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Payments for Environmental Services (PES): A reality check (stories from Indonesia)

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HIGHLIGHTS

FIELD RESEARCH IN INDONESIA This document presents results from field research in Indonesia on a prominent tool for conservation: Payments for Environmental Services (PES). We conducted the analysis from the double perspective of the usual PES definition, and of a previous conceptual analysis of our own.

GAP BETWEEN THEORY AND PRACTICE Field investigations show a clear disconnect between the theory of PES and the implementation on the ground. While the letter of the initial definition is not met (e.g. conditions are poorly defined), we discuss whether the spirit remains.

PUBLIC ACTION IS NECESSARY While intended to promote private deals in addition or in substitution to public action, PES may require at least as much public intervention as traditional conservation practices. High transaction costs and the presence of numerous sellers of a given service are central reasons for this.

PILOT PROJECTS AS SPEARHEADS In practice, the PES we could identify in the course of the study relate to pilot projects supported by international organizations and networks, with associated financial resources, knowledge, and motivation for visible results. It remains to be proven that PES can develop outside this specific framework for action.

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Introduction

Within the framework of its work programme on the issues of biodiversity and natural resource management, IDDRI conducted an analysis on the emerging concept of Payments for Environmental Services (PES), which is a conservation tool that is cited increasingly by authors and practitioners. It consists of payments (monetary or in-kind) to natural resource users, based on a voluntary contract dealing with the provision of a given environmental service. The above-mentioned IDDRI study (Pirard et al. 2010) identified a number of issues that both the scientific community and donors have the entitlement to query to guarantee the correct and productive application of PES. This questioning process is all the more relevant if PES is to become the instrument of choice for the large-scale conservation of forests, wetlands, or any other type of ecosystem. Thus, the following points have been identified during the course of the desk study as particularly important from the perspective of a widespread implementation of the PES instrument:

(i) The role of economic assessment for the determination of the relevance and content of contracts in a situation where potentially strong asymmetries of power exist, alongside uncertainties regarding the relationship of cause and effect between the practices of natural resource users (providers of a service) and the supplying of environmental services;

(ii) The nature of the service providers, particularly the dichotomy that exists between the local rural populations and their use of resources for subsistence, and the industrial companies that operate on a large scale, particularly on public lands;

(iii) The nature of the service beneficiaries, who may be localized or widespread, according to whether a service is locally obtained or a global public good;

(iv) The nature of PES, which can be viewed as a means either to trigger transition toward activities compatible with the maintenance of services (*asset-building*, in order to perpetuate change) or to assist the resource user indefinitely in order to compensate for constraints (*use-restricting*, as a temporary solution);

(v) Interactions with public authorities, particularly in relation to the danger of undermining the strength of state authorities in countries where governance remains deficient and is in need of improvement to ensure good long-term environmental management;

(vi) The relevance of reversing the "polluter pays principle", however widely accepted, with potentially adverse consequences in terms of strategic behaviour.

This preliminary analysis remains at a rather conceptual level and utilizes a canonical and normative definition that a majority of research/operational projects refer to. According to this definition, PES are (i) a voluntary transaction, by which (ii) a well-defined environmental service (iii) is being "bought" by at least one buyer (iv), from at least one provider (v) if - and only if - the service is actually preserved (conditionality) (Wunder 2005). Being essentially theoretical, our previous analysis called for a deeper examination in the field in order to complete it and also to test our hypotheses.

The field work underlying the present paper was conducted in 2010 on a limited number of Indonesian sites, based on our contacts and

the availability of local staff. This selection was independent of any previous assessment of the degree of project success – at least consciously – so that we present here cases that we do not consider successful from the perspective of PES implementation. Even though all of the four case studies have provided us with a better understanding of PES in practice – at least in the Indonesian context – their limited number, in addition to the short study period, tend to disqualify any strong general statement regarding PES. Yet the present analysis wishes to contribute in a useful manner to discussions on PES, and we firmly hope that it provides researchers and practitioners with a new and consistent insight.

The field sites are studied from the perspective of the definition by Wunder (2005) because it underlies a great deal of analyses and tends to become a reference in the literature (grey or scientific) and apparently provides a basis for designing projects on the ground. We will thus compile a table that summarizes for each of the case studies whether they stick to this definition and can reasonably be defined as "PES". It is generally presented as an innovative incentivizing tool, clearly distinct from both Integrated Conservation and Development Projects (ICDP) and "command-and-control" type projects; as such, the verification of whether or not its application truly demonstrates the quality of innovation is justified within the context of following up conservation practices and the influence of the multiple debates on environmental services as a basis for conservation. To this end, one could also argue that the initiatives that adhere to the tool's basic principles while not strictly meeting all of its rules (following the "spirit" and not the "letter" of the instrument), are worth being defined as PES.

Beside the Wunder definition, the case studies are also compared to our previous analysis (Pirard et al. 2010) and particularly to the six main points identified as important (listed above). These points backed up our search for the information in the field, and allowed us to address explicitly the role of public action, the nature of contracts and associated activities, the characteristics of the stakeholders, and the potential to replicate the approach at a larger scale.

1. Presentation and objectives of the case studies

Four sites have been studied during our field research. Two sites are located in Sumatra and managed by an intergovernmental organization (ICRAF) in the framework of a large action-research project (RUPES). The two other sites are located in Java and coordinated by an Indonesian research centre (LP3ES) in the framework of an initiative to develop PES for watersheds.

