government); Central Government controls the Mechanism through the allocation of funds</p> <p>Financial sustainability: Uncertain due to political instability</p>

**Table 21 . Honduras, Case: Micro basin Las Dantas River, Yuscaran, El Paraiso**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2005	<p>Area: 350 ha of totally protected lands plus 212 ha in the process of being expanded for sustainable land uses (shaded coffee production and ecotourism)</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: San Martin Agroforestry Cooperative</p> <p>Consumers: 7500 inhabitants of twelve communities</p> <p>Administrator: Twelve water associations of the watershed organized as a network</p> <p>Facilitator: Vida Foundation, Yuscaran Municipal District and the Network of environmental teachers</p>	<p>Organization: amount of the compensation; and responsibilities and activities</p> <p>Organization: 965 water consumers pay US\$ 0.15/month/household (965 households)</p> <p>Amount: L\$ 35,000 per year, equivalent to US\$ 1835/year</p> <p>Responsibilities and activities: For providers: protection of the forests in the catchment zone, implementing environmental friendly practices in the agricultural production; for consumers (network of water associations): Make payments that are concentrated into a fund to compensate the providers and that are also used to leverage other funds</p>	<p>National legal and institutional framework</p> <p>Legal framework: Several laws support the Mechanism: Environmental Law, Law of Municipalities, Forestry Law, Protected Areas Law</p> <p>Institutional frame: International Cooperation and Zamorano Agricultural School support the process through funding and technical assistance</p>	<p>Cost of the Mechanism and sources of funding</p> <p>Cost: The operation of the Mechanism includes the maintenance of the infrastructure and the management of the environmental compensation, estimated at US\$ 1225/year</p> <p>Sources: The Mechanism is financed with payments made by water consumers; these funds are used to leverage other funding</p>	<p>Achievements and limitations of the Mechanism</p> <p>Achievements: The process of consultation and negotiation between participants has helped to achieve commitments to conservation of the watershed</p> <p>Limitations: Availability of water for domestic use may compete with future potential use for agricultural irrigation</p>	<p>Sustainability of the Mechanism</p> <p>Governance: Responsibilities are shared among providers and water consumers and facilitators</p> <p>Financial sustainability: Current funds are insufficient to cover all of the environmental compensation; the use of these funds as leverage to raise external funds is perceived to be a viable option</p>

**Table 22. Honduras, Case: Watershed of Neteapa River, Moroceli and Potrerillos, El Paraiso**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2003	<p>Area: 3676 ha declared as "water production zone" and 45 ha considered as the water catchment zone, subject to conservation</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: Agricultural producers in the upper basin</p> <p>Consumers: 9000 inhabitants in eight communities</p> <p>Administrator: Treasurer of the Neteapa Association of Water Boards</p> <p>Facilitator: Alliance formed by Zamorano, the MIRA Project, the Vida Foundation, the city Mayor, and the Environmental Teachers Network</p>	<p>Organization: Compensation is made through payment of US\$ 0.16/month/household (1563 households)</p> <p>Amount: US\$ 3000/year</p> <p>Responsibilities and activities: For the provider: Protecting the forests in the water catchment area, implementing agroforestry and soil conservation practices; for the consumer (Association of water boards): Determining the need of contracts, making payments to the compensation fund, monitoring the implementation of conservation practices by the providers</p>	<p>Legal framework: Various laws including environmental, municipal, forestry, protected areas laws and the National strategy on environmental goods and services</p> <p>Institutional framework: Various facilitators including the Zamorano school, the MIRA and Forcuencas Projects, and the VIDA Foundation are supporting the Mechanism with funding and technical assistance</p>	<p>Cost: Not determined; most of the operational costs are covered by stakeholders through voluntary work</p> <p>Sources: Main source of funding are the payments made by consumers and some eventual external donations</p>	<p>Achievements: The creation and capitalization of the fund; awareness raising of the participants; start of payments for compensation for environmental conservation</p> <p>Limitations: Change of land use in the upper basin as a result of growing urbanization</p>	<p>Governance: Shared administration among providers, consumers and facilitators with the support of the Moroceli Municipal District</p> <p>Financial sustainability: Limited funds to cover all the needs of environmental compensation</p>

