

Payments for Environmental Services, Forest Conservation and Climate Change Livelihoods in the REDD?

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5. The livelihood impacts of incentive payments for watershed management in Cidanau watershed, West Java, Indonesia

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INTRODUCTION

Payment for environmental services (PES) is now quite a well recognized approach in Asia. Interest and investment from international donors has enabled the testing of different PES mechanisms over the last decade, particularly those focusing on watershed protection and carbon sequestration. With the exception of China and Vietnam, where the schemes are state-run, schemes in Asia are generally small-scale, community-level projects.

The case study presented in this chapter is located in Cidanau, Indonesia. The Cidanau watershed is one of the most important watersheds supplying the domestic and industrial water needs of Banten Province, Java Island, Indonesia. The watershed covers 22 260 ha located between two regencies: Serang and Padeklang, and their six sub-districts. The Cidanau watershed also has a special role in biodiversity protection. In the base of the bowl-shaped Cidanau watershed lies the Rawa Danau Reserve – a 4200 ha nature reserve, which contains the only remaining lowland swamp forest in Java and has 131 endemic species. The reserve is important in the hydrological process, too, as the reservoir for the Cidanau River and its tributaries, which then flow into the Sunda Strait.

The Cidanau project was initiated by a multi-stakeholder watershed forum – *Forum Komunikasi DAS Cidanau* (FKDC)¹ and facilitated by the *Rekonvasi Bumi* and the Institute for Social and Economic Research, Education & Information – both Indonesian non-government organizations (NGOs). In the beginning, the aim of the PES scheme was to slow down the environmental degradation of the Rawa Danau Reserve and the watershed around it. The PES scheme in Cidanau officially started in

Table 5.1 The sample of FGD participants

Village	Participating households	Proportion of total participating households (%)	Non-participant households	Proportion of total non-participating households (%)	Total households in each village
Cikumbuen	32	100	30	18	203
Citaman	43	100	30	18	210
Kadu Agung	38	100	30	8	414
Total	113		90		

2004 when a state-owned water company – the *Krakatau Tirta Industri* – and the FKDC, representing the upstream farmers, signed a contract to conserve the watershed.

This chapter describes the process of initiating the PES scheme and its design, and reviews the impacts of the 5-year scheme on local livelihoods. We assessed these impacts through a series of focus group discussions with the participants and non-participants and interviews with implementing agencies.

Methods to Assess the Impacts of the PES Scheme

We collected qualitative data from three villages in the Cidanau Watershed (Citaman, Cikumbuen and Kadu Agung). In each village, we held two focus group discussions (FGDs) for participants and two FGDs for non-participants. All the PES participants joined the discussion and, for the non-participants, we contacted village leaders who organized available household representatives to join the FGDs. The non-participants comprised 30 households from each village. In total, the FGDs involved 113 participants and 90 non-participants (Table 5.1).

The facilitators guided the FGDs through a series of questions on the impact of PES by comparing three time-periods: 1998–2000 (2000 was a landmark year, remembered by communities because it marked the beginning of political reforms and an economic crisis), the years between 2000 and 2004, and after signing a PES contract (2005 to the present). The livelihood impacts were discussed in terms of the five asset types covered in the Sustainable Livelihood Framework: financial, human, social, physical and natural. For each asset category, we asked the participants as a group to identify relevant impacts (Table 5.2), and collectively to rank them according to their relative importance. For example, under financial assets,

Table 5.2 The livelihood issues discussed in focus groups

Capital	Type of information discussed
Financial	Sources of income over the three periods
Human	What (if any) capacity/skills/knowledge were gained through the scheme?
Social	What was the nature and degree of trust with other stakeholders during the three periods? What norms or standards of behaviour did the community set itself in connection with the scheme (e.g. sanctions, etc.)? What were the community's networks like during the three periods?
Natural	What benefits did they gain from the watershed and its protection?
Physical	Had any investments been made as a result of the scheme (e.g. infrastructure)?

groups listed all sources of income during each era. The ten most important sources were then ranked, and paper dots were used by the facilitators to describe the relative percentage that each income source contributed to overall household incomes. Some impacts, such as trust and social capital, required further discussion to clarify their meaning.

In addition to the FGDs, a 1-day workshop was held involving FKDC members, local government and the Krakatau Tirta Industry company. We followed this up with some informal interviews to clarify any conflicting or unclear data from the workshop. In analysing livelihood impacts, the data are limited to the results from the FGDs and stakeholder interviews, as there has been no detailed quantitative analysis, so far, of household-level livelihood impacts in Cidanau.

THE DESIGN OF THE PES SCHEME

The Environmental Problems in Cidanau

The Cidanau watershed has been experiencing rapid change in land cover for almost two decades as forest is converted for agriculture due to population increase and a high dependence on farming.² The number of people living and farming illegally in the upstream protected area increased from around 600 in the late 1990s to an estimated 1500 in 2007. This period has also seen the conversion of conservation forest to rice fields and other

crops. In addition, the Rawa Danau Reserve has experienced intensive encroachment and associated decreases in flora and fauna diversity. In 2000, about 20 per cent of the Rawa Danau natural reserve area had been encroached upon (Darmawan et al. 2005).

As noted earlier, this conversion of forest to farming land combined with unsustainable farming practices degrade the environmental services (ES) provided by the Cidanau watershed. The Cidanau watershed is the only water supply for the Cilegon housing and industrial area as well as for approximately 100 industries that operate around it. The main problems experienced by the water consumers (the ES beneficiaries) of the Cidanau watershed are shortage of water in the dry season and water quality degradation due to pollution and high sedimentation (Adi 2003; Munawir and Vermeulen 2007; Budhi et al. 2008).