The sites of **Singkarak and Bungo** (Sumatra) are initiated and managed by ICRAF[1] in the framework of the RUPES (Rewarding Upland Poor for Environmental Services) programme, which seeks to promote the implementation of PES giving a central place to the reduction of rural poverty. It is worth noting that the RUPES programme favours the use of the term RES – Rewarding Environmental Services – rather than PES, in order to broaden the scope of the possible transactions between providers and buyers of the service. In particular, the assumed goal is to go beyond the monetary payments by privileging investments in infrastructure and the development of local capacity (see Leimona et al. 2009). Thus, it is clear that with regard to the application modalities, there is a bias in favour of rural development compared to conservation.

The site of **Singkarak** in West Sumatra was chosen by RUPES in 2004 following protests from local lakeside populations regarding disruptions purportedly caused by the establishment of a state-owned hydroelectric plant (PT PLN). The alleged disturbances concerned a decline in the fish catch, increasing fluctuations of the lake's water level (floods and droughts), and diverse types of pollution. It is important to note that these disturbances were accentuated by land use changes in the surrounding hills, including the decline of old plantations which led to the colonization of land by invasive grass (alang-alang). The protests have led, independently of the project and according to the polluter pays principle, to the local redistribution of the taxes paid by the company to the province (25%) and the two districts (25%) concerned, to

1. The World Agroforestry Centre.

initiate works such as road infrastructure, irrigation networks and other projects.
While the involvement of a local NGO (*Yayasan Danau Singkarak*) has made the problem known to the RUPES programme, the Singkarak watershed had already been identified as a potential site to develop a reforestation project for the purposes of carbon sequestration. The lake covers about 10% of the 129,000 ha of the entire watershed, and about one third of this area, while under the control of local communities, is considered to be in a critical condition (Leimona et al. 2006). It should be noted that these communities (*nagari*) have regained a formal power of village governance, and that the individual usage rights remain in practice subject to the agreement of traditional leaders. Within a few years, the only activity that was able to meet the PES definition was the installation of a voluntary carbon offset project in Paninggahan village, a scheme that was promoted by a Dutch investor. While an auction was initially planned to determine the payment amounts for landowners, the financial proposals were considered to be too low and the risk of conflict too high, preventing implementation of the auction. Ultimately, it has been decided that the carbon project will be developed over 140 hectares, with contracts currently signed on 28 ha.

Bungo, which is located in Sumatra's Jambi province, is a site where ICRAF conducts research on agricultural systems, ranging from 'jungle rubber' to rubber monoculture systems through to agroforestry systems of different levels of complexity (RAS, Rubber Agroforestry Systems). The main trend, shown by studying maps of the region from the late 1980s onwards, is towards a simplification of agricultural systems with the development of rubber monocultures and palm oil plantations. In this context, the RUPES programme seeks to encourage the preservation of more complex systems that scientific research has shown can help promote a great wealth of biodiversity. Certainly jungle rubber only represents a 'triple second best' solution, in the sense that it is not the first economic choice for farmers or the government, and in regard to emblematic fauna it remains less beneficial than natural forest cover. However, the ambition of the RUPES project is to make it into an overall winning strategy by combining its productive and environmental potential (ability to function as a corridor for the surrounding national parks), especially through the use of rubber clones to increase yield per hectare without altering its ecosystemic services.
A few years into the project and ICRAF has highlighted three types of PES on the Bungo site: the construction of a hydroelectric plant that benefits from upstream preservation of good forest cover, the eco-certification of latex production although negotiations with the potential buyer (a tyre company) are still ongoing, and the establishment of the *hutan desa* as a new community forest model.

The other two visited sites (Cidanau and Ciratum, located in West Java) are coordinated by an Indonesian research centre - the LP3ES (Lembaga Penelitian Pendidikan dan Penerangan Ekonomi dan Sosial) - as part of a broader project to develop PES in watersheds, which is coordinated by the International Institute for Environment and Development (IIED) entitled "Developing Markets for watershed protection services and Improved livelihoods". In this instance, it should be noted that the PES concept, which is developed at the international scale, goes through a national level and is then implemented through the involvement of the industrial beneficiaries of the services linked to the watersheds.

The example of **Cidanau** in the Javanese province of Banten (see detailed description in Munawir and Vermeulen 2009) is quite mature, the process beginning in 1998 at the initiative of a local NGO. The problem here relates to intrusions into the nature reserve, which is also a wetland, and which functions as a "buffer zone" to regulate the water from the 13 tributaries that flow to the Cidanau river. In 2004, LP3ES took hold of the issue, aiming to develop a PES in the framework of the IIED project. At that time the river's flow was considered to be in continual decline, and the importance of the flooded site in terms of biodiversity had been demonstrated through a study carried out by the Japanese agency JICA.
The negotiations lasted about one year, culminating in 2005 with the signing of a tripartite agreement involving (i) the Krakatau Tirta Industri (KTI) plant, sited a few hundred

meters from the river mouth, which processes and distributes water from the Cidanau river downstream of the flooded area, (ii) the Forum Komunikasi DAS Cidanau, which is a forum for discussion and management that gathers together representatives of the Ministry of Forestry, landowners, the KTI plant, local authorities, NGOs and facilitators from LP3ES, and (iii) an organisation of farmers who operate upstream (Kelompok Tani Karya Muda Dua).
Although the KTI company has played an important role by agreeing to contribute financially alongside the state, it has asked the Forum to actively function as an intermediate with potential providers. In addition, the Forum is responsible for the redistribution of annual payments to farmers, the amount of these payments being influenced by an existing national programme aiming at supporting community/individual forests (P2HR, Program Pembangunan Hutan Rakyat) with the objective of restoration. There are two types of contract: one linking the buyer (KTI) and the Forum, the other linking the Forum and the provider (landowners).
Discussions with the Forum, and in particular with representatives of the administration, have led to the development of a proposal that ultimately makes the end-users of the water (i.e. KTI clients, about 80 units) pay for the service. In the opinion of the participants, this should take the form of royalty payments.

