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Payments for Environmental Services in Indonesia: What if economic signals were lost in translation?

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Abstract

This article provides an analysis of a Payment for Environmental Services (PES) scheme in the Cidanau watershed, Indonesia. It contributes to the debate on the alleged effectiveness of such economic incentives to actually change decisions among land users. Building on the standard PES theory of change, one would assume that farmers respond to payments and change their land use decisions accordingly for the delivery of environmental services. However, at the project level the impacts of economic incentives depend on how the signal is transmitted to decision-makers. An extensive household survey was undertaken among 270 participating farmers in order to investigate these assumptions. Results indicate that farmers join the scheme for intrinsic motivations rather than because of economic incentives. Besides, the scheme does not target farmers whose decisions could be changed for the sake of service provision. Finally, farmer group leaders display disproportionate power of decision while individual farmers have a low level of understanding of the PES programme. As a consequence, land use patterns might not depend on the economic incentive only; rather they are likely to be determined by the local social context, traditions and economic dependency on forests. This in turn casts some doubts on the strong (yet contested) economic assumptions that underlie the emergence of PES schemes and on their modus operandi in developing countries.

Keywords: Payments for environmental services, Indonesia, motivations, economic incentives, market-based instruments, watershed services.

1. Introduction

Water problems have been partially attributed to deforestation and forest degradation in many watersheds (FAO, 2008). Against this background, mechanisms based on regulation, economic incentives or the provision of information, are intended to “influence individual or organizational behaviour variables that enter into a [...] party’s calculus of the costs and the benefits of compliance” (Cohen, 2006: 32).

In an effort to compare these mechanisms, part of the scientific community increasingly alleges that market-based instruments (MBIs) have a comparative advantage when sending economic signals to change behavior and to secure positive environmental outcomes (Stavins, 2001). Indeed, many contend that market prices and economic incentives have the greatest ability and flexibility to cost-efficiently help reach equilibrium situations in a voluntary manner without coercion (Hanley et al., 2012; Pirard, 2012).

Payments for Environmental Services (PES), commonly qualified as MBIs, have been promoted as innovative tools for sustainable environmental management (Ring and Schröter-Schlaack, 2011; Vatn et al., 2011). Based on the perception that other conservation approaches, including coercive measures, had failed to deliver (Stavins, 2001; Ferraro and Simpson, 2002), such MBIs were thus moved to the front stage.

While the notion of PES is difficult to capture, with many definitions and means of implementation (Wunder, 2005; Muradian et al. 2010; Lapeyre and Pirard, 2013), PES are

understood in this article as policy instruments that (i) distribute economic incentives to the providers of environmental services (carbon sequestration, regulation of the water cycle, biodiversity, etc.) with (ii) associated conditions based on either actions or delivered environmental outcomes.

Any program, be it for development, social, or environmental purposes, is actually expected to affect outcomes through a causal chain (Chen, 2005; White, 2009). The intervention, through project inputs (e.g. a sensitization campaign), will first affect variables acting as mechanisms for change. These 'mediators' are situated on the causal pathway between the policy and program impacts. For instance, motivation to quit smoking might increase after an anti-tobacco campaign, and in turn this increased motivation will induce smokers to actually quit. As such, these variables mediate between the intervention and the outcomes along the causal chain. Besides, moderator factors, not directly affected by the specific policy under scrutiny, may also affect program outcomes but are considered extraneous to the intervention. These moderators include age, education, income, personality, gender, etc, which may explain differences in change and outcomes.

In this context, evaluating failure or success of a PES intervention requires analysis and assessment of its theory of change by mapping out the causal chain and by rigorously examining the assumptions behind (White, 2009).

The alleged comparative strength attributed to PES programs, namely their capacity to cost-effectively trigger environmentally optimal decisions, is based on several underlying assumptions proposed in the standard economic literature (Engel et al., 2008; Collier et al., 2010). When undertaking rational choices, economic agents are indeed assumed to be

capable of maximising their utility based on available information on costs and benefits, stable preferences and externally constrained budget. As stated by Gneezy et al. (2011, p.191), “economists often emphasize that ‘incentives matter’. The basic ‘law of behavior’ is that higher incentives will lead to more effort and higher performance”. Building on this theory of change, the rational view of PES alleges that such economic instrument, through payments, effectively modifies actors’ harmful strategies towards environmental-friendly ones.

Yet one can wonder whether this causal pathway actually materializes in real-life situations where underlying assumptions for the intervention might not be verified. It is thus relevant to confront causal chains in the standard theory of PES to realities on the ground by paying careful attention to a number of critical elements:

- The governance of the scheme influences the capacity to identify and target the appropriate ES providers whose decisions need to be changed in order to provide the services;
- Limited literacy, bounded rationality and imperfect information sharing might alter ES providers’ ability to understand the economic incentives;
- Bounded self-interest, as opposed to rent-seeking strategies, might alter ES providers’ responses to payments when their motivations go beyond financial aspects (social, ethical motivations).