Fluctuating water flow and water quality are the most important problems in Cidanau. The average discharge is 12.5m³/s, fluctuating from an annual minimum of 1.2m³/s in the dry season (August) to an annual maximum of 44m³/s in the rainy season (January) (Adi 2003). In addition to the fluctuating water flow problem, intensive use of fertilizer and agricultural chemicals and the process of burning paddy husk reduce the quality of Cidanau's water. Remote sensing observation indicates that about 71 per cent of the watershed is prone to degradation, with the rate of erosion above 35 tonnes/hectare/year (Adi 2003). The sedimentation narrows water channels, swallows reservoirs and contributes to the reduction of water supply and quality from the Cidanau catchment.

PES as One Initiative to Rehabilitate the Cidanau Watershed

The numerous efforts that have been made to overcome the watershed problems in the Cidanau have had limited success. These include a transmigration programme for the communities living in the Rawa Danau area, reforestation, and land rehabilitation activities. Key issues in the failure of past efforts included a lack of consultation and joint planning between key stakeholders and a lack of attention to social outcomes.

The failures of these previous efforts at watershed management triggered a group of people concerned about the degradation of Rawa Danau to establish the FKDC in 1998. The forum tried to increase awareness among the public and within local government about environmental problems and integrated watershed management by conducting seminars and discussions. This forum received recognition from the newly established Banten provincial government³ and gained legal status through a Governor's Decree in 2002.

The concept of payment for watershed services in Cidanau was

Table 5.3 The stakeholders involved in the PES scheme

Role	Stakeholders
ES Providers	Four upstream farmer Groups from Cidanau (Citaman, Cibojong, Kadu Agung villages)
ES Buyers	Current single buyer: PT KTI Potential buyers: other companies in Cilegon such as PDAM (state-owned water company), Krakatau Steel, Ronn & Hass, PT Pelindo, PT Politrima, Chandra Asri, Bakrie Group
ES Intermediaries	Forum Komunikasi Cidanau (FKDC) – a multi stakeholder forum
Policy makers	District government and legislative officers of Serang (upstream) and Cilegon (downstream) Provincial government and legislative officers of Banten National watershed management body coordinated by the Ministry of Forestry
Main supporting NGOs	Rekonvasi Bhumi, LP3ES
Main supporting university	Bogor Agricultural University
Main supporting international agencies	World Agroforestry Centre, International Institute for Environment and Development, GTZ

introduced by international organizations, such as *Deutsche Gesellschaft für Technische Zusammenarbeit* (German Technical Cooperation, GTZ), the World Agroforestry Centre and the International Institute for Environment and Development in 2002. A member of *Rekonvasi Bhumi* (a local NGO) visited Costa Rica to see the implementation of a PES programme funded by GTZ. The conditionality aspect, the involvement of multiple stakeholders in watershed management and the innovative nature of the Costa Rican PES scheme stimulated interest to trial such a scheme in Cidanau. In 2004, the FKDC invited the PT Krakatau Tirta Industry (PT KTI) to join this scheme and started facilitating negotiations between private land-owners in the upper watershed and the company.

The Stakeholders, their Roles and Responsibilities

The PES scheme involves many stakeholders, including farmer groups, downstream companies, government officers from district, provincial and national levels, supporting NGOs and universities (Table 5.3).

Table 5.4 *Farmers involved in the PES scheme*

Village	Number of farmers	Starting year
Cikumbuen	32	2007
Citaman	43	2005
Kadu Agung	38	2007
Cibojong	29	2005 (ended after 2 years)
Total	142	

The sellers of the environmental service

In total, 142 farmers were involved in the PES scheme: 43 from Citaman, 29 from Cibojong, 38 farmers in Kadu Agung and 32 in Cikumbuen (Table 5.4). Participating villages were selected according to the mapping of critical land by the local government (for example, steep slopes and erosion-prone soil) and participating farmers at each village were selected by considering their involvement in farmer groups and private ownership. Aside from land ownership, no other socioeconomic criteria were considered, as the intermediary felt that there was relatively equal wealth distribution and landownership rates among the communities, with the typical land of each household being between 0.2 and 0.5 ha.

The buyer of the environmental service

KTI – the only authorized company managing water from the Cidanau watershed – is the only buyer in the current PES scheme. The water from upstream flows through a 28 km pipe to the water treatment reservoir. KTI initially used this clean water for its steel industry operations. Recently, this company has also been supplying about 80 per cent of the water needs of 120 companies at Cilegon, such as PDAM (a state-owned company that supplies drinking water, which purchases the water at a subsidized price), and Indonesia Power Company, which supplies electricity to Java and Bali. This highlights the importance of the Cidanau watershed for industrial activities. KTI clarified that the initial source of funds for the PES scheme came from the operational budget of the company, and PES funding was drawn from corporate social responsibility funds.⁴ The company's staff remarked that the motivation for engagement in PES was to support conservation efforts in the Cidanau watershed, rather than securing access to clean water for the production process. The company's staff mentioned that the government was the one responsible for the maintenance of the constant flow of water.