The **Citarum** River, which rises in the hills above the city of Bandung in West Java, has displayed significant fluctuations in water flow that have been associated with upstream environmental degradation. A reservoir resulting from the Jatiluhur dam is located near to the river mouth. This reservoir is used by the PT Aetra company, which was created in 1997, to supply water to a section of the metropolitan area of the capital Jakarta. Since the beginning of its operations, the company has experienced a problem with water turbidity, which is tending to increase. Erosion was identified as the main cause, and a link rapidly made with environmental changes occurring upstream of the dam. In 2008, the LP3ES contacted PT Aetra in order to attempt a replication of its activities in Cidanau. The Asian Development Bank (ADB) provided financial assistance for LP3ES to play the role of facilitator for the implementation of a pilot project to make payments to resource users upstream of the dam.
At the time PT Aetra considered that it would be too complicated and laborious to make a direct request to the authorities to take action on land usage, given that this company is only one of the users of the Jatiluhur dam amongst numerous others (e.g. for irrigation of cultivated fields), and that the sources of pollution[2] and sedimentation are caused by several parties. The process of establishing the PES is guided by LP3ES (supported by Yayasan Peduli Citarum, a local NGO), which chooses sites based on several criteria: inhabitant capacity (social capital), land gradient level, existing infrastructure, level of land degradation.
At the present time, contracts have been agreed at two levels: between an agricultural landowner association and a division of the Ministry of Forests covering 33 ha (via a local NGO); and also between a different agricultural landowner association and PT Aetra for 22 ha. These contracts share the characteristics of financing the establishment of tree plantations, partly for the production of non-timber forest products (fruit, coffee), with highly varied densities per hectare.

2. PES from theory to practice: a significant gap

Anyone who has immersed themselves in the PES literature is bound to notice the gap between theory and practice. It is as if putting the concept into practice distorts its characteristics to such an extent that it tends towards other modes of action that are already well known in the field of conservation: in particular, integrated conservation and development projects (ICDP), and regulations based on environmental taxation (which is generally the translation of the polluter pays principle).

Table 1 clearly shows that none of the case studies point towards a PES according to the classical definition of Wunder (2005) or even,

2. Indeed, pollution is identified as a problem in addition to the quantity of water available, due to household consumption but also because of livestock breeding (dairy cows in particular).

more modestly, a PES where a voluntary agreement establishes that a transaction is to be conditional to the provision of an *environmental service*[3]. Without attempting to prejudge future developments, particularly with regards to the projects of the RUPES programme, it seems that this observation is mainly caused by two types of difficulty: how to bring together all of the beneficiaries and providers and/or elucidate the causality relationships between land usage and environmental services, as well as their economic evaluation. Thus, practitioners get a reality check when faced with concrete cases. This fact is an issue of concern for the future of PES, especially given its intense promotion at the international level.

The case of **Cidanau** probably comes closest to the PES concept given that a service beneficiary, who was clearly identified at the beginning of the process, became involved with several facilitators in negotiations that have led to the signing of contracts with resource users. Although the contracts are at two levels, with strong intermediary involvement to bring together the many stakeholders, it appears that they have been established for an initial five-year period through a transparent and participatory process. While the annual payments represent financial amounts that all parties have agreed upon, the contracts do not specify precisely the nature of the operations that are to be conducted and verified on the land concerned. This raises the question of the conditionality associated with the provision of a service. Although the notion of service is widely cited throughout the contracts as their ultimate raison d'être, there is no procedure in place to monitor water quantity and quality.

The **Citarum** situation is rather similar to that of Cidanau, a fact that can be easily accounted for by the presence of the same facilitator (LP3ES) and similar issues regarding services related to water distribution. Once more, there are contracts at multiple levels and substantial state and NGO involvement. The problem of upstream land degradation has been acknowledged for some time and on this matter there is no doubt among stakeholders. A number of contracts have been signed offering financial payments to a farmers' collective if they restore the land, but within a short period of less than a year. Thus, the conditionality in this case is virtually non-existent, as the agricultural landowners receive full payment within the first month, regardless of their future decisions and, importantly, of their commitment to ensure the maintenance of the environmental service.

As regards **Singkarak**, from the outset the emphasis here has been placed on the hydroelectric plant and its role in the observed environmental disturbances (declining fisheries, pollution, etc...), although at present this liability has not yet been proven. From this perspective and according to PES reasoning, the issue should have logically (if taken to the extreme!) led to the financing of the cessation or modification of hydroelectric operations by the local population... Despite the fact that such an outcome would at best have been delicate, and at worst absurd, the very philosophy of the RUPES programme requires transactions to be in the opposite direction. Therefore, with the full agreement of local authorities, the system that all stakeholders have accepted is one of compensation, in the form of a redistribution of taxes, for disturbances that the plant has most likely caused.
The only undertaking on this site that seems analogous to the PES concept is a voluntary carbon offset project that is funded by a Dutch investor. The population, which occupies about 2,700 hectares across the Paninggahan area, was contacted through the traditional authorities with regard to the development of a small section of this region. Without going into events in full detail, it is worth noting simply that the buyer-proposed auction system for selecting providers on the basis of lower costs was not successful, leading to its replacement by a more commonplace trading system where negotiated amounts constitute the basis for payments. Under such circumstances, it appears that all of the classic PES requirements have been attained, with the exception of conditionality and also the fact that the contracts were made at two levels (between the Dutch investor and local representatives - *wali nagari* – and between local representatives and landowner groups - *kelompok tani*).