**Table 23. Honduras, Case: PES, Cumes River Watershed, Jesus de Otoro Municipal District, Intibuca (JAPOE)**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Started in 2002 and was working until 2006 with external support	<p>Area: Total area is 3179 ha; primary and secondary forests cover 2425 ha in the Montecillos Natural Reserve</p> <p>Scale: Local-Municipal</p> <p>Uses: Domestic; agricultural irrigation</p>	<p>Provider: 50 agricultural producers in the upper basin; 21 contracts signed</p> <p>Consumers: 1705 families consuming the water in the town of Jesus de Otoro; other consumers not incorporated yet: small villages and agricultural producers</p> <p>Administrator: Water and sewage Board of Jesus de Otoro (JAPOE), designated by the Municipality</p> <p>Facilitators: PASOLAC, CRS, ESNACIFOR, IHCAFÉ, Save The Children, ABUASAN-COSUDE</p>	<p>Organization: JAPOE gathers people from the different boroughs of the city and has been designated by the Municipality to administrate the Mechanism operated by a manager</p> <p>Amount: The Swiss Cooperation donated US\$ 21,000 to start the project; payments are made on a household bases costing each family US\$58 /family/year for protecting forests and carry out sustainable agricultural practices; operational and maintenance costs of the Mechanism are provided by JAPOE</p> <p>Responsibilities and activities: Providers carry out reforestation, forest protection and soil conservation practices in the upper basin, based on annual contracts; monitoring and verification is carried out by JAPOE and the Municipality</p>	<p>Legal framework: Supported by various laws including Municipal, Environmental, Forestry, and Protected Areas Laws; a Municipal ordinance designated JAPOE acts as the administrative entity of the Mechanism</p> <p>Institutional frame: JAPOE has received the support of various external cooperators</p>	<p>Cost: Around US\$ 35,000 invested in the compensation and implementation of the Mechanism</p> <p>Sources: Swiss Cooperation through PASOLAC and AGUASAN; consumer payments; Municipality and providers have made in-kind contributions</p>	<p>Achievements: JAPOE is a credible organization in the community capable of acting as a mediator between dwellers of the watershed; the creation of a fund for environmental compensation; providers are organized and receiving compensation</p> <p>Limitations: Other water users have not been incorporated into the Mechanism yet; the Municipality is not taking responsibility for the Mechanism; lack of technical staff for monitoring; funds need to be managed more efficiently</p>	<p>Governance: JAPOE administers the Mechanism in a decentralized way; providers, consumers and JAPOE are included in the Mechanism</p> <p>Financial sustainability: Feasible but administrative and financial capacities need to be strengthened; the incorporation of other water consumers is needed to increase the raise of funds</p>
Since 2006 it has been managed by the water and sewage Boards of Jesus de Otoro (JAPOE)							

**Table 24. Honduras, Case: National Committee on Environmental Goods and Services (CONABISAH)**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2001	<p>Scale: National</p> <p>More than 90% of documented experiences of PES in Honduras are related to water resources</p> <p>Forest and soil conservation are set as priorities in the sustainable development of the country</p>	<p>Actors, consumers, administrators and facilitators are diverse: NGO, Central Government, Municipalities and Local Organizations</p> <p>The CONABISAH promotes a national scheme with local impacts</p> <p>Municipalities and Water Committees are the main beneficiaries and providers of environmental services in the country</p>	<p>Organization: CONABISAH is a political and coordinating entity, promoting the appreciation, negotiation and compensation of environmental goods and services; is a consultative and supportive entity to processes at different scales within the country. CONABISAH is not an executive entity</p>	<p>Legal framework: Different laws including the Forestry, Protected Areas and The Water Law consider environmental compensation; public policies in forestry and water consider compensation for water supply and use</p> <p>Institutional frame: A technical office of environmental goods and services was created within the Ministry of Environment</p>	<p>Cost: The Committee does not manage its own budget</p> <p>Sources: The actions promoted by the Committee are carried out by its members in their own organizations</p>	<p>Achievements: In 2007 a national strategy of environmental goods and services was prepared with the approval of the president of the country; compensation for environmental services was incorporated into national public policies through various mechanisms; civil society and local and national government are aware of the relevance of the issue</p> <p>Limitations: A constant search for new forms of financial support is required</p>	<p>Governance: The Mechanism is lead by the central Government with wide participation of local actors and the support of the international community</p> <p>Financial sustainability: The new forestry law considers some financial support for environmental services</p>