The intermediary for the environmental service

FKDC's role in the PES scheme is to manage funds, to facilitate contracts with farmer groups, and to monitor and verify rehabilitation activities. Its additional role is to raise awareness of payment for environmental services amongst other potential buyers in the Cilegon industrial area. FKDC added an *ad hoc* team within its structure in 2005 specifically to facilitate the scheme. This *ad hoc* team consists of representatives of government institutions at the provincial and regency levels in the Cidanau watershed area and an NGO.

This team plays an intermediary role by: (1) managing the payment of PES funds from the buyer to the farmers for their rehabilitation and conservation activities; (2) supporting planting activities on private farms involved in the PES project; (3) encouraging other potential buyers to join the scheme; and (4) advocating the integration of the PES scheme in the provincial and district governments' environmental management policy.

Setting the Price for the Environmental Service

The price-setting process in Cidanau was based on negotiations between the buyer (KTI), the intermediary (FKDC) and the sellers (farmer groups). The agreed price was formalized in a Memorandum of Agreement between KTI and FKDC (represented by the Governor of Banten Province). After this agreement, the chairperson of the FKDC *Ad Hoc* team and farmers' groups from Citaman and Cibojong made another agreement covering a total land area in two villages of 50 ha. In 2007, the other two villages (Kadu Agung and Cikumbuen) joined the initiative, each with 25 ha.

The annual rate set in the contract between the KTI and the FKDC was US\$350⁵ per hectare based on input costs, calculated according to funding levels provided in government tree-planting programmes (land preparation, ground cover, seedlings, transport, fertilizers and labour) on state lands. The market value was established by referring to the cost per hectare of the national forest rehabilitation programme (GERHAN) coordinated by the national government. KTI agreed to make three payments within 5 years, and were subject to a 6 per cent tax. The total payment of the KTI to the FKDC was US\$35 000 for Phase 1: 2005–07 and US\$40 000 for the following Phase 2: 2007–09. The payment for the fifth year was to be renegotiated.

The *Ad Hoc* Team initially offered farmers annual payments of US\$75 per ha. The annual payments were agreed at US\$120 per ha, provided that 500 trees per ha were planted and plantings maintained. The FKDC scaled down the payment to farmers in order to cover all the five-year payments with the available four-year funds from KTI – or, in other words, to provide a buffer

Table 5.5 Actual allocation of revenues by the FKDC in the first four years*

Allocation	US\$	Proportion of total payments made (%)
Payments to farmers	60 000	80
Transaction cost	10 500	14
<ul style="list-style-type: none"> ● 40% for conducting capacity building and searching more buyers (dissemination, publication, seminars, etc.) ● 27% for monitoring and verifying field activities ● 33% for operational cost: <ul style="list-style-type: none"> – 16% for paying personnel costs – 11% for organizing meetings – 6% for administration 		
Tax	4 500	6
Total	75 000*	100

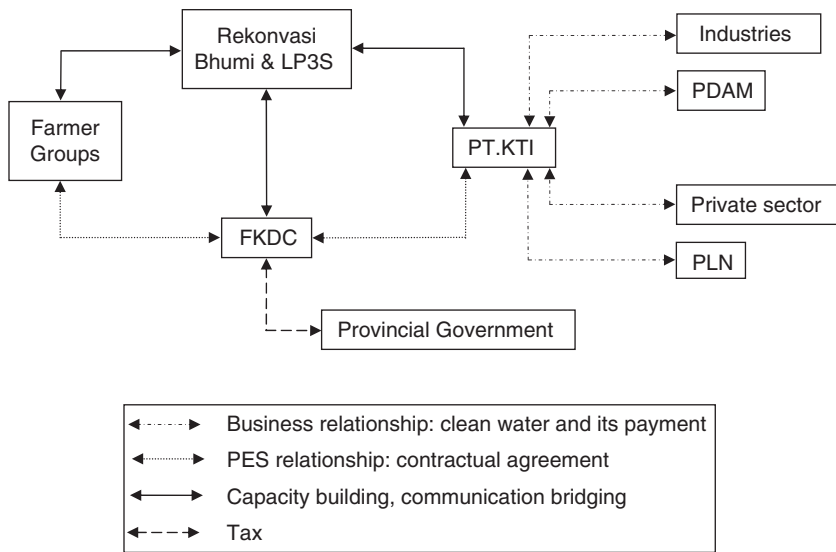
Note: * This amount is the payment from KTI for Phase 1 and Phase 2 (4 years). KTI still has to transfer the remaining funds for the fifth year, as much as \$US100 000, which is contingent on current performance. The total commitment should be \$US175 000 (100 ha × \$US350 per ha × 5 years).

in case KTI did not meet its obligations. They took this risk-management action because they still have to negotiate the fifth-year payment in 2011. From the interview with the FKDC members, they plan either to involve new farmer groups in other villages or to extend the contract with the current farmers if the KTI disburses its third payment in 2011.

Payment Allocation

Since it had a key role in the agreement and disbursement of payments to farmer groups, FKDC took responsibility for managing many of the transaction costs for buyers (Table 5.5). FKDC members estimated that the transaction cost was around 14 per cent of the annual payment, including the costs of capacity-building activities, searching and contacting new buyers, information dissemination, and monitoring and verifying performance of agreements in the field.

Farmers used about 95 per cent of their initial payment to buy seedlings, plant and maintain the trees, and were left with around 5 per cent to spend on their own priorities, including investment in local business in their first



Notes: FKDC – Forum Komunikasi DAS Cidanau (Communication Forum of Cidanau Watershed); PDAM – state-owned drinking water company; PLN – state-owned electricity company.