3. Of course, this does not mean that the contracts do not refer to an "environmental service" nor that the action is motivated by this service.

Indeed the payments are made in instalments at different stages in the project: 60% at the start, 15% following tree plantation, then 20% in five years provided the plantation has been correctly managed, and then the remaining 5% after ten years. However, since the vast majority of the total payment is paid out within the first few years (75% including the tree plantation stage), the remaining amount, which is not disbursed until ten years into the project, therefore appears to constitute an incentive/condition in a merely formal sense. It is not our role to discuss the reasons behind the short-term timing of the payments, which is no doubt due to the need to cover the initial costs of restoration and the possible opportunity costs. However, lessons must be learnt from this situation in terms of PES - the conditionality of maintaining the environmental service does not exist in this example.

The situation in **Bungo** can be encapsulated in very different terms that have been well identified by the RUPES programme from the outset: in order to reduce the progressive disappearance of an ecosystem that is both productive and beneficial from an environmental perspective (biodiversity and forest cover), the implementation of mechanisms to provide compensation for these services is required. Such mechanisms must specify that resource users should be considered as partial beneficiaries of the services because they gain from electricity generation at a lower cost (hydroelectricity in lieu of a fuel powered generator[4]) and the production of non-timber forest products.
However, this optimistic approach has not led to fully satisfactory results from a PES perspective, despite its real benefits for biodiversity and the importance of seeking to promote the jungle rubber system, particularly through the introduction of high yielding cloned trees. While the hydroelectric plant has probably raised awareness regarding the consequences of a substantial conversion of upstream land, it does not in any way equate to a payment/reward that is given on the condition of maintaining an environmental service. In reality, the plant was provided as a reward for the successful collaboration over several years between the local population and the researchers who have worked on the site. It was not possible to achieve the eco-certification of latex, probably due to insufficient quality and quantity to interest a buyer. Finally, the creation of a *hutan desa*, presented as a new community model, provides an example of management that is certainly relevant in the Indonesian forest context, but does not correspond to the PES definition.

While the gaps observed between the PES concept and its implementation occur at several levels, it is particularly striking to note that there is a total absence of economic assessment of environmental services at all visited sites. This is an issue of concern given that PES projects are developed within a context of the rapid expansion of economic evaluations applied to biodiversity and ecosystem services, of which they are expected to represent an important field of application (see for example Engel et al. 2008). The motivation for a buyer to sign a PES contract is, in theory, that they will obtain a net benefit: i.e. their payments must not be greater than the profit obtained by maintaining the service.
With regard to carbon, an economic evaluation has been carried out on the Singkarak site to compare the costs of paying landowners to engage in carbon sequestration with the expected revenues from the trading of carbon credits on the voluntary compensation markets. What remains distinctive to this service type, which relates to climate regulation, is the use of a proxy - the market price of carbon credits - to assess the environmental benefit. Economic evaluations of this kind are therefore inevitably linked to the financial value of the reduction/sequestration of carbon emissions.
With regard to biodiversity, economic evaluations consistently face such methodological hurdles that prevent their instigation, while those that are conducted are often unreliable. These hurdles relate to the complexity of the topic of "biodiversity" itself and its link with the provision of services, the lack of knowledge about the potential benefits, the wide distribution of the possible beneficiaries and the lack of market representation to ascertain the value of "biodiversity" (illustrated here by the withdrawal of a tyre company). It is not surprising to note therefore that the only evaluations undertaken thus far (which have been conducted in

4. A monthly financial contribution from each household is required, but it remains affordable.

Bungo to assess the role of jungle rubber for biodiversity maintenance, not only in the plantations but also in the surrounding forest due to its corridor function) have concerned the extra costs of one land use system compared to another (agroforestry versus monoculture), and also to ascertain the benefit to landowners from harvesting non-timber forest products.
In relation to services associated with water, which are at the core of at least two of the four sites visited, we must reference the deficiency of prior evaluations into the damage caused by upstream land degradation as well as the benefits that could result from the protection/restoration process of these areas. Only one general conclusion is available that finds a consensus: the use of upstream land has consequences on the profits of companies involved in the treatment/distribution of water. These companies, however, have never invested in research that would enable them to obtain a clearer picture of these gains/losses in order to refine their PES contracts. The reasons for this include the costs of implementing such research, the presumed complexity of the relationship between cause and effect that seems to discourage the funding of such studies from the outset, and the objective to increase as rapidly as possible the scale of the PES in order to dilute the costs and to ensure a level of environmental efficiency.

Although central to the definition of a PES, the voluntary nature of the interventions, transactions and contracts seem in many cases to diminish in favour of approaches that are more systematic and, in particular, more binding (Prasetyo et al. 2007). This trend has not been observed on the visited sites in their current state, but it has been noticed in other rather similar sites in Indonesia. Besides which, the companies involved in the two sites of Citarum and Cidanau have expressed a desire for the implementation of legal measures that would allow the involvement of other service beneficiaries as payers. We will return to this topic in the following sections in order to describe the channels by which it is planned to accomplish the move from a voluntary mechanism to a more binding approach. However, at this stage we can note that our observations identify a clear trend towards possible new environmental tax systems.