The PES literature provides increasing evidence on the drivers and motivations that explain ES providers’ responses to payments. Consistent with the standard view, studies have shown the importance of a number of external parameters, including economic ones: household income and livelihood diversification opportunities (Zbinden and Lee, 2005; Bremer et al., 2014), level

of payments and opportunity costs (Balderas Torres et al., in press; Bremer et al., 2014), farm size and land tenure (Zbinden and Lee, 2005; Bremer et al., 2014).

Yet other, non-economic determinants also explain farmers' decisions in PES, and Kosoy et al. (2008) recommend to "overcome the idea that resource managers follow only an individual rationality prior to deciding whether or not to participate" (p.2073-2074). Behavioural studies have emphasised that internal factors (habit and cognition) as well as social factors (norms) largely complement external factors when responding to incentives (Prendergrast et al., 2008; Collier et al., 2010). On the one hand, farmers most often display bounded rationality; as a result education (Zbinden and Lee, 2005), the level of literacy and computational capacity (Hayes, 2012; Ferraro, 2008) as well the degree of information sharing and dissemination (Zbinden and Lee, 2005; Kosoy et al., 2008) might explain the extent to which participants enroll in PES and correctly interpret the contract. On the other hand, farmers in rural settings might display characteristics of bounded self-interest (Shogren, 2012). When deciding about their land use strategies, farmers follow intrinsic pro-environmental and pro-social attitudes (Kosoy et al., 2007; Van Hecken and Bastiaensen, 2010), and are motivated by their social reputation at the neighbourhood level (Chen et al., 2009). Finally, enrolled farmers might also respond differently to incentives depending on how they perceive their involvement and decision-making power within the PES scheme (Zbinden and Lee, 2005; Kosoy et al., 2008; Hayes, 2012).

In sum, a rapidly growing literature on behavioral economics and social psychology increasingly questions the standard economic theory of PES. In this article we contribute to this emerging body of research about the capacity of such economic incentives to eventually change farmers' strategies. Building on an extensive household survey and qualitative

interviews, we specifically question the rational view of PES, and its underlying assumptions (the causal chain), with the study of a payment scheme for watershed services implemented in the Banten province in Indonesia. In particular, two research questions are tackled: first, who participates and does the scheme target the appropriate farmers, i.e. those who would have made different decisions without the scheme, and whose decisions impact the provision of the service? Second, do farmers understand and interpret the intervention properly, i.e. according to the theory of change and objectives initially stated by the payer?

To do so, the article is organized as follows: section 2 describes the study site, the PES program design and its originally stated theory of change; section 3 presents our household survey methodology; section 4 details empirical results, while section 5 discusses the latter and section 6 concludes.

2. Presentation of the case study

2.1 General information about the site

The Cidanau river watershed is located on the island of Java (Figure 1).

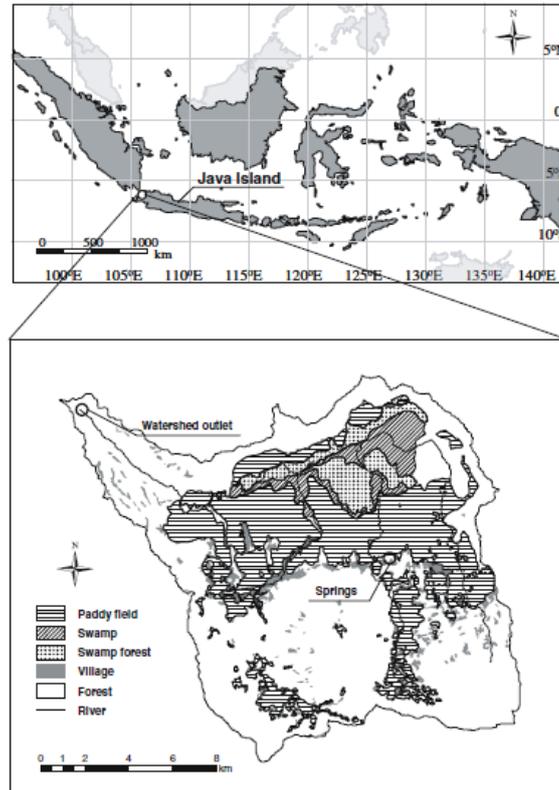


Figure 1. Location and map of the Cidanau watershed and land patterns

Source: Yoshikawa et al., 2008

It covers 22,036 hectares, comprising a plateau of 10,176 hectares with the former lake Danau (now a swamp area) and rice fields, and another 11,860 hectares with 21 sub-watershed and 4 tributary rivers flowing into the Cidanau river (Budhi et al., 2008).

Land in the watershed is mostly privately owned. According to 2002 figures there were 1,806 households living in the watershed, and land cover patterns include forests (58%), paddy fields (28%) swamp forests (5%), swamps (4%) and residential areas (5%) (Figure 1). Overall, the trend for land conversion remains unclear. Yet, it is usually acknowledged that newly cultivated land, illegal farming and migrations to the area increased in the watershed after the economic crisis in 1997 (Yoshino et al., 2003).