Source: Adapted from Budhi et al. 2008.

Figure 5.1 The PES scheme relationship and flows of services

year. Interviews indicate that the operational costs for the second year were 50 per cent lower, and many farmers chose to invest the balance in their businesses.

The contract between the FKDC and the farmer groups in the four villages involves a yearly payment of US\$120 per ha for 5 years, subject to satisfactory implementation of the rehabilitation works activities, including planting and maintaining timber and fruit trees at a minimum of 500 trees per ha and no cutting during the contract period.

During the first year of the contract, 30 per cent is paid on the signing of the contract, 30 per cent is paid after six months of implementation and the remaining 40 per cent is paid at the end of the year. Subsequent annual payments of US\$120 per hectare are made for the next 4 years (40 per cent is disbursed in June and 60 per cent in December), subject to the satisfactory implementation of the rehabilitation works.

All members of the first two farmer groups received their first payment in May 2005. Three months later, the FKDC commenced monitoring and requested records of tree-planting on contracted lands. In Citaman,

the *Ad Hoc* team found that 0.5 ha was not being maintained as per the agreement because the owner left the village for a new job. However, since the other members of the farmer group had accomplished the minimum requirements of the contract, the *Ad Hoc* team did not disqualify the group. The group decided to manage the 0.5 ha of land and charged the owner the operational costs of managing this land under the contract. The contract is a collective one. If a farmer breaks the rules, the *Ad Hoc* team will terminate the contract of all the members. The collective contract was chosen over individual contracts because the team assumed that by applying the 'sharing responsibility principle',⁶ it could strengthen internal relationships and self-monitoring among group members.

Implementation Problems

A number of issues associated with the PES scheme were raised by FKDC members in focus group discussions.

First, the FKDC found it difficult to communicate the unique characteristics of an incentive-based mechanism to other stakeholders, such as local governments and buyers, because of their relative inexperience with the operation of such mechanisms. Buyers often viewed the scheme as adding another layer to their operational costs and have, in many cases, used corporate social responsibility funds to cover the ES payment (which means it is accounted for as a promotional rather than an operational cost). Second, lengthy negotiations were unavoidable given the number of stakeholders involved and because KTI was unwilling to pay the farmer groups directly. There were at least three stages of negotiation over 2 years. The first stage, to establish the main design elements, was between the *Rekonvasi Bumi* and the *Ad Hoc* team of FKDC and took a period of 8 months. The second negotiation period, to draft the contract, between the KTI and the *Ad Hoc* team lasted about 6 months. The third negotiation phase, to develop contracts for payment amounts and conditionality, was between the *Ad Hoc* Team and farmer groups in the villages of Citaman and Cibojong.

Third, FKDC members expected the communities to have a more active role in conserving the watershed rather than depending on the PES payment for any environmental conservation. There was confusion about whether any formal regulation by provincial government could play an important role in targeting more ES buyers as well as providing an enabling policy environment with strong political support. They stated that such regulations were needed, but did not have ideas about the contents of such regulations. Without the certainty of voluntary participation of additional buyers, FKDC was less able to encourage more sellers to engage in the scheme. Meanwhile, KTI demanded regulations obliging potential

buyers to participate in the PES, having assumed that such regulations would optimize the role of additional buyers in conserving the watershed.

After 2 years of implementation, the Cibojong village did not achieve the target stipulated in the contract and the contract was terminated. A farmer cut the trees on about 0.14 ha of land, reporting that the trees had been stolen (an investigation later found out that one of his family members had cut the trees to buy a motorcycle). Procedurally, a report should have been made to the FKDC, together with a letter from the police department guaranteeing that they would not breach the contract further. However, this was not done, and the members assumed that the contract had been cancelled. Villagers continued to cut trees on the PES-contracted lands, based on their assumption that the scheme would not provide them any further payment. An interview conducted by the FKDC with the members revealed that most would have preferred to remain in the scheme. Therefore, the cancelling of the contract would likely have been avoided if the group had advised the members of the correct procedure following the initial (illegal) cutting of the trees.

THE IMPACTS OF THE PES SCHEME

The Environment

A clear assessment of the environmental outcome of the scheme is not available yet. Although some data were presented earlier in this chapter on decreases in water quantity and quality in Cidanau, the actual link between the land-use practices used to promote watershed protection and water supply are unclear. Also the scale of the current PES scheme may have been limited in its environmental impact given the size of the watershed. The monitoring system for the scheme relied on the accomplishment of contractually agreed land-use practices as a proxy for environmental outcomes. FKDC members, particularly those from KTI, have visually observed that the water supply is relatively stable in 2008, but so far this has not been backed up by scientific evidence.

The Livelihoods of the Participants and Non-participants

Financial capital

According to FGDs, the communities in Cidanau earn their income from the tree-crops – *melinjo*,⁷ coconut, robusta coffee, durian and clove – which represent the top five income sources, and further planting of these tree crops was supported through the PES scheme. The FGDs did not indicate

Table 5.6 Household income sources

Source of income (%)	After PES (2005–now)		Before PES (2000–05)		Before PES (before 2000)	
	P	NP	P	NP	P	NP
<i>Melinjo</i>	27	28	23	32	15	17
Farming labour	15	15	0	8	0	13
Coconut	12	8	10	8	15	10
Clove	10	7	18	7	12	10
Coffee	10	10	15	10	17	18
Durian	7	3	13	8	23	12
<i>Salak</i> ^a	5	8	5	5	3	0
Wood	5	7	8	0	0	0
Payment for ES	3	0	0	0	0	0
Banana	2	2	3	3	3	12
Cocoa	2	0	0	0	0	0
<i>Petai</i> ^b	2	7	0	5	0	0
Cotton	2	0	3	2	5	2
<i>Jengkol</i> ^c	0	0	0	0	5	0
Paddy	0	0	0	0	0	2
Upland paddy	0	2	0	5	2	0
Others (clove labour, livestock labour, motorbike renting, construction labour, trader)	0	3	0	7	0	5

Notes: Totals may not add to 100 due to rounding.