**Table 25. Honduras, Case: Public-private alliance, La Soledad River watershed, Valle de Angeles, Francisco Morazan**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2004.	<p>Area: 46,000 ha within the project; 1200 ha up to year 2010</p> <p>Scale: Local</p> <p>Uses: Domestic, agricultural irrigation, sugar industry, hydroelectric, biomass</p>	<p>Provider: 326 land owners in the upper basin; the number is expected to grow</p> <p>Consumers: Agricultural producers, the sugar industry, 45,000 domestic consumers of water</p> <p>Administrator: The watershed council</p> <p>Facilitator: INFOP and FUNDER, with support from CATIE and ASDI</p>	<p>Organization: There is a directory and a technical committee integrated by government organizations to administer the PES; a project coordinator operates the Mechanism</p> <p>Amount: A donation of US\$ 27,000 from FOCUENCAS, ASDI and CATIE, to start the project; compensation provided is US\$ 22.5/ha/year for protection; operational and maintenance costs of the project covered by The Watershed Council</p> <p>Responsibilities and activities: Providers carry out a comprehensive plan of action including natural resource conservation and production activities regulated by annual contracts with each community</p>	<p>Legal framework: Supported by various laws: Municipal, Environmental, Forestry, Land Use Planning, Civil Participation</p> <p>Institutional frame: Agreement for public-private cooperation between regional rural bank, Valle de Angeles Municipal district and the Watershed Council for the financing of the project; individual contract with each community</p>	<p>Cost: US\$ 40,240 is invested each year to carry out compensation and to make the Mechanism viable</p> <p>Sources: ASDI and CATIE made a unique donation of US\$ 27,000 (67%); rural bank US\$ 3240 (8%); Watershed Council US\$ 10,000 (25%); the Mechanism works with a system of reimbursable loans</p>	<p>Achievements: The Watershed Council, Communities, Municipality and agricultural producers work in coordination; part of the environmental cost of the use of water was incorporated; external support focused geographically in the catchment zone; funding is renewable;</p> <p>Improvement in the health indicators for better availability and quality of water; reduction in burned areas, increase in forest natural regeneration</p> <p>Limitations: Water consumers have not been involved; the water catchment zone needs to be legally declared as a negotiation tool with other municipal districts</p>	<p>Governance: Private-Public agreement managed by the Watershed Council and the Municipality with wide legal support; self environmental regulation for the communities; set an individual and collective code of behavior</p> <p>Financial sustainability: Promising since it does not depend on political will but rather on a collective communal interaction; does not require additional donations from external donors; it will grow as long as water consumers from neighboring municipal districts become incorporated</p>

**Table 26. Mexico, Case: Committee for natural resources of the upper Chinantla (CORENCHI), Papaloapan river, Oaxaca**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2004	<p>Area: 16,000 ha in the water catchment zone; 10,000 ha of forest with potential to be incorporated into PES and 5500 ha of secondary vegetation and coffee plantations with potential for Carbon projects</p> <p>Scale: Regional</p> <p>Uses: Domestic, hydroelectric, industrial (paper, sugar, beverages), agricultural irrigation</p>	<p>Provider: Six rural communities gathered at CORENCHI; 2000 people from the Chinanteca ethnic group</p> <p>Financial support: CONAFOR (Mexican Forest Service) finances the payment for the environmental service from forests in relation to water production</p> <p>Consumers: Six municipal districts with 265,000 inhabitants, industries, one hydroelectric facility and agricultural producers</p> <p>Facilitator: NGO Geoconservacion AC</p>	<p>Organization: CORENCHI is made up of various peasant organizations and is the entity that negotiates the implementation of conservation activities with the Government</p> <p>Amount: 3.1 million pesos annually during the last ten years (US\$ 225,000 per year); environmental compensation with monetary payments for 443.7 pesos/ha (US\$ 32 per ha); in the future it is hoped that payments will come from water consumers</p> <p>Responsibilities and activities: Community members carry out conservation practices in exchange for payments</p>	<p>Legal framework: Forestry law backs the Mechanism</p> <p>Institutional frame: CONAFOR, the Mexican Forest Service is financing the process</p>	<p>Cost: 10% of the subsidy is allocated for the operation of the Mechanism: 310,000 pesos per year (US\$ 22,500); 20% of the subsidy is devoted to conservation or community production projects; 70% to provide direct subsidies to poor families of the communities living in the water catchment zone</p> <p>Sources: The Mechanism is part of the Environmental Services Program of CONAFOR; payments from PES are allocated in a bank account to support negotiation efforts between providers and consumers of water; water consumers no longer make any environmental payments</p>	<p>Achievements: The Mechanism is based on comprehensive conception of the environmental value of forests and is the result of a long process of organization for local development through the sustainable use of natural resources that the central Government acknowledges and supports with funding</p> <p>Limitations: Financial support comes entirely from the central Government and International Cooperation; the willingness to pay of water consumers is uncertain</p>	<p>Governance: To be sustainable in the long-term a commitment is required from water consumers to pay for the environmental service of forests</p> <p>Financial sustainability: Uncertain when the Government subsidy finishes</p>