2.2 Environmental issues

Decreasing forest cover, land erosion and surface water runoff, causing eutrophication and siltation, have negatively affected the Rawa Danau swamp area and led to lower quality water downstream in the Cidanau river (Yoshino and Ishioka, 2005). Besides, according to statements by local stakeholders (but without scientific evidence) the average debit of the Cidanau river has decreased, especially during the dry season.

As an initial step 9,987 hectares of upstream lands within sub-watersheds were first declared 'critical lands' based on their soil type, vegetation cover and steepness (Budhi et al., 2008). Yoshino and Ishioka (2005) thus made important recommendations to tackle environmental issues in the watershed: preservation of the remaining vegetation cover, and forest rehabilitation of the 'critical lands' with steep slopes. These recommendations subsequently provided a scientific basis for the PES scheme undertaken by the local water supply company in the Cidanau river watershed.

2.3 The PES scheme

2.3.1 Context and main actors

The private company PT Krakatau Tirta Industry (PT KTI) collects water near the Cidanau river mouth. The water is then processed and commercially distributed to a number of users including the local State-owned water company, and 120 industrial users.

PT KTI staff clearly expressed concerns about the situation in the watershed. Water demand by industrial and domestic units is expected to increase steadily whereas above-mentioned environmental problems might lead to a decrease in water availability and quality, (interview hydrology expert from PT KTI January 2013), and siltation might increase blockages in its water pipe and pump.

In response, building on the large amount of scientific research undertaken in the watershed, a broad group of actors established in 1998 the multi-stakeholder Cidanau Catchment Communication Forum (FKDC). It includes representatives from government agencies, a university, upstream and downstream farmers, PT KTI, and a local NGO called Rekonvasi Bhumi. It received legal recognition in 2002, and benefited in 2004 from scientific results and recommendations drawn from a seminar jointly organized and funded by several universities, the Government of Banten Province and PT KTI.

2.3.2 Design of the PES scheme

The concept of downstream-upstream payments was first introduced to Cidanau stakeholders in 2002 by the German Technical Cooperation (GTZ) and the national NGO LP3ES (Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial). This move, under the coordination of the International Institute for Environment and Development and the World Agroforestry Centre, was part of a broader research-action project to develop PES schemes in several watersheds in Indonesia. While options were being considered in 2002, a member of Rekonvasi Bhumi was funded by the GTZ and visited the Costa Rican PES scheme. There he identified the conditionality component as innovative and likely to ensure greater effectiveness, as compared with purportedly failed past land rehabilitation and reforestation programs in the area. In 2004, the FKDC was thus willing to trial such a new instrument to tackle environmental issues in the watershed; and in 2005 PT KTI, convinced to be a beneficiary from watershed services to be provided by upland farmers, agreed to fund a PES scheme with FKDC as intermediary and the local NGO Rekonvasi Bhumi as the implementer on the ground.

Institutionally, two different contracts are at play (Figure 2). On the one hand there is a 5-year Memorandum of Understanding (MOU) leading to an annual payment of USD 350 per ha by PT KTI to FKDC for planted and/or conserved forest (a minimum of 500 trees per hectare). On the other hand there are several contracts between the FKDC and farmer groups for a similar period, specifying eligible tree species and annual payments of USD 125 per ha by FKDC to farmer groups.

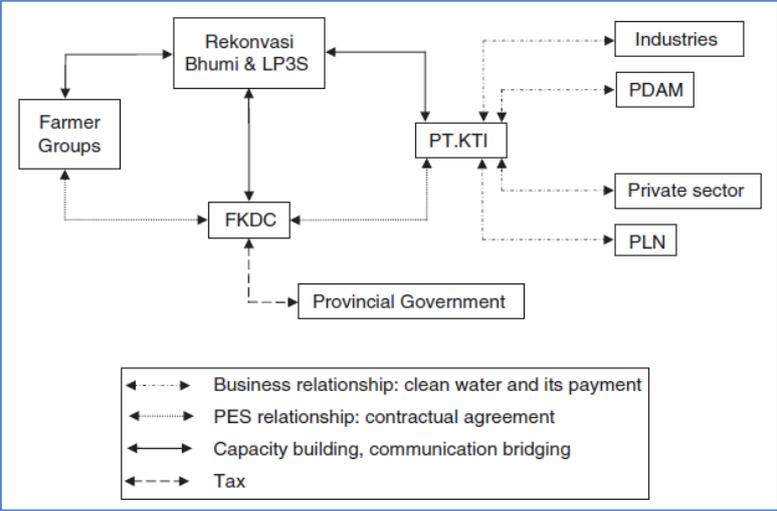


Figure 2. Governance structure for the PES scheme

Source: Leimona et al. 2010

Note: PDAM is the Parastatal water distribution company while PLN is the State electricity company

For each of these latter contracts FKDC deals with groups, not individuals, to plant and conserve trees on 25 ha of contiguous land. Each group chooses the land, with various numbers of members depending on the size of their individually-owned plots. Farmer group leaders need to assess the number of eligible trees for each individual plot before the contract begins. Whenever plots do not meet the 500 trees per hectare condition, the farmer must plant to fill the gap and can benefit from support by PT KTI with the distribution of free seedlings. The contract, describing rights and duties for both parties, is signed by the group leader but distributed to each group member.