P for participants and NP for non-participants.

^a *Salak* (*Salacca zalacca*) is a cultivated palm tree native to Indonesia and Malaysia. The fruit is also known as snake fruit because of its reddish-brown scaly skin. The pulp of the fruit is edible with a sweet and acidic taste.

^b *Petai* (*Parkia speciosa*) is a leguminous tree; its beans are an acquired taste and are combined with other strongly flavoured foods for traditional Asian dishes.

^c *Jengkol* (*Archidendron pauciflorum*) is also a leguminous tree. Similar to *petai*, the beans are frequently served as a vegetable salad or accompaniment to Indonesian dishes.

Source: Adapted from Budhi et al. 2008.

significant changes in income sources between the periods before 2000, 2000–2005 and after the introduction of the PES in 2005 for both participants and non-participants (Table 5.6). Tree species were selected on the basis of commodity prices and market demand to enable participants to build their productive base of valuable tree crops.

Most of the participants reported *melinjo* to be one of their main

income sources before and after the PES. The farmer groups in Citaman have also invested some of their PES income to develop a *melinjo* nursery, with training on processing *melinjo* into crackers from the Rekonvasi Bhumi. These value-adding activities might enable communities to gain a better return from *melinjo*. Some participants stated that wage labour from farming and other sectors, such as construction and business (for example, motorbike rental), also contributed more to their household incomes in recent years compared with agricultural products. The communities have become more dependent on labour income compared with income from agriculture because most of them have sold their lands, or only had small land areas to begin with, which could not fulfil their income needs from agriculture. In addition, the PES contract constrained the clearing of lands which participants owned, and respondents added that this gave them more time to undertake alternative work, such as paid labour.

The indications are that the PES contract in Cidanau did not have a major impact on the livelihood options pursued by communities because of their existing reliance on tree crops as a primary income source before the scheme commenced. Some participants did mention, however, that they had lost income from wood harvesting and wanted the option of continuing with tree thinning on their contracted gardens. The income from the wood harvest could be as high as US\$200 annually, around 60 per cent higher than the value of the PES contract. Wood harvesting had previously contributed an estimated 5 to 7 per cent of household income for both participants and non-participants. The discussion also recorded the use of some 40 types of commodities, including leaves, flowers and fruits that are locally marketable.

The annual PES income of US\$120 per hectare contributed only around 3 per cent to PES participants' household incomes. Only one group in Citaman regarded PES as a primary source of income. The rest considered PES income to be short term and not a primary livelihood source, although during the 4-year operation of the scheme the total payment might have exceeded their income from selling fruits. Around half of the participants assumed that the PES contract could increase the price of their land, although most non-participants did not consider it likely that the land price would rise as a result of the PES scheme. No transaction on land allocated to the PES scheme has occurred, therefore there is no information about the impact on the value of land.

The PES scheme has stimulated local business, mostly because of additional business development support from NGOs and government agencies involved in the PES scheme. The facilitating NGO *Rekonvasi Bhumi* (together with the Serang Service Office of Industry, Trade and

Cooperatives) has supported farmer groups with entrepreneurship and marketing training, and also gained advice on technical issues from the Environment Technology Agency (Munawir and Vermeulen 2007). Some areas of local business development have included the production and marketing of vegetable oil from *nilam* (*Pogostemon cablin*) and *melinjo* cracker production. FKDC members had observed that the PES scheme provided a locus for greater government support to the participating villages to: (1) establish a nursery of fruit trees; (2) develop local business for edible mushrooms in Citaman and Kadu Agung; and (3) establish a poultry project in Cikumbuen. They felt that the reputation of these villages had been raised due to their participation in the PES scheme.

Human capital

PES participants and non-participants attended occasional training conducted by the Agricultural Service and Forestry Service of the local government, dealing with coffee, *melinjo*, timber and fruit tree cultivation. However, the PES scheme had a particular impact on the capacity, skills and knowledge of participants (Table 5.7) because of their regular interaction with NGO staff and researchers. PES participants were more aware of environmental issues, such as the causes of erosion, land slides and downstream sedimentation, as well as management measures, such as erosion prevention, prevention of illegal cutting of trees, waste management, and the role of trees in water and soil conservation. However, only about 30 per cent of the participants and 17 per cent of the non-participants knew about the concept of PES and how the value of the contract could be calculated.

PES participants also reported improved capacity and skills in managing the farmers' organization, including networking to improve local business and to improve implementation of the PES scheme. This capacity-building occurred through interaction with the FKDC members.

As noted earlier, some participants observed that they had more available time and less activity on their lands due to restrictions on activities under the PES scheme. Because of this, PES participants and non-participants focus groups identified a need for training in alternative livelihoods, such as (1) raising livestock and poultry; (2) cultivating fruit and timber trees; (3) making fruit crackers, from *melinjo*, banana and cassava; (4) pest management; (5) establishing freshwater fish ponds; (6) apiary businesses; and (6) cultivating mushrooms. Women identified an interest in training in literacy, sewing and cooking. The FKDC members added that the communities also might need further training to strengthen their local institutions.