**Table 27. Nicaragua, Case: PES, Public-Private Alliance, Gil Gonzalez river basin, municipal district of Belen, Rivas**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2007 Initial phase finishes in 2009	Area: 800 ha in the whole project; 104 ha up to 2008  Scale: Local  Uses: Domestic, agricultural irrigation, sugar industry	Provider: 29 agricultural producers owning lands in the upper basin; it is expected that the number will increase in the near future  Consumers: Agricultural producers, sugar industry from the south (CASUR), incorporated to PES; other consumers not incorporated yet into the Mechanism: three Municipalities, other agricultural producers  Administrator: Belen Municipal District and CASUR in a joint decision designated a project coordinator; supporters of the Mechanism: INAFOR, INTA, AMUR  Facilitator: German cooperation agencies (GTZ and DED)	Organization: A directory and a technical committee have been set up to administer the PES; a project coordinator is in charge of the implementation  Amount: Donation from the German cooperation for the start of the project was US\$ 21,000 (allows compensation of US\$ 35 ha/year for protection; operational and maintenance costs covered by CASUR.  Responsibilities and activities: Providers carry out reforestation and protection of forests and in the future soil conservation of the upper basin, all regulated by individual contracts with each producer	Legal framework: Supported by various laws including the municipal, environmental and national water laws  Institutional frame: Public-private agreement for cooperation between CASUR, Belen Municipal District and the German Cooperation (GTZ and DED) for the finance of the project	Cost: US\$ 113,000 has been invested to compensate producers and activate the operation of the Mechanism  Sources: German Cooperation US\$ 56,000 (49%); Sugar Industry US\$ 44,900 (43%); Belen Municipal District US\$ 11,900 (11%); providers of the WES US\$ 900 (1%); the amounts include monetary donations, in-kind training and technical assistance	Achievements: - Belen Municipal District and CASUR are working in coordination and both have incorporated the environmental cost of water to make compensation; external support effectively provided; service incorporated and benefiting	Governance: Public-Private agreement, signed and administered by the Municipality, supported by the law of Municipalities; Directory with representation of providers, consumers and administrators; Technical committee is providing training and supporting the monitoring of projects  Financial sustainability: Promising as long as the Municipality and CASUR maintain their commitment; two more years are needed to consolidate the Mechanism to make unnecessary the external support; incorporation of other water consumers is needed