During the contract 5-year period the minimum 500 trees per ha must be maintained, which is verified by a monitoring team set up by FKDC. The team involves all stakeholders and goes to the field once a year to monitor 2.5 ha of randomly chosen land. Once it gives its approval, payments are made to farmer group leaders (practically transferred on their bank account), who in turn are responsible for the cash distribution to participants. In case of a negative report by the team, i.e. if at least one farmer fails to meet the conditions, payments are terminated for the whole group.

Since the beginning of implementation in 2005, a total of 8 farmer groups have been involved at some point in time: 4 are currently still under their first contract, 2 breached their contract while 2 other have renewed it for another 5 years (Table 1). Besides, the MOU between PT KTI and FKDC was renewed in 2010.

Building on standard discourses with respect to PES and technical assistance from research partners, the contract sets an economic transaction where a buyer (PT KTI through the intermediary FKDC) buys a defined environmental service from a farmer group (and its members) specifically named a 'seller' in the contract, depending on its 'willingness to accept' (in English in the contract). This is expected to trigger a causal chain whereby conditional payments to private farmers on steep land plots would change the cost-benefit ratio (proximate mediator) for land use activities and thus would modify farmers' behaviours towards tree planting and conservation (intermediate mediator), which in turn would curb deforestation in the watershed (output) and, ultimately, improve water quality and quantity (outcome). This article questions whether such theoretical causal chain is verified empirically.

3. Methods

The assessment of the scheme was undertaken in December 2012 and January 2013 with two components: an extensive household survey among a majority of participating farmers in the scheme; and an institutional analysis with semi-structured interviews of key informants that built on previous field research (Leimona et al., 2010; Pirard and Billé, 2010).

Among others, the household survey included socio-economic questions (asset and land characteristics, land use patterns and cultivation strategies), but also questions related to farmers' motivations to participate in the programme, their knowledge of the contract, rules and incentives, as well as questions about their perceptions of decision-making processes. For the latter questions, rather than using a multiple choice questionnaire (MCQ) respondents were told to openly answer questions; open answers were then directly coded by enumerators by ticking one or several of the possible choices already written on the survey instrument (these were defined after thoroughly pre-testing the survey). Importantly enumerators were clearly said not to read the list of choices written on the questionnaire.

Respondents were randomly selected within each participating farmer group (past or present). A majority of male heads of households were interviewed but women also attended the interview session in a majority of cases. In total we interviewed more than 70% of participants in the Cidanau PES programme, i.e. 270 participating households out of 382 total participants (including those who no longer participate) (Table 1).

| VILLAGE NAME | GROUP NAME | # PARTICIPATING HH | # INTERVIEWS | YEAR START | YEAR RENEW CONTRACT | YEAR CEASED CONTRACT |
|--------------|----------------|--------------------|--------------|------------|---------------------|----------------------|
| CITAMAN | Karya Muda II | 44 | 36 | 2005 | 2010 | |
| | Karya Muda III | 49 | 34 | 2010 | | |
| KADU AGUNG | Agung Lestari | 30 | 21 | 2008 | | 2009 |

| | | | | | |
|--------------|----------------|------------|------------|------|------|
| CIBOJONG | Karya Bersama | 26 | 19 | 2005 | 2007 |
| CIKUMBUEUN | Alam Lestari | 60 | 37 | 2008 | 2013 |
| RAMEA | Alam Sejahtera | 58 | 40 | 2010 | |
| PANJANG JAYA | Haparan Maju | 75 | 54 | 2011 | |
| UJUNG TEBU | Karya Bakti | 40 | 29 | 2011 | |
| TOTAL | | 382 | 270 | | |

Table 1. Participating villages and households; survey sampling

Source: Authors

Simultaneously, we carried out semi-structured interviews of key informants in the programme: heads of each farmer group, two FKDC board members, the director of the implementing NGO, three directors for the private company, three field workers. This allowed us to analyse in depth the institutional setting and governance structure of the programme as well as to disentangle motivations, strategies and discourses carried by different stakeholders. This also helped us to triangulate information so as to avoid misinterpretations.