Interviews with the FKDC members indicated that their knowledge

Table 5.7 Type of knowledge/capacity/skills gained by participants and non-participants after the PES implementation

Type of knowledge/capacity/skills	Participant (%)	Non-participant (%)
Conservation		
Causes of erosion, land slides and downstream sedimentation	100	17
How to maintain clean water and to reduce air pollution	83	–
Roles of trees in conservation	67	–
Simple construction to prevent erosion	50	–
Understanding of PES concept	33	17
Institution and governance		
Ability to govern an organization	67	17
Ability to solve problems within farmer groups	67	–
Administration of farmer groups	50	17
Networking to improve local business and PES implementation	50	–
Transparent financial management	33	–
How to develop local business		
Livestock	33	17
Agriculture	17	–
Fishery	–	–

about PES issues increased, such as the principles of PES, how to design community-based forest management, how to strengthen local institutions, global issues such as global warming, the Clean Development Mechanism, and Reducing Emissions from Deforestation and forest Degradation.

Social capital

Aspects of social capital discussed in communities include behavioural norms within the community, reciprocity between community members, trust and the existence of internal and external networks, before and after the implementation of the PES scheme.

The focus groups with PES participants in Citaman revealed that they had written rules to guide members of their farmers' group towards meeting their collective obligations under the PES contract: if one member defaulted on the agreement, this would become the responsibility of the whole group. Sanctions would be imposed on such a member in the form of expulsion from the group. In other villages, there were no written rules, but people knew the rule that trees should not be cut in the contracted areas.

The sanction for cutting trees involved a police report, as well as informal social sanctions at the community level. The informal sanctions included exclusion from social gatherings. The participants also commented on rent-seeking by local government staff in relation to PES payments, that is, requesting part of the payment for contributing to village income.

All the participants that joined the focus groups knew about the written contract between their group and the FKDC, and that observing restrictions on cutting trees was necessary to receive payments, while cutting trees would lead to contract termination. Some participants observed that the local NGO, *Rekonvasi Bhumi*, used informal warnings as the first step if contract infringements occurred. (Farmers from Cibojong village, where the contract had been cancelled, were not participants in these focus groups.)

The PES contract brought opportunities for participating communities to interact more with other external stakeholders, which expanded the external networks of these communities to include: (1) researchers conducting studies on PES in Cidanau; (2) local NGOs who facilitated the PES contract; (3) the KTI as the buyers; (4) the FKDC as the intermediary; (5) other government agencies besides the Agriculture and Forestry Services, such as the Natural Resource Service. In contrast, non-participants only mentioned increased interaction with the local NGO and government agencies amongst their new contacts after PES.

The focus groups discussed issues of trust within the community and between community members and external stakeholders (Table 5.8). Trust was seen as the ability to receive and give assistance from people beyond the immediate household and relatives in case of shortness of money or food. Focus groups reported that trust amongst community members (both participants and non-participants) in Cidanau was relatively high, while the level of trust between community members and external stakeholders was lower. This is consistent with the observation that the four villages involved in the programme have a high degree of internal homogeneity. Most of them are Moslem and their wealth strata are almost equal, which may contribute to ease of interaction and trust.⁸ In Cidanau, communities usually participate in regular collective action events to produce public goods and services, such as maintaining roads, bridges, community buildings and water supply systems. These activities are an important aspect of rural social capital in Indonesia (Grootaert 1999). This also appears to be the case in Cidanau.

Some key persons, mostly group chairpersons and village elders, lead in negotiations with external stakeholders and gain access to more information than other participants. There were some signs of jealousy amongst non-participants about their exclusion from the PES scheme (which was

Table 5.8 Trust among internal and external stakeholders

Relationship	How trust is expressed
Amongst participants	Borrowing money and rice Sharing information Mortgaging (loans) Collective labour sharing
Participants and government	Making identification and family card Paying tax Receiving administrative information Getting cash assistance* Maintaining security
Participants and non-participants	Collective labour sharing Sharing information Borrowing money, rice, daily needs and construction materials
Participants and FKDC	Delivering the payments for accomplishing the contracts Sharing information Maintaining transparency in managing the funds of organizations
Participants and the state plantation company PERHUTANI	Giving seedlings Giving information Giving access to manage forest and plant ally-cropping on the area of PERHUTANI
Participants and NGO	Implementing programmes Sharing information, especially on environmental services Conducting meetings

Notes: * The Indonesian government has a programme called *Bantuan Langsung Tunai*, or direct cash assistance, as one of its programmes for buffering the poor from the financial crisis.

the result of the limited budget of the buyer). The interaction between participants and non-participants in the same village decreased as the interaction between participants and other external stakeholders increased. This condition somehow created an exclusive group of PES participants who did not mix socially with other villagers. The FKDC members also mentioned this tendency.