3. Heavy constraints on successful PES implementation

The causes of the differences between theory and practice, as described in the previous section, require explanations. However, our observations have shown that the gaps between

Table 1: The case studies from the perspective of the Wunder definition (2005)

	Voluntary transaction	Identification and evaluation of the environmental service	Nature of the buyer	Nature of the seller	Conditionality
Singkarak	Voluntary, but ambiguity regarding the redistribution of taxes paid by the hydro-power plant	Focus (by default?) on carbon sequestration, which implies a reliance on carbon market prices	Foreign investor, serving as an intermediary for the end-buyers	Communityl representatives and groups of small-holders with farming activities	Weak, with most payments at the beginning
Bungo	Voluntary	Well-studied services (mostly biodiversity-related) but not quantified in economic terms and thus not underlying contract agreements	ICRAF	Local communities	No conditionality (legally-speaking)
Cidanau	Voluntary	Service is identified but not quantified	Private company	Small-holders with farming activities	No well-defined conditionality for the payments to the intermediary (Forum); but well-defined conditionality for annual payments to the farmers
Citarum	Voluntary	Service is identified but not quantified	Private company along with an entity emanating from the Ministry of Forestry	Small-holders with farming activities	Weak, with most payments at the beginning

theory and practice vary to some degree, with the initiatives on the watersheds being fairly close to the theoretical definition. The differences between sites in terms of the nature of the remunerated services (biodiversity and carbon, water) probably had an impact: water services appear to be more appropriate than biodiversity services for the design of PES.

Differences in property rights regimes have been observed and should be retained for analysis. It appeared that the property rights on the two Javanese sites were better clarified and more individualized than for the two Sumatran sites, where the community seems much more able to influence individual choices. For example, in Singkarak the traditional authorities "*wali nagari*" control the decisions of landowners, the latter having usage rights that seem to severely limit their flexibility to engage directly in contract negotiations with service beneficiaries. This may complicate the negotiation process, given that the service buyer must consult and involve several echelons in order to achieve their *modus operandi*. Note also that the procedure initially chosen to determine which landowners and fields were to be included in the contracts – i.e. the auction sought by the Dutch investor – did not take off following an assembly of all the landowners, where they agreed by consensus to change the mode of selection due to the risk of conflict.
At both Javanese sites, individual land rights seem better acknowledged and applied, although some collectives are formed in order to bring together several agricultural landowners. Negotiations take place gradually, steadily involving an increasing number of the service providers. In Citarum for example, the group that made a contract with the division of the Ministry of Forestry (Pusat Standardisasi Lingkungan) - the Kelompok Tani Giri Putri – originally began with the involvement of 26 families, and later grew to 90 families who signed up to the contract following a field visit in February 2010. These participants are from the village of Cibedug, which includes around a thousand families in total, which leaves a good scope for development according to our contacts.

In all cases observed, transaction costs represent one of the principal concerns among the range of challenges to PES implementation. Although we were unable to estimate the amounts of such costs, this observation is based on several facts: RUPES programme projects have been conducted over periods of several years, with the aim of laying the foundations for PES, without achieving decisive results in this regard; the development of the afforestation project for voluntary carbon offsetting would probably not have been possible without the financing of previous transaction costs by the RUPES programme; private companies in Citarum and Cidanau seemed to renounce the instigation of research that would allow the clarification of the range and modalities of PES, partly due to the high costs involved; and also, all projects studied began thanks to public aid from diverse sources (International Fund for Agricultural Development, Asian Development Bank ...).

Furthermore, questions must be raised regarding the weakness of the verification mechanism, which is intended to link payments to the requirement for the successful implementation of methods to maintain environmental services. The fact that the cost is considered to be prohibitive compared to the cost of the entire operation represents a plausible explanation that is consistent with previous comments. A service buyer probably reasons as follows: "It is good if the payments trigger a virtuous circle of restoration, provided the initial transaction costs have been supported by public programmes, and it does not matter whether the service providers meet their commitments because my financial involvement is limited". Another plausible explanation is that it is not easy for a private company to cease making payments to rural populations, if only due to reputational (image) and/or political (public authorities are involved) reasons. Incidentally, the reputational issue is addressed in Wunder et al (2008) who discuss an Indonesian case where the PES could not finally be implemented.

Transaction costs are partially linked to the number of agents under contract. For the sites studied, it appears clear that the wide distribution of resource using stakeholders presents a difficult problem to solve. It is worth noting that the companies involved with the services related to the watersheds in Java have only

signed contracts with a few resource users, even though they are fully aware that it is only by the transition to the larger scale that the achievement of significant results in terms of water management can be realised. These companies seem to be aware that moving to the large scale will be difficult to achieve without support from the authorities, which risks changing the nature of the mechanism, a subject that is discussed further herein. There is clearly a trade-off issue here with regard to transaction costs: on the one hand it is advantageous that property rights are well-defined (which is the case with individual rights); on the other hand it is advantageous to have a limited number of sellers (which is the case with large community lands). Large-scale landowners fit the two criteria – clear rights and few sellers – although with associated equity issues.

In all events, it is striking to observe that the transaction costs for designing PES based on satisfactory analysis and specifically tailored contracts, and which include appropriate verification and assessment procedures to guarantee the long-term commitment to the project, are high enough to constitute a major hurdle that in most cases has decisive consequences. Lessons may probably be drawn from this kind of observation regarding the fundamental advantages of the contractual approach compared to the more "traditional" command-and-control approach.

4. On the nature of transactions, contracts and activities

Although the choice of RUPES sites represents a bias in the study of the nature of payments and activities (a tilt towards rewards and capacity building), it is undeniable that the other sites also show convergence towards activities that are productive and regarded as such by the service providers (instead of ceasing activities). These activities include plantations or the maintenance of forests or agroforests that are actively used by landowners for subsistence or for the trade of non-timber forest products.