**Table 28. Nicaragua, Case: Environmental fund for protection and conservation, La Golondrina watershed, Blanco River, Matagalpa**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2003	<p>Area: 1527 ha of the micro basin La Golondrina; 931 ha area for protection and reforestation with PES</p> <p>Scale: Local</p> <p>Uses: Domestic use</p>	<p>Provider: 13 agricultural producers owning the land in the upper basin; compensation is starting with four of them</p> <p>Consumers: 2667 families, mainly from the Rio Blanco urban area</p> <p>Administrator: Municipal Water Company of Rio Blanco (EMARB)</p> <p>Facilitator: Dutch Cooperation Agency; NGO Fundenic and the PASOLAC Program</p>	<p>Organization: Consumers pay an additional 10% for their water fee to feed an environmental fund account; the Fund has accumulated US\$ 21,000</p> <p>Amount: Compensation per hectare is calculated by activity for the protection area; compensation is not implemented yet; amounts of the compensation in US\$ per ha/activity:</p> <ul style="list-style-type: none"> <li>Riparian forests = US\$ 36.00</li> <li>Agroforestry or silvopastoral systems = US\$ 27.00</li> <li>Reforestation and natural regeneration = US\$ 18.00</li> <li>Soil covering crops = US\$ 9.00.</li> </ul> <p>Responsibilities and activities: Contracts are not in place with providers of WES; providers that receive compensation will be subject to verification</p>	<p>Legal framework: Municipality's law and general national water law</p> <p>Institutional frame: Rio Blanco Municipal water company administers the fund; an administrative council for the Mechanism was created with the participation of civil society; the Mechanism is socially accepted</p>	<p>Cost: Includes the administering of funds, promotion, river water measurements and negotiation with producers; it is calculated at US\$ 500/month equaling US \$6000 per year)</p> <p>Sources: The PES fund was created with a donation from PASOLAC and then increased by a 10% increment by the water canon; the operative cost has been taken on by the Municipality</p>	<p>Achievements: Willingness to pay by water consumers for environmental compensation; formalization of the PES by a board of directors with the participation of the Municipality, civil society and producers</p> <p>Limitations: There is no control on the quantity of water consumed by consumers individually, the fund needs to continue to grow to be sustainable since consumers paid until 2008; poor coordination among the organizations for the administration of the process</p>	<p>Governance: PES is administered by the Municipal water company as an autonomous entity governed by a board of directors with the participation of the Municipality, civil society and producers</p> <p>Financial sustainability: Promising; the fund for PES has been growing; however it requires a substantial increase to be viable in the long term; payments based on the amounts of water consumed are expected to be the main source of funding in the future</p>

**Table 29. Nicaragua, Case: PES, Micro basin El Mal Paso, El Regadio, Esteli**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2000  The current stage finished in March of 2009	Area: 2665 ha  Scale: Local  Uses: Domestic, agriculture; industry	Provider: 63 land owner producers in the upper micro basin  Consumers: Dwellers of El Regadio; tobacco industry; agricultural producers  Administrator: CAPS El Regadio, Esteli Municipal District  Facilitator: Institute for Rural Development (IDR-BID), CRS, MARENA-PRODEP, FIDER	Organization: Esteli Municipal District implemented, through the IDR Project, compensation measures to providers via financing productive conservation activities, including protection of water sources, preparation of forest protection plans, training and legal advisory to water committees  Amount: For El Regadio, an amount of US\$ 175,000 was allocated for a period of two years  Responsibilities and activities: Improve agricultural practices mitigating and reducing polluting activities	Legal framework: Municipal law, water law, environmental law  Institutional frame: Cooperation with Esteli Municipal District; individual contracts with providers	Cost: Total Capital= US\$ 175,000  Sources: <ul style="list-style-type: none"> <li>IDR (BID) = US\$ 317,052.45;</li> <li>CRS = US\$ 10,552.25;</li> <li>MARENA-PRODEP = US\$ 10,000;</li> <li>FIDER= US\$ 1000</li> </ul>	Achievements: Providers satisfied with the Mechanism; CAPS El Regadio willing to increase the charges to water consumers to strengthen the environmental fund; Formalization of the municipal fund within the Esteli Municipal District  Limitations: Finishing of the project; Extra funds needed to continue with assessment of consumption and valuation of water resources	Governance: Bilateral agreements between CAPS and service providers  Financial sustainability: Uncertain since the process is not consolidated

**Table 30. Cuba: Case of the Comprehensive Forestry Farms, Cauto River, Granma**

Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 1998	<p>Area: 18,370 ha of forest land; 66,000 ha are also protected within the municipal district</p> <p>Scale: Local</p> <p>Uses: Domestic, agricultural irrigation, industry</p>	<p>Provider: Central Government through the Forestry Farms</p> <p>Consumers: 47,891 inhabitants, social entities of the municipal district, 11 communities, two sugar industry companies, one animal production company, one fishery, one rice agro-industry and 38 cooperatives</p> <p>Administrator: Municipal entity of water resources</p> <p>Facilitator: Commission for reforestation and watersheds</p>	<p>Organization: The National Forest Service provides funding for projects in each Forestry Farm based on annual plans</p> <p>Amount: 3.4 million pesos as an annual average for the municipal district</p> <p>Responsibilities and activities: The Forestry Farmer carries out duties including protection of riparian forests and conservation of forest stands outside the riparian corridors</p>	<p>Legal framework: The Forest Law created the Fund for forestry development –FONADEF- that allows the payment of promotional activities, silvicultural management and forest protection; additional water and environmental laws support the Mechanism</p> <p>Institutional frame: The Forest Service provides authorization for implementing the management plans for forested areas; the Governmental entity for Water Resources regulates water use</p>	<p>Cost: Information not available; all the costs of the Mechanism are covered by the central Government</p> <p>Sources: National budget through FONADEF</p>	<p>Achievements: The protection of the banks of the Cauto River through restoration of forest cover; people in the area are more aware of the ecological and economic value of riparian forests</p> <p>Limitations: Total dependence on Government financial support</p>	<p>Governance: Municipal Government with the support of the central Government</p> <p>Financial sustainability: Feasible as long as the central Government continues providing financial support</p>