There was general agreement that trust between communities and government was lower after 2000 and has become worse since the start

of the PES project. The communities do not consider the government a partner from whom they can ask for assistance. The communities felt a reduced level of confidence in the government's capacity and commitment to provide public services (Table 5.8). Since 1998, Indonesia has been in a period of transition known as '*Reformasi*' (Reform in Indonesian). Although this period has been characterized by greater freedom of speech, many rural communities considered that they had more secure livelihoods during the earlier Suharto-dominated period, which involved unprecedented national growth and greater integration of rural areas into national development. The *Reformasi* era provided greater autonomy to village level governments. However, there have been fewer nationwide programmes, as local conditions vary greatly and severe financial constraints during 1997–1998 led to reduced government spending on rural development (Antlov 2003). The communities in Cidanau noted that the government had paid less attention to rural development after the beginning of the *Reformasi* era and felt a diminished sense of trust in the government. *Rekonvasi Bhumi*, the only NGO that is active in advocating the PES concept, was established soon after the beginning of the *Reformasi* era, when greater space was created for civil society. In Cidanau, interaction between community members and this local NGO nurtured a level of trust; the same was true with FKDC, the ES buyer.

Government officials shared the view that the existence of the PES scheme had increased their communication with stakeholders such as the FKDC members and the KTI, as well as a need for greater inter-agency communication. They expected that PES could assist the government in conducting its conservation programmes and in improving the communities' livelihood.

Natural capital

Since the PES scheme only targeted individual farmers, and restrictions on land use only applied to private lands, there was no change in access to common resources. Before the scheme and after its beginning, communities in Cidanau utilized non-timber products from the forest, such as water, wild boar, fish, firewood, medicinal plants, herbs, fruits and leaves. Around half of the participants did comment, however, that the PES contract had reduced their access to timber for construction because they could not harvest the timber from the contracted land. Currently, they have to buy some wood to fulfil their own needs. The FKDC reported that, at the end of the contract, the farmers would be allowed to cut 40 per cent of their current plantings to fulfil their needs for wood and increase their incomes if they are willing to continue the PES contract.

Both participants and non-participants knew the benefits of maintaining

natural resources. They could explain environmental services provided by the healthy ecosystem and claimed that they had had this knowledge for a long time. According to informants, the services provided by an intact watershed and the Rawa Danau Reserve included providing timber for construction and non-timber forest products, storing water, avoiding floods, landslide and erosion, contribution to a comfortable micro-climate, fertilizing soils and ecotourism, particularly for the Rawa Danau. In addition, the local government and the buyer added that the Cidanau watershed had high and strategic economic value because it supported the existence of important industries and households in the towns of Cilegon and Serang.

The communities have been involved in various rehabilitation activities (both government-initiated and locally organized) before and after the PES scheme. Government programmes included planting trees, such as mahogany, clove, *albizia* and *calliandra*, joining forest fire prevention activities and forest patrols for the prevention of illegal logging, and terracing steep lands. The Cidanau communities were also involved in the National Movement of Land Rehabilitation. Self-supporting activities included cleaning the river annually in Kadu Agung and planting bamboo and productive trees, such as *melinjo*, durian and stink bean. However, these actions are mostly patchy, not integrated and short-term with uncertain success.⁹ In addition, the PES project did not set up systematic monitoring for environmental services in Cidanau. The KTI claimed that the sedimentation and water quality in Cidanau had improved in the last 2 years. However, whether this conclusion is correct, and whether the change in ES has any connection with the PES scheme, have not been scientifically demonstrated.

Physical capital

The Citaman group invested 5 per cent of its PES payments to build a 100m pipeline for clean water to serve about 50 households. This water pipeline also served non-participants, but they were required to pay a service fee of US\$0.30 per month or 1 kilogram of rice. The Kadu Agung group planned to build a village mosque from all funds collected through the PES contract. Other villages did not report plans to invest their money in education and health improvements. Their investments in physical capital were a collective decision driven by their specific needs. Villages without any investment plans might simply not have collective needs.

Participants in focus groups complained about the poor condition of roads, which doubled their transportation costs. This has been the case for many years and a change of government did not bring any changes to their village assets. However, the discussions with the FKDC highlighted the

fact that the community had received assistance to develop a nursery and a building for community meetings in Ciomas village. The budget for these activities came from the provincial government in 2005 because it noticed the existence of PES activities in the village.

The FKDC has no further plans to develop public facilities in the villages covered by the PES scheme. Nevertheless, it agreed that developing public infrastructure in the sellers' villages could multiply the positive impacts of the PES scheme. For example, better roads to the villages would increase accessibility and improve communication, coordination and monitoring as well as contributing to wider economic and social development.

CONCLUSION

Livelihood Impacts

The Cidanau PES scheme has affected the livelihood of PES participants and non-participants. Benefits were mostly non-financial: expanded social networks with external stakeholders; knowledge and capacity of the community; and small-scale public infrastructure investments. Direct financial benefits were limited. So far, four villages out of five have proved successful in meeting the contract terms; however, there is a need to investigate further whether the non-financial benefits and limited financial benefits are sufficient to cover their 'total opportunity cost'. We presume that these benefits, combined with recognition from governments and external stakeholders, can increase farmers' commitment to the scheme. It is important to adjust the value of the new contract so that farmers can cover their true opportunity cost if the funds from the buyer allows that. This finding is in line with the conclusions in other PES sites in Asia (Leimona et al. 2009).

Although the PES scheme did not drastically change the livelihoods of participants, linkages with external stakeholders had begun to create options for participants to diversify or capture greater value from their income sources. The external stakeholders are largely partners in the PES scheme, such as the FKDC and a local NGO. Exposure to these partners also increased the participants' knowledge of conservation, as well as the skills to manage the farmers' organization, and helped to build networks to improve their businesses and implementation of the PES scheme.