Described below are the contracts on services related to watershed regulation that are in place at the sites of Cidanau and Citarum, these contracts were chosen because they have been established the longest and have already been the subject of joint signatures by both parties.

(i) **Citarum.** A contract was signed in September 2009 between the PT Aetra company and the association of agricultural landowners "Kelompok Tani Syurga Air" for an area of 22 hectares, aiming to "collaborate to establish a mechanism that links the parties upstream and downstream of the Citarum watershed, with the objective to ensure good management of water resources"[5]. A pre-defined amount must be paid by the company to the association as "compensation", which is given in three stages and according to several conditions. The association members commit to plant and maintain their plantations across all their fields "in a way to promote the proper functioning of the watershed". This work must be accomplished within the six months following the signing of the contract, but the maintenance activities must continue until the plantations mature. The three stages of the company's financial payment to the association are: 50% initially, then 25% three months later, and finally the remaining 25% after six months. On behalf of its members, the association shall bear the costs of training and for the monitoring the planting and maintenance activities. Payments are made into the association's account and not to its individual members. However, there is individual entitlement to benefits derived from the non-timber forest products of plantations. The exploitation of trees for timber production must have the company's consent (and cannot take place within the first seven years) in order to avoid service degradation, and the trees must be replaced regardless. Future monitoring activities are supported and conducted by the LP3ES as facilitator.
Another contract was signed between an entity emanating from the Ministry of Forestry and a local NGO that was responsible for the redistribution of payments to an association of agricultural landowners. The contract covers an area of 33 hectares with the objective of establishing a mechanism "to link the stakeholders situated upstream and downstream of

5. This quotation and the following ones are taken from contracts written in Indonesian that have been roughly translated by the author.

the watershed in order to increase the forest cover and to contribute to the sustainability of water resources". A pre-defined sum must be allocated to train farmers in the use of organic fertilizers and pesticides, to establish a nursery, to buy plants and to organise assessment meetings on a routine basis. The contract is implemented for a six months period after signing, and the funds must be reimbursed if they have not been used correctly during this time frame. The non-timber forest products from the plantations are at the disposal of the individual farmers, and timber production is subject to rules set by the payer (and cannot take place within five years). The local NGO is responsible for verifying and writing progress reports.

(ii) **Cidanau.** A contractwas signed in November 2004 between the KTI company and the Komunikasi DAS Cidanau Forum, (hereinafter referred to as the "Forum[6]"), entitled "assurance of payment for environmental services" with the aim of "restoring the ecosystem in order to maintain its utility". The company commits to pay a pre-defined amount during an initial period of two years, reserving the right to renegotiate this amount in subsequent years (the planned payment period is under a renewable five year contract). The Forum must distribute the funds for forest restoration activities over 50 hectares, providing details of the payments made to the agricultural landowners.
Another contract was signed between the Forum and an association of agricultural landowners to follow on from the previous one, aiming to pay an amount per hectare that is noticeably slightly lower than the amount paid by the company to the Forum. This discrepancy is justified, according to my contacts, by the level of flexibility that it provides in allowing the scheme to carry on after the hypothetical cessation of payments by the KTI company. The farmers must commit to plantation activities in order to obtain these payments, limiting themselves to a pre-defined range of species (for instance, coffee is not included). The conditions for their participation include: the ownership of property rights, location within the limits of the Cidanau watershed, the observation of a coherent plan for plantation development – avoiding among other things the temptation to resort to monoculture – the preservation of forest cover at least during the time prescribed by the contract (five years for the first period), and that they should form associations with other landowners to cover at least 25 hectares. The payments are made (i) during the first year as follows: 40% from the outset, 30% after six months and 30% after 12 months; and (ii) in subsequent years: 40% after five months and 60% after 11 months. All of these payments, except for the initial one, are made after verifications that are the responsibility of the Forum. The conditions that must be met in order to qualify for the payments include the planting of at least 500 stems per hectare and the replacement of dead trees. We should note here that verification involves the assessment of a randomly chosen section corresponding to 10% of the total area.

Reading through these contracts raises several points that must be addressed, notably that the conditions for payments remain rather vague and therefore they are largely left to the interpretation of the auditors. This is understandable in an Indonesian context, and especially a rural one, where the practice of obtaining a consensus remains prevalent. In these circumstances it would be difficult or even unusual to impose strictly defined conditions on such payments, and furthermore the cessation of payments would be a delicate matter. This is even more relevant when considering that the precise effects of different types of land use on the environmental service remain largely unknown, especially when comparing the effects of one plantation type to another.

Regarding the short period of time over which the payments are made (a few years at best), we propose an explanation. Since the financed activities concern the establishment of plantations with a predominant focus on productivity, the payers are no doubt anticipating that the landowners will see that their best interests are served by the continuation of their maintenance/exploitation operations over the longer term, irrespective of PES payments. Moreover, certain training activities are planned – for example regarding the manufacture/use of organic fertilizers – that seek to give farmers the means to

6. As previously mentioned, this Forum is an arena for discussion and management, which brings together representatives of the Ministry of Forestry, landowners, the KTI plant, authorities of the Serang department, NGOs, and LP3ES as a facilitator.

continue these practices for their own benefit, or at least without incurring extra costs.

Also related to the real or assumed impact of PES on the choices and practices on the ground, we observe that the additionality is not always verified (according to the comments of the farmers themselves), or at least does not represent a priority for the payers. Not only would it be difficult and expensive for payers to verify that additionality has been obtained, but such an approach would seem rather incongruous in this context. The underlying logic being to act rapidly and in the desired direction (land restoration or the maintenance of forest cover) and at limited cost.