4. Results

4.1 Socio-economic characteristics

Average respondents' age is 48 years old while the average household size is 5 people (Table 2). Average education level is relatively low (about 5 years) and a large majority of households were locally-born with few migrants.

| <i>Characteristics</i> | <i>Mean</i> | <i>Median</i> | <i>SD</i> | <i>Min</i> | <i>Max</i> | <i>N</i> |
|---------------------------|-------------|---------------|-----------|------------|------------|----------|
| Age (years) | 48,4 | 48 | 12,4 | 23,0 | 82,0 | 266 |
| Education (years) | 5,24 | 6 | 3,2 | 0 | 13 | 266 |
| Household size (n) | 5,0 | 5 | 1,9 | 1 | 10 | 266 |

| | | |
|------------------------|-------|-----|
| % migrants (<50 years) | 22,6% | 266 |
|------------------------|-------|-----|

Table 2. Socio-educational characteristics

Source: Authors

Economically, most households in the PES scheme depend on their own private land to sustain their livelihoods (73% farmers as first professional activity) while others work on other farms (8% as first professional activity). Participating households own on average 1.06 ha of land (either included in the PES scheme or not) with great disparities: 70% of households own less than the average amount of land and the maximum is 11 hectares. The average land area specifically contracted under the PES scheme is 0.56 ha per participating household. Other assets owned by households include motorcycles (51%), TV (83%), chicken (82%) but also hand phones (42%) and gas stoves (40%), while ownership of cattle or livestock (16%), and car (4.5%) is more limited.

4.2 Does the governance of the scheme enable the selection of appropriate providers?

Contrary to stakeholders' initial views of the PES scheme, implementation on the ground was actually reappropriated based on the local institutional and social context.

First, conditions in the MOU between PT KTI and FKDC were mostly decided by the technical team, composed of various stakeholders (PT KTI, district and provincial planning agencies, Forest Department, Rekonvasi Bhumi). Building on rules in previous government land rehabilitation and reforestation programmes rather than on extensive negotiation, PT KTI and FKDC unilaterally decided that a minimum of 25 ha per farmer group was necessary for inclusion with contiguous lands. Decisions with respect to the number of trees per hectare (500) and the level of payments were also inspired by past practices in the national forest rehabilitation programme (GERHAN) coordinated by the national government (Leimona et al., 2010). Similarly, although contracts signed between FKDC and each farmer group stipulate the

group's 'willingness to accept' contractual right and duties, very few conditions and clauses are actually negotiable.

Besides, while originally many scientific assessments had helped FKDC to understand environmental issues and recommended reforestation on 'critical lands', decisions about geographic implementation moved apart from its initial rationale. According to interviews with FKDC technical team, there was a tendency to contract farmer groups previously known through various other programmes and who had demonstrated a good organizational capacity. Similarly at the group level the process of selecting individual owners and their land remain in the hands of the farmer group leader. Practically the local land selection process obeys to criteria that relate more to social connections than to scientific assessments of their relevance from the perspective of water services provision, as originally thought. Observation suggests that most critical lands (steep plots and low forest cover) were not included in the programme. In turn this means that payments were probably not distributed to the most appropriate land owners, i.e. those whose land use decisions affect the outcome, or just by coincidence.

Such a revised selection process was partly driven by changing rationale and objectives from the buyer' side (PT KTI). As the latter was increasingly willing to showcase quick results from its support to the project, the program's underlying assumptions evolved and implementation was adapted to local challenges. It moved from a first phase largely focused on tree enrichment (planting trees on under-forested lands) to a second phase where the conservation of private plots with sufficient forest cover was prioritized.

This bias in the selection process was further investigated with household data. First, most lands enrolled in the scheme were already well forested before being contracted under the

PES. Almost three quarters (71%) of households did not have to engage in planting to reach the required number of trees. When asked about their motivations for having preserved forest cover on their lands prior to the incentives, 88% of households mention they can use trees for fruits and wood, 47% state that trees are good for medium and long term investment, while 12% say forests are important for human life anyway.

Moreover, 81% of participants report they will keep trees if the programme comes to an end. Within this category, 88% say they will be able to use forest for fruits and wood and 51% say that trees are good for medium and long term investment; this explains their willingness to sustainably manage trees whatever incentives are distributed from the PES scheme. Besides, a majority of all plots currently under the PES (58%) would host the same tree species with the same respective proportions after payments would be stopped, according to the respondents. For the other plots, tree species would mainly remain the same but only the respective proportions would change. In total these results suggest that the project might fail to fulfill objectives initially set by stakeholders to tackle environmental issues in the watershed.

Second, a very substantial share of participants displays motivations to join the scheme that rather relate to social and cognitive aspects, independently from the sole distribution of economic incentives (Table 3).

| Why did you join the PES scheme? (n=270) | Rank#1 | Rank#2 | Rank#3 | Rank#4 | Total |
|---|---------------|---------------|---------------|---------------|--------------|
| <i>External (economic) motivations</i> | | | | | |
| <i>Cash payments</i> | 38.6% | 23.6% | 9.4% | 1.5% | 73.1% |
| <i>Trees are good investment</i> | 3.7% | 7.9% | 4.9% | 1.5% | 18% |
| <i>I can use the trees for revenues</i> | 1.9% | 6.4% | 3.4% | 1.5% | 13.2% |
| <i>I attended meetings where told about it</i> | 3% | 2.6% | 0.4% | 0.4% | 6.4% |
| <i>Land was unused before</i> | - | 0.7% | - | - | 0.7% |
| <i>The programme helps us to plant trees</i> | 1.5% | 0.7% | 0.7% | - | 2.9% |