**Table 31 . Dominican Republic: Case PES in the upper basin of Yaque del Norte River.**

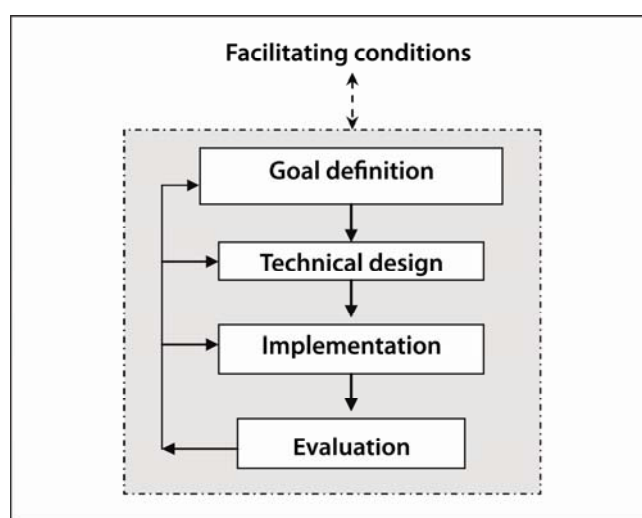
Time in operation	Forested area of the case; scale; and uses of the water	Participants (provider(s) of the service, consumers, administrator, facilitator)	Organization; amount of the compensation; and responsibilities and activities	National legal and institutional framework	Cost of the Mechanism and sources of funding	Achievements and limitations of the Mechanism	Sustainability of the Mechanism
Since 2008	<p><b>Area:</b> The whole watershed covers 5400 sq km; the initial stage will cover the upper basin, an area of 802 sq km</p> <p><b>Scale:</b> Regional</p> <p><b>Uses:</b> Domestic, hydroelectric, agricultural irrigation, industrial, tourism and recreational</p>	<p><b>Provider:</b> Private land owners in the upper basin</p> <p><b>Consumers:</b> Hydroelectric companies, domestic and industrial consumers, agricultural producers and tourist facilities</p> <p><b>Administrator:</b> SEMARENA (National environmental fund and Ministry of Environment)</p> <p><b>Facilitator:</b> German Cooperation Agency (GTZ) and Center for Agriculture and Forestry Development (CEDAF)</p>	<p><b>Organization:</b> Providers do the paperwork to participate in the Program; based on a combination of environmental and social criteria, the Program make contracts according to the type of payment</p> <p><b>Amount:</b> (US\$/ha). Types of payment: - Protection: 250 - Reforestation for conservation: 387 - Reforestation through productive plantations: 369 - Agroforestry systems: 100</p> <p>Payments are made in recognition of the environmental service for water supply</p> <p>Responsibilities and activities: Protection: contracts for five years period. Payments are made each year; reforestation: contract for five years; agroforestry systems: planting of trees on shaded coffee plantations</p>	<p><b>Legal framework:</b> Protected Areas Law and Environment Law</p> <p><b>Institutional frame:</b> The PES is managed by the central Government through a board of directors and a technical committee with representatives of the three organizations that support the Mechanism: SEMARENA, CORAASAN and EGEHID; an executing unit carries out the activities</p>	<p><b>Cost:</b> The Electric Company provides US\$ 169,000 annually for an initial period of four years</p> <p><b>Sources:</b> The initiative is financed only by the Electric Company (EGEHID) for a four year period; in the future it is expected that there will be a charge for PES to water consumers for domestic and agricultural uses</p>	<p><b>Achievements:</b> Action plan formulated with the participation of 34 organizations; the board of directors and the technical committee are established and operating; a manual has been prepared; rapid rural assessments have been completed; intervention areas have been defined</p> <p><b>Limitations:</b> Lack of a specific Legal framework for PES; financial source is not secured; a unique funds provider; poor involvement of locals in the development of actions (Municipalities and others)</p>	<p><b>Governance:</b> Three government organizations coordinate the project through an executing unit</p> <p><b>Financial sustainability:</b> The delineation of a financial strategy is needed in order to create a source of permanent funding to make compensation in the long term possible; other water consumers must be incorporated into the Mechanism</p>