We would like to propose another type of explanation to understand why contracts are apparently so far from being satisfactory, at least if one refers to the theoretical definition of PES: these contracts are elaborated in the framework of projects, usually development or action-research projects. Therefore these contracts probably suffer from the usual and largely known (Lecomte 1986, Bako-Arifari and Le Meur 2001) weaknesses of projects as a way to improve practices on the ground. Notably: (i) perpetuation of action is put at risk, which in our case studies translates into payments and conditions that are spread out over a short period of time, and (ii) there is little compatibility between external interventions over several years on one hand and, on the other hand, deep local changes that require more time, which in our case studies translates into activities more or less in line with past local practices.

5. Are PES bound to remain pilot projects?

The PES initiatives presented in this article seem to be applications of the pilot projects concept, whether consciously or unconsciously. This is the purpose of the present section that takes most of its inspiration from the analysis by Billé (2009).

Pilot project is understood here as the attempt by public and/or private stakeholders to test new practices and techniques with the prospect of future replication. Through the implementation of an action at a small scale, with limited financing requirements and little resistance to overcome, it can be hoped (expected?) that the new practices and techniques will be adopted and replicated by other actors and/or in other sites. This process is known as a "ripple effect". The PES initiatives presented here are either a faithful application of the "pilot" concept, or rely implicitly on the hypothesis of replication. Indeed the RUPES projects are intended to provide lessons in order that future PES consistently support economic equity in the context of rural poverty; and the LP3ES/IIED projects are part of a large initiative to ensure that international reflections on new conservation instruments have an impact on the projects in developing countries.

Pilots possess an undeniable power of attraction for various stakeholder categories: decision makers are provided with the capacity to act rapidly for the resolution of a given problem, while still limiting the risks of generating structural changes owing to the limited scale of the action; beneficiaries of the financial and/or technical assistance for obvious reasons; and also donors, who enjoy the opportunity to spend funds without major difficulties. This power of attraction seems to have been a factor in the four case studies: projects have been implemented without significant problems or conflicts, even though concrete impacts on the environment can still be questioned. This power of attraction is even greater if none of the stakeholders can be considered as losing in the process, which incidentally is a central characteristic of PES. One can thus propose the hypothesis that PES are an ideal target for pilot projects in the sense that local resistance is surely limited as much as possible.

Beyond the initiation of local activities, the criticism of "pilots" relates to their assumed impact; a criticism that should be taken very seriously as these projects are essentially intended to be replicated at a larger scale to achieve a significant impact on the environment. But several factors seem to limit this possible achievement. To begin with, we can quote the "Hawthorne effect", according to which the participants in an experiment have a clear tendency to improve their performance, whatever the changes in practices tested throughout the experiment. However, this

behaviour does not go on indefinitely and it is misleading to expect its perpetuation; besides, these fairly artificial performances for the project are deceptive and can drive action in the wrong direction. This could be what we observe when private companies, for instance PT Aetra or KTI, are making the payments. In such circumstances one should not perhaps expect many others to follow the same path, especially without the numerous stimuli provided by the international project. This could also be the case with smallholders who change their practices according to PES contracts - we may doubt whether their enthusiasm will be communicable. It is a fact that new experiences have the capacity to attract, especially when the process involves numerous visits, meetings, and other means of capturing the interest of the local populations.

Secondly, pilots are usually elaborated and implemented in promising contexts, which means that exceptional conditions are met. Along with human and financial means that are unlikely to be available again in future. We do not have enough elements at hand to determine whether "exceptional" conditions were present in the case studies, but it is undeniable that the selection process for the sites has oriented action in this direction. Indeed project designers have looked for a "site with a problem", where stakeholders are already aware of an issue, as it is for instance in Singkarak (for the RUPES programme) where local populations had already started to take action. On the other hand, it clearly emerges from our study that significant human and financial resources have been made available, which were not only necessary but also will not be available again in other replication attempts – decreasing means and resources are thus applied to increasingly difficult conditions. We refer here to the transaction costs which, as previously mentioned, are substantial. These costs were met by external funds, which has been a major reason for the (at least partial) feasibility of the PES.

6. Reaffirming the role of public action for PES implementation

The PES has an interesting relationship to the state and more broadly to the public policies that are instigated in the environmental field. This relationship is crucial because the essence of PES challenges the "polluter pays principle" – because the payer is no longer the polluter but is instead a beneficiary of an environmental service – which underlies environmental action in many countries. The polluter pays principle is frequently viewed as a prerogative of the state through the elaboration and the implementation of regulations. The potential of PES to inhibit state action (in the sense that it replaces regulations otherwise needed for the application of the polluter pays principle) is not without consequences, particularly in developing countries where governance is deficient and where the reinforcement of public authorities may be among the long-term objectives.

However, this relationship between PES and public policy is ambiguous, and it goes beyond a mere conflict between regulation (polluter pays) and private action (voluntary contracts between agents). It is probably on this point that our field observations have surprised and informed us the most[7]. There appears to be an underlying trend at work, which is pushing for the transformation of PES into public policy tools, but in an altered format. We are witnessing the emergence of projects that use the term "mandatory PES", which is obviously a complete contradiction of one essential dimension of the PES definition, but which incorporates the principle of charging the service beneficiary. These include for example the levying of a tax/royalty on a local authority in order to finance certain land uses upstream of the watershed. The ultimate beneficiaries of the service, i.e. the water users, are then forced by their representatives (local authorities) to finance these upstream activities.