| | | | | | |
|---|------|-------|------|------|-------|
| <i>Technical assistance</i> | - | - | 0.4% | - | 0.4% |
| <i>Increased land value for sale</i> | - | 0.4% | - | - | 0.4% |
| <i>Seedlings are given for free</i> | - | - | - | 0.4% | 0.4% |
| Social motivations | | | | | |
| <i>Social pressure by people in the village</i> | 27% | 15.4% | 3.4% | - | 45.8% |
| <i>My neighbours were part of it</i> | 3.4% | 12.4% | 1.1% | - | 16.9% |
| <i>Was chosen by the farmers' group leader</i> | 3.4% | 2.2% | 0.7% | 0.4% | 6.7% |
| <i>Good for reputation</i> | 1.1% | - | - | - | 1.1% |
| Cognitive motivations | | | | | |
| <i>Good for the environment</i> | 4.9% | 3.4% | 3% | 1.1% | 12.4% |
| <i>Forest protection for future generations</i> | - | 2.2% | 1.9% | - | 4.1% |
| <i>Forest is important for human-being</i> | 1.1% | 1.5% | 0.4% | 0.7% | 3.7% |
| <i>Islam teaching</i> | 1.1% | 0.7% | 0.7% | 0.7% | 3.2% |
| <i>Give benefit for downstream people</i> | 0.4% | - | 1.5% | - | 1.9% |
| <i>Preserve Rawa Danau</i> | 1.1% | 0.4% | 0.4% | - | 1.9% |
| <i>Other</i> | 6% | 4.1% | 2.2% | 0% | 12.3% |
| <i>Does not know</i> | 1,9% | - | - | - | 1,9% |

Table 3. Participants' motivations to join the PES

Source: Authors

Note: The table reports responses according to the ranking made by respondents, who were given the opportunity to openly state up to four reasons for joining the scheme. For instance, 38.6% of respondents stated "cash payments" as their first reason, while 1.5% of them stated it in fourth position. Overall "cash payments" was mentioned by 73.1% of respondents, in whichever position.

Although around 39% of respondents still rank cash payments as the main reason for joining the programme, an almost equivalent number of them (35%) display social motivations instead: this includes 27% who mention social pressure and influence in the village, 3.5% who were simply 'chosen' by the group leader, 3.5% who joined because their neighbours were part of it, and another 1% who associated participation with good reputation. Further, 9% of participants display cognitive motivations as their first reason to participate: this includes 6% who joined the PES scheme because this is important for the environment and human being, 1.5% who want to follow Islam teaching and provide benefits for other people, and 1% who are willing to specifically preserve the swamp area.

In total, this diversity of motivations strongly influences the way farmers respond to economic signals when deciding about their land uses. This provides evidence of some mismatch between the rational view of PES and the realities on the ground: according to the original causal chain, payments would mechanically induce behaviour change and modifications in land use decisions; but our results on farmers' motivations show that payments are also interpreted through the lens of intrinsic ethics and the local social context. This challenges the view that such an incentive-based instrument, as originally designed, can fulfill, on its own, its initial environmental goals.

4.3 Is the contract understood and influential for service providers?

Due to the institutional design of the programme, limited information sharing about the PES scheme does not allow participating farmers to understand the contract and thus to modify their strategies towards environmental sustainability (the goal initially stipulated).

Qualitative observations and key informant interviews tend to show that, because contracts are signed at the group level, farmer group leaders retain most of the information while individual participants have a limited understanding of the programme. For the sake of an easier implementation, project managers do not want to look into local politics (interview Director PT KTI, Thursday 10 January 2013). As a result, knowledge among participants largely depends on the leaders' desire and capacity to disseminate information within the group.

This situation might be an impediment to an optimal implementation of the scheme because responses to incentives might fall short of initial expectations if poorly understood, and participating farmers might lose interest in a project where they do not feel sufficiently involved and empowered.

While participants appear to be well-aware of the contract rules, a significant number of them actually associate conditions for participation to the discretionary choice made by the group leader. Admittedly, up to 87% of participants could concretely mention at least one required condition to participate and 95% mentioned at least one compliance rule as part of the 5-year contract. Nevertheless the story is slightly more complex. Noticeably 18% of participants confuse required conditions for joining the scheme and the decision power in the village; they report to be selected by the farmer group leader. This finding points to a lack of transparency and limited dissemination of information about the PES scheme. In turn, this weakens its capacity to make service providers change their decisions according to incentives within the contract.

Due to this modus operandi, there is very limited knowledge of the amount and timing of payments among participants. Up to 85% of households cannot say much about the amount and timing of payments, although the contract is very clear in this regard. From the point of view of participants, distribution takes place at a random date and according to the discretionary choice by farmer group leaders.