#### Annex 4. Guidelines for the design and implementation of compensation mechanisms

Based on the analysis of the case studies and the discussions from the Regional Workshop, in this section a series of principles are discussed in order to provide a guide to the design process, implementation and evaluation of compensation mechanisms for the WES from forests. A key element of this proposal is its dynamic and adaptive nature.

The principle proposal<sup>5</sup> includes the definition of goals, the technical design of the mechanism, its implementation, and finally, the evaluation of the achievements of the proposed objectives as well as the identification of unforeseen outcomes. It is emphasized that in any case, these principles should be taken as a recipe that must be followed to assure the sustainability of the initiatives. In another regard, the described process is not necessarily a sequence, and additionally is influenced by a series of facilitating elements from the socioeconomic, political and legal environment. Figure 1 summarizes the essential principles of the proposal.

**Graph 3. Process for adaptive design and implementation of Compensation mechanisms**



i. **Facilitating conditions:** there are a series of external factors that produce favorable or restricting conditions for the development of compensation initiatives. These conditions might affect the sustainability of the compensation mechanism in several of the stages of its development, and are the outcomes of decisions made by Central Governments, which implies that, even though they are not directly responsible for the development of the compensation mechanism, they truly have the possibility of producing the necessary conditions for its sustainability. Some key facilitating elements —already discussed previously— are the political continuity and will, the security of the property rights and the existence of public policies and a complementary legal framework.

ii. **Definition of goals:** this component must answer some basic questions: (i) what is the problem we face?; (ii) what might be the expected outcome?; (iii) why is the compensation mechanism considered the most suitable tool for the specific context of analysis?; (iv) where and when is the implementation expected? and (v)

<sup>5</sup> This proposal builds on and expands previous proposals for the development of PES schemes outlined by Campos, JJ; Alpizar, F; Madrigal, R; Louman, B. (2006). Enfoque integral para esquemas de pago por servicios ecosistémicos forestales. Segundo Congreso Latinoamericano IUFRO-LAT. 26 pp. and Alpizar, F; Madrigal, R. (2007). «Bienes y servicios ecosistémicos en América Latina y el Caribe: buenas prácticas, mecanismos de financiamiento y rol del Estado», Banco Interamericano de Desarrollo (BID), 161 pp.

what will the impact be of the scheme on poverty and wealth redistribution in general? Despite the importance of goal formulation, unfortunately, few of the initiatives analyzed in this document were able to explicitly display their goals. That makes it difficult to verify the achievement of goals and, in general, the evaluation of the mechanism.

iii. **Technical design:** The technical design of the mechanism is an important component of the case studies analyzed. The design includes the definition of collection and payment amounts, and the selection of priority areas for intervention. The suggested methodology to define such aspects must be comprehensive, and will require biophysical, social and economic information. It is important to emphasize that the following principles are intended for the design of compensation mechanisms at different levels, from national to local. However, it is important to keep in mind the need for balance between strict technical criteria and the associated costs. In many local initiatives in small rural areas where there is little heterogeneity of actors, technical requirements are usually unnecessary and expensive for such scale. As we move towards broader scales with a higher diversity of actors, the technical criteria in support of the mechanism tend to become necessary conditions for building credibility in the initiative. Some of the key elements of the technical design are:

- **Biophysical component:** One of the pillars upon which the compensation mechanisms are built is the link between forest conservation or restoration and the provision of water. This relationship must be established as clearly as possible to allow the definition of who the providers are and which activities they must carry out. It is also important to define clearly who the beneficiaries are in the implementation of these activities.