Participants and non-participants reported that they were aware of the benefits of conservation before the PES scheme was implemented. Their understanding of the PES concept was still limited. The capacity-building for the PES concept at the local level has been important. However, future capacity-building should also be focused on tangible aspects of the PES

scheme and problems that put barriers at the local level in implementing PES, such as lack of information about good planting materials and knowledge of tree management.

The PES scheme has created new standards and mechanisms for managing behaviour around natural resources. It supports the establishment of new written and unwritten rules as well as sanctions related to natural resource management and land-use practices. The PES contract sets out formal rules and sanctions binding the sellers and the intermediary which supplement their existing informal rules and sanctions. These informal rules and sanctions were useful to support collective action and induce the accomplishment rate of the PES contract.

There were signs of jealousy among non-participants in Cidanau towards the participants due to their exclusion from the PES scheme. So far, such jealousy has not destroyed social relationships in communities because the size of payments is limited and it has not created inequality. The investment of PES income in community infrastructure, such as water supply, mosques and meeting halls might reduce social conflict as such investments extend to the indirect beneficiaries of the scheme, although not to the same degree in some cases. Improved government investment in PES villages, as planned but yet to be implemented, could also help to reduce the risk of potential conflict between participants and non-participants.

Access to common pool resources, such as state forests, did not change with the implementation of the PES scheme because only non-timber products were taken from the forest.¹⁰ However, the restrictions posed by the PES scheme on landowners' access to timber on their own lands could lead to illegal logging on common lands – that is, it could result in so called 'leakage'. Monitoring of the nearby environment should therefore be carried out by the PES scheme.

Environmental Impact

There is insufficient scientific evidence to judge the impacts of the Cidanau scheme on environmental services. Although the selection of contracted villages was based on criteria (steep slopes and erosion-prone soil) that would maximize environmental outcomes, and stakeholders in the scheme believing that planting trees would solve the watershed problems in Cidanau, the causal link between changing land-use practices and increasing ES are unclear and indirect. For the next step, identifying and monitoring specific indicators of watershed services in Cidanau is crucial. For instance, a rapid hydrological assessment in Singkarak, West Sumatra, Indonesia (Farida et al. 2005; Jeanes et al. 2006), concluded that raising

the water level of the lake, sought by the ES buyer to increase its hydro-electric performance, is mostly influenced by changes in mean annual rainfall and only mildly by land cover. Without an understanding of watershed functions, and related indicators, PES schemes such as this may not achieve the desired environmental impact, leading to disappointment amongst sellers and buyers.

Design of the PES Scheme

The amount of the payment per hectare set out in the PES scheme in Cidanau was based on input costs for tree planting. Information on opportunity costs is not yet available for Cidanau. Farmers might have accepted the contract without further consideration of the real costs and benefits involved in the scheme. The agreed value of the contract might not fully represent the real opportunity cost of the farmers because of the dominant position of the intermediary. The transaction cost in Cidanau was about 14 per cent of the total payment.

In terms of lessons for REDD, the Cidanau case raises important issues about the need to factor in opportunity costs when negotiating payments to ensure their long-term sustainability. It also highlights the need for awareness of the social dynamic between participants and non-participants and the need to design benefit packages to minimize community-level conflict. The Cidanau case suggests that the role of the intermediary is very important and possibly dominant. An honest and trusted intermediary is one of the keys to success.

NOTES

1. The 64 members of this forum are upstream and downstream stakeholders. The upstream stakeholders include farmer groups, the government of Serang district, the Serang legislative body, provincial agriculture services (provincial and district forestry and environment), provincial and district planning agencies (BAPPEDA), provincial human capacity and development agencies, provincial human settlement and regional infrastructure services and a non-government organization. Downstream stakeholders include representatives of the PT Krakatau Tirta Industry (KTI) (a private water company), the government and legislative body of Cilegon District, agriculture services and urban water users. This body was later to become the primary coordination mechanism for PES.
2. The land cover of the Cidanau watershed is dominated by agriculture (71 per cent): consisting of mixed farming (36.7 per cent) and rice fields (34.4 per cent). The remaining land cover is forest (18.5 per cent) and swamp forest (8.4 per cent) (Adi 2003).
3. Banten was a district in West Java Province before 2000 and became a new province in 2000.
4. In Indonesia, a state-owned company must allocate 1 per cent of the net benefit of state-owned companies to develop environmental programmes with communities. The legal

- basis of this scheme is the Letter of Ministry of State-owned Company Affairs about Corporate Social Responsibility Partnership Program (KEP-236/MBU/2003).
5. \$US1 = Rp10000.
 6. In Indonesian, the term is *tanggung renteng* literally meaning an individual failure will become collective failure.
 7. *Melinjo* (*Gnetum gnetum*) is a plant native to Indonesia. The seeds are used for vegetable soup, or ground into flour and deep-fried as crackers.
 8. Rahadian, Director of *Rekonvasi Bhumi*, pers. comm. (2008).
 9. Reports on the failure of the National Movement of Land Rehabilitation are numerous (see, for example, As 2006). One of the reasons for this failure is that the programme is top-down with very little participation from the community. The government dominates the supply of the plant materials and determines the species that should be planted. The community acts as labourers for the planting activities and they are often not interested in maintaining their plantations because, in some cases, they do not have access to the harvest.
 10. Further investigation on this should be done because some literature mentioned that deforestation had been a big problem in Cidanau (Kiely 2005).

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