Other survey results support the view that information among participants is limited and decision-making processes remain opaque. When asked about who is responsible for setting rules and payments made to the farmer group, 73% mentioned the farmer group leader and another 8% mentioned his name. Other stakeholders with great involvement in contract design are forgotten by participants: as little as 5.5% name the intermediary FKDC, 6.5% name the water supply company PT KTI, and 5.5% name representatives from Rekonvasi Bhumi. Interestingly, only 2% of the participants see themselves as having a voice in the negotiation about rules and payments. Similarly, when asked about who decides how to distribute

payments among participants within each group, 79% interviewees again point to the farmer group leader and 18% even name him, while a little 3.5% of them see themselves as having a word to say in the process.

5. Discussion

In this article we investigate the capacity of PES to operate effectively in an Indonesian rural context where watershed services are targeted. Theoretically, their alleged environmental effectiveness builds largely on underlying assumptions about how, along a causal chain, farmers with unlimited rationality and self-interested maximizing behaviour will respond to economic incentives. However, when narrowing down to actual realities on the ground results presented above demonstrate some mismatch with the standard economic theory of PES, and show how different actors' characteristics, contested rationales and objectives could explain this situation. We discuss both our research questions below.

5.1 Problems with the selection of service providers

Our data show that the governance structure of the PES scheme actually fails to enable the selection of appropriate land users so as to fulfill initial environmental objectives. Indeed, the local institutional and social context forced project managers to progressively modify their expectations.

Not based on freely negotiated agreements, the level of payments and contract conditions result in large parts from unilateral decisions by the intermediary organization, based on technical specifications from previous government reforestation programmes. Besides, although the eligible area was based on extensive hydrological studies so to as to rehabilitate

9,987 hectares of critical lands and to provide an environmental service to PT KTI, the subsequent identification of participating groups and associated land was mainly related to social networks. The farmer groups were selected because of their leaders' good previous bilateral relationships with the intermediary organization. Group leaders play to some extent the role of a regulator and have a very influential role in the choice of lands and farmers that participate in the PES scheme. In many instances, farmers seem hardly aware of their own enrollment in the programme. Rather, they were morally pushed to enroll by the group leader or other village members.

Further, farmers pay limited attention to economic incentives when deciding to participate in the scheme. Instead, social and cognitive motivations are very important lenses for PES participants to interpret the signal. In this rural context with few migrants and strong social capital, the need to maintain a good reputation might explain villagers' participation when other villagers and group leaders use social pressure for enrollment. In addition, religious beliefs and the desire to conserve the environment for altruistic reasons also seem critical in our case. Furthermore, farmers in Cidanau are very dependent on forest ecosystems for their livelihoods and see these as reliable and stable sources of income.

These findings do not come as a surprise in the Indonesian rural context where social control is strong (especially in these villages with few migrants), economic dependency of households on forested areas is high, and literacy is low. They are also consistent with other recent research on participation and motivations in various PES schemes. In Mexico, Kosoy et al. (2008) show that community values and perceptions are critical for environmental projects whereas Rico Garcia-Amado et al. (2013) state: "intrinsic reasons predominate [...] for keeping

conservation initiatives in the future. [...] 'Respect for nature' drives people's motivations more than utilitarian and monetary reasons". In Namibia, Silva and Mosimane (2014) observe that social motivations also take precedence over economic incentives for participation in the CBNRM programme, as expressed by respondents: "how could I live here and not be a member?". In the Colombian Andes, Hayes (2012) similarly explains that many farmers answer "por qué no?" (why not?) to the question about motivations for participation; hence according to the author, "PES decision-making model may not necessarily coincide with peasant farmers' decision-making processes" (p.149).

Whether it is a problem or not that participants display other motivations to enroll than economic ones, remains an open question. Some argue that social motivations can positively reinforce economic incentives to achieve environmental objectives. However, others argue that economic signals could crowd-out intrinsic motivations and thus could jeopardize sustainability of the PES scheme after monetary incentives are terminated (Fisher, 2012; Narloch et al., 2012; Rico Garcia-Amado et al., 2013). Using economic signals in these contexts is thus not neutral in the longer term; project implementers should therefore make sure that economic incentives are the most appropriate instruments to be locally used, in conjunction with other interventions (sensitization and capacity building for instance).

In the end these data suggest that additionality might not be verified. Rather, the current situation suggests that having a high number of participants is set as a priority by project managers to sustain the scheme and to spend the available budget, even in the absence of additional environmental service delivery. So far, the service beneficiary PT KTI has not engaged in a rigorous ecological impact evaluation of the PES scheme. Indeed its motivations to support the scheme has evolved from securing access to clean water with conditional

payments to upland farmers (the initial program theory), to a broader objective of conservation efforts and corporate social responsibility (Leimona et al., 2010, p.111). However, the needs for measurable indicators for watershed services remain greater than ever.

5.2 The causal chain needs repair

Our data also show that economic signals are poorly understood with the Cidanau PES scheme. Most farmers in the area encounter difficulties to understand the contracts, and the reasons for this situation are various. They include a low education average level, and insufficient capacities among group leaders to make their duty. Although the contracts are supposed to be circulated and socialized among participants before implementation, a vast majority of them had no clue about the amount and the timing of future payments. As it looks like, participants only wait for the group leader to hold a meeting in his house where he distributes 'hand-out money' to household heads. Further, participants seem confused about eligibility as well as on-going rules; many even declare to be eligible simply because they were actually chosen by the group leader. In this context, how are farmers expected to respond to signals that they do not correctly understand? How can one expect farmers to change their land use strategies if they do not understand that this is what they get paid for? In the short term, one might argue that social pressure may play the trick; however in the longer term, such pressure might be decreasing and farmers might re-adopt their environmentally harmful strategies.