Two main questions must be asked: where to intervene? and, What to do on these sites? The first question is related to the definition of criteria to select priority areas, such as water catchment zones. Unfortunately, only 11 out of the 27 studied initiatives has carried out this kind of assessment, which might reduce the impact of forest conservation investments on the water supply. The second question is related to the decision about what type of land uses must be included, based on restoration needs. The answers to those questions will provide a clear idea about the spatial dimension of the mechanism, and also are intended to provide support for why beneficiaries should devote resources to protection/restoration activities in these areas.

- **Estimation of costs:** The estimation of costs is directly associated with the biophysical component mentioned earlier. In essence, it is necessary to determine the associated costs of conservation and restoration in identified priority areas. In many cases a combination of economic valuation methods will be needed to measure the related costs. At the same time, it is necessary to describe the potential providers located in these sites, in accordance with the type and profitability of their productive activity, nature of the property rights (private, communal, etc.), size of the family land available and any other type of information that may help understanding the motivation and decision making of the producer with regards to the land.
- **Demand component:** The existence of a measurable demand for the WES is essential for the financial sustainability of the compensation mechanism. Only when funding is secure, might it be possible to make a final determination about the temporal and spatial scale for the mechanism. Therefore, these scales are defined by the biophysical conditions and the availability of financial resources.

This component must perform two interconnected tasks. First, potential beneficiaries need to be identified. Second, it is necessary to determine how much they are willing to pay for the service.<sup>6</sup> In this phase of the design a fund raising strategy must be

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<sup>6</sup> The poverty of potential beneficiaries could make payments very low, which might influence the spatial and temporal scale of the mechanism and, eventually lead to needing to seek financial alternatives.

begun and revised frequently. Ultimately, effective participation of beneficiaries must increase for the financing of the mechanism to be viable. Some of the key elements of this strategy are: (i) to demonstrate benefits based on the type of user (i.e., households will be interested in quality and availability of water, companies will require demonstration that it would be good for business by reducing operation costs and improving public image, or it might be included as a form of corporate social responsibility) and (ii) to diversify and supplement the sources of income. The combination of voluntary and mandatory contributions and the search of additional funding (for example REDD) for the provision of other ES must be an ongoing task. It is important to mention that this strategy assumes that the intermediary or administrative entity of the initiative has sufficient bargaining power (technical and logistical) and leadership to carry out such a process.

- Operative component: In this case, an administrative or intermediary entity between providers and consumers must be proposed for the WES. In its most simple form, this operator would be responsible for coordination and leadership, transferring funds between beneficiaries and providers, and minimizing associated costs of the operations, controls and monitoring. Transparency of administration is a necessary condition for building credibility in the collection and payment mechanism. It is important to note that in many cases, especially in small towns in Central America, is not necessary to hire new personnel for these tasks but rather assign new duties as part of the environmental units of the Municipalities with some training on the subject.

Furthermore, the existing level of organization in the area is another variable to consider, because if producers are well organized or the Municipality has sufficient capacity, the implementation of the compensation scheme might require lower transaction costs in terms of the creation of specific organizations for the administration of the scheme.

iv. **Implementation:** The experience of the analyzed initiatives allows us to affirm that the implementation should be conceptualized as a gradual process and, in many cases, be essentially pragmatic. This should not seem contradictory in light of the effort made during the technical design phase, but it must be understood that the development of these initiatives is an adaptive management process, profoundly related to the prevailing social, economic and political environment.

The process of gradual and adaptive implementation is essential to improving the management capacities of local actors. Thus, a relatively high participation of external actors (NGOs, universities, international cooperation, and central government, among others) might produce a higher level of local ownership. Similarly, this process can help increase the credibility of the initiative, but must necessarily include strategies for dissemination of results and general raising of awareness among the stakeholder community.

v. **Evaluation:** The dynamic and adaptive nature of the management process of the compensation mechanisms requires a rigorous evaluation of the goals set at the beginning of the process. Also, this assessment should be viewed as a continuous process of feedback, to strengthen the positive aspects and to correct in cases where results do not match up with expectations.

To carry out this task systematically and transparently, it is necessary to have a baseline and a set of indicators to evaluate processes and outcomes. That is not an easy task, largely due to the complexity associated with the quantification of WES and how specific actions affect provision of water. However, some basic indicators on water availability and quality, number of hectares under protection, and number and characteristics of the providers should be part of the essential inputs into this process.