Of the sites visited, we have observed a dynamic that corresponds closely to this trend in the sense that the role of the state is predominant and is reinforced by the implementation of pilot PES which otherwise would be difficult to instigate without state involvement. The examples

7. Note that we do not consider here the assistance provided by organizations, which rely on public money, such as inter-governmental (ICRAF) or national (LP3ES) organizations, to be classified as public action.

of Cidanau and Citarum are revealing in this regard: in one case, the company buying the service has accepted the proposal to participate in a PES, knowing that this should be a step towards a wider application of the mechanism in order to include all beneficiaries, either by persuasion or regulation (a proposed provincial law suggests a framework for the establishment of economic incentives and funding options to support environmental services); and in the other case the company purchasing the service has only committed for a few years, admitting that it does not want to continue with the experiment if it remains the only payer. In the latter case the company has petitioned the authorities to ask for payments from the industries to which it distributes the water. According to calculations, this would allow a more than tenfold multiplication of the annual amount paid. Only such a solution would have an effect at a sufficient scale to truly impact upon the regulation of the watershed. But the question then becomes: are we still in the framework of a PES when money is collected through compulsory means such as tax collection? In any event, public action appears to be necessary to facilitate transactions, either as an intermediary (participating to the animation of discussions and negotiations) or by centralizing the collection of financial resources.

7. Lessons for the future of PES

7.1. Questioning PES definition based on field experiments

Although conducted over a short period and at only four sites that were all located in Indonesia, the field visits have shone a new light on our analysis of PES in several respects – first of all, as summarized in table 1, from the point of view of their links with the definition proposed by Wunder (2005) and frequently used by practitioners and analysts.

The first lesson learnt is that PES as defined in the literature hardly find an operational translation in the projects initially devoted to their implementation. The successful implementation of the concept depends on favourable conditions to such a degree that it is very unlikely that PES, as initially defined, could ever be applied on a wider scale. There is a great flexibility in their implementation, which shows that PES can in practice take much more diverse forms than the original conceptual definition would suggest. Where some may point to fundamental differences (the form does not match the definition), others may just see continuity (the spirit and objectives remain unchanged).

The observation that the application of the PES instrument does not strictly adhere to its theoretical definition corresponds to the concerns of Muradian et al (2009), who question the usefulness of postures and perspectives that are too restrictive and prescriptive. This conclusion also emerges from our observations. The limitations of an exact implementation of the definition are multiple, including: property rights that are collective rather than individual, environmental services that are hard to sell (biodiversity), uncertainties about the causal relationships between practices and environmental services, transaction costs and the difficulties involved with grouping the dispersed beneficiaries without requiring more restrictive state intervention.

Although many scientific studies emphasize the value of environmental services that can constitute an incentive to encourage the

Table 2: Key characteristics of the case studies

	Proximity to the definition	Importance of transaction costs	Nature of transactions	Role of public action
Singkarak	Matches the specific definition of carbon-related PES	Very high	Financial payments, or ad-hoc and outside the contracts	Limited
Bungo	Far	Very high	In-kind and outside the contracts	Limited
Cidanau	Fairly close	High	Financial payments with an intermediary to cover the costs	Substantial with an active involvement of the authorities
Citarum	Fairly close	High	Financial payments to cover the costs	Increasing, as is the involvement of the authorities

promotion of environmental management, the complexity and cost of these studies makes their generalization difficult and therefore their use for the concrete development of PES is limited. None of the sites visited made reference to any assessment of the value of the services considered for PES, and therefore the contracts and associated payments cannot be based on the value of these services. Thus, in future it is possible that we will see PES that focus on the state of the environment and on the nature of certain activities that are considered to be beneficial, rather than concentrating on the verified provision of services.

7.2. Strengthening theoretical analyses with empirical evidence

The case studies have benefited from a previous theoretical analysis (Pirard et al. 2010) that remains globally valid but has gained from the provision of a reality check.

The impact on the role of the state is ambiguous and difficult to predict. In theory, PES reverse the "polluter pays principle" and offer to replace the public sector with the private sector as the decision making centre for environmental issues (e.g. farming practices are guided by incentives that are negotiated with a private company, rather than according to regulations). But in practice the opposite effects tend to occur. The role of public action would be strengthened because of the principle of reality: the scattered distribution of stakeholders, the high transaction costs, the fear of free-riding behaviour by some beneficiaries, all of which are factors that compel private stakeholders to seek the intervention of public powers. However, this intervention is likely to have a major impact on the nature of the mechanism, which would be profoundly transformed to become a binding and involuntary instrument. As an example, "mandatory PES" are developing in Indonesia and include environmental taxation.

Such public intervention has the objective of changing the scale of the mechanism, for example: by extending the activities and beneficial practices to the scale of the entire watershed, rather than a few individual fields. Alongside this impact, which from an environmental perspective is positive, it is also interesting to note that some very localized PES - which accordingly do not have a great impact, even in the opinion of the payers concerned - do possess the great advantage of being able to encourage a dynamic of consultation and dissemination of information, which clearly increases local awareness of environmental problems. This is especially true as the targeted environmental services also have an impact on the resource users (for example, floods or biodiversity).

Another comment concerns the nature of the activities which are financed due to their positive impact on the maintenance of environmental services. These activities are always productive on the visited sites and are not therefore derived from a situation where the population would be willing to receive a rent in exchange for ceasing their use of the resource. There are two reasons to explain this: firstly, the payments proposed by the beneficiaries of the service are too small to be competitive with the opportunity costs of the service providers should they have to stop production; secondly, it appears complicated, all the more so in the framework of short term projects, to propose that landowners should simply cease their operations when agriculture is in fact their way of life. ■

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Payments for Environmental Services (PES): A reality check (stories from Indonesia)

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