Lack of transparency and elite capture by farmer group leaders might explain part of this lack of understanding of the economic incentive. A majority of households thought that group leaders were drafting the rules in the contract and were deciding how to distribute payments;

other project managers were ignored probably because they were not as visible as the local elite. Yet in the field, key informants acknowledged that farmer group leaders had contrasted skills for the management of the scheme. Notably, being a group leader and properly managing a farmer group according to the requirements of the PES scheme is not an easy task. As it stands now leaders are requested to perform these duties in addition to their regular activities; one avenue for improvement would be to appoint leaders who would then devote a larger part of their working hours doing this specific job.

Our findings are supportive of observations made in other contexts. In the case of the national PES scheme in Mexico, Muradian et al. (2010) argue that farmers view payments as donations and rewards rather than as a market transaction that would be incorporated in their decision-making process. Empirically, Hayes (2013) demonstrates that in the Colombian, low educated, rural context, participants had problems making sense of the contractual arrangements: only 13% of the participants understood that contracts implied a commitment to conserve forest on their lands. In addition, participation and empowerment were almost non-existent as only 10% of participants considered themselves the principal decision-maker in the farm-level changes.

All in all, this frequent lack of transparency is a subject of worries for policy instruments that rely on economic incentives. Most importantly, the limited involvement of farmers in the decision-making processes reduces opportunities for social learning and adaptive capacity at the community and individual levels (Hayes, 2013). Hence, in the longer term the sustainability of these approaches might be jeopardized by limited farmers' capacity.

6. Conclusion

Building on this case study in Cidanau, we aimed at investigating the capacity of a wave of innovative policy instruments to deliver in terms of environmental service provision.

Two research questions were investigated to assess the potential of these innovative instruments to really change land uses on the ground: does the governance of the scheme allow PES incentives to target and reach the appropriate providers? And is the contract sufficiently understood by service providers to trigger expected decisions?

Results were not supportive of these two critical requirements for success along the causal chain. As a result, there is little reason to expect land uses to be modified within this PES scheme by its economic incentives only. Further, the PES contract is likely to succeed owing to its reliance on other sources of motivation as well.

Relevance of such results for other PES schemes is arguably ambiguous: on the one hand the scheme under consideration was probably not designed to give incentives the greatest chance to work and this might have been clear from the onset in the minds of the designers (although not officially); on the other this approach is all but exceptional in the realm of PES, as the gap between theory and practice is already demonstrated in this field (Lapeyre and Pirard, 2014).

Nonetheless these results usefully contribute to research in the field of market-based instruments, where incentives play a central role. Hahn (1989) indeed concludes that implementation is extremely different from what economists would want it to be based on sound economic theory: “[experience] shows how the actual use of these tools tends to depart from the role which economists have conceived for them” (p.96). Several factors can explain this situation, among these the necessity to adapt to specific contexts due to differences in political objectives, as stipulated in Mermet et al. (2014): “Economic tools (or instruments) for biodiversity are just what the phrase says: tools (or instruments). [...] [But] serious

assessment of a tool's potential starts once you factor back in all the contingencies that the tool is going to meet in actual use” (p.307).

Main reasons for such an outcome lie in the governance structure of the scheme that gives priority to social connections for the selection of participants and impedes in practice a smooth dissemination of information to farmers about the contracts and related conditions. Although the scheme is sophisticated and has improved over time, most stakeholders, including the service beneficiary, have a clear interest to keep the ball rolling and showcase progress, independently of actual environmental impacts. Hence, better implementation and targeting in enrollment should be recommended.

In this context a trade-off exists between the reduction of transaction costs and enhanced effectiveness, and this is embodied by the key role played by farmer groups and their leaders in the implementation. These leaders have a great influence and power in operating the scheme, thus reducing costs: selection of participants, dissemination of information, and the distribution of incentives. As a corollary, a lot depends on their willingness to achieve results and skills as managers, which we found uneven and not monitored.

Project managers are aware of this fact, and efforts to improve the situation are on-going. In particular, a new element might be introduced in the near-future with procedures to assess the quality of internal governance in the farmer groups. Indeed, the implementing NGO decided to introduce an institutional assessment of each group in order to assess information-sharing and decision-making processes within these groups. This is a move towards greater effectiveness through better dissemination of information, farmers' involvement and social learning. The future will tell whether this is enough to make the incentives-based approach deliver; but whatever happens it also points to the challenge of implementation for these

innovative instruments in a rural context where service providers have a low level of education and social pressure is to remain strong. Clearly, facilitation by public authorities would help a great deal in socializing innovative schemes among the service providers.